1

Preparation

Junior Farmer Field and Life School – Facilitator's guide

Module 1: Preparation

Junior Farmer Field and Life School – Facilitator's guide

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Module 1: Preparation

INTRODUCTION

When about to start a JFFLS programme the first few months will be very important in setting the stage for the whole learning process to follow. Participants need to get to know each other and feel comfortable in the group. They will also need to choose an appropriate learning site for holding their JFFLS sessions. Ideally a place with good shade and enough space to hold meetings with easy access to water that is close to the school and to the learning field. Access to a learning field is also necessary, as well as to make sure, when necessary, that a feeding programme is in place. During the first few group sessions, the group should also discuss what they expect to learn and what they will be doing in order to make their fields and their lives healthy and productive. In order to prepare boys and girls for the activities to come it is also important that the participants gain an understanding of the cropping calendar as well as the life cycle of plants and animals and how this relate to their own life.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The activities should serve as examples to be modified and applied as appropriate.

By the end of this module participants should:

- Know each other and have made friends;
- Start to understand the JFFLS learning mode;
- Have expressed and discussed their expectations and goals for attending JFFLS;
- Understand the life cycles of animals, crops and human beings.

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

- **ENERGIZER AND FUN** (30 MIN)
- **IN THE LEARNING FIELD** (45 MIN)
- **AGRICULTURAL TOPIC** (45 MIN)
- **MAKING THE LINK WITH LIFE** (30 MIN)
- **CULTURAL ACTIVITIES (ART, DRAMA, SONG)** (30 MIN)
- **ASSESSING PROGRESS**
- **CLOSING ENERGIZER**

Exercises

↘ GETTING STARTED WITH “ENERGIZERS”

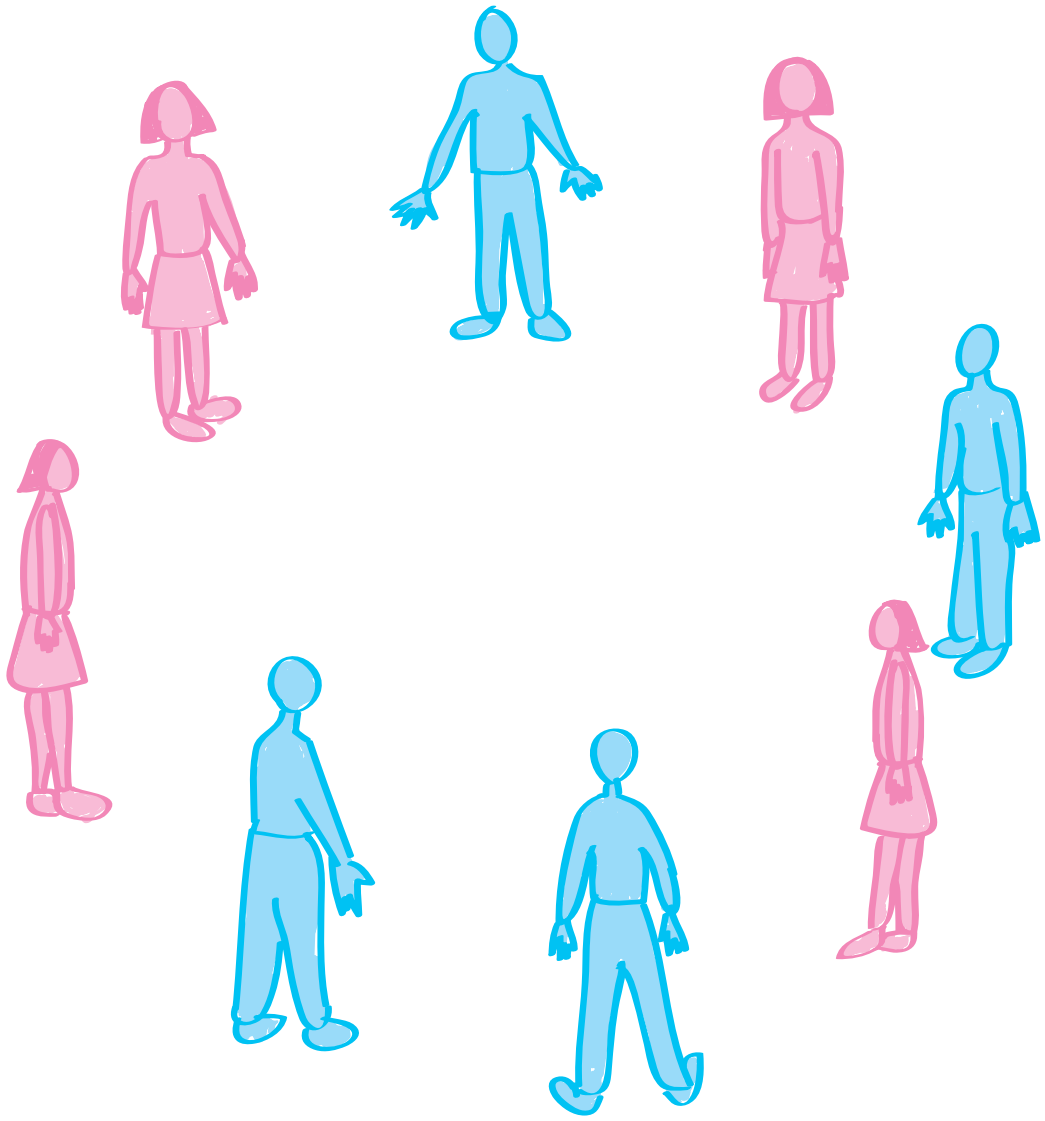
Some sample energizers that will also help to “break the ice” and make participants feel comfortable while at the same time introduce the module’s theme are provided below.

Energizer: Three truths and a lie

Everyone thinks of three pieces of information about themselves. For example, “Alfonse likes singing, loves football and has five brothers”. Participants then circulate in the group. They meet in pairs and introduce themselves by giving the pieces of information about themselves and try to guess which of the “facts” is a lie among each others phrases.

Energizer: What we have in common

The facilitator calls out a characteristic of people in the group, such as “having a bed of their own”. All those who have beds of their own should move to one corner of the room. As the facilitator calls out more characteristics, such as “ikes chicken”, people with the characteristic move to the indicated space.



GETTING TO KNOW EACH OTHER

At the start of the JFFLS learning process it is very important that a friendly atmosphere is created so that the participants feel comfortable and excited about learning. This also helps in developing a feeling of mutual trust between participants, facilitators and other resource people. This topic focuses on participants getting to know each other and feeling comfortable in interacting with one another.

exercise 1

KNOWING EVERYONE ELSE'S NAME

OBJECTIVE:
To assist participants get to know one another.

TIME:
15 minutes

MATERIALS:
A ball, made out of old newspapers or any other locally available material.

STEPS:

1. Everyone stands in a small circle. (If the group is very large, it may be necessary to split the group into two circles). You start by throwing the ball to someone in the circle, saying the name of the participant as you throw it.
2. The participant who receives the ball then chooses someone to throw the ball to. Before throwing the ball, the participant names the person who threw the ball to him or her, and the name of the girl or boy he is going to throw the ball to.
3. Once everyone has received the ball and a pattern is established, introduce one or two more balls, so that there are always several balls being thrown at the same time.
4. You can use this game in future JFFLS sessions until everybody knows everyone else's name.

exercise 2

PARTICIPATORY INTRODUCTIONS

OBJECTIVE:
To assist the participants get to know one another and build trust levels between each other.

TIME:
20 minutes

STEPS:

1. Ask the participants to identify a friend in the group that they have never met or don't know very well. Each participant will then interview his or her new friend and ask: what is your name, age, where do you come from, what do you like and dislike, your dreams? etc.
2. After 5 minutes of interviewing each other, the participants will introduce their new friend to the group, summarising the main information about him/her.

SETTING THE LEARNING MODE

At the initial stage of JFFLS the group needs to be established by the participants agreeing on norms and rules that should regulate their sessions and activities. Participants also need to discuss their expectations and learn to deal with their fears. This will ensure cohesion among members and ensure that everybody has a common understanding of their group structure. Since learning in JFFLS is done very differently from the normal school setting it is also important that the participants start to understand the principles of learning in JFFLS and realise that they are not to wait for the facilitator to always give information, but that they themselves have to be active and observe and ask questions if they want to learn effectively. This exercise helps to introduce these aspects.

exercise 1

UNDERSTANDING FEARS AND EXPECTATIONS

Participants coming together in one JFFLS groups probably have quite different expectations. They might also and have certain fears that could affect their learning while involved in various activities within the group. It is important for the facilitator to recognize the expectations and fear at the start and try to see how they might enforce or provide hinders for the objective of the programme.

OBJECTIVE:

To understand what is expected to make the JFFLS a success.

TIME:

30 minutes

MATERIALS:

Flip chart, marker pens and cards.

STEPS:

1. Ask the participants to write down (or draw) on a card one expectation for being in the group.
2. Collect the cards, read them out and post them on a flip chart or on the wall.
3. Discuss each expectation and come to an agreement if it is realistic to achieve it during the course of JFFLS and which factors might influence its success.
4. Thereafter brainstorm on participants' fears for participation in JFFLS and try to encourage them to help each other to come up with ideas for how to reduce or eliminate their worries.

exercise 2

DEVELOPING GROUP NORMS AND RULES

OBJECTIVE:

To agree on learning mode and develop rules and norms for the group.

TIME:

1 hour

MATERIALS:

Large sheets of paper and markers.

STEPS:

1. Briefly revise the expectations and JFFLS activities mentioned and discussed in the previous exercise.
2. If necessary, discuss the expectation in more details using the following guiding questions:
   - What do you expect to learn during the JFFLS?
   - What do you want to learn during the JFFLS?
   - Are you interested to learn more about agriculture?
   - About which crops or animals do you want to learn more about?

- Do you want to learn more about health, nutrition or about setting up a small business?

3. Ask the participants what kind of rules and regulations the JFFLS should follow to create a successful environment for participants to work and learn together. List all the rules and regulations mentioned on a large sheet of paper – for example: be on time, participate fully, respect each other opinion, listen to each other, speak one by one, no fighting, etc. If necessary probe the discussion by using the following guiding questions:
   - Do you like to learn through practice?
   - Are you used to work in groups?
   - What does it mean to work and learn in groups?
   - What do you think is important when you have to work in a group?
   - What kind of different tasks have to be fulfilled to be able to work effectively in a group?
   - What kind of roles and regulations need to be respected when working in a group?
4. Add any missing ones to the list. Especially probe for any needed norm or rule in relation to gender interactions in the group.
5. Ask the participants if they are prepared to commit themselves to participate fully in all JFFLS sessions, prepared to work in small groups, to learn through practice and to respect the prepared list of rules and regulations of the JFFLS.
6. Summarize the discussions.

exercise 3

HOW TO BEST LEARN

Providing an opportunity to the participants to learn through discovery should be enhanced in the JFFLS group. It is important for the facilitator to understand when and how the participants learn best. In this exercise the participants will reflect on their preferred learning style.

OBJECTIVE:

To assist the facilitator in understanding participants' preferred learning style.

TIME:

1 hour

MATERIALS:

Flip chart and marker pens.

STEPS:

1. The participants are requested to complete the sentence below in pairs:
   - "I learn best when…"
2. Once all of them have done this, each participant should hand over what they have noted to their neighbour pair for reading it out and posting it on the flip chart by the facilitator.
3. Discuss in the group how the learning in the group will/can take into consideration as much as possible the different aspects highlighted by the participants.
4. Introduce at the end the learning principles of the JFFLS (see an introduction to the JFFLS approach).

exercise 4

LEARNING BY DISCOVERY: WHAT IS THIS, WHAT IS THAT?[1]

The goal of discovery-based learning is to provide an opportunity for participants to learn through curiosity and by experimenting and discovering, rather than by memorising facts. One way of stimulating a critical thinking is to ask questions that allow the participants to develop their own analysis and understanding. When a participant asks a question, instead of answering the question directly, the facilitator directs the participant towards the answer by asking probing questions. In this way, participants are given the opportunity to learn by themselves and come up with their own solutions.

OBJECTIVES:

- To help participants learn through discovery and curiosity;
- To guide them to critically analyse an issue and make their own decisions on a given problem.

TIME:

1 hour

MATERIALS:

Field, plastic bags, notebook and pens/pencils.

STEPS:

1. This is a role play. Assign the following roles to the different participants: farmer and facilitator.
2. The “farmer” should focus on something in their agricultural system (parasite, disease, plant etc.) and ask: “What is this?”
3. The “facilitators” should instead of supplying a direct answer, respond with one of the following type of probing responses: “Where did you find it?”, “Have you seen it before?”, “What do you think it is?”, “What do you normally do when you see this?”, “What do others do?” (Keep asking questions).
4. NEVER PROVIDE THE DIRECT ANSWER TO A QUESTION – THAT KILLS CURIOSITY. THE QUESTION IS A VALUABLE CHANCE TO LEARN!
5. After the members have taken their turns in each role, process experiences and lessons learned through a plenary discussion.

[1] Adapted from Livestock Farmer Field Schools, Guidelines for Facilitation and Technical Manual (Groeneweg et. al., 2006)

ESTABLISHING THE FIELD LEARNING SITE

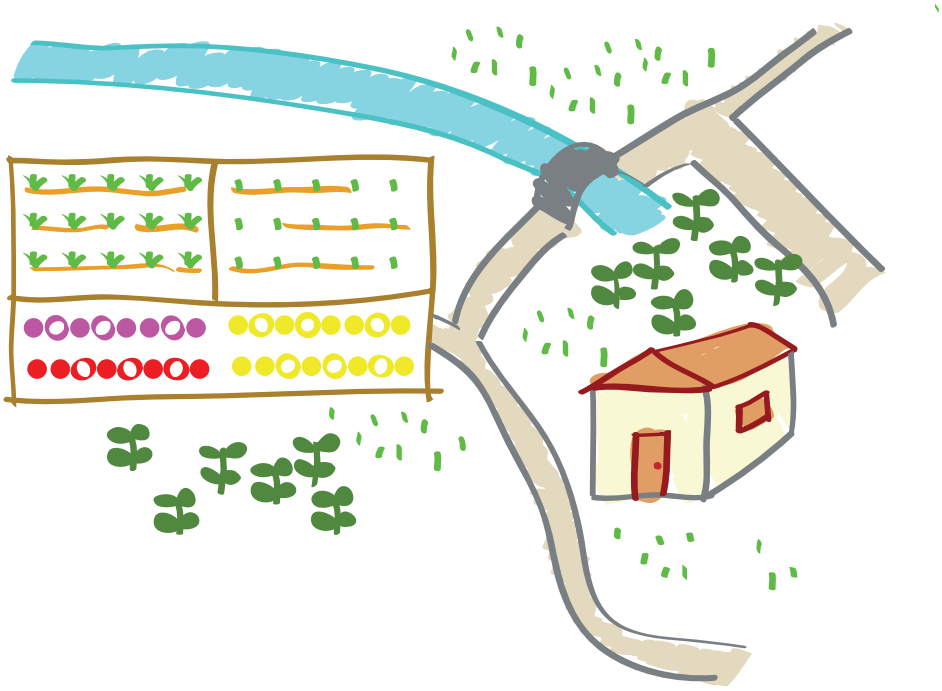
An important place of the JFFLS is the learning field. Since an important principle of JFFLS is to learn through experiments the learning field is where the participants will learn agricultural practices and management skills. Participants will discover themselves the best way of growing a certain crop and dealing with erosion problems or other agricultural issues. In this topic participants will be introduced to the objectives and the different kind of activities they will undertake in the learning field.

facilitators' notes 1

LEARNING SITE: CONSIDERATIONS

Characteristics of a good learning site:

- The site should be relevant for the enterprise.
- The site should be easy to access.
- Close to school and secure.
- Should have enough space for holding learning sessions.
- Experimental sites should not be too far from one another.
- Soils should be suitable, fairly fertile and well drained.
- Closer to a good source of water.
- The terrain of the land should be flat or gentle sloping.
- The host should have willingly given out the land or there should be a written agreement if its rented.



exercise 1

GETTING TO KNOW THE LEARNING FIELD AND EXPERIMENTATION

OBJECTIVE:

To think about the need for a learning field and activities to undertake.

TIME:

About 2 hours

MATERIALS:

Large sheets of paper and markers.

STEPS:

1. Introduce the topic of a learning field. Ask the participants why the JFFLS has a learning field and what they think they will do in the learning field during the JFFLS sessions.
2. Explain that the learning field will be used to learn about good agricultural practices and management skills through hands-on practice. Make sure they understand that agricultural production is not the main objective.
3. Explain to the participants that they are allowed to make mistakes when learning, since learning from mistakes and understand them is a very effective way of improving their knowledge.
4. Go with the participants to the identified learning field and observe the area. Ask them what they would like to grow there and why.
5. Explain that they first need to prepare a plan on what, where, when and how they would like to cultivate in the learning field and that the plan should include some small experiments with different cultivation practices.
6. Ask the participants why they should include some experiments in the plan.
7. Explain that there are many ways of growing a crop depending on the conditions of the field and the skills of the farmer. Each farmer should find out the best way of cultivating based on his/her circumstances. The best way to do this is by testing different ways of cultivation on small pieces of land.
8. Explain that during the coming weeks they will start planning the different activities they would like to do in the learning field through a number of exercises.

exercise 2

IDENTIFYING A GOOD LEARNING SITE

OBJECTIVE:

To make participants understand the characteristics of a good learning site.

TIME:

30 minutes

MATERIALS:

Flip chart, marker pens, masking tapes.

STEPS:

1. Divide the participants into subgroups.
2. Ask them to discuss in their small groups the factors they will consider when identifying a learning site for their group.
3. Ask them to write their input down on flip charts after agreeing in the groups.
4. Invite them for plenary presentations.
5. Summarize the key characteristics for a good learning site.

THE SEASONALITY OF FARMING

Which crops that are grown and when are in most cases depending on the agricultural seasons and rainfall patterns of a particular area. It is important that the participants understand this seasonality of farming and how it influence both workload pattern and availability of food in the household during the year. This topic aim to help participants understand the cropping calendar and related food security situation.

exercise 1

THE CROP CALENDAR

OBJECTIVE:

To think about the life cycles and seasonal calendar of crops and relate this to farming workload across gender groups.

TIME:

1 hour

MATERIALS:

Flip chart, masking tapes, marker pens.

STEPS:

1. Ask the participants to describe the different phases of the life cycle of plants.
2. Select two crops that most participants have experience in growing (for example, corn, sorghum, beans).
3. Ask the participants to describe the life cycle of these crops, in particular during which months these crops grow, when are they planted and harvested.
4. Introduce an empty crop calendar, such as the one below.

5. Divide the participants into groups, with two groups for each crop that you are working with. Encourage the participants to complete the table through questions such as:
   - "When do we plant this crop?"
   - "When do we harvest this crop?"
   - "What agricultural activities are involved in each phase/step and when?"
6. Ask the groups to draw a boy and a girl, showing who is doing which task (together or in groups). They will need to decide in which circumstances more work is involving girls or boys for example by drawing bigger figures or repeating smaller figures a few times to indicate work carried out.

In order to promote understanding, you may want to show the participants the calendar prepared for corn that is illustrated .

Steps of agricultural calendar for: corn/maize

exercise 2

FOOD SECURITY CALENDAR

OBJECTIVE:

To think about how availability of food fluctuate across the year.

TIME:

1 hour

MATERIALS:

Flip chart, marker pens, score cards, masking tapes.

STEPS:

1. Ask the participants to draw a big/large circle on ground and divide it into 12 equal parts. Label the months of the year in the 12 parts.
2. Ask them to indicate in which months of the year food is plentiful and ask them to mention the type of food available at that time (both crops and wild foods). Which ones are more abundant than others?
3. Ask them to show this by drawing a picture of the food item on their score cards and by placing them onto the corresponding month in the calendar. If a crop is abundant, then this can be shown by having more cards.
4. Ask them which time of the year food is not readily available. What do they do then?
5. Discuss how these fluctuation and change in food availably influence their health and body conditions across the year.

LINKING THE LIFE CYCLES OF PLANTS, ANIMALS AND PEOPLE

This topic provides the “magic” link to life, based on the agricultural related learning topics undertaken. As with all living things, crops also go through a number of development stages in their life. During each stage their needs are different and it is important to know these needs if the crops are to grow healthy. The participants will here begin to understand the life cycle of plants and animals and how they are linked to the life cycle of people.

facilitators' notes 1

CROP STAGES

Background information

The total growing period of a crop is divided into 4 growth stages (see figure below):

1. **The initial stage:** this is the period from sowing or transplanting until the crop covers about 10% of the ground.
2. **The crop development stage:** this period starts at the end of the initial stage and lasts until the full ground cover has been reached (ground cover 70-80%); it does not always mean that the crop is at its tallest.
3. **The mid-season stage:** this period starts at the end of the crop development stage and lasts until maturity; it includes flowering and grain setting.
4. **The last season stage:** this period starts at the end of the mid-season stage and last until the last day of the harvest; it includes ripening.

Crop needs per growing stage: Maize (the more + are indicated the more protection is needed)

Crop needs\ stages	Initial stage	Crop development stage	Mid-season stage	Late season stage
Water	++	++	+++	+
Fertilizer	++	+++	+++	-
Protection*	++++	+++	++	+

*Protection from pests & diseases and weeds

exercise 1

THE STAGES OF A CROP'S LIFE

OBJECTIVES:

- To understand the different development stages of crops;
- To understand the different needs of crops during each stage so that they can grow healthy.

TIME:

1.5 hour

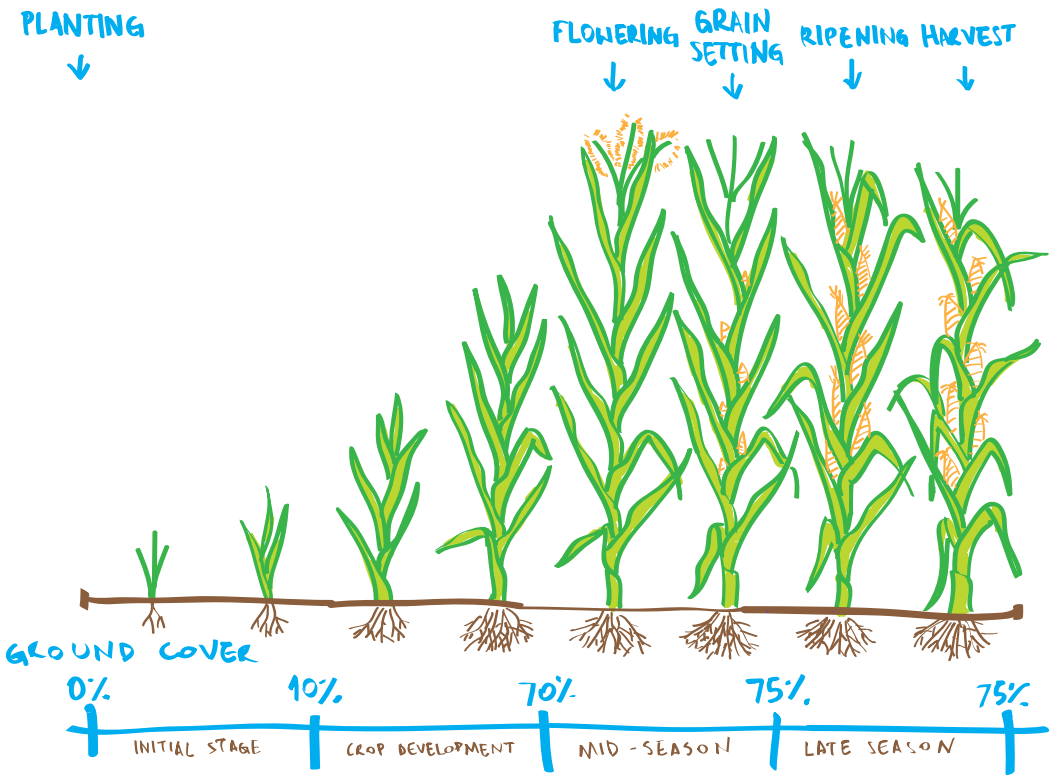
MATERIALS:

Flip chart paper, markers and examples of plants (crop) in different stages collected by the facilitator before the session.

STEPS:

1. Explain to the participants that plants, like every living thing, develop through a number of stages.
2. Ask the participants what they think the different development stages are for one crop, for example maize, that they would like to grow in the learning field.
3. Repeat step 2 for one or two other crops the participants would like to grow in the learning field.

4. Introduce the four different stages normally used in books: initial stage, crop development stage, mid-season stage and late season stage. Explain the different stages and show the participants examples of the different stages.
5. Ask the participants to mention which are the needs for a plant/crop to grow healthy. List them down on a large sheet of paper and, if needed, use the following guiding questions:
   - Is there a crop stage when the crop needs less water?
   - Is there a stage when the crop cannot do with less water?
   - Are their crop stages when the crop needs special protection measures?
   - Do the fertilization needs differ for each crop stage?
6. Discuss with the participants one by one the plant/crop needs mentioned.
7. Divide the participants in small groups and ask each group to select one crop and to discuss in the group how the different crop needs differ from one crop stage to the next. Ask each group to write their notes on a piece of paper.
8. Ask each group to present the outcome of their discussions.
9. Summarize the discussions.



exercise 2

UNDERSTANDING LIFE CYCLES

OBJECTIVE:

To understand the similarities between stages in crop, animal and human development.

TIME:

1 hour

MATERIALS:

Flip chart, marker pens.

STEPS:

1. Allow the girls and boys to shout out everything that they know about the life cycles of plants, animals and humans and note what they say on a sheet of paper. Or encourage the participants to do a role play on the main phases of the life cycle of
   A) plants;

   B) animals and

   C) people.

The life cycle of a plant, an animal and a person

Childhood **Adolescence** **Adult** **Elderly** **Death**

2. Split the group into three. One group should mime the life cycle of plants, a second the life cycle of animals and a third the life cycle of people. Give 10 minutes to each group for preparation. Ask each group to show what they know through miming. While one group is miming the others should observe!
3. Ask to the participants to summarize what they saw about the life cycle of plants, animals and people and complete the ideas presented (on the flipchart/blackboard) following the table in the handout below.
4. Introduce the following questions (for plants, animals and people). In their respective groups above, ask them to discuss the questions:
   - What are the principle characteristics of each phase?
   - What are the needs of plants, animals and humans for each phase?
   - How do we ensure these needs are met?
5. Have each group present its work in front of the other participants.
6. Facilitate discussions on the following question: “Are the needs for people during the different phases similar to those of plants/animals?”
7. Ask the participants to reflect on which stage they themselves are now and what their present needs are. Share the reflections in the group.
8. Summarize the importance of understanding the different phases of the life cycle in learning how to take care of plants, animals and people, so they can grow-up healthy.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama. Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1. Song about the crop calendar

Writing songs is a way to promote self-expression and to build teamwork. In this exercise, ask the participants to write a song about a typical week taking care of crops. Each part of the song should talk about one day of the week. The participants can work in smaller groups or they can all work together Here is an example of one song that was composed.

Monday before lunching

On Monday before lunching,
A girl wanted to take a walk
She cannot take a walk
Because she has to work
She was working like this, like this (3 times)
I've seen her working like this...

On Tuesday before lunching
A boy wanted to take a walk
He cannot take a walk
Because he has to sow seeds
He was sowing like this, like this (3 times)
I've seen him sowing like this...

On Wednesday
A girl had to water

On Thursday
A boy had to plant

On Friday
A girl had to weed

On Saturday
A boy had to harvest

On Sunday
They had to play

ACTIVITY 2. The story of my life

This activity will help participants to get to know each other better and to create a feeling of trust. They will be encouraged to talk about their lives and to create positive feelings in terms of their personal experiences, so that they can think about their life in a more positive way.

TIME:

60 min (30 min. for each part – possibly done in two sessions).

MATERIALS:

Material for making puppets, a piece of material to make a stage, a model puppet to use as a demonstration.

STEPS:

Part A

1. Form group of two participants (who don't know each other very well). Think about keeping the girls and boys separate, as they will have to sit on the floor hand in hand, knee to knee and looking into each other's eyes.
2. Explain to them that they should keep eye contact with their friend and that their hands and knees should be touching throughout the exercise.
3. Ask the participants to guess the story of their friend's life without asking any questions and without letting their friend speak or comment. The participant who is guessing tells the story the way that he/she imagines it.
4. After five minutes, have the participants change roles and repeat step 3.
5. Ask the participants to sit on the floor in a circle and to comment one by one:
   - How did you feel when you were asked to tell the story of your friend's life?
   - How did you feel when you were listening to the story of your life imagined by your friend?
   - Is there anything in the story invented by your friend that you would like to have done or would like to do in the future.

Part B

6. Ask the participants to go back to the same friends, explaining that this time, each one should tell his/her real story, but only bringing out the positive events, mentioning the best moment of his/her life.
7. Ask the participants to sit in a circle on the floor and, one at a time, to tell everyone how they felt when they heard their friend tell their story.

ACTIVITY 3. The journey across the river

STEP:

1. Read out the story below for the participants.

The story of Masha and Vidzo´s journey across the river

Once upon a time in a village called Viriko there was a boy named Masha and his sister Vidzo.

One morning after New Year celebrations their parents woke them up for a journey across the river Galana. Masha and his sister were so excited that they were going to visit their great grandparents.

When they crossed the river they saw many people clearing their farms. As they passed one farm after another they could clearly see that most people were engaged in their farms.

When they reached their destination they were pleasantly welcomed home by all and sundry. A big male goat was slaughtered for them. Masha and Vidzo were so happy to meet the other children sand they played happily after that sumptuous meal!

The following morning all the villagers went to prepare their land and this followed day in day out. All the children were accompanying their parents to the farms.

One morning Masha observed a heavy cloud hanging over the sky. His grandfather told him that it was a sign of rain. Two hours later it rained heavily for almost half a day. The following morning most of the villagers went out planting in their farms. This continued for about 2 months and there were grasses all over the place. Masha and Vidzo were delighted to see how both young and old worked communally in the farms to tend to the crops for about 3 months.

Unbelievably most farms were full of a very good maize, cow pea and simsim crops. Then came the harvesting time when the rains had subsided and it was dry again. This marked the beginning of the festive season in the village with most of them celebrating the bumper harvest.

After this came the short rainy season and Masha was amazed to see a repeat of the whole range of activities. This continued for the next 3 months until the Christmas season when most of the villages again went festive after a successful harvest. For Masha and Vidzo this was such an unforgettable experience!

ASSESSING PROGRESS

exercise 1

DREAM VISIONING[2]

This exercise helps participants to think in terms of their long-term visions and aspirations, and thereby bring them beyond the immediate daily problems. It provides a good basis for planning JFFLS activities as it builds on participants own dreams. In order to later on be able to monitor and assess progress it is important that the participants have clearly articulated their visions and agreed on some common goals to strive for in the group. Thus this exercise should be carried out as one of the first activities of the JFFLS.

OBJECTIVES:

- To articulate participants' dreams and visions for the future;
- To identify potential indicators for assessment of progress later on.

TIME:

About 1.5 hour

MATERIALS:

Flip chart, marker pens.

STEPS:

1. Explain to the group members that they will be required to describe how they would like things to be in 3 years time from now. The dreams vision should relate to the persons livelihood and life as a young farmer.
2. Allow 15 minutes for personal reflection before sharing in sub-groups or directly in plenary until a single common future is created from the individual reflections. Guiding questions might be: "What are the characteristics of the ideal situation we wish to achieve here in the long term?" or ask them to complete the sentence: "I know that my vision for this situation has been achieved when I see…"
3. Ask the participants to make a drawing of their dreams, and then discuss these in the larger group. In the discussion the dreams can be specified further including timeframes for achievements.
4. Once expressed and discussed the dreams can help to identify indicators to be assessed later on in order to see if the dreams are being realized.

[2] Adapted from Discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006)

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Planning

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Module 2: Planning

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Module 2: Planning

INTRODUCTION

Any activity undertaken in the farm or in life in general should start with good planning. This way one can assure to get the maximum benefit out of certain activity. An important aspect of planning in agriculture is analysing field and soil conditions, choosing which crops to grow or which type of livestock to keep and thinking of how to ensure good agricultural practices. Apart from providing food, there are other reasons for growing crops, such as for example grow crops to sell on the market to get some income. The participants should realise understand early on that growing crops and raising animals are ways to make money.

In this module, the participants will first discuss analysing field and soil conditions, then identifying the type of enterprise to implement. They will also be introduced to principles of experimentation and Agroecosystem Analysis (AESA) which is an important tool for the daily monitoring of the field situation. Finally, in order to relate the field conditions to their own lives participants will begin to learn how to plan their lives by discussing family planning, analysing their daily activities and discussing decision making.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modifies and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of this module participants should:

- Be able to analyse field and soil conditions;
- Know how to identify and plan agricultural enterprises;
- Have been introduced to the concept of AESA;
- Understand the important of team work and family planning.

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

- **ENERGIZER AND FUN** (30 MIN)
- **IN THE LEARNING FIELD** (45 MIN)
- **AGRICULTURAL TOPIC** (45 MIN)
- **MAKING THE LINK WITH LIFE** (30 MIN)
- **CULTURAL ACTIVITIES (ART, DRAMA, SONG)** (30 MIN)
- **ASSESSING PROGRESS**
- **CLOSING ENERGIZER**

Exercises

↘ GETTING STARTED WITH "ENERGIZERS"

Some sample energizers that will also help to "break the ice" and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Sport actions

OBJECTIVE:

To agree on learning mode and develop rules and norms for the group. ticipants get to know one another.

STEPS:

1. Divide the big group into four smaller groups. Assign one sport activity/action each to each group. Use the following sports activities/actions:
   - Basketball, shoot
   - Volleyball, smash
   - Football, kick
   - Baseball, bat
2. Point to any one group to start the game. The group should say its sport and its corresponding action thrice before calling out the sport and corresponding action of the group it has chosen to respond. The group that is selected does the same, i.e., say its sport and its corresponding action thrice before calling out the sport and corresponding action of another group. For example the basketball group may say, "Basketball shoot, basketball shoot, basketball shoot to football kick". The football group should answer, "Football kick, football kick, football kick to volleyball smash", and so on.
3. Eliminate any group that makes a mistake in calling out or doing the actions of any of the sports activities. The group that not eliminated automatically wins.
4. When a winner has been identified, ask the winning group why they think they won over the rest (expect different answers). Ask the following questions: why did your group not make any mistake? How did you choose which group you were going to call out next? Did you have a leader? Did you plan? Accepting all answers will encourage participants to share in the discussion as well as give them the feeling of respect.
5. Emphasize the value of planning and coordination for successful teamwork.

Energizer: Newspaper run

OBJECTIVES:

- To demonstrate the need to make decisions;
- To promote team work.

MATERIALS:

Newspapers.

STEPS:

This is a competitive game, so the groups should all agree before you start, on the distance both groups have to cover (i.e. the distance of the race).

1. Divide the participants into teams of three.
2. Give each team two big sheets of newspaper. Tell them to place one sheet on the ground and for the whole team to stand on it in a row holding hands with each other.
3. Then have them place the second sheet of newspaper in front of them.
4. Explain to the participants that when you say “go” they have to cover the distance to the finish line by stepping from the sheet of paper onto the second sheet, which they have to place in front of them by bending backwards, picking it up and placing in front of them. They should repeat this process until they reach the finish line.
5. To make it more difficult you may want to tell the participants that they must continue holding hands, and they have to use their free hands to collect the piece of paper behind them.
6. The first team to reach the finishing line is the winner.
7. When the race is over, ask the participants what was difficult, what was easy and if they worked well as a team. As them to talk about whether one person was more coordinated their movements, etc.
8. Once you have discussed the game in this way, explain that the game is a bit like life: we need to make decisions if we want to move forward. Sometimes we do this as individuals, sometimes as part of a team.

ANALYSING FIELD CONDITIONS

The conditions of a field i.e. the kind of soil, its fertility, availability of water, the weather patterns etc. makes a big difference in the way that a crop develops. Therefore it is important to understand these different field conditions in order to decide what kinds of crops will grow best in a given area. It is also important to understand what kind of agricultural practices will help to produce a healthy crop. In this topic, the participants will first discuss the resources available, characteristics they desire in a field to be able to grow a healthy crop and learn how to measure land gradient. They will also visit the JFFLS learning field to check out the conditions there.

exercise 1

RESOURCE INVENTORY

OBJECTIVE:
To identify and appreciate the available resources in the local surrounding.

TIME:
2 hours

MATERIALS:
Flip charts, marker pens, cards.

STEPS:

1. Open the discussions by asking the participants to identify the various resources they come across in the environment or farm during their day to day activities. Record all responses on a flip chart.
2. Divide the participants into two groups.
3. Ask one group to make a map of one of the participant's individual farm with enough detail to show the boundaries of the farm, homestead, the location of each crop and livestock enterprises, rivers or streams, trees, and other farm structures including buildings.
4. Ask the other group to make a map of the community. This map should include other local resources that are not directly on individual farms e.g trees, forest, and water point etc.
5. Ensure that most of the useful resources are identified and mapped on the drawings with the participation of everybody.
6. Discuss which resources can or can not be obtained in your local community.

exercise 2

CHARACTERISTIC OF AN AGRICULTURAL FIELD

OBJECTIVE:
To understand the desired characteristics of an agricultural field.

TIME:
About 20 minutes

MATERIALS:
Large sheets of paper and markers.

STEPS:

1. Introduce the topic of analysing field conditions. Ask the participants why they think it is important to analyse the condition of the field before planning the crops they will grow.
2. Ask the participants to mention all the important characteristics of an agricultural field that a farmer needs to know when he/she starts cultivating. List all characteristics mentioned on a large sheet of paper. If you think they have missed something, bring it up and discuss based on the checklist below.

3. Go through each item on the list, asking the participants why it is important to know this item when a farmer starts cultivating his/her land.

Summarize the list of “important characteristics for a learning field” and ask the participants to copy the list in their notebook.

facilitators’ notes 1

CHARACTERISTIC OF AN AGRICULTURAL FIELD

Checklist: Important characteristics of an agricultural field

- Soil type (texture: light-heavy, structure: compact-loose, organic matter: high-low).
- Soil depth (deep enough to support good root development).
- Slope of the land (danger of erosion, run-off water, problems for mechanisation).
- Drainage situation (depressions in the field, lowest point of the field).
- Presence of water sources (if irrigation is needed).
- Vegetation (is there heavy vegetation? Are there weeds?).
- History (what was cultivated in that field in the past gives information about condition of the field).
- What is going on in neighbouring fields (weeds, pest and diseases often enter from neighbouring field).

exercise 3

HOW TO ANALYSE FIELD CHARACTERISTICS

OBJECTIVE:

To analyse the condition of the JFFLS learning field and gain an understanding of its specific characteristics.

TIME:

About 1 hour

MATERIALS:

Learning field, large sheets of paper and markers.

STEPS:

1. Go with the participants to the field that has been selected for the JFFLS learning field. Divide the participants into small groups.
2. Ask each group to analyse the field, using the list of important characteristics that they have developed above, to identify what they are seeing.
3. Bring the participants back together at the edge of the field and ask the groups to present the results of their field assessment.

4. Discuss the presentations. Ask the participants if it was difficult to assess some of the field characteristics of the learning field (for example, the soil characteristics).
5. Ask the participants to think of the results of their analysis and if they can see what kind of problems they might have when they start cultivating the crops they would like to grow in the learning field. Use the questions below to stimulate discussion.
6. Summarize the discussion and observations made in the field and discuss the following questions:
   - Is it possible to grow a crop in all different soil types?
   - What can the vegetation that is in the field tell us about the fertility of the soil?
   - Why is it important to know about the history of the field?
   - Is it always important to have a water source close to the field?
   - Where does the water flow to after a heavy rain shower?
   - Why is it important to check the soil depth at different locations in the field?

exercise 4

MEASURING THE LAND "GRADIENT"

OBJECTIVE:

To understand the concept of land "gradient" and relate it to the flow of water and movement of soil in a field.

TIME:

About 1 hour

MATERIALS:

A ball, a basin of water.

STEPS:

1. Hold a discussion where you begin by asking the participants what land gradient means, and why it is of important in agriculture. Make a list of the responses on flip charts and then break into sub-groups for discussion.
2. Go with the participants to a piece of bare ground – one that has no vegetation cover.
3. Ask one child to drop a ball on the bare ground from about a height of half a metre.
4. Tell the participants to observe the direction and the speed that the ball rolls.
5. Repeat steps 2 and 3 at different sites in the same area.
6. Discussion: Ask the participants what they observed about the direction and speed of the rolling ball at the three points. What do they think is the direction of the slope of the land? Ask them which of the directions is steeper. (The point where the ball runs fastest is the steeper slope of the land).

As an alternative:

1. Go with the participants to a piece of bare ground.
2. Pour a basin full of water on the ground.
3. Observe the direction and the speed that the water flows.

4. Repeat steps 2 and 3 at different sites in the same area.
5. Discussion: Ask the participants what they observed at the three different points. What was the speed of the water flow? Where does the land slope? (The faster the water flow, the steeper the land).

After the discussion, explain to the participants that land that is sloped can contribute to soil erosion. When it rains, the soil that is higher up can easily begin to wash away. Introduce the idea of building land gradient barriers to prevent erosion.

facilitators' notes 2

BUILDING LAND GRADIENT BARRIERS

Tips for building land gradient barriers

When the level curves are measured and marked, you can decide what you need to do to protect the soil from erosion and to try to control the flow of water. No matter which kind of barrier you are going to build, these tips should be of use to you.

- Prevention through planting trees or plants: it is always a good idea to plant trees or plants on the top of a hill. If the gradient is very steep, the trees will help prevent soil erosion. Plants and grass/shrub will also help to control water flow.
- Starting from the top (the water runs from the top to the bottom): if you start from the top you will automatically protect everything you have at the bottom which means that you can use smaller barriers at the bottom.
- Managing water flow but making sure it keeps moving: it is important to let the water run and not gather around the plants too much. Badly planned barriers can lead to the formation of stagnant water pools and bring malaria and other water-borne diseases to the area.
- Correcting problems as they arise: if a barrier or a terrace falls down, re-build it quickly, because it could cause serious erosion on the hillside.

ANALYSING SOIL CONDITIONS

The condition of the soil makes a very big difference for the health of plants or crops growing in it. When beginning to plant a field, one will need to learn how to analyse the soil to see if it is of good quality for growing crops. In this topic participants will learn simple tests to determine the condition of different types of soil. They will also begin go understand concepts such as soil colour, texture, fertility and structure and what they mean for growing healthy crops.

exercise 1

UNDERSTANDING THE SOIL

Soils in different fields or locations can be very different, in terms of color, type of particles it contains (texture) and the way that it holds together (structure). Knowing your soil is of high importance when growing crops since it has big implications on the fertility of the land and the ability of the soil to retain water.

OBJECTIVE:

To learn to understand the soil in the local area better.

TIME:

About 1 hour

MATERIALS:

Shovels, paper, pens.

STEPS:

1. Hold a group discussion on the idea of “soil fertility” and explain that this means the ability of the soil to give plants the nutrients and water they need as well as the right type of “bed” for the roots to develop.
2. In groups of 4-6 persons, walk to a piece of land; a cultivated field, grazing land or forest area.
3. Dig up one square block of soil for each subgroup, about two hands wide. Try not to disturb or break the block.
4. Ask each group to examine and describe their block of soil in terms of:
   - **Soil colour:** what soil colour do they see? Why is colour important? Does the top soil have a different colour than the rest of the soil, in such case why?
   - **Soil texture:** what kind of particles are the soil made up of? How big are they?
   - **Soil texture:** brake of pieces of the block with your hands and study the shape and feeling of the pieces. Examine if the soil has a loose structure or if the particles are bound hard to each other. Look for channels and canals in the soil where water and air can pass through and look how the roots move in the soil?
5. Discuss the following concluding questions:
   - Is the examined soil a good soil for growing crops in, why or why not?
   - If there was a hard layer of soil, how do you think this would affect the way the roots develop?
   - How would you want your ideal soil to look like?

facilitators' notes 1

CHARACTERISTICS OF SOILS

Soil colour

- Dark colours: high organic content, which means better drainage and higher nutrient levels. Very good fertility.
- Red-brown and orange: good drainage, free movement of air and water. With enough water, good fertility.
- Dull yellow and blue: seasonal drainage problems.
- Grey: poor drainage, too much water and not enough air.

Soil texture

- Sand: relatively course and feels gritty when rubbed between the fingers.
- Silt: much finer than sand and feels smooth and floury. When wet, it feels smooth but not sticky.
- Clay: the finest particle, cannot be seen without a microscope. When wet, it is sticky.

Soil structure

- Single grains: soil with no lumps and when the soil (usually sandy) easily falls between the fingers.
- Crumby: small soft porous lumps of irregular shapes and not closely fitted together. The lump easily breaks apart.
- Blocky: small soil blocks can be seen, usually with six irregular faces that easily fit together along vertical edges.
- Plate or columnar: less common are when the soil is arranged as thin horizontal flakes or as vertical columns or pillars.

Summary of an healty and poor soil

Healthy soil	Poor soil
Litter or plant fragments on the surface.	Bare and compacted soil surface.
Darker colour because the soil has been.	Lighter colour because the soil is starved and weak soil structure (dense but breaks into particles).
An open structure with pore spaces and channels for air and water entry and drainage through the soil.	A compact soil with poor aeration and drainage (what happens to plants and animals if we shut them in an air-tight box?).
Lots of fine roots holding the soil together.	Few roots or roots of problem weeds such as couch grass (witch weed) which spreads underground by rhizomes.
Channels formed by earthworms and/or termites (termite galleries often have a fine-textured lining of soil).	Few channels and large pores.
More visible organisms and diverse species (and the different structures they make).	Few visible organisms, or sometimes many visible organisms of one or two species (low diversity), e.g. many white grubs.

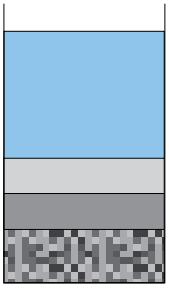
exercise 2

WHAT IS THE SOIL MADE UP OF?[1]

It you look closely at the soil, you can see that is made up of many different kinds of particles. Some of them are soft, some are hard. Some are light coloured and some are darker. Some are powdery and some are stickier. This is called the "composition" of the soil. Most soils are a mixture of clay, silt and sand and organic matter (decomposed crop residues). The soil composition helps understand the kind of nutrients that the soil has to give to the crops. It also helps understand how well it will be able to hold water for the crops and how well it will be able to support the roots of crops as they grow. In this exercise we will look at three soils and examine what they are made up of.

OBJECTIVE:

To look in detail on three soils and examine what they are made up of.



TIME:

2 hours

MATERIALS:

3 glasses, 3 soil samples, water, something to stir with.

STEPS:

1. Divide the participants into three sub-groups.
2. Ask each group to collect about two handfuls of soil; each group from one of the following three fields, from a valley, from top of a hill or from the side of a slope.
3. Ask the groups to looking at, and touch the samples, making a guess of what the soil is made up of.
4. Each group fill 1/3 of a glass with their soil sample. Thereafter, ask them to fill the rest of the glass with water and stir the mixture well.
5. Let the mixture rest for 5 minutes, and then stir it well once again. Put it down and do not touch it for two hours.
6. After two hours look at the soil in the glasses. The soil has now dropped to the bottom of the glass and the water is clear. Several layers of soil have formed. The biggest particles, will be furthest down and the smallest particles higher up. At the bottom of the glass you will have a layer of sand, above that you will find a layer of silt and at the top there will be a layer of clay. If the water is not clear it is because there are still clay particles in the water. If waiting for a long time these particles would also settle down in the top layer. On top of the water you find pieces of leaves and roots floating.
7. Ask the participants to describe the different layers in their glass, the thickness of the layer, what kind of particles, is there any material floating on the surface etc. Which soil sample do they think would be the best soil for growing a crop and why?

[1] Adapted from: The soil, FAO, 1976.

exercise 3

HOW TO "FEEL" THE SOIL TEXTURE[2]

In the field soil texture can be determined by "feeling" the soil. This involves taking a small sample of soil and rubbing it between the thumb and the other fingers. Soil feels very different when touching it, depending on what kind of particles it is made of. In this exercise you will practice to "feel" the soil texture. Soils with a lot of sand will fall apart, while those with more clay can be worked into a very good ribbon. Silty soils feel very smooth. Loam soil is smooth but slightly sticky and has just a little feel of grit. Eventually, after much practice, you will be able to accurately assess the type of soil using this method.

OBJECTIVE:

To practice how to "feel" the texture of a soil.

TIME:

1 hour

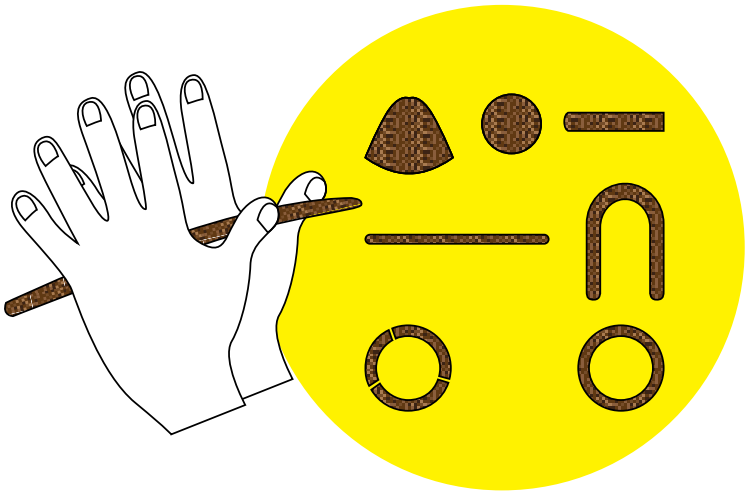
MATERIALS:

Soil samples, water, measuring spoon, water container for hand washing.

STEPS:

1. Collect about 5 soil samples from different kinds of fields.
2. Remove stones, roots, leaves and seeds from the soil samples and break down hard particles.
3. Take a handful of soil; moisten it with water, a little at a time (drop by drop) until the soil begins to stick to your fingers. Work the soil in your hand until it's smooth and uniformly moist.
4. Try to first form a round ball and then a long ribbon by squeezing the soil between your thumb and forefinger. Follow the guidelines below in order to classify the soil sample.
   - Sandy loam: the soil contains enough silt and clay to become sticky, and can be given the shape of an easy-to-take-apart ball.
   - Silty loam: similarly to the sandy loan but the soil can be shaped rolling it with a small and short cylinder.
   - Loam: contains almost the same amount of sand, silt and clay. Can be rolled into a 6" long cylinder that breaks when bends.
   - Clayey loamy: similar to the loamy, although this one can be bent and be given an U shape (without forcing it) and does not break.
   - Fine clay: the soil can be given the shape of a circle, but shows some cracks.
   - Heavy clay: the soil can be shaped as a circle, without showing any crack.

[2] Adapted from: Guidelines and Reference material on Integrated Soil and Nutrient Management and Conservation for Farmer Field Schools, FAO, 2000.



5. Questions to discuss:
   - What components are the different soil samples made up of?
   - Which of the soils would you prefer to cultivate, and why?

Point at which the soil becomes malleable and can be hand-shaped, indicates its texture.

(Source: Agricultural Compendium for Rural Development in the Tropics and Subtropics).

exercise 4

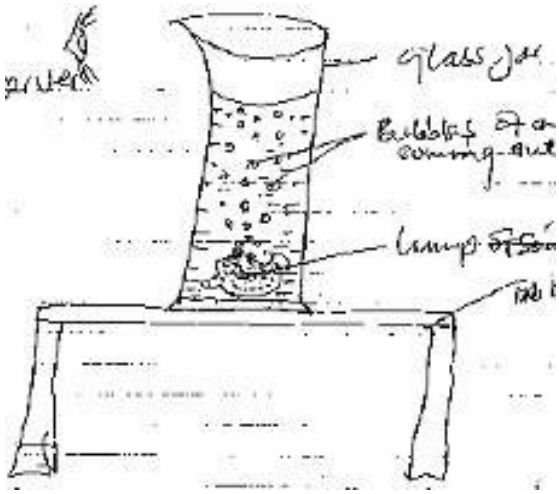
AIR IN THE SOIL?

Roots need air to breathe and space to spread out. This is provided by air spaces between each particle of soil and between the “clumps” of soil. It is in these air spaces that all of the “action” takes place – where air and water move.

OBJECTIVE:
To demonstrate the presence of air in the soil.

TIME:
15 minutes

MATERIALS:
Lump of soil, water, glass, a table.



STEPS:

1. Place the glass on a table where it is visible for all.
2. Fill ¾ of the glass with water.
3. Place the pump of soil in the glass of water.
4. Observe and discuss what happens.
5. Conclude by explaining that the bubbles of air one can see coming from the lump and rising up to the water surface shows that there is air in the soil.

IDENTIFYING ENTERPRISES

When one has understood the basic conditions and qualities of the resources available one can start to plan which crops to grow or animals to keep. This includes selecting which crop species and variety to plant, what type or how many animal to keep. It also includes planning ones agricultural activities in more detail and organising ones farm operation in such way that labour requirements are spread out during the year. In these topic participants will start plan their enterprise selection in more detail.

exercise 1

PLANNING SOURCES OF FOOD

OBJECTIVE:

To start planning the selection of farm enterprises based on food requirements.

TIME:

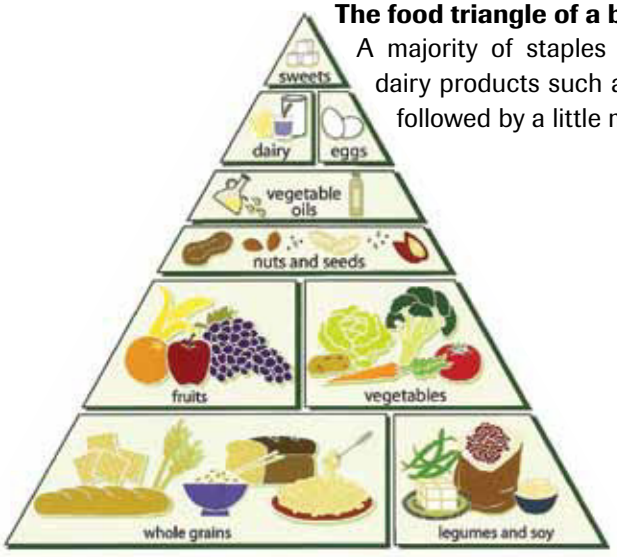
1.5 hour

MATERIALS:

Flip chart paper and markers.

STEPS:

1. Ask the participants to list down the type of crops grown in the community.
2. Ask the participants why they grow the crops.
3. Ask them to identify the different elements of a balanced daily diet (cereals, vegetables, meat, fruit).
4. Divide the participants in small groups and ask the groups to discuss what crops they should grow and what animals they should keep in order to produce a balanced diet all year. Ask each group to list the different crops and animals on a large sheet of paper, along with the months when those crops would be eaten.
5. Ask the groups to present their list.
6. Discuss the presentations and identify the periods of the year when it will be difficult to produce one or more elements of a balanced diet.
7. Make a list of all the crops and animals that the participants presented and then ask them which of the crops they would like to grow in the learning field.
8. Discuss the following guiding questions:
   - How long can you store the produce of the different crops after harvesting?
   - How much do you need to grow to have enough food for yourself all year round?



The food triangle of a balanced diet.

A majority of staples such as maize, millet, porridge, bread and dairy products such as milk or cheese. Then vegetables and fruit followed by a little meat or fish products.

exercise 2

PLANNING CROP ACTIVITIES

OBJECTIVE:
To understand what aspects to take into consideration when planning a crop enterprise.

TIME:
About 2 hours

MATERIALS:
Flipchart and marker pens.

STEPS:

1. Discuss in the group the following questions and keep a list of the answers on a flipchart:
   - What size is our learning field?
   - What is the best time to plant crops, given the climate and the market?
   - What other factors are important in deciding what crops to plant and when to plant them?
   - What crops do you think we should plant?
2. Move together with the group to the learning field and divide the participants into sub-groups of 4-5 persons.
3. Ask them to develop a plan that gives step-by-step ideas of what they have to do in order to produce a crop in the field. If the following aspects don't come up by themselves probe the discussion related to: crop selection, land clearing, land preparation, ploughing, seed bed establishment, manure/fertilizer application, weeding, watering, pest and disease control, harvesting etc.
4. Bring the participants back together and have them present their plans. Conclude the session by asking the following questions:
   - Is it a good idea to make a plan? Why or why not?
   - Was it easy or difficult to make a plan in a group?
   - What basic steps do we need to follow to make a plan?
   - Did everybody participate in the discussion? Why or why not?

exercise 3

SELECTING LIVESTOCK ENTERPRISES

OBJECTIVE:
To reflect on the advantages and disadvantages of keeping different types of livestock.

TIME:
1.5 hour

MATERIALS:
Flipchart and marker pens.

STEPS:

1. Introduce the topic of livestock as part of the farming system.

2. Ask the participants what kinds of livestock/animals are kept by farmers in the area. Draw them down on a large sheet of paper. If needed, add the missing ones.
3. Discuss the different kinds of animals and ask the participants to indicate which of those animals are the most common.
4. Divide the participants in small groups and ask each group to select one of the most common kinds of livestock. Ask each group to discuss the advantages and disadvantages of keeping that particular animal and to present this on a large sheet of paper.
5. Ask the groups to present the results of their discussions.
6. Discuss the presentations of the small groups.
7. Ask the participants:
   - What do they think is the most suitable type of livestock to be kept?
   - What are the advantages of integrating livestock with crop production?
   - Do you need a lot of space for keeping livestock?
   - What do you need to do to protect livestock?
   - What kind of feeding arrangements are needed for keeping livestock?
8. Discuss the possibilities of keeping some (small) livestock with the JFFLS in order for the participants to learn to take care of (small) livestock.

exercise 4

PLACING CROPS/LIVESTOCK ACTIVITIES INTO AN AGRICULTURAL CALENDAR

OBJECTIVE:

To learn how to prepare an agricultural calendar including planned crop and livestock activities and understand how this relates to food availability and labour requirement.

TIME:

About 2 hours

MATERIALS:

Flipchart and marker pens.

STEPS

1. Ask the participants to name all crops and livestock that they would like to grow or keep in their fields, both in the group learning field and on their own farms.
2. Then ask them to complete the following table as well as they can, indicating the start end of each crop/livestock cycle.
3. Discuss the concept of short-cycle, medium-cycle and long-cycle crops and advantages/ disadvantages of each.
4. Review the final calendar discuss the following questions:
   - Are there some month of the year where you will have more food to eat than others?
   - Any ideas of how to get a better distribution of harvests across the year?
   - Are there some months of the year where you will have more work on the farm to do than others times? Is this a problem for you?

- Thinking of the different roles of men and women (boys and girls) on the farm, what conclusions can you draw in term of benefits/challenges with this crop calendar.

Example of an agricultural calendar

Crop	OCT	NOV	DEC	JAN	FEB	ETC
Cereals						
Food crops						
Cash crops						
Livestock						
Medicinal plants						

INTRODUCTION TO EXPERIMENTATION AND THE "AGROECOSYSTEM ANALYSIS" (AESA)

Learning in JFFLS is often taking place through comparison. For faire comparison it is important to be aware of some basic principles of experimentation. One also needs to have a process in place for how to monitor and evaluate the various options compared, in order to be able to make a final conclusion. Thus when planning field activities, the participants need to define the kind of comparative studies they will put in place and a process for how to regularly analyse the situation in their fields. The AESA is an effectively tool for doing this, as well as for sharing knowledge. AESA provides a structure for how to observe, analyse and discuss the field situation so that they can make the right decisions about how to manage the crops they are growing. It involves regular observations of crops during their various stages of growth in order to make decisions on solving problems that may arise. It also promotes "learning through discovery". The main aims of this topic is thus to introduce the concept of learning through comparison and introduce the monitoring tool AESA.

exercise 1

TABLE PRINCIPLES OF EXPERIMENTATION[3]

Farmers usually learn by trying out new things and ideas on their farms. Experimentation does not need to be complicated or risky and anybody can do it. However in order to fairly be able to compare different options experimented on some basic principles of experimentation are important to avoid making wrong conclusions.

OBJECTIVE:

To learn some basic principles of experimentation.

TIME:

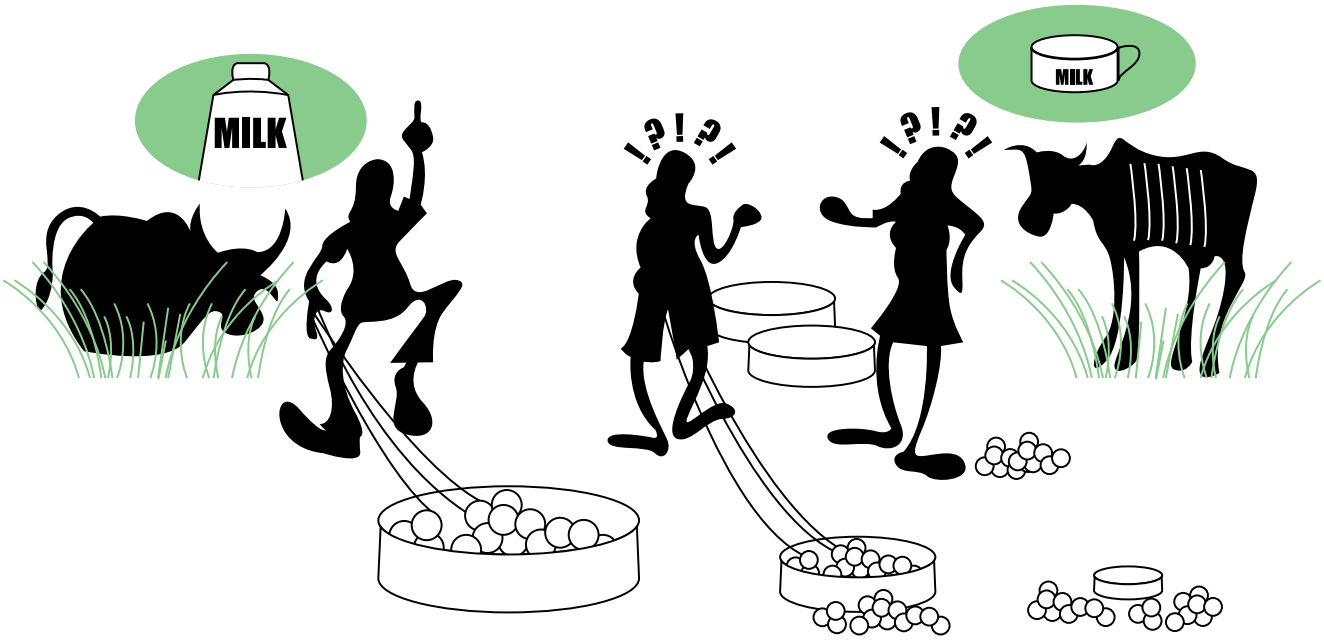
1.5 hour

MATERIALS:

Five buckets (three of the same size, two of different sizes), 30 stones, flip charts and markers.

STEPS:

1. Ask for three volunteers and explain that these people represent three things you want to compare (see Table below for the corresponding key steps in experimentation and throwing stone exercise). Explain to the group that the objective is to find out who is the best at throwing stones into a bucket. Each person is given 10 stones and the one who gets the most stones in the bucket will be the winner.
2. Ask the rest of the group to vote on who do they think is going to win.
3. Place the three different sized buckets, one in front of each volunteer so that they are all the same distance from the buckets, and give them each 10 stones. Ask them to throw as many stones as they can into their bucket. Count the number of stones in each bucket. Give participants the "results" and ask them who they think is the winner. Then ask: "Was this a fair competition?" Of course it wasn't fair, because it is much easier to get the stones into the biggest bucket. Ask how the game can be made fairer. It can be made fairer to provide a uniform situation i.e. everybody has the same size bucket.



[3] Adapted from Livestock Farmer Field Schools, Guidelines for Facilitation and Technical Manual (Groeneweg et. al., 2006).

4. Play the game again, give the results and ask again who the winner is. This time the results seem fair – but now ask the participants whether they think the same person will win if they play more times? Play the game once or twice more – enough times to show that people don't always have the same scores. This demonstrates the importance of repeating treatments to make sure your results are reliable. Work out the average score for each person and then declare the winner.
5. Ask the three volunteers to pick the bucket and stones of their choice and explain how they made that choice. People are not always objective and may be biased without knowing. This can influence the results; therefore it is important to give the treatments and the location of the experiment an equal chance of being chosen (randomisation).
6. Ask some of the participants who did not play the game: "Did they vote for the right person?" Ask if it was difficult to guess who would win, since they had never seen these people throwing stones before. Then ask the same participants: "Do they consider themselves better or worse at throwing stones?" Everybody must have an idea on how to scale themselves or maybe a good friend. If you have someone participating in the game of which you know his/her capacity of throwing stones you have a point of reference (also called control) to value the scores of the others.
7. Explain that to set up a good experiment you need to think about: the objective, uniformity, replication, randomisation and common practice/control to make sure you have a good quality experiment. Every field comparative experiment should consider these elements.

Principles of experimentation: how the throwing game relates to key steps in experimentation

Key steps in experimentation	"Throwing stones' exercise"
Subject	Three volunteers.
Objective	To find out which of the three volunteers is the best at throwing stones.
Uniform situation	Buckets are of the same size. Distances from the volunteers to the buckets are similar (If there are not three buckets of the same size, the volunteers can play the game three times, changing buckets each time so that they throw into each of the three sizes).
Replication	Repeat game to give the volunteers another chance to win because the volunteers did not always have the same score.
Randomisation	Account for bias (the volunteers did not decide on the bucket but were given a bucket randomly).
Point of reference: i.e. control o normal local practice	Ensure participation of yourself or someone whose skills in throwing tones you know.

exercise 2

THE CONCEPT OF AN ECOSYSTEM[4]

When comparing various farming practices it is important to understand that each crop or animal is interacting in a complicated ecosystem where many aspects depend on each other. In the AESA exercise observation of the ecosystem forms the basis for monitoring of crops or animals. This exercise introduces the concept of an ecosystem.

OBJECTIVE:

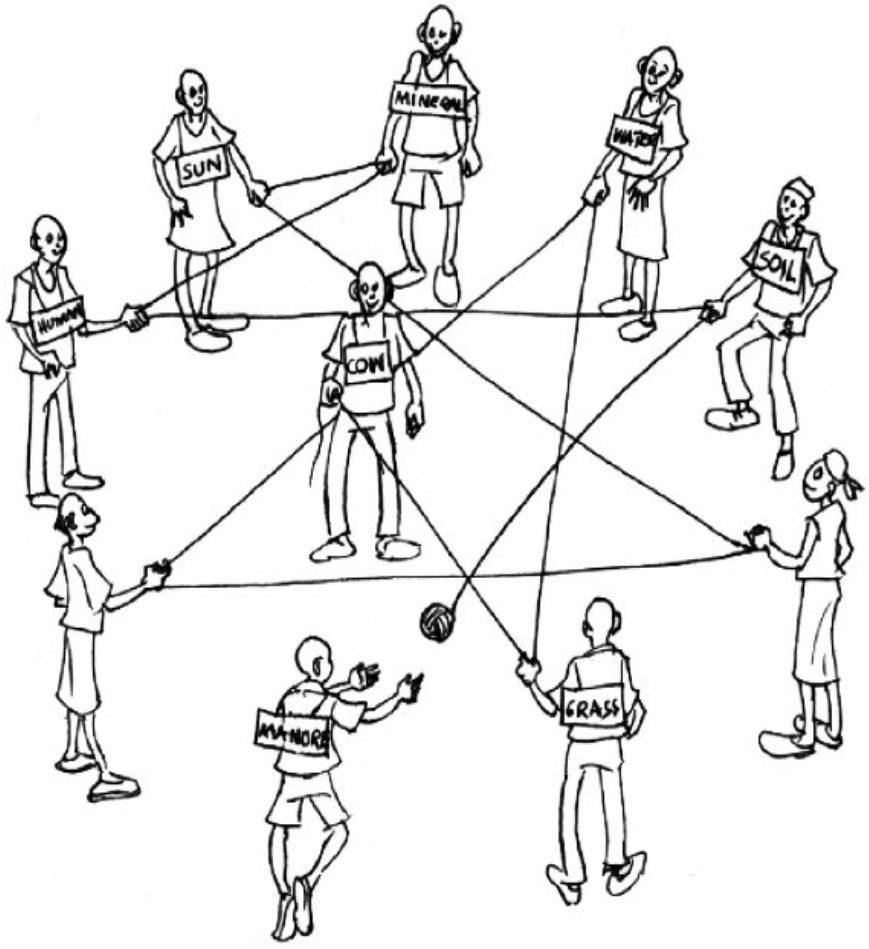
To understand what the concept of an ecosystem is.

TIME:

1 hour

MATERIALS:

A ball of wool or string, cards, masking tape, marker pens.



[4] Adapted from Livestock Farmer Field Schools, Guidelines for Facilitation and Technical Manual (Groeneweg et. al., 2006).
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STEPS:

1. The facilitator should prepare the exercise by taking the same number of cards as there are participants and writing the name of a component of the ecosystem on each card (e.g. cow, grass, water, soil, sun etc.).
2. The participants form a circle and pick one card each. Each participant fixes the card on his/her body so all can see it.
3. The participant who picked the card showing "cow" stands in the middle of the circle holding the ball of wool or string.
4. The participant who represents the cow says: "I am a cow and I relate to X because of Y" (e.g. "I relate to grass because I eat it and it gives me energy"). The "cow", keeping hold of the end of the string, then throws the ball to the person with the "grass" card.
5. The person receiving the ball does the same and this is repeated until all participants are connected. Each card or person can be visited more than once.
6. The participants are asked why they are connected, what they can learn from the exercise, and what happens if one element is removed from the system.
7. The facilitator then introduces the concept of an ecosystem.

exercise 3

INTRODUCING THE AESA FORMAT

OBJECTIVE:

To understand what the concept of an ecosystem is.

TIME:

1 hour

MATERIALS:

Pen/pencils, markers, flip charts.

STEPS:

1. The facilitator reminds the group about the defined focal activity of the JFFLS and planned comparative trials.
2. Ask the participants what needs to be observed and what kind of information needs to be collected to measure performance e.g. and to be able to compare the various options against each other.
3. Based on this information, the AESA format is developed by the group asking participants what they need to know to enable appropriate management decisions to be taken.
4. The parameters identified should be categorised into those that need to be captured only once e.g. date of planting (general information), and those that need periodic updating e.g. height of the crop (agronomic parameters).
5. An AESA format is then developed on a flipchart including the defined information and including a drawing of the study subject. See an example below of a crop AESA format.

A typical format of crop AESA Sheet

Name of JFFLS:	
AESA NO: GROUP NO: PLOT NO: PROBLEM ADDRESSED:	DATE: WEEK NO:
General information	**Parameters**
Variety: Date planted: Age of crop: Spacing: Fertilizer: Weather: Time of observation: Plant population: Germination %:	Length of leaves; Width of leaves: No of leaves: No of diseased leaves: No of dead leaves: Length of plant: No of pods:

Insect pest	**Plant drawing**	**Natural enemies**
Pest observed:		Natural enemies observed:

Observations	**Recommendations**
Soil moisture: Diseases: Insect pests: Plant health: Deficiency: Weeds: Predators:	What management practices should be applied:

THE IMPORTANCE OF PLANNING AND TEAM WORK

This topic provides a “link to life”, following the learning that participants have undertaken on agricultural planning in the field and learning sessions. Here participants will begin to learn how to plan their life by analysing their daily activities, and think of how to better share the daily workload. They will also begin to understand the different activities that men/boys and women/girls do and how the division of household labour often means that women and girls have more work to do for the well being of the household than men. This will therefore strengthen their sense of team work.

exercise 1

ANALYSING AND SHARING DAILY TASKS

OBJECTIVE:

To reflect on the differences in daily activities among girls and boys.

TIME:

2 hours

MATERIALS:

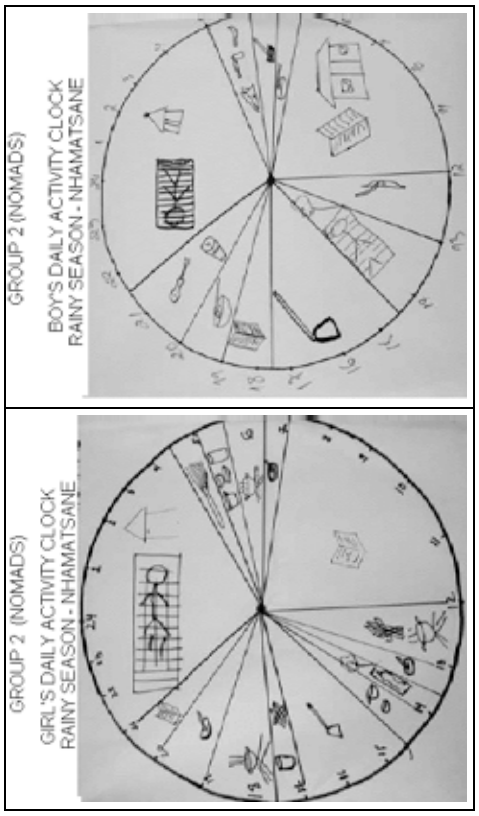
Flipchart and markers.

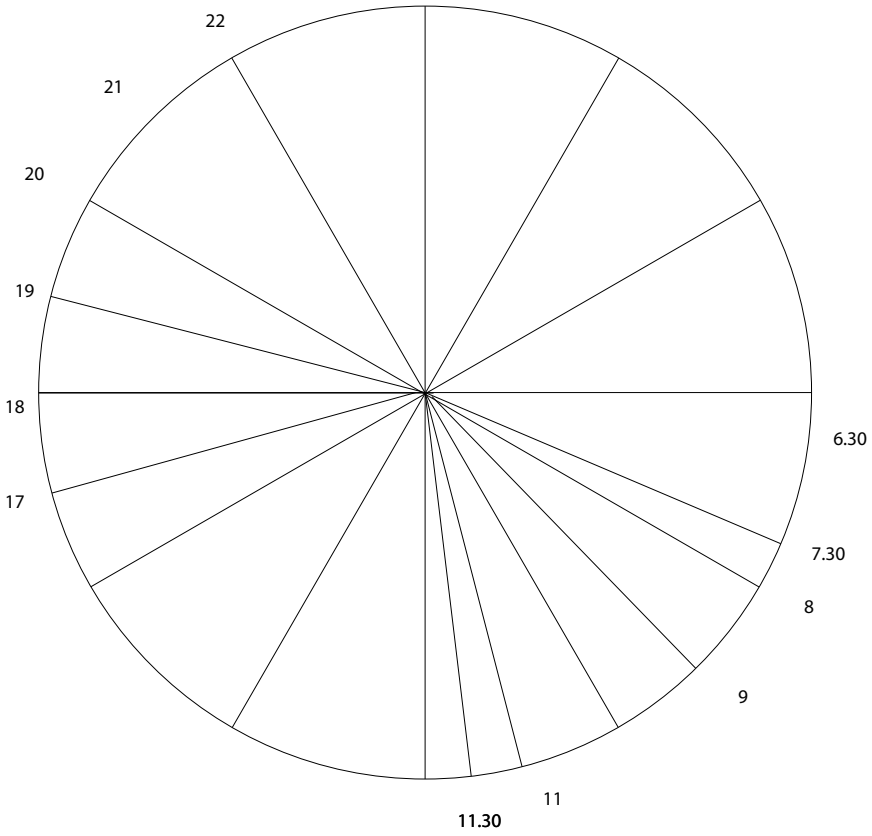
STEPS:

1. Start explaining that it is interesting to look at what happens during a typical day for girls and boys in the community and how tasks are shared between them.
2. Then, working in small groups (boys and girls separate), ask the groups with girls in to draw a Daily Activity Clock for a girl and the opposite for the boys group. Explain that the half of the groups will draw a clock showing what that person (girl or boy) does on a typical day in the rainy season and the others will do the same for a girl or boy showing what that person does on a typical day in the dry season.
3. Show the participants how to draw a Daily Activity Clock (see illustration). Ask the groups to draw a large circle on the ground or on a piece of paper that looks like a clock. Explain that the circle represents a 24 hour clock and that the participants will mark each activity on the circle according to when it is done. If there are some activities that are done at the same time, like child care and gardening, they should both be mentioned in the same time slot. Explain that they will have to use images to represent the different activities, so that the clock is clear for everybody.
4. They should also describe the characteristics of the boy/girl that they use as example (age and type of household they live in, if the head of the house is old, a woman, a man or a child etc.).

Examples of a daily activity clock

5. Have each group present their clocks.
6. Ask the groups to compare the typical day of a boy with that of a girl, the different kinds of activities (work and leisure) The following questions can help you in facilitating the discussions:
   - How is the time divided in the clocks?
   - How much time is dedicated to activities that bring in cash?
   - How much time is dedicated to activities for food production?
   - How much time is dedicated to domestic activities and who does most of this work?
   - Are there any activities done for the community?
   - What about free time?
   - How much time is there for sleep? How much does this change in the different seasons of the year?
   - In what ways can the clocks be compared for girls and boys? Do they do different things? How much time do they give to each activity?
   - Will their workload affect their attendance at the JFFLS? How?
   - What can we do to ensure that even the busiest girls / boys can participate in school and in the JFFLS?


GROUP 2 (NOMADS)
BOY'S DAILY ACTIVITY CLOCK
RAINY SEASON - NHAMATSANE
GROUP 2 (NOMADS)
GIRL'S DAILY ACTIVITY CLOCK
RAINY SEASON - NHAMATSANE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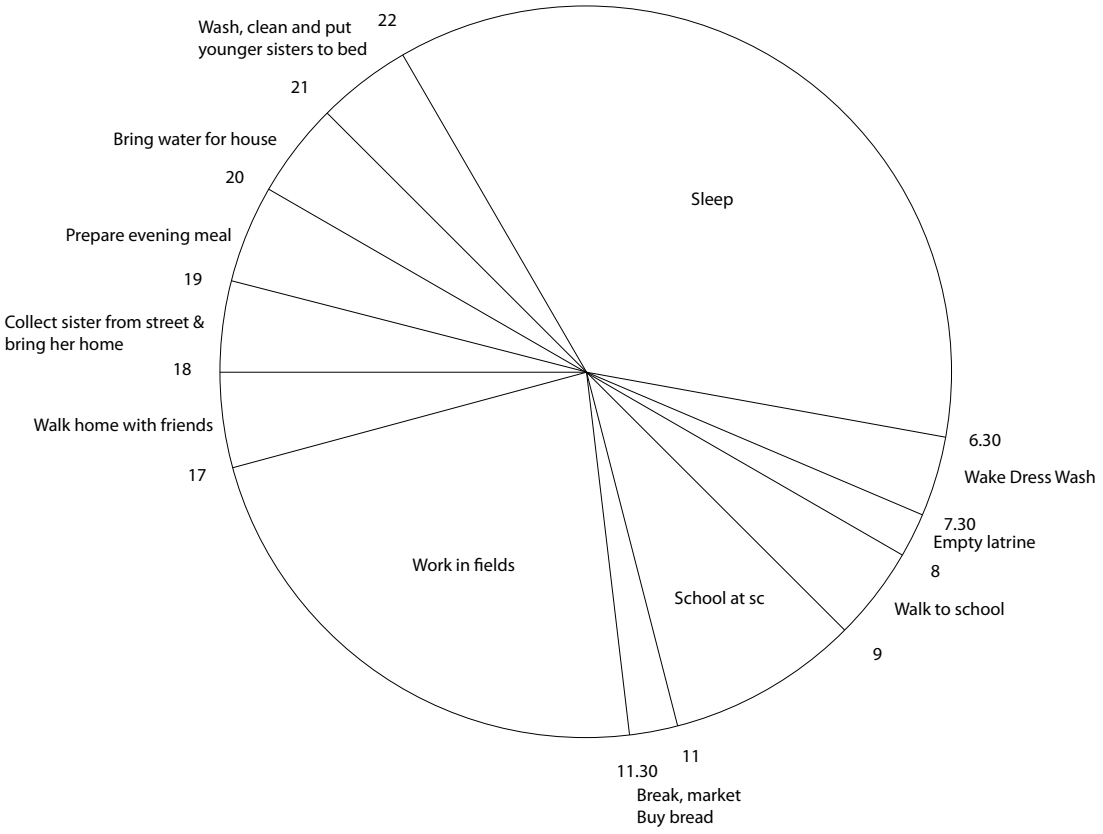

Wash, clean and put younger sisters to bed
22
21
Bring water for house
20
Prepare evening meal
19
Collect sister from street & bring her home
18
Walk home with friends
17
Sleep
Work in fields
School at sc
6.30
Wake Dress Wash
7.30
Empty latrine
8
Walk to school
9
11
11.30
Break, market
Buy bread

exercise 2

MAKING DECISIONS

OBJECTIVE:

To start to understand the need for making informed decisions.

TIME:

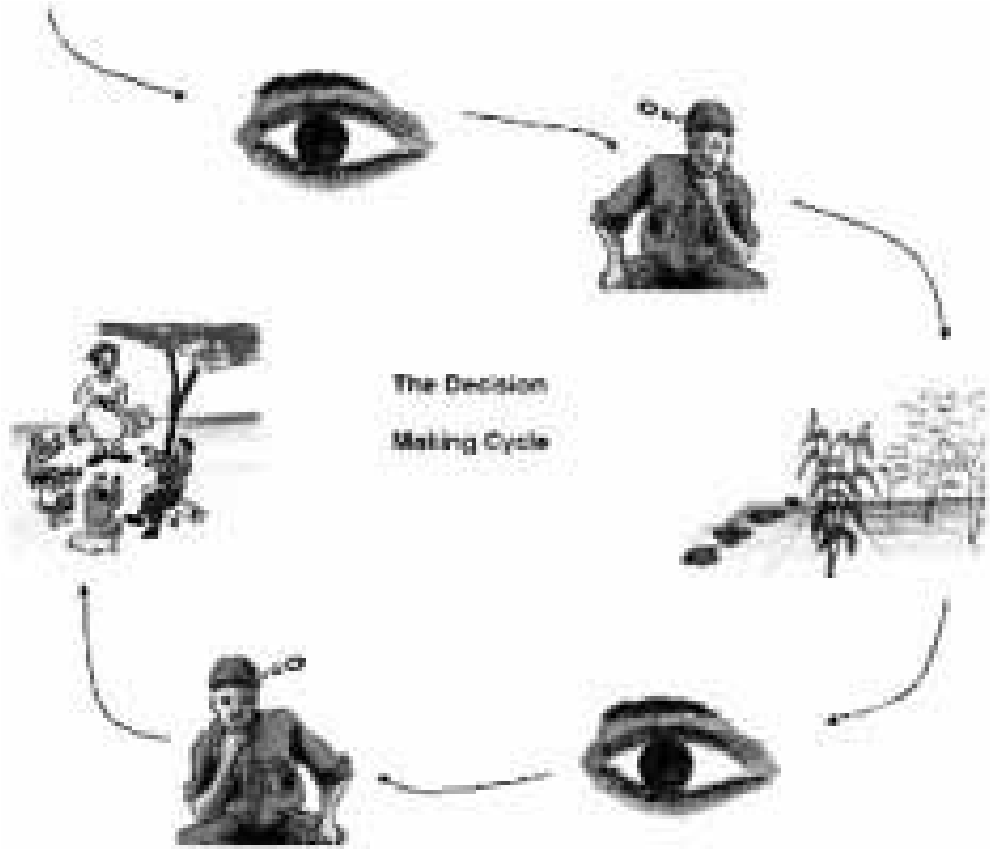
About 1.5 hour

MATERIALS:

Flipchart and markers.

STEPS

1. Tell the participants a story or describe a situation in which a child must make a decision (for example, a child wants to play with her friends, but her mother needs her to help clean up the house; or another child has parents who tell him that he must become an accountant driver, but he want to become a driver).
2. Ask the participants all of the possible decisions that could be made in the situation and write them down.
3. Divide the participants into small mixed groups (boys and girls). Ask them to prepare a role play in which they act out the two main options:
   - The child who follows the desire of his/her parents;
   - The child who follows his/her own dreams.
4. Ask each group to act out their play in front of the others.
5. Bring the Participants back together and ask them what the different advantages and disadvantages of the options are. Also ask them how they made their decision.



6. Show the participants the concept and phases of the decision-making process (show the figure on the following page). Ask the participants what they think each phase means
   - Receive/observe the information
   - Analyse the information
   - Experiment with different options
   - Observe and analyse the results
   - Make a decision (share/decide)

exercise 3

INTRODUCTION TO FAMILY PLANNING

OBJECTIVE:

To understand the importance of family planning.

TIME:

1 hour

MATERIALS:

Flip charts and marker pens.

STEPS:

Just as crops need enough room to grow healthy, people also need enough "space" to become healthy adults. It is important that the participants make this "link to life" so that they begin to think about child spacing.

1. Refer to the earlier exercise where the space required for a crop to spread its leaves and roots was discussed. Ask what connections can be draws to humans and the space that people require.
2. Ask the participants to give examples of what happens when people don't have enough space, for example in their house or when competing for natural resources or water.
3. Divide the participants into two groups. One group is a family with many children (6, 7, 8, 9, 10, 11, 12, and 18 years old) and the other group is a family with four children (5, 8 12, and 15 years old).
4. Ask each group to discuss about child spacing in a family.
5. Ask them to discuss the advantages and disadvantages of having a big family.
6. Have the two groups present their results in front of everyone.
7. Discuss the following questions:
   - What are the main advantages to having a large family? A small family?
   - What are the main disadvantages to having a large family? A small family?
   - What is the advantage of spacing children?
8. Summarize the presentations and make the link to spacing of crops in a field.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1. Planning for our future

STEPS:

1. Divide the participants into groups of eight or less.
2. Ask each group to think of a story (or a story told through song) about the importance of planning for the future in agriculture and life. It should include lots of detail about the people, places and situations involved. Encourage them to use speaking, singing and/or acting to communicate their story.
3. Ask each group to present their story. Encourage them to listen carefully to the other stories.
4. Ask them to comment on each story. For example, is it realistic? How does it make them feel? What are the strongest things that came out of it?
5. When the participants are finished making their comments, encourage them to reflect on what they saw. Some helpful questions are:
   - What did the stories show about relationships between people in the community?
   - What did they show about people's attitudes?
   - What did they show about the biggest challenges facing the community?
   - (If applicable, what did they show about how HIV/AIDS affects the community?)

Note: As an alternative, you or one of the participants can start with the first two to three sentences of a story. Then ask a volunteer to suggest the next two to three lines. Then ask another volunteer to suggest the next two to three lines. Keep going until the story reaches an end or has covered several important points.

ACTIVITY 2. Understanding the ecosystem

STEPS:

1. Divide the group into 4 subgroups.
2. Ask group 1 to go into a maize farm, group 2 a banana plantation, group 3 a rabbit pen and group 4 the JFFLS learning site. Allow them to mark an appreciable area preferably not more than 20 square metres.
3. For each group ask them to identify both living and non living things found there and list them.
4. Ask them to identify and describe ant relationship between them in the form of a relationship web.
5. Ask each group to make a presentation and encourage discussions.
6. Ask them what will happen if any of the components in the ecosystem are removed.
7. Summarize by emphasizing on what an ecosystem is, what the components are and the relationship that exists between them.

ACTIVITY 3. Show me how you look when you feel...

It is important for the participants to be able to recognize what they are feeling. Part of understanding feelings is also being able to recognize the messages given to us by body language. Persons who understand their own feelings can also understand how others are feeling too. This activity helps people to get to know their own feelings and understand how our bodies can express emotions that we are experiencing.

OBJECTIVE:

This activity helps people to get to know their own feelings and understand how our bodies can express emotions that we are experiencing.

MATERIALS:

A ball or similar object that the participants can throw to each other without hurting anyone.

STEPS:

1. Ask the participants to stand in a circle.
2. Give the ball to one of the participants.
3. The child passes or throws the ball to another girl or boy and says: “Show me how you look when you feel... (sad, happy, angry, jealous, frustrated, etc.)”
4. The child who catches the ball has to act out the feeling with her/his body. If the child seems to have difficulty, maybe you can say: “Show us what you do when you are... (sad, happy, angry, etc.)”
5. Some participants find it difficult to act out a feeling. The other participants can help by saying: “The last time I felt jealous was when....”.
6. It may be slow at first – sometimes the participants cannot get in touch with their feelings immediately. You can help them by saying: “Think of the last time you felt angry/sad/happy. Can you remember how it felt? Try to put yourself back there in your mind”.
7. You do not have to make sure that each child gets a chance; the game should be short and can be repeated in other sessions. Use your judgement for how long you want it to last. The first time you use it, the activity may be longer as the participants begin to understand what you are trying to do with them.

ASSESSING PROGRESS

INTRODUCTION TO PM&E – HOW GOOD ARE WE AT OBSERVING?

In order to monitor the activities undertaken in JFFLS and assess whether they are contributing to the established goal of participants, one needs to "observe" what is going on. Observation forms the basis for all monitoring and evaluation activities and is also a key element in exercises such as the AESA. Good observation skills can be enhanced and improved upon. This exercise makes it clear to participants that observation does not happen by itself but one has to make an effort to observe well.

OBJECTIVES:

- To learn the value of being a good observer;
- To become aware how good observation is an essential element of farm management.

STEPS:

1. One volunteer is asked to leave the group and remain out of sight for 10 minutes.
2. The remaining participants form into small subgroups of about 6 people each.
3. Each group discusses amongst themselves exactly what the missing person looked like: what was he/she wearing, how tall was he/she, what did the hair look like etc.
4. After discussing this for a few minutes, each group selects a volunteer to draw an image of the missing person, including as much detail as possible.
5. The missing person is then invited back and each group in turn compares their drawings with him/her. How accurate were the drawings? Did each group remember the same details? How good were the groups at observing?
6. The facilitator then broadens the discussion: how important is it to carefully observe our farm and animals? How can we improve our observational skills?

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3

Growing up healthy

Junior Farmer Field and Life School – Facilitator's guide

Module 3: Growing up healthy

Junior Farmer Field and Life Schoo — Facilitator's guide

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Module 3: Growing up healthy

INTRODUCTION

Growing healthy crops and animals and understand how people should grow healthy is one of the most important learning activity for the JFFLS participants.

A healthy crop is stronger and has fewer problems with pests and diseases; it will also produce better fruits and vegetables. The same is the case for animals and participants will, in this section, learn different ways to take care of both their crops and their animals. Good plant and animal nutrition is key to healthy growth. In the same way, aspects such as hygiene, sanitation and good agricultural practices play an important role in health and nutrition.

Therefore, in this module the participants will understand how to take care of themselves – through healthy nutrition and good hygiene.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modifies and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of the Module the participants should:

- Understand how to start a plant nursery;
- Appreciate good agricultural practices;
- Know how to ensure that crops and livestock grow up healthy;
- Know how to use the AESA exercise for regular monitoring of crops and livestock;
- Know how to apply HESA to understand the social and health impact of risky behaviour;
- Be able to relate crop and livestock nutrition to human health and nutrition.

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

ENERGIZER AND FUN (30 MIN)

IN THE LEARNING FIELD (45 MIN)

AGRICULTURAL TOPIC (45 MIN)

MAKING THE LINK WITH LIFE (30 MIN)

CULTURAL ACTIVITIES (ART, DRAMA, SONG) (30 MIN)

ASSESSING PROGRESS

CLOSING ENERGIZER

Exercises

↘ GETTING STARTED WITH "ENERGIZERS"

Some sample energizers that will also help to "break the ice" and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Matching cards

OBJECTIVE:

To introduce and raise interest for the module topic.

STEPS:

The facilitator chooses a number of statements that relate to the module topic such as "baskets can protect chicks!", "Regular monitoring produce a healthy crop!" etc., and writes half of each phrase on a piece of paper or card. For example, they write "Baskets can" on one piece of paper and "Protect chicks" on another. (The number of pieces of paper should match the number of participants in the group). The folded pieces of paper are then put into a hat. Each participant takes a piece of paper from the hat and tries to find the member of the group with the matching half of the statement.

Energizer: Gun, rabbit, wall[1]

OBJECTIVES:

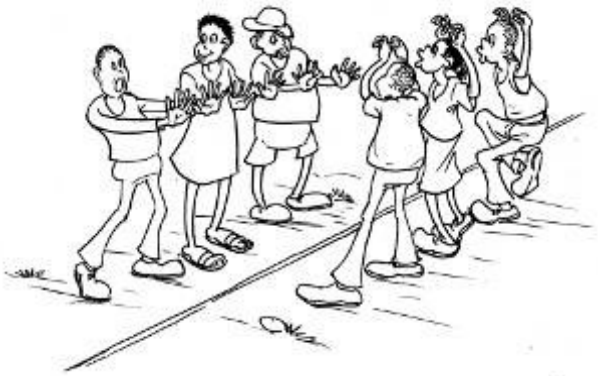
- To enhance understanding of strengths and weaknesses, and learn importance of identifying strengths of each individual to help one another overcome weaknesses;
- To recognise importance of group work and consensus, since all members of a team need to be going in the same direction;
- To understand that a group needs to be organised to function well.

STEPS:

1. Split the group into two.
2. The facilitator explains that there are three characters: a gun, a rabbit and a wall, each having its specific strengths and weaknesses. The gun can beat the rabbit since the rabbit can be shot. The wall beats the gun as it can stop the bullet, and the rabbit beats the wall as it can jump over it.
3. Each group has to decide whether it is a rabbit (by placing the hands on the head), a gun (by placing the hands like a gun) or a wall (by stretching the arms out wide).

[1] Adapted from Livestock Farmer Field Schools, Guidelines for Facilitation and Technical Manual (Groeneweg et. al., 2006).

4. The two groups form a line facing each other. The facilitator counts to three, then the groups show which they are by making the movements. The team with the most “winning” moves is declared the winner.



5. What can be learned from this exercise? Each creature has its strengths and weaknesses. Also, a group needs to be organised and must communicate well, and a good leader can bring the group together.
6. In addition, the group has to pull together and will lose out if one person does something different from the others.
7. Ask the participants to comment on what can be learned from the exercise (each creature has its strengths and weaknesses and that the group needs to be organised and communicate and reach a consensus to be able to win the game).

STARTING A NURSERY: FROM NURSERY BED TO THE FIELD

Many crops that we want to grow in the field need to be planted in nursery beds first, and then transplanted to the field after a few weeks. It is important for the participants to understand how to prepare a nursery bed, how to plant the seeds, take care of the seedlings, and how to transplant them to the learning field at the right time. Here are some sample activities that you may want to use.

exercise 1

WHY WE NEED NURSERY BEDS[2]

OBJECTIVE:
To understand the importance of nursery beds.

TIME:
About 1.5 hour

MATERIALS:
Large sheets of paper and markers.

STEPS:

1. Ask the participants the following questions, and write their responses on the flip charts:
   - Why do farmers often grow horticultural crops first in a nursery bed and then transplant them later into the main field?
   - How and where should you build your nursery bed?
2. Then take the participants to the place where you have decided to prepare the nursery bed.
3. Ask the participants the following questions:
   - What do the seedlings in the nursery bed need to be protected from?
   - How can we provide the needed protection?
   - How do we need to take care of the seedlings?
   - How can we build the nursery bed so that it helps protect and take good care of the seedlings?

exercise 2

CONSTRUCTING A NURSERY BED

The participants will now practice preparation of a nursery bed. Take them through the following steps, making sure that everybody participates in the work. Depending on the number of nursery beds that you are preparing, you may be able to divide the participants into smaller groups.

- **Select a good site:** An ideal location would be a place near the learning field (so that the nursery is often visited and well taken care of), with good and fertile soil, near a reliable source of water and where water does not collect or stagnate. Avoid placing the nursery beds where existing species of the same family have pest and disease problems.
- **Clear the site:** Remove stumps, roots, and stones in the area. Leaves and other non-wood debris can be separated and made into compost.
- **Layout of the beds:** Horizontal, if possible oriented east west (sun), one-meter width and half a meter between the beds.
-

OBJECTIVE:
To understand how to construct a nursery bed.

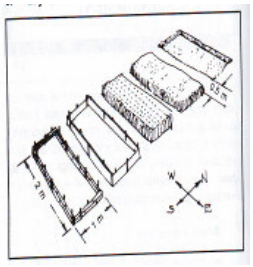
[2] Adapted based on personal communication with Jaap van de Pool.

TIME:
About 2 hours

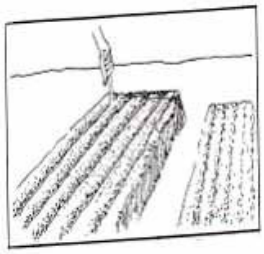
STEPS:

1. Mark out the boundary of nursery beds with string.
2. Dig the soil in the beds, break lumps of earth and remove remaining roots and rhizomes.
3. Loosen the soil and make a raised bed, narrow enough to allow for weeding without stepping on it (± 1 meter width).
4. Add compost and river sand, if needed, and mix well. Sand can help in loosening the soil for better drainage and easy uprooting of the seedlings.
5. Level the bed and if needed prepare borders. Make shallow furrows using a stick.
6. Sow the seeds (treated with protectant if necessary) in the furrows at recommended depth. Allow sufficient room for the seedlings to grow.
7. Cover the furrows thinly with soil no more than 2-3 times the thickness of the seeds.
8. Scatter wood ash all over the seedbed if ants and snails are a problem.
9. Use mulch like rice straw, grass, compost and partly decomposed forest litter to protect the seed and soil from heavy rains and weeds and to keep the soil constantly moist.
10. If needed, construct (low) shade structures.

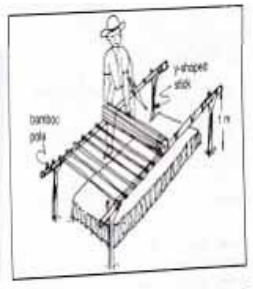
Orientation of the beds



Sowing of the seeds



Constructing shade



❮❯ exercise 3

TEST FOR SEED GERMINATION

This exercise shows the “Germination Power” of seeds and demonstrate that seeds will grow only when the embryo is healthy, when it has enough nutrients, and when enough water and oxygen are available.

OBJECTIVE:
To understand how seeds germinate.

TIME:
Half a day, and about a week of monitoring

MATERIALS:

- Soft paper (or other alternatives, like leaves);
- Seeds for different food/tree crops (enough seeds for each group of participants);

- Plastic bags;
- Clean water.

STEPS:

1. Divide the participants into groups of about 4-5 persons who live close to each other.
2. Have each groups count out 100 seeds from the different batches of seeds.
3. Ask them to prepare two layers of paper towel and carefully damp them with clean water until they are moist but not wet.
4. Ask the participants to put the 100 seeds on top of the towel in 10 rows of 10 seeds (the distance between the seeds should be around 2 cm).
5. Have them cover the seeds with the other layer of paper towel, moist the paper towel with water and roll the towel with the seeds into a loose type of sausage roll.
6. Ask the participants to place the roll into a plastic bag to keep the paper damp (the majority of seeds germinate better in the dark, so dark plastic is usually better).
7. Have them write the name of the group on the bag, the letter of the seed batch it contains, and the date the seeds were sown.
8. Select one member of each subgroup who will keep the bag at their place and make sure that it's stored in a dark place.
9. The host of the bag (together with other group members, if possibly) will then make daily observations of the seeds by opening the bag and rolling out the paper to observe the germination. He/she will note the number of seed that have germinated each day and remove them. Once the number is observed and noted (remove the germinated seeds) roll the towel up again and put it back into the plastic bag for other daily observations.

10. At the next JFFLS session ask the groups to report back their findings:
    - How much time did it take for the seed to germinate?
    - How many seeds germinated? Was the number low or high?
    - Why is it important to know the germination capacity for seeds?

facilitators' notes 1

SEED GERMINATION

Depending on the crop the germination process can be observed after 1,2 or more days.

Seeds germinate more quickly on paper towel than they do in the field. While the paper towel makes it easier to observe, it can also produce inaccurate estimates of germination periods.

The batch of seeds can be put in a jar or a pot of water in order to watch if some seeds sink to the bottom or not. When they float it can mean that they are not good and that they probably won't germinate. When they sink it can be a good indicator of how easily they will germinate. In this case, the seed exercise can also be used to compare the germination of floating seeds and the germination of seeds that sink, by having the groups prepare a roll of seeds from each sub-batch

exercise 4

TRANSPLANTING SEEDLINGS

Transplanting is stressful for the seedlings. If not done carefully, the seedlings may suffer and not continue to grow properly.

OBJECTIVE:
To know how to transplant seedlings.

TIME:
About 2 hours

MATERIALS:
Flipchart and markers.

STEPS:

1. Before going to the learning field, ask the participants the following questions, and list their answers on a flipchart:
   - What are the different steps in transplanting seedlings?
   - What are the most important things to do when you are transplanting seedlings?
   - What is the best time of the day to transplant seedlings (morning, mid-morning or evening) and why?
   - Why should the farmer only transplant strong and healthy seedlings?
   - Why is it important to transplant the seedlings at the right age, not too young and not too old?
   - What can a farmer do to reduce the stress of the seedlings after transplanting? (mulching)
2. Now go with the participants to the main field where the seedlings later on will have to be transplanted from the nursery bed(s). Ask the participants the following questions:
   - Is the field ready for the seedlings? If yes, why do you think so? If not, what still needs to be done to be able to start planting the seedlings?
3. Have the participants participate in transplanting the seedlings:
   - Discuss the different steps of transplanting the seedlings.
   - Water the nursery bed and demonstrate how to collect the seedlings from the nursery bed, without damaging the leaves and roots.
   - Ask all the participants to practice collecting a number of seedlings from the nursery bed.
   - Show how to transport the seedlings to the main field.
   - Ask the participants to collect all the uprooted seedlings from the nursery bed and to take them to the main field.
   - Discuss and show the participants how to plant the seedlings in the main field.
   - Ask the participants to plant the rest of the seedlings.
   - Ask the participants to water the transplanted seedling and if needed apply the mulch.
4. When you have finished, summarize all the steps of transplanting seedlings.

facilitators' notes 2

STEPS IN TRANSPLATING

Steps in transplanting seedlings	Important aspects
1. Preparing the main field.	Well prepared and fertilised soil, no weeds.
2. Water the nursery bed.	Sprinkle the water in a manner that you disturb the soil as little as possible.
3. Digging up the seedlings.	End of the day, select only the strong seedlings for transplanting, leave soil on the roots and be careful not to damage the roots.
4. Transporting the seedlings.	Short time, keep wet and in the shade. The uprooted seedlings should be
5. Planting the seedlings.	End of the day, careful not to break or bend the roots.
6. Watering the main field.	The seedlings should not suffer from water stress after transplanting.

HOW TO ENSURE GOOD AGRICULTURAL PRACTICES

In order to be able to grow a healthy crop, a number of good agricultural practices need to be undertaken and practiced. For example the soil needs to be tilled in a manner that ensures as little disturbance as possible to soil functions. The planting methods needs to ensure optimal spacing and crop rotation should be practiced in order to maintain the quality of the land in the long term. Integrated pest management can be helpful to ensure that unnecessary spraying of fields cause health hazards to humans and biodiversity. In this section some sample activities that you may want to use to cover the above topics are presented.

exercise 1

UNDERSTANDING METHODS OF LAND PREPARATION

OBJECTIVE:
To understand the different methods of land preparation.

TIME:
About 1 hour

MATERIALS:
Flipchart and markers.

STEPS:

1. Ask participants to explain what land preparation is.
2. Ask participants to explain why land preparation is important.
3. Discuss the different methods of land preparation (hand method, ox-cultivation, tractor, minimum tillage) giving advantages and disadvantages of each. In the discussion that follows, you may want to refer to the box below to make sure that certain key ideas come up.

facilitators' notes 1

MINIMUM TILLAGE

Reduced or zero tillage

Reduced tillage refers to practices that do not disturb the entire soil surface, but loosen only that part of the soil where the crops grow, or by no- or zero-tillage practices that leave the soil surface undisturbed.

In reduced or zero tillage systems, land preparation involves slashing of weeds or former crop residues. Crop seeds are sown into a small slot in the soil either placed in the soil through the mulch layer or spread (broadcast) over the mulch. Besides the small slots that are traced across the field, the rest of the field is not disturbed.

Leaving the soil undisturbed will keep the soil healthy: the diverse soil organisms will all co-exist and interact each species living and carrying out its functions and the "goodies" and the "baddies" will be in balance (equilibrium). Tillage usually disturbs this natural balance - reducing the good or beneficial soil organisms and giving others the opportunity to multiply and become a pest or source of disease to the crop e.g. nematodes, termites and grubs. It is interesting to note that if kept in balance even these potentially harmful organisms do not seriously harm the crop.

exercise 2

UNDERSTANDING SOIL EROSION

OBJECTIVE:

To understand what soil erosion is.

TIME:

About 1 hour

MATERIALS:

Flipchart and markers.

STEPS:

1. Begin by asking the participants what they think soil erosion means, what causes it and why it is not a good thing. Keep a list of their responses on flip charts and then break into a group discussion on the topic.
2. Then take the participants to observe a field suffering from erosion and ask the following questions:
   - What is the field like?
   - What is erosion?
   - Where can we observe erosion?
   - Why and how does erosion happen?
   - Is it a good thing or not? Why?
   - What do farmers do to fight erosion?
3. Use the key points below to summarise the exercise.

facilitators' notes 2

SOIL EROSION

Erosion happens when the soil start to disappear, as it is slowly eaten away. Soil erosion has one of the most negative impacts on agricultural, as well as having very bad effects on the environment. So, controlling it is very important!

Soil erosion is caused by natural activity:

- Normal or geological erosion
- Wind erosion
- Water erosion

Factors influencing soil erosion are:

- Rain
- Land gradient
- Soil structure (texture, organic matter, water seepage, permeability, etc.)
- High population density, destruction of forests and other ground cover, etc.

exercise 3

CAUSE AND PREVENTION OF SOIL EROSION

OBJECTIVES:

- To demonstrate how erosion occurs on a bare soil;
- To understand the importance of soil cover.

TIME:

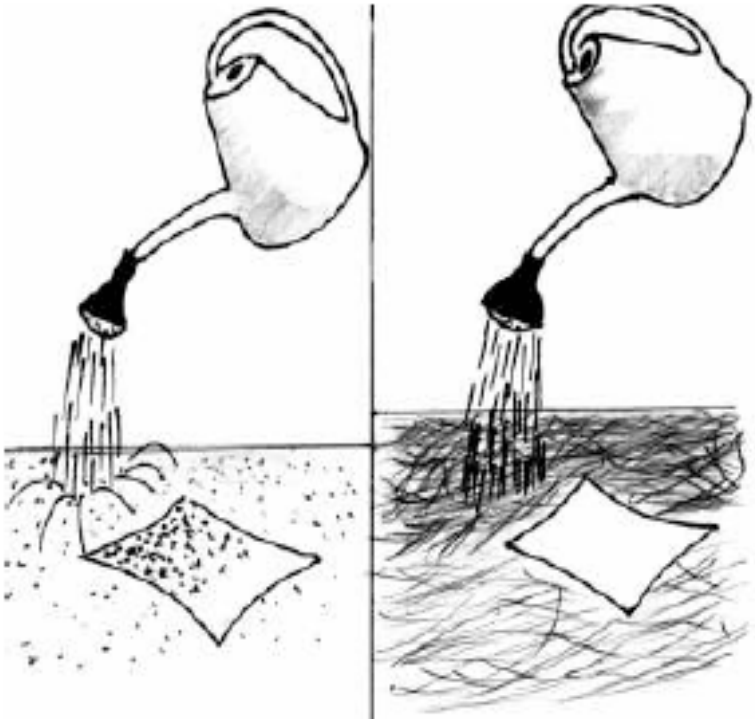
About 20 minutes

MATERIALS:

Two pieces of cloth or clean paper; a water can or old tin can with small holes on the bottom (to let the water pour out like rain).

STEPS:

1. Go with the group to a small land area that lacks plant coverage.
2. Place one of the pieces of cloth or paper on the soil. Water the cloth or paper intensely as if rain was falling.
3. Observe and discuss the number of soil spots you can see on the towel/paper, explaining that it looks like what happens when rain falls on uncovered soils.
4. Repeat the exercise with a new piece of cloth or paper in a place where the soil is covered by grass, weeds or dead foliage. The second piece of cloth or paper will have less land spots in comparison to the first.
5. Discuss the observations: what does this tell us about erosion and about the importance of keeping the soil covered?



exercise 4

OBSERVING PLANT SPACING

OBJECTIVE:

To reflect on plant spacing and row planting.

TIME:

About 1.5 hour

MATERIALS:

Flip chart paper and markers, measuring tape.

STEPS:

1. Organize a visit to a field with a stand of a mature crop, or preferably several crop stands, so that everyone can observe the space between the different plants in the field.
2. Ask the participants to observe the gap between the plants and try to imagine the way they were planted (in a row, in a bed, randomly). Have different participants measure the distance between plants of different types of crops (distances between rows and between each plant). Have them then to record their observations on a table, arranged according to the different crops in the field.
3. Ask the participants the following questions:
   - What does crop density mean?
   - Why is it important to respect certain distances between plants or seeds when planting a crop?
   - What advantages or disadvantages are there in sowing seeds in a line or randomly?
   - What do you think can happen to individual plants when they are placed to closely together?
4. Explain to the participants the ideal spacing and planting method for some of the most common crops in the area, including a cereal, a legume and a tuber crop. As you explain ask a few participants to help prepare a drawing on a large sheet of paper that visually shows the spacing for the various crops.
5. Considering that some seeds planted might never germinate, or some plants may die young due to pest or diseases, discuss different ways of ensuring a good spacing and density of the mature crop. For example by planting more seeds than necessary and then weed out some if they all survive, etc.

exercise 5

UNDERSTANDING CROP ROTATION

OBJECTIVE:

To understand the benefits of crop rotation.

TIME:

About 1 hour

MATERIALS:

Large sheets of paper and markers.

STEPS:

1. Ask the participants what they think the negative effects could be of growing the same crop in the same field many consecutive years. List the answers on the flipchart.
2. Review each item on the list and ask the participants how they think that crop rotation could help.
3. Discuss the following questions:
   - What pests and diseases attack only certain crops and which ones attack a range of crops?
   - Is it possible to identify groups of crops that are affected by the same pest and disease?
   - How can this help in identifying a suitable crop rotation practice?
   - How can crop rotation have an effect on the fertility of a soil? How can it have an effect on weeds?
   - Can you think of any of the main crop rotations practised in the area?
4. Divide the participants into small groups and ask each group to list all the different crop rotations they know that farmers in the area are using:
   - Ask the groups to discuss how these different crop rotations could help maintain a healthy field and crops.
   - Ask the small groups to present the results of their discussions.
   - Discuss the presentations and try to conclude on the best, most effective crop rotations that farmers practice in the area.

facilitators' notes 3

BENEFITS OF CROP ROTATION

Main principle of crop rotation

In crop rotation specific crops or groups of crops are grown on different piece of land each year. Groups are moved around in sequence, so they don't return to the same spot for at least three years.

Benefits of crop rotation

- **Pest and disease control:** soil pests and diseases tend to attack specific plant families, so by rotating crops the pests' life-cycles are broken.
- **Weed control:** some crops (e.g. potatoes and squashes) can suppress weeds, minimizing problems for following crops.
- **Soil fertility:** different crops have different soil requirements and benefits. Changing crops grown from one year to another minimizes soil deficiencies and allows the soil to replenish.
- Soil structure: alternating between deep-rooted and fibrous-rooted crops improves soil structure.

facilitators' notes 4

ROTATION FOR SOIL NUTRIENTS

Here is an example of how to rotate crops to keep the soil rich in nutrients. The idea is to divide your crops into four different types for four different seasonal rotations:

- **Leaves:** thrive on nitrogen; examples include lettuce, salad greens, chicory, spinach, broccoli, Brussels sprouts, cabbage, cauliflower, kale and kohlrabi.
- **Fruits:** need phosphorus; examples include squashes, cucumbers, melons, pumpkins, tomatoes, peppers, and eggplants.
- **Roots:** love potassium; examples include onions, shallots, garlic, scallions, leeks, carrots, beets, turnips, and radishes.
- **Soil builders and cleaners:** legumes are excellent for the soil because they store nitrogen from the air and release it into the soil; examples of cleaners include corn and potatoes, examples of builders include beans and peas.

For example, the first season of planting could be devoted to leafy plants, the next season to fruits, followed by the root plants and then legumes.

exercise 6

MANAGEMENT (IP UNDERSTANDING PRINCIPLES OF INTEGRATED PEST M)

Growing a healthy crop is a key in good farming. Healthy plants are stronger and can defend themselves better against pests and diseases. The different ways that we take care of our field have an effect on the health of our crops and can also be used to manage any pest problems.

Growing a healthy crop is the first principle of Integrated Pest Management (IPM). IPM is about pests, but it is much more than just pest control. IPM is not about eliminating all pests. In fact, some pests are needed to keep natural enemies away from the field. IPM is about reducing those pests that cause damage and yield loss.

IPM may often be focused on using pesticides as little as possible. But the basis of good crop management decisions is to have a better understanding of the crop ecosystem, including that of the pests, their natural enemies, and the surrounding environment. Monitoring of the crop is the first step into understanding ecosystems.

OBJECTIVE:

To understand the main principles of IPM.

TIME:

About 1 hour

MATERIALS:

Flip chart paper and markers, measuring tape.

STEPS:

1. Introduce the four principles of IPM:
   - Grow a healthy crop;
   - Understand and conserve defenders;

- Visit field regularly;
- Become an expert in managing your crops;

2. Ask the participants what they think each of these principles means.
3. Divide the participants in groups and ask each group to write down the different crop management practices that they think will have an effect on the health of a crop.
4. Ask one representative from each group to present their findings to the class.

PLANT NUTRITION

In this section participants will start to understand and appreciate the nutritional elements which are needed for healthy growing of plants and animals including people.

exercise 1

PLANT NUTRIENTS

OBJECTIVES:

- To introduce the importance and definition of plant nutrients;
- To realise the link between plant nutrition and human feeding.

TIME:

About 1 hour

MATERIALS:

Maize leafs from a poor and from a healthy soil.

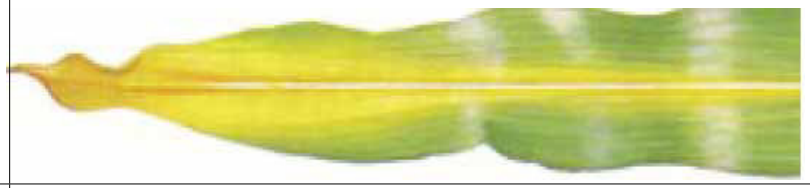
STEPS:

1. Ask the participants to discuss and list down the ingredients that are used in cooking that are little in amount but very necessary. This may include oil, salt, sugar, baking soda etc.
2. Let them explain why these ingredients, which are often just small portions of what they eat, are still important.
3. Show the participants a healthy and an unhealthy crop leaf collected from a fertile site versus a site of poor soil fertility in the surrounding area. The sites could be a general field and the other a special place e.g. close to the animal unit or next to where kitchen waste is deposited.
4. Ask them to guess the sites where the leaves were collected.
5. Let the participants take a walk through the field and look for the sites whether the samples were collected from.
6. In plenary discuss how plants look when they are sufficiently supplied by nutrients. This may include colour of leaves, sizes of plants, fruits. Refer to the chart below showing how different colours indicate specific nutrient gaps in the soil.
7. Observe the entire fields where the leaf samples were collected. Let them discuss what factors are essential for healthy growth of plants and reason for what could be contributing to the crops at one site doing better than that of another site?

facilitators' notes 1

NUTRIENT INDICATIONS ON PLANT LEAVES

Nutrients shortages as indicated by colour changes on leaves

Healthy with dark leaves and shiny.	
Phosphate shortage, reddish purplish especially on young plants.	
Potash deficiency appearing as firing with brownish color on edges up to the tip of leaves.	
Nitrogen hunger and the yellowish colour star from tip and moves along the middle line.	
Magnesium deficiency causing whitish strips and purplish colour in the back side.	
Drought causes leaves to be grey-greenish in colour, leaves roll up to size of pencil.	
Disease starts with small spots.	
Chemicals may sometimes burn the plants.	

exercise 2

EFFECTS OF GOOD AND POOR NUTRITION ON HARVESTS

OBJECTIVE:

To understand the effects that good or poor nutrition has on harvests.

TIME:

45 minutes

MATERIALS:

A selection of different maize cobs.

STEPS:

1. Ask the participants in advance to bring three cobs of maize each to the planned session.
2. Let each participant make a mark on their cobs to identify the ones they brought. The cobs should be different in appearance.
3. Ask them to work in sub groups to guess what could have caused the differences they have seen.
4. Group the cobs that are similar in the way grains are distributed on the kernel and try to evaluate what type of problems are most common.
5. Based on the observations and the notes below discuss what the effects of nutrient shortage have on crop performance.
6. Introduce the idea of composting and discuss the process of establishing a compost heap based on the notes further below.

facilitators' notes 2

NUTRIENT INDICATIONS ON MAIZE COBS

Effects of nutrient shortages on crop performance

Small ears are sign of low fertility. Boost yield by application of fertilizer.	
Well filled, each kernels weigh about 2/3llb.	
Potash shortage and so the grains are not well filled at the tips and loosely chaffy kernels.	
Phosphate shortage interfering with pollination and kernel fill. Ears often short, with poorly developed kernels.	
Shortage of nitrogen as the plant was growing. Kernel at tip did not fill because there was poor protein supply to form seeds.	
Green silk when plant is mature indicating there was too much nitrogen in relation to other nutrients.	
Dry weather slowed silking behind traselling. Kernels are not pollinated.	

facilitators' notes 3

BUILDING A COMPOST HEAP[3]

Composting is an excellent way to improve the fertility of the soil. A compost heap can be built up gradually by any farmer, provided that layers of organic waste, soil, fresh manure and green plant material are alternated. The key to good compost making is to collect as wide a range of suitable materials as possible. A micro-biological process causes the composting of this material into rich organic fertilizer. In composting, the presence of water and air is important. The compost heap should neither be too wet, nor too compact. The heap should be turned every few weeks to ensure equal maturing of the compost.

MATERIALS:

- Ingredients for the compost heap: manures, crop residues, grass, leaves, weeds, lime, rock phosphate, wood ash, etc;
- Wooden stakes, roughly 1.5 m tall and 4-5 cm diameter;
- Plastic twine;
- Branches for stakes;
- Plastic tarpaulin (if available).

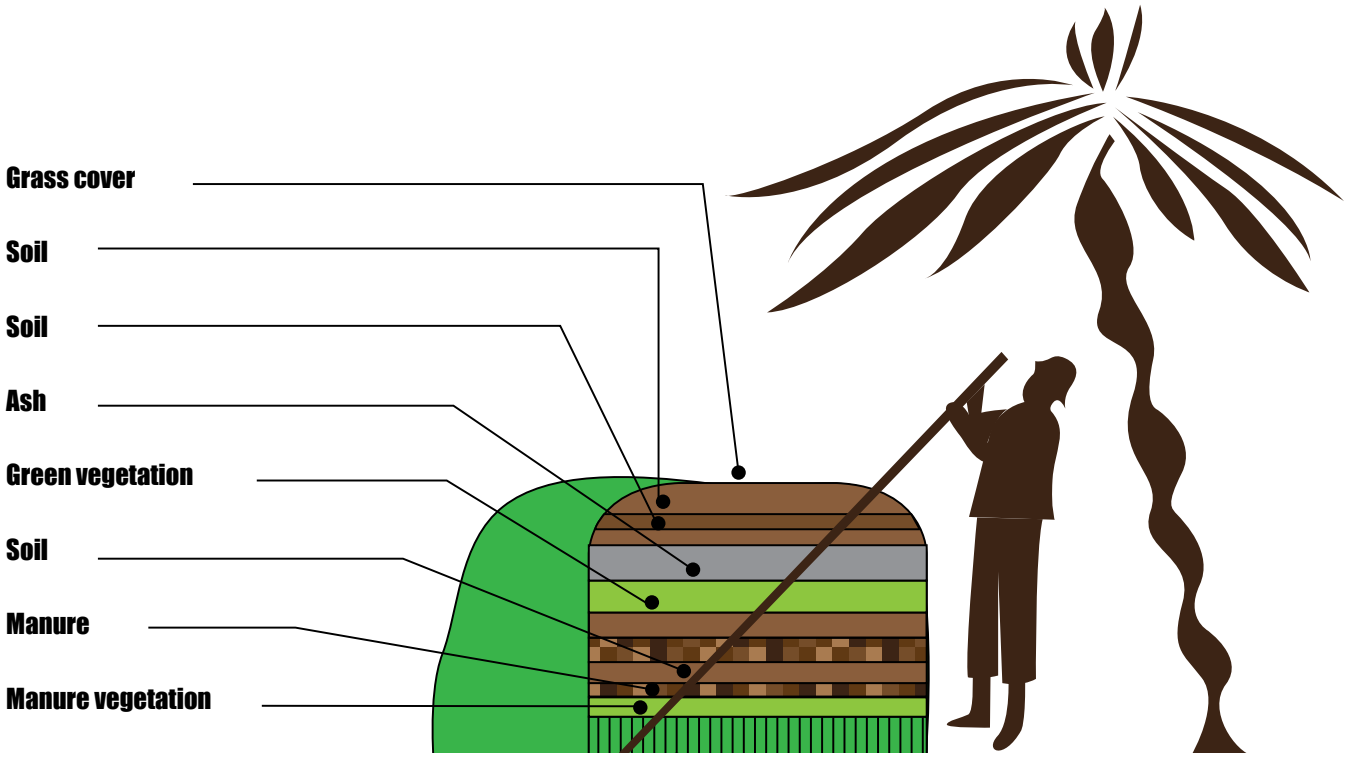
STEPS:

1. Try to build your own compost heap in the shade or near to a water supply if possible, using the guide below or through making a compost pit.
2. Identify and gather available materials and chop these plants materials up with a large knife to accelerate the breakdown process.
3. Collect animal dung (cow, chicken and pig dung can be used) ashes, by-products, feathers and rock phosphate.
4. Make a wooden cage of about 1.5 meters wide and high from the branches and the twine. Spaces between branches should be 2-3 cm.
5. First make a layer of coarse plant material such as stalks or twigs is needed to ensure good air circulation and drainage. Following that, organic material should be placed in layers (see drawings in the illustration).
6. Apply water to the material to be composted and mix in very thoroughly (as if mixing cement). When sufficiently moist place the material in a thin layer on the heap. Organic material should be placed in layers of 10 cm, manure only 2 and soil only 1 cm respectively. N.B.: Don't take the shortcut of placing dry materials on the heap and watering them. It never works!!!
7. After the layers are completed (at a height of about 1 meters), thrust a pole down to the bottom of the pile in 4 to 6 locations in order to create an air channel to the center of the pile. Cover the heap with sacks, grass or banana leaves.
8. Turn the compost heap every 2 to 3 weeks. In turning, the heap is completely taken apart. It is built up again on a base of coarse material. The drier and less decomposed parts such as the edges are placed in the centre of the new heap.
9. During the dry season: cover the heap with a thin layer of soil to reduce evaporation and minimize fly breeding. Where water is scarce, composts can also be built in pits to minimize water loss.
10. During the rainy season: turn the heap after every rainstorm until the heap is moist throughout.

[3] Adapted from Settle (2000), CABI/FAO (2000) and IFOAM (2002).

Cover the heap with a plastic sheet, grass or dry-mud so that the rains do not bring the temperature in the heap down.

11. Depending on the climate, it may take several months before the compost is fully matured. The compost can be used as soon as most of the original material is no longer recognisable and has turned into brown / blackish and crumbly substance.



ANIMAL FEED AND NUTRITION

Proper feeding is essential to ensure that animals receive adequate nutrients for maintenance of production and a healthy body condition. Good pasture land provides all the essential items for good nutrition of livestock. However, sometimes pastures are degraded or grazing is restricted to certain areas. Livestock might therefore be missing out on some valuable food items and supplementation thereby becomes necessary.

exercise 1

MAIN FEED GROUPS

OBJECTIVES:

- To become familiar with local examples of the five different food groups and the benefit of each;
- To realize the need to provide a balanced diet to animals, especially those that are sick, pregnant or injured.

TIME:

1 hour

MATERIALS:

Flip charts, markers, tape, pasture or area to collect feed samples.

STEPS:

1. Group the participants into groups of 4-5 members. Have each group go out and collect as many types of livestock food as they can find (different types of grasses, pods, leaves etc.), in a 20 minute time, and then come back to the learning site with the samples.
2. Each group then presents what they found to the others, describing the plant or food, where it grows and what benefit it provides to the livestock.
3. Ask the participants the following questions; “Why do some of these plants bring different benefits than others?”, “Why do some animals at certain times seek after certain plants?”, What would happen if we only gave animals one of these plants and never any other?”, “Are there some plants not included in the collected samples that normally are important for your animals?”
4. Discuss the need for a balanced diet, where animals eat a variety of foods including items from all the main food groups listed below including:
   - Proteins: body building foods.
   - Carbohydrates and fats: energy giving foods.
   - Minerals: for healthy bones, blood and milk production.
   - Vitamins: protective foods.
   - Water: essential for life.
5. Ask participants for examples among the plants collected that provide good sources of each of the various food groups. Also discuss the specific nutritional requirements of pregnant or milk giving females or sick animals.
6. Introduce the idea of conserving grass as hay based on the notes below.

facilitators' notes 1

CONSERVING GRASS AS HAY

What is hay?
Hay consists of grass, sorghum, maize stover, rice straws and other leafy feeds cut when green and dried before storage.

Procedure:

1. Cut the grass just before or during its flowering stage. Or when the leaves are rich enough (very green).

2. Spread the grass on the ground to dry. Leave the cut grass in the field to dry for at least 3 days. Protect the drying grass from rain or moist in order to avoid mould development. Turn the grass after 1-2 days.

3. When dry, collect the material and bale using a simple hand baler.

exercise 2

A BALANCED MEAL FOR YOUR CHICKEN

OBJECTIVES:

To understand what a balanced meal means and what it includes.

TIME:

40 minutes

MATERIALS:

Paper and marker pens.

STEPS:

1. The week before the activity, ask participants to bring: a small amount of something they would eat at home themselves and a small amount of what they feed to their chicken at home.
2. Ask the participants to suggest a meal and lay it out on the table. They should use the foodstuff they brought and may make cards for what is missing but that they regularly use.
3. Ask them to prepare a sample of meal for a chicken using the items that they brought.
4. Ask each group to present their findings.
5. Analyse to see which meal included all the necessary components for a healthy living.
6. Did they identify the five food types for humans (water, carbohydrate, fats and oils, protein, minerals salts and vitamins)?
7. Based on the notes below discuss the purpose of each food/feed type and relate this to the food types needed by chickens.
8. Discuss the sources and quantities of each of these feedstuff needed by chickens.

facilitators' notes 2

POULTRY FEEDING

Supplement feeding for more eggs, meat and disease control:

- **Energy foods:** crushed cereals or root crops.
- **Protein foods:** legumes, cowpea/cassava leaves, animal products; termites, insects, worms, fish or meat by-products.
- **Vitamines:** fruits, greens, grasses etc.
- **Minerals:** crushed egg-shells, bones etc.
- Provide **clean drinking water** at all times.

REGULAR MONITORING THROUGH CROP AGROECOSYSTEM ANALYSIS (AESA)

The AESA was introduced in an earlier module, but it is important to remember that the AESA needs to be done frequently so that the participants can really understand and manage the growth of their crops. As long as crops are present in the learning field, the participants should conduct an AESA once a week.

exercise 1

UNDERSTANDING FIELD ECOSYSTEMS

In order to protect crops against pest and diseases the participants first need to understand the "ecosystem" of the learning field. The ecosystem is all of the plants, animals and micro-organisms in a particular area and how they interact with each other.

OBJECTIVES:

- To study the field ecosystem and the role of natural enemies in controlling pests and diseases;
- To understand the meaning of an ecosystem and how to analyse it.

TIME:

1.5 hour

MATERIALS:

Large sheets of paper and markers, plastic bags, alcohol and glue.

STEPS:

1. Introduce the topic of protecting crop against pest and diseases.
2. Ask the participants to mention the four principles of IPM and discuss these four principles in relation to protecting the crop against pest and diseases.
3. Ask the participants what they think an "ecosystem" means.
4. Go with the participants to the learning field. Divide them in small groups and ask the groups to collect as many different types of organisms in the field (ecosystem) as they can, including plants, plants with diseases, insects, worms, spiders, flies etc.
5. Ask the groups to go to a shady spot. Add alcohol to the plastic bag and shake the bag so that the live animals die.
6. Discuss and separate with the participants the collected organisms by their function in the ecosystem. Ask the participants to place them in different levels: plants at the bottom, plant feeders at level 2, natural enemies at level 3, and decomposers at level 4. Glue them on a piece of paper. If uncertain of the function, label the organism as "uncertain".
7. Discuss in the group the following questions:
   - Are all the plants they found "weeds". Why or why not?
   - Are all insects "pests". Why or why not?
   - Are all pests present in the field a problem?
   - Is a pest insect a problem during all its development stages or only during one or two?
   - What are the different development stages of one of the selected insect?
   - How do the natural enemies (defenders) help the farmer in managing pests and diseases in the field?
8. Summarize the observations and discussion made in the field.

exercise 2

REGULAR MONITORING THROUGH CROP AESA

OBJECTIVE:

To practice how to carry out regular monitoring of crops through AESA.

TIME:

2 hours

MATERIALS:

Large sheets of paper and makers, measuring tape or stick.

STEPS:

1. Hold a "refresher discussion with the participants about AESA: What is it? Why do we do it? How should it be done?"
2. Go with the participants to the learning field and divide them in small groups of 4-5 persons in each.
3. Assign an area in the learning field for each group to study a selected plot size or number of plants (depending on the crop).
4. Ask the groups to make a list of important observations about their crops' development so far, and recommendations.
5. Ask each group to discuss the information they have written down and to propose management practices to solve any problems. For example, if many weeds have been observed, weeding might be proposed as a management suggestion.
6. Summarize the findings on one sheet of paper that can be used as a monitoring and recording sheet. Drawings should be simple and reflect field conditions/observations.
7. Ask each sub-group to present their findings. Make sure different people present their findings each time.
8. Discuss the group presentations and the suggested management options, and decide together on what immediate actions have to be taken – and who will take them.

facilitators' notes 1

EXAMPLE OF QUESTIONS FOR DISCUSSION DURING AESA

Probing to explain the dynamics in using integrated pest management approach:

questions for discussion at the seedling stage

- Comment on the overall health condition.
- What is not satisfactory with the colours of leaves, what could be the cause variation?
- What effect is the weather having on plant growth?
- What kind of damage are the pests doing at the present crop stage?
- What kind of pests do you see and how many are there?
- Is there danger of pests increasing by reproduction?
- Asses if the friendly insects are also reproducing?
- Is there any way to prevent these pests from increasing?
- What is the pest condition in other fields in the area that could influence your field?

- How many of them are there? Where do you think they might have come from?
- What do they eat and what did they eat before they were pests?
- Are there insects that are neither pest nor natural enemies?
- Are there decomposers that eat dead material in the soil?
- Are the pest and natural enemy populations increasing or decreasing compared to previous weeks?
- How does the condition of the field compare with the previous week?
- What do you expect will happen next week?
- Are there any specific pests to monitor more carefully?
- Do you think there is a need to apply insecticide? If no, is there an alternative?
- Have the plants recovered from pest damage during a previous stage?
- Is there any disease in the field? How can they be managed or controlled?
- Is the plant developing as expected (how many leaves, height, etc.)?
- Are there many weeds? When is the right time to do weeding?
- What is the management plan for next week?
- Were last week's decisions effective?

exercise 3

REGULAR MONITORING THOUGH LIVESTOCK AESA[4]

OBJECTIVE:

To understand how to carry out regular monitoring of livestock through AESA.

TIME:

1.5 hour

MATERIALS:

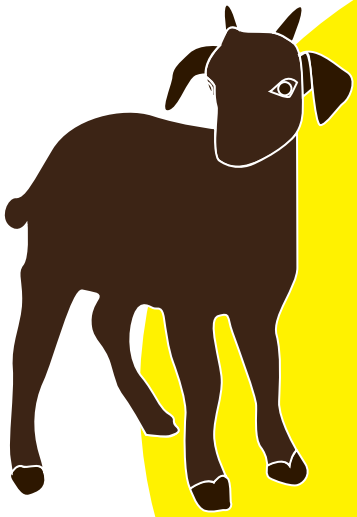
Pen/pencils, markers, flip charts.

STEPS:

1. The group is divided into smaller groups (usually the same groupings as for host teams). Each sub-group goes to a (or their) unit under study (i.e. a goat, a cow, a poultry unit, a landscape view point etc.) for 30 minutes to collect data according to the agreed Livestock AESA format, and then returns to the learning site.
2. Each sub-group then analyses the data collected and prepares the Livestock AESA format on a flip chart (allow 20–30 minutes). A major drawing in the middle of the sheet should be included illustrating the unit of study. In the case of many illiterate participants the AESA parameters should also be noted down in the form of drawings rather than text. All drawings should be simple and reflect the field conditions/observations.
3. Each sub-group presents its results in a plenary session and receives feedback from the other sub-groups. Make sure that the task of presenting rotates among the various sub-group members each occasion the exercise is done.
4. The results of the various sub-groups are then compared and the whole group comes up with a consensus that forms the basis for future management decisions. The facilitator can probe the discussion though questions such as; "What changes can be observed since the last AESA monitoring?", "What management implications do these observations imply?" etc.

[4] Adapted from Pastoralist Field Schools: Guidelines for Facilitation (FAO and VSF Belgium, 2009).

EXAMPLE OF A LIVESTOCK AESA FORMAT FOR GOAT MANAGEMENT



Pesa number _____
Sub-group name _____
Date _____
Time of observation _____

GENERAL INFORMATION
Weather _____
Conditions _____
Breed _____
Name _____
Birth _____
age _____
date _____

Weekly recording _____
Parameters _____
_____
Body weight _____
Body measurements _____
Daily _____
milk _____
yield _____
Feeding _____
routine _____

Recommendations

HYGIENE AND SANITATION

Diseases and poor nutrition can restrict the growth of plants and animals. With improved management of hygiene, sanitation and nutrition disease challenges can be kept at a minimum. Money that would have been spent on treatment can be retained for a different purpose. In this section participants will learn different ways to take care of the health of both their crops and their animals in order to improve food supply from the farm and realise the importance of hygiene and sanitation in the field.

exercise 1

POINTS OF CONTACT WITH PESTS ON LIVESTOCK

OBJECTIVE:
To discover the most common points of contact with pests on livestock.

TIME:
1 hour

MATERIALS:
Paper, pencils, bags to collect insects.

STEPS:

1. Arrange for the participants to visit a homestead of one of the group members who looks after a friendly animal (calf, lamb etc).
2. Ask the owners to restrain the animal so that the group can be comfortable around it.
3. Ask them to make a drawing of the animal they are handling.
4. Ask them to look for any strange thing / any insect that can be found on the animals body, taking a careful look at the ears, eyes, tail end, hooves, stomach, udder area etc.
5. Indicate on the drawing where any insect or stuff were located that could make the animal uncomfortable or even sick.

The drawing above show sites that could be having pests, dirt or injuries as observed by the participants.

exercise 2

HYGIENE AND SANITATION IN THE FIELD

OBJECTIVES:
To understand hygiene and sanitation in the crop field.

TIME:
2 hours

MATERIALS:
Flipchart and markers.

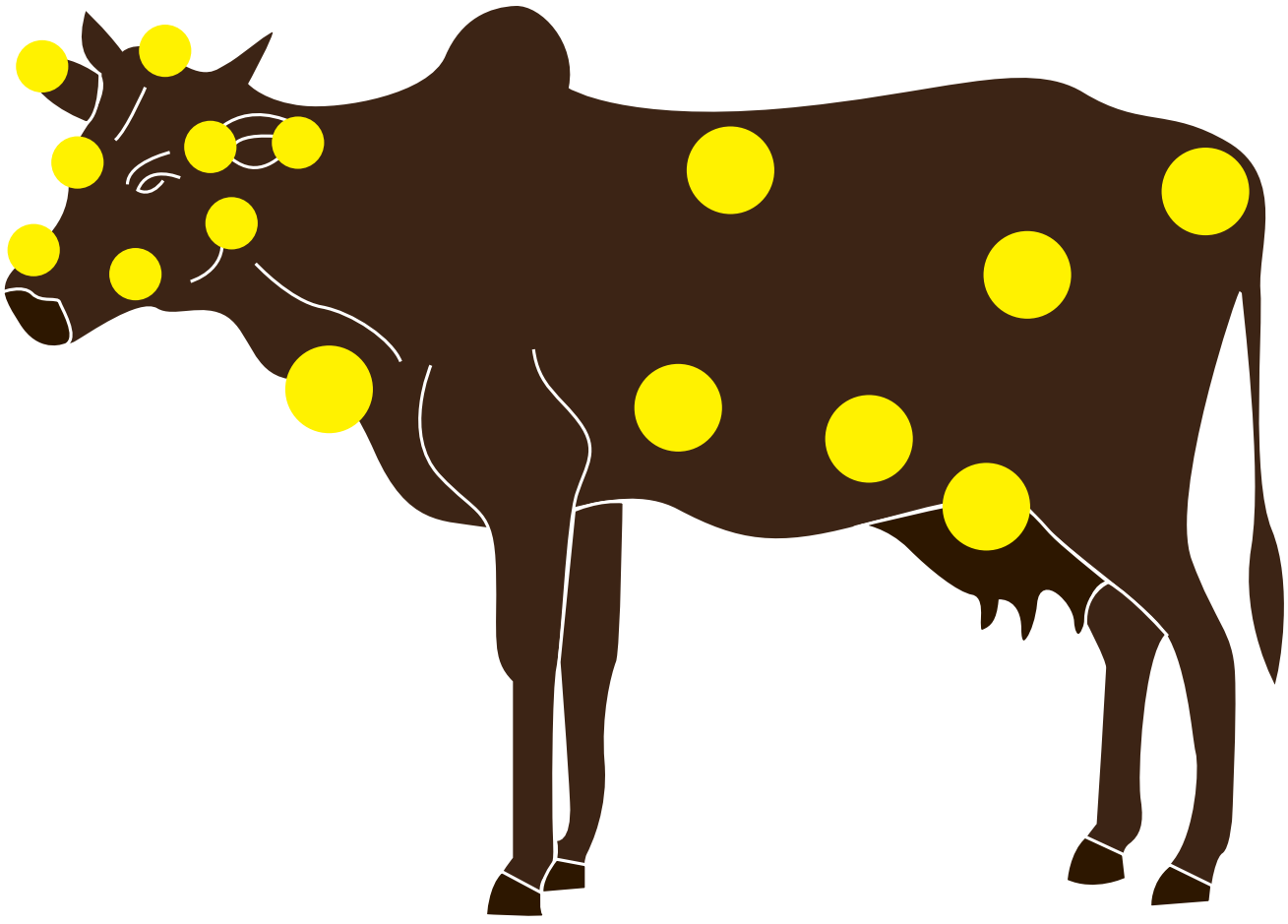
Note: this activity should be conducted in a nearby field where crops are already growing.

STEPS:

1. Ask the participants to walk through a field in a zig-zag pattern and have them compete on who will have the highest number of plant seeds or flowers attached themselves on their clothes and bodies.
2. Let them discuss why some of them had so many seeds and flowers attached to their clothes.
3. Find out if there is a difference in the paths they followed and whether

the plots were weeded or not?

4. Ask the participants what they intend to do with the stuff they remove from their clothes.
5. Explain and discuss the following aspects:
   - One has to be careful not spreading the seeds of weeds in the fields being farmed.
   - Sanitation is knowing what to do with risk and spread factors in the environment, i.e. sick plants, empty tins, plastic bags that may be habitats for pests and any such things that can spread a negative health effect. Encourage a discussion on each of the items.
   - Chemical control should only be used as a last option and that, for safety reasons, participants should not be allowed to spray chemical pesticides.
   - Other ideas may include creating border crops that trap and shield the main crop from certain pests, having a pit where sick plants/plant parts are buried/burnt, having special tools for handling the sick plots, paying attention to cleaning tools after using them in any particular field.
6. Ask one or two members of the group to make a summary of their findings.



HUMAN HEALTH AND NUTRITION

This section links the agricultural activities that the participants have undertaken in the learning field and in the classroom to life. The participants will begin to understand that their own health is even more important than the health of their crops or animals, and that one of the best ways for them to stay healthy is by eating healthy.

exercise 1

GETTING SICK, GETTING BETTER

OBJECTIVE:

To stimulate the participants to think about the diseases and sicknesses that they see in their family and community.

TIME:

2 hours

MATERIALS:

Flipchart and markers.

Note: You might want to ask a local nurse or doctor to participate in this session.

STEPS:

1. Ask the participants if they know the names of any human diseases that happen in their area.
2. Ask them what somebody looks like when suffering from the disease.
3. Write all of the sicknesses that they mention on the flipchart.
   Note: you may need to come up with some suggestions if the participants come up with only one or two sicknesses.
4. Divide the participants into groups and ask them to discuss the following questions:
   - When you get sick, what do you do to get better?
   - Do you know any cures for the sicknesses you have mentioned?
   - Do you know about HIV?
   - How can you prevent the diseases mentioned?
   - Where is the nearest clinic?
   - Who helps take care of you when you are sick?
5. Bring the groups together and discuss the issues in plenary.
6. Point out that it is important to try and get treatment when we are sick, and that we should try not to wait until we are very sick before going for help. Make the link between what the participants learned about controlling/preventing diseases and pests in the learning field.

exercise 2

FOOD AND HEALTH “MESSAGES” THAT WE GET EVERYDAY

OBJECTIVE:

To reflect on the food and health messages around us.

TIME:

1 hour

MATERIALS:
Flipchart and markers.

STEPS:

1. Ask the participants to think about different messages they receive from other people about healthy eating and drinking. You might want to give them some examples, such as:
   - My aunt gives me fish and spinach every week because it is good for me. But I hate spinach and fish.
   - My grandmother tells me that I should eat lots of fruit and vegetables every day. I wonder why.
2. When the participants have given five or six examples, you can begin to ask them what these messages mean.

exercise 3

GOOD NUTRITION PRACTICES

Food and nutrition are very important aspects in keeping our bodies healthy. Most people get sick because their bodies are not strong enough to fight off sickness. By eating the right types of foods and enough of them, your body can become strong. Therefore it is important for the participants to know the different types of healthy foods that can be found.

OBJECTIVE:
To understand the elements of good nutrition practice.

TIME:
2 hours

MATERIALS:
Flipchart and markers.

STEPS:

1. Explain to the participants that different types of food are needed by the body to be healthy and strong. Ask any of the participants if they know what the three food groups are. If not, explain to them that food is divided into three groups:
   - **Energy foods** such as rice, plantain, yam, sugar cane, cassava, breadfruit, palm oil, different types of bread, and others.
   - **Body building foods** such as fish, chicken, meat, eggs, peanuts, beans, cabbage, milk among others.
   - **Protective foods** such as oranges, pineapples, watermelon, apple, paw paw, potato greens, cassava leaf, vegetable oil, and tomatoes.
2. Explain that food has six nutrient groups that are responsible for keeping us healthy: carbohydrates, fats, proteins, minerals, vitamins, and water. We get sick if we do not eat the right type of food.
3. Ask the participants what they think the following terms mean:
   - **Balanced diet:** when the food and drink taken each day are in proper proportion. Not too much of any one item and not too little of the other;
   - **Nutrition:** when a person eats foods that are in line with what the body needs;
   - **Body building foods:** our bodies need protein to build muscle. Protein is found in meat,

fish, chicken, nuts and beans;

- **Energy foods:** foods that give us energy are typically starchy foods, called carbohydrates;
- **Protective foods:** fruits and vegetables provide our bodies with important vitamins and minerals to keep all our bodies strong. Vitamins help us our bodies to fight germs and other things that make us sick.

4. Ask the participants to name the types of food they eat every day. Then ask them to divide the foods into the three food groups on flip chart paper.
5. Ask the participants if the results seem to show a balanced diet.
6. Divide the participants into three groups – the "Energy Group", the "Body Building Group" and the "Protective Group". Ask each group to come up with two complete meals that they believe are balanced meals.
7. Have each group present its meals and explain why they are balanced.

AN INTRODUCTION TO A LIVELIHOODS ANALYSIS AND THE HUMAN ECOSYSTEM ANALYSIS (HESA)

In the JFFLS participants need to examine the problems that threaten their livelihoods, weigh available options and make decisions about what action they could take given their own assessment of resources and options. The issues to which the JFFLS approach are applied range from poverty, loss of land, pesticide use, family planning, alcoholism, gender based violence (GBV), gender equality and the attendance of children at school, to specific health problems such as malaria and HIV. The schools strengthen communities by supporting participants in their learning and analyses of how their behaviour exposes them to HIV or other risky behaviour.

The core process is the linking of ecology, group organization and participant-driven learning applied through the Human Ecosystem Analysis (HESA). In this socio-ecological approach, participants (15 years old and above) investigate various threats to their lives such as HIV and GBV. This analysis enables them to understand their own strengths, vulnerabilities and constraints[5]. Combined with a long-term outlook, participants should be more able and self-confident to address problems and the impact of their own decisions over time. They are also empowered to decide for themselves on how to protect themselves against poverty-related diseases such as HIV and/or other social threats. The ultimate goal is to enable them to recover and build their knowledge and confidence to become effective decision makers in their own lives, the lives of their families and in their community network.

The Human Ecosystem Analysis (HESA) in the JFFLS involves participants investigating threats in the same way they investigate pests during AESA. Instead of the crop and or livestock, the individual and/or household and/or community threats are studied. It is recommended to introduce HESA only

[5] See Farmers' Life School Manual (www.fao.org/hivaids/). The manual describes the 16-week course designed to help the agriculture sector, AIDS programmes and NGOS to facilitate farming communities to face their local concerns, build their resilience and thus reduce their vulnerability to HIV/AIDS.

when participants are 15 years old.

The HESA studies the impact of a threat within a livelihood framework (see table below). Participants will quickly understand impacts and the inter relations between the main assets. HESA leads participants to discover and analyse the way people live, their problems and decisions to eliminate risky behaviour and threats and reorganize their lives according to the systemic analysis and group discussions. The HESA process is used as a basis through which the group discussion is part of a decision making process. Boys and girls will also learn to understand the long term effects if preventive measures are not envisaged.

One key tool in the HESA is the problem analysis flow diagram. The tool can be applied to analyse the specific problems in order to find solutions:

- During the regular JFFLS activities in the field, where life skills can be discussed alongside agricultural skills;
- When socio-economic problems such as HIV, malaria, violence, alcoholism, migration of young people, etc. arise within the community.

The framework through which the analysis is done is based on the livelihood framework.

Livelihood assets refer to resources that people control or have access to and which serve as the basis of household livelihoods (human, social, natural, physical and financial assets). Analysing the impact of threats on people assets is central to identifying appropriate measures and strategies to improve their situation and reduce their vulnerability.

exercise 1

PRACTISING LIVELIHOODS ANALYSIS

OBJECTIVE:

To understand livelihoods assets within a household and practice livelihoods analysis.

TIME:

The exercise may take few days, as participants will have to discuss in their groups, obtain the consensus of the community ad household members and practice their study

MATERIALS:

Flipchart and markers, notebook.

STEPS:

1. Review existing asset base drawing the following template and ask 3-4 sub groups of participants to choose a household within their community to practice their livelihood analysis.
2. Ask the different groups to identify the assets available to the household to undertake farm, non-farm, household and community activities (see also the table below):
   - **Human assets**: sex and age of household head, average household size, skills and knowledge of household members, health of household members, and use of hired labour;
   - **Natural assets:** rainfed area, irrigated area, fallow, trees and livestock;
   - **Physical assets:** seed and fertilizer, farm tools and implements, post harvest equipment, other household assets (furniture and other household items, quality of house, and means of transport);
   - **Financial assets:** use of credit, remittances, savings;
   - **Social assets:** membership of groups and associations, leadership roles, participation in reciprocal labour groups.
3. At the end of the exercise ask the participants to present their analysis to the other groups and ask one or two members of the group to make a summary of their findings.

Characteristics	
Human assets	
Age, sex and marital status of HH head	
Number of people living in HH	
Skills, knowledge and educational levels of HH members	
Main threats (health, social, economic) facing the HH	
Natural assets	
Rainfed area cultivated (ha)	
Irrigated area (ha)	
Fallow (ha), length of fallow, reasons for fallow	
Fruit trees, woodlots etc	
Number of livestock and draught animals	
Number of livestock and draught animals	
Physical assets	
Source of seeds and fertilizer	
Inventory of farm tools and equipment	
Post harvest equipment and granaries	
Number of dwellings and construction materials	
Ownership of means of transport	
Other HH assets	
Financial assets	
Access to credit	
Remittances	
Savings	
Social assets	
Membership of groups	

facilitators' notes 1

THE LIVELIHOODS FRAMEWORK

The livelihood assets

- **Human capital:** skills, knowledge, ability to work and good health and the amount and quality of labour available;
- **Social capital:** membership in community and other groups, relationships of trust, dynamics in the household and community;
- **Natural capital:** land, forests, marine/wild resources, water;
- **Physical capital:** livestock, shelter, tools, materials, basic infrastructure and producer goods;
- **Financial capital:** income from employment or self-employment, credit, remittances from relatives abroad or in urban areas, or transfers from the state, liquid assets such as livestock and jewellery.

Source: DFID's sustainable livelihoods guidance sheets. 1999, www.livelihoods.org

exercise 2

PRACTISING HESA

OBJECTIVE:

To practice the HESA, analyse threats and identify protective measures to improve the situation.

TIME:

About 1.5 hour

MATERIALS:

Large paper and markers, small notebooks and pencils.

STEPS:

The participants conduct their analyses in small groups, identifying a problem or a threat in their lives and then identifying the impact on their livelihoods taking into account the 6 HESA categories listed below.

The HESA format

HESA topic: **General Information** Location: Subgroup: Date of HESA: Problem analysed:		
Impact		**Protective measures**
Health		
A **B** **C**		**A** **B** **C**
Economy		
A **B** **C**		**A** **B** **C**
Education		
A **B** **C**		**A** **B** **C**
Social relation		
A **B** **C**		**A** **B** **C**
Culture		
A **B** **C**		**A** **B** **C**
Conclusions:		
Recommendations:		

1. Ask the participants what are the main threats in their community. Make a list on the flipchart.
2. Ask the group to choose the threat they want to analyse.
3. Break into subgroups of about 5-6 persons each and ask each group to think about the impact of the problem analysed on the 6 HESA categories. Draw or write the 6 categories in a simplified manner.
4. Ask them also to make a list of the different impacts of the problem under the 6 categories under the HESA format.
5. Then ask the participants to come up with ideas for improving the situation under each livelihoods asset.
6. Ask each group to present its analysis to the other groups and make their recommendations.
7. Compare the different analyses and solutions and discuss them with the participants.

facilitators' notes 2

HESA AND MALARIA

For example if malaria is the problem analysed ask the group to identify the consequences of malaria on the their health, the health of the community at large, its impact on the economy of the family/ community (if my dad is sick with malaria, he stays in bed and he is not able to work, etc.) on their education (if I am sick…I don't go to school, etc.) on the environment and social relation. Then help them to find solutions…if we keep the area around the house clean and dry mosquitoes won't multiply, if I sleep under a mosquito net, I will not be beaten etc.
Facilitators may want to ask them to discuss the issue in the same way with their peers or their community.
When analyzing GBV, facilitators may introduce to the participants the various forms of violence according to the table below and ask them to identify one or more forms of violence they would like to analyse through the HESA exercise.

Key Points for the facilitator

1. Healthy eating.
2. Eating habits are linked to local foods.
3. Are there any food taboos for certain kinds of people?
4. Are certain types of food given only to men and boys? Girls and women?
5. Food taboos should not be encouraged.
6. Girls and women need good food, especially when they are pregnant or breastfeeding.
7. Everyone – boys and girls alike – needs nutritious food.

exercise 3

UNDERSTANDING THE KEY FACTS ABOUT HIV[6]

Understanding HIV and AIDS needs to be covered in each module. In this way the participants will know what HIV is and how they can protect themselves from it.

OBJECTIVES:
- To develop the participants interest in learning about HIV;
- To understand some key facts about HIV.

TIME:
About 1.5 hour

[6] Adapted from: http://www.healthlink.org.uk/projects/hiv/article03.html

AGREE DISAGREE DON'T KNOW

MATERIALS:

Three signposts labelled "Agree", "Disagree" and "Don't Know".

STEPS:

1. Prepare three signposts with the words "Agree," "Disagree" and "Don't Know" on them. Place the signposts in different parts of the classroom or learning field.
2. Tell the participants that you are going to say a number of things about HIV and they are to run to the signpost that corresponds to what they think.
3. Make the following statements, and let the participants run to the signposts. After each statement, ask participants to volunteer from their station to explain why they chose that station.
   - Being cool is important.
   - Having a loving and trusting relationship is important.
   - It's cool to say "no" to sex.
   - You should not have sex before marriage.
   - Sex is OK if you are getting something for it.
   - It's OK to have sex if you wear a condom.
   - Having lots of money is important.
   - Being healthy and happy is important.
   - If someone gets HIV or AIDS, they deserve it.
   - It's OK to have sex with someone who is much older.
   - Antibiotics can cure AIDS.
   - There is not cure for AIDS but there are things you can do to prevent it.
   - HIV can be spread during sex.
   - You can prevent HIV by not having sex at all or using a condom during sex.
   - HIV can be spread by sharing plates and cups with someone who has AIDS.
   - You can tell if someone has HIV by looking at them.
   - After a person gets HIV, they can live for many years without showing signs or getting sick.
   - Since everyone dies of AIDS, it is better not to know if you have it.
   - You can be cured of AIDS by having sex with a virgin.
   - Traditional healers have cured AIDS.
   - AIDS is a disease of immoral people, such as prostitutes.
4. Discuss in what ways HIV/AIDS affect participants and young people (see box).

The second part of this exercise will make participants think about what AIDS is.

5. Ask participants the questions below one at a time and give them time to respond and reflect on the questions before you fill in or explain the correct answer.
   - Do any of you know what AIDS is?
   - How does the AIDS virus attack the body and make it weak?
   - How do you know if you have AIDS?
6. Summarise the discussion and draw some general conclusions and recommendations.

facilitators' notes

EFFECTS OF HIV

HIV and AIDS can affect participants in a range of ways, such as:

- Having to cope with sick parents or guardians, which brings both practical and psychological pressures
- Having to cope with the death of parents and other loved ones
- Having to deal with the trauma and grief of bereavement and resulting psychological problems, such as depression, guilt, anger and fear – often with a lack of support
- Having to deal with neglect and loss of parental care, love and attention - leading to developmental problems
- Having to adjust to life with guardians/foster parents
- separation from siblings
- Facing life unsupported in a child-headed household
- Losing inheritance and home
- Being forced into survival as street participants
- Facing stigma, discrimination and social exclusion
- Experiencing a cycle of illness and malnutrition
- Becoming infected and living with HIV
- Inability to thrive or continue in school
- Severe economic hardship and lack of livelihood opportunities
- Gender discrimination
- Sexual abuse and exploitation

facilitators' notes 3

WHAT IS AIDS?

What is AIDS?
AIDS is a disease that is caused by a virus called HIV. The virus is very much like the very tiny pests that you have seen on crops. But the HIV virus is so tiny that you can't see it without a microscope. This virus attacks the body just like pests attack plants. It attacks the part of your body that defends your body from getting sick or weak.
(You may want to ask the participants to make a drawing of pests attacking plants, and the AIDS virus attacking a body, to reinforce the idea that AIDS is caused by micro-organisms).

How does the AIDS virus attack the body and make it weak?
Our body has lots of white cells in it. They are like little soldiers that protect our body from sickness. When these little soldiers are busy fighting a sickness – like a cold or a fever or a stomach ache – we may feel tired or sick. But once the soldiers have done their job we feel better.
The AIDS virus is very strong. It attacks the white cells – our little soldiers – and kills them. So we can no longer fight other diseases that come into our body.
(Again, you may want to ask the participants to make a drawing of the AIDS virus attacking the body, to make sure they understand the concept of a virus entering the body's system)
.

How do you know if you have AIDS?

When the virus enters the body, you have the HIV infection – you are HIV positive. But you may not feel any difference at all. In fact, you can carry the virus in your body for five or ten years and not feel anything.

Once the virus has destroyed many of your white cells, you will start to show signs and symptoms of illness. Some of the signs and symptoms are:

- Unexplained weight loss;
- Fever for more than one month;
- Diarrhoea for more than one month;
- Sores on your private parts or mouth for more than one month;
- Coughing for more than one month;
- Lumps under your arm, on your neck or in your groin;
- Skin infections.

As you can see, many of these are also signs and symptoms of other diseases. So the only way to know if you have AIDS is to get a special HIV test.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1 – Thinking about the future

STEPS:

1. Divide the participants into 4 groups.
2. Avail enough pencils, manila papers, masking tape and rubber.
3. Ask them to reflect on two questions: How do they want their families to be in the future? How do they want their community to be in future? And what do they think is needed in order to get there?
4. Ask them to present their ideas though drawing.
5. Let them make presentations.
6. Encourage them to note the key things they need to do so that they can realize the perceived future.

ACTIVITY 2 – Stand up against HIV

STEPS:

1. Have all the participants seated in the classroom or in the learning field. Tell them that you are going to say a lot of ways that HIV can be spread and that some of them are true and some of them are false. Instruct them to stand up if they think your statement is true. Here are the statements you can make:
   - Sex without a condom (T)
   - Shaking hands or holding hands
   - Hugging and kissing
   - Contact with semen (T)
   - Sleeping together without having sex
   - Visiting a person infected by the AIDS virus
   - Using the same hair brush or comb
   - Breastfeeding (T)
   - Using a common bathroom
   - Sharing the same plate or cup
   - Sharing needles, razors or knives for cutting skin (T)
   - Being bitten by a mosquito or any other insect
   - From mother to infant during delivery (T)
   - From mother to infant during pregnancy (T)
   - Sneezing
   - Contact with infected blood (T)
   - Using the same telephone
2. Divide the participants in groups and ask them to write a song or a poem about the ways they can and cannot get the HIV virus.
3. Ask the groups to present their song or poem.

ACTIVITY 3 – Charade with feelings

This activity is designed to help the participants to get to know their own feelings and how to express them.

TIME:

15 minutes

MATERIALS:

Small pieces of paper.

STEPS:

1. Write words that describe feelings separately on small pieces of paper (anger, sadness, joy, excitement etc.) and draw faces that express these feelings on the cards.
2. Let each child choose a feeling card and observe the feeling silently.
3. Tell them they must not tell the others what is written on the card but they should demonstrate the feeling to the rest of the group using only facial expressions or body language.
4. The other participants should guess what feeling is being demonstrated.
5. Dismiss the group, but remain in the room so that you are available for any participants who may have questions.

Note: When you are using this activity for the first time, try and have one of the more confident participants do the first demonstration. The others can use the first demonstration as a model for their own performance.

ASSESSING PROGRESS

exercise 1

MULTIPLE CHOICE TEST FOR EVALUATING KNOWLEDGE AND SKILLS[7]

This test of participants' knowledge provides reliable information in an entertaining manner without participants feeling pressured or threatened by the exercise.

OBJECTIVE:

To measure participants' knowledge and skills in issues related to any topic such as farming or human health issues.

Note: If the exercise is carried out twice (in the beginning of the JFFLS and at a later stage. i.e. after about a year) it is possible to evaluate the increase in knowledge among participants. In such case it is important that the pre- and post-test are of similar difficulty.

TIME:

About 2 hours for preparation and 1 hour for conducting the exercise.

MATERIALS:

Pieces of A4-size cardboard, marking pens, thread, thumb tacks, sticks, actual live or natural specimens.

STEPS:

1. Prepare questions related to the module topic. The questions should be such that response options can be given. Typical questions may include:
   - What is lacking in this plant nursery (shade, watering, weeding)?
   - What impact does this management option have on the soil (can create a hardpan, can substitute manure, improves the structure of the soil)?

   The questions should relate directly to a local problem. Where possible, the questions or alternatives should be made of materials collected from the farmers' fields, for instance leaves with nutrient deficiency symptoms or soil samples or be phrased so that they directly relate to a visible aspect on a farmers field.
2. Prepare the response forms as shown below.
3. Write all questions on separate pieces of cardboard mount the cardboard on sticks and finally set up the question post in the field. Use soil, plant and natural materials in the field to illustrate the questions.
4. During the exercise, the participants will walk around the course of questions and indicate their answers on the response format.
5. Collect the response forms and process the results to determine participants' performance
6. Discuss the results of the exercises in plenary and solicit comments on how to improve the exercise for future use.

[7] Adapted from Discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006).

Example of a response form

Q	Name		
	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			

Example of a question post

What effect does the mulch on this plot not have?

A) It provides nutrient to the soil

B) It reduces the temperature of the soil

C) It prevents soil moisture from being lost

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4

Diversity

Junior Farmer Field and Life School – Facilitator's guide

Module 4: Diversity

Junior Farmer Field and Life School – Facilitator's guide

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Module 4: Diversity

INTRODUCTION

In JFFLS field activities will gradually become more complex with a bigger variety of crops and activities undertaken. After learning about basic agricultural practices, combinations of various practices will be introduced. For example you may end up with a number of different crops growing in the same field, all at different stages, some that you are just planning while others you are harvesting. This is an example of diversity, which is important for various reasons. For example combining different types of plants help in giving different nutrients to the soil so that it can continue being fertile and healthy. But how do we best combine different crops without creating conflict? For this good planning is needed.

Moreover people need a diversified diet, based on nutritious and balanced meals; they also need to have different ingredients in order to be healthy.

In this module participants will also learn about gender roles and the different roles of girls and boys in society and how these compliment each other. It is the diversity of people with different characteristics and skills that create an interesting society. Failing to understand personal differences and diversity can be a cause conflicts, gender stereotypes and violence within the home and community. On the other hand by understanding and appreciating diversity, we can contribute to a better life.

In this module the concept of diversity will be explored from different angles. The module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modifies and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of this module participants should:

- Be able to appreciate diversity, understand what it is and why it is important;
- Understand the benefits of maintaining diversity in agriculture and how this relates to diversity in food intake;
- Appreciate biodiversity and natural resource protection;
- Begin to reflect on the diversity of roles and resources across gender groups.

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

ENERGIZER AND FUN (30 MIN)

IN THE LEARNING FIELD (45 MIN)

AGRICULTURAL TOPIC (45 MIN)

MAKING THE LINK WITH LIFE (30 MIN)

CULTURAL ACTIVITIES (ART, DRAMA, SONG) (30 MIN)

ASSESSING PROGRESS

CLOSING ENERGIZER

↘ GETTING STARTED WITH "ENERGIZERS"

Some sample energizers that will also help to "break the ice" and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Diversity in thinking about a subject

OBJECTIVE:
To promote creativity and diversity in thought.

TIME:
About 10 minutes

MATERIALS:
Cards and pencils, a number of different objects of different kinds.

STEPS:

1. Give to the participants a range of objects such as a groundnut (in a shell), a mango, banana, etc.
2. Invite the children to think, in groups, of the diversity of things they can do with that object.
3. Stimulate them to appreciate the diversity of ideas that were presented and how it can help us thinking of the various ways of adding value to a single object or product.

Energizer: Playing with sticks

OBJECTIVE:
To promote creativity and diversity in thought

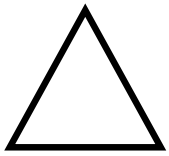
TIME:
About 15 minutes

MATERIALS:
6 short sticks per person, about 10 cm height.

STEPS:

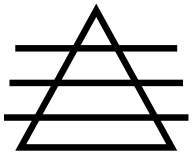
1. Ask each participant to look for 6 sticks of equal-length.
2. Ask each person to arrange the sticks in a configuration such as they create (progressively more difficult):
   - One triangle
   - Two triangles
   - Three triangles
   - Four triangles
   - Six triangles
   - Eight triangles
3. Then ask a volunteer to come forward and demonstrate to the entire group the solution to each task.

4. Provide praise or a small reward to each successful person.
5. Lead the group in a discussion of what they learned from the exercise.

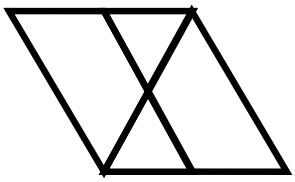


One triangle (with another one super-imposed over it.)

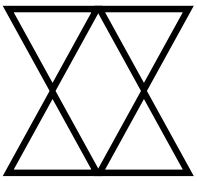
2 triangles



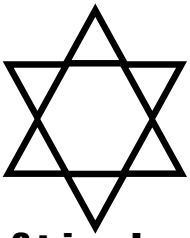
4 triangles



4 triangles (alternate)



6 triangles



8 triangles

Exercises

APPRECIATING DIVERSITY IN AGRICULTURE

Communities are faced with a myriad of problems hindering optimal agricultural production. It is important to note that the farmers do not have an equal array of options to go round these problems. It is important therefore to introduce the aspect of diversity in agricultural technologies so that the farmer always has alternate ways of solving one problem. However it must be observed too that this calls for thorough analysis of these diverse technologies in order for farmers to choose the best option for his/her situation. Diversity also spreads the risk in cases of unforeseen circumstances such as pest or livestock disease outbreaks. One sometimes use the expression “not to put all eggs in one basket” to illustrate this. The more activities and options one have in place the less the risk of loosing.

The JFFLS will gradually take on more diverse activities, and in the field a variety of different crops will be grown, especially horticultural crops. It is thus important for participants to understand why diversity is important, and how to make the best choices for the learning field.
Diversity also includes thinking outside of preconditioned norms and behaviours such as for example the case of gender roles and norms and challenging of routines such as food habits.
This module aims to provide an understanding of the meaning of diversity, and how this is relevant in agriculture in relation to natural resources and in people’s daily lives.

exercise 1

GROWING DIFFERENT CROPS

OBJECTIVE:

To appreciate diversity in crop production.

TIME:

About 30 minutes

MATERIALS:

Flip charts and marker pens.

STEPS:

1. Ask the participants the following questions, and write their responses on the flip charts:
   - Name all the different crops that are grown in your community/ or ask the children to work in groups and draw the crops grown in the community, and discuss:
   - Why would farmers want to cultivate a variety of crops instead of just one crop?
   - What horticulture crops do you know of?
   - Why is it important to have a garden with many different crops growing in?
   - What risks are there if one decides to specialise in only growing one or few types of crops.
2. You may want to continue this discussion in the learning field by asking the participants to observe the field and then answer the following questions:
   - Is this place good for horticulture crops?
   - What do we need to do in order to prepare the land?
   - Which are the crops that we want to plant? Why?

exercise 2

DIVERSITY IN THE CROP CALENDAR

The participants will now practice preparation of a nursery bed. Take them through the following steps, making sure that everybody participates in the work. Depending on the number of nursery beds that you are preparing, you may be able to divide the participants into smaller groups.

OBJECTIVE:

To understand the importance of crop diversification to improve food security.

TIME:

About 40 minutes

MATERIALS:

Flip charts and marker pens.

STEPS:

1. In plenary, brainstorm about the crop growths periods of the most commonly grown crops, and in which months and for how long duration they stretch.
2. Ask the participants to prepare a cropping table on a large sheet of paper and list all the different crops mentioned on the table, see table format below. Instead of writing the crops, they can draw them in the first column. If many crops are to be placed one can divide them in groups of types of crops that then each subgroup work on, i.e. one does cereals, another does vegetables, another one cash crops, fruits etc.

Crop	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maize												
Cassava												
Beans												
Cabbage												
Pineapple												
etc.												

3. Stimulate the participants to think about the various crops:
   - When do we sow this crop?
   - How can we increase the performance of the crop?
   - When do we harvest the crop?
4. Ask the participants to look at the table and think about the workload of women and men for the various crops; who does what when and how heavy are the different tasks? Is there a different workload between boys and girls?
5. End with a discussion focusing on the diversity of the cropping calendar. How can more diversity be brought in and how to diversify the work tasks for men and women.

facilitators' notes 1

CROP DIVERSITY

Why should we plant different crops? To give variety to our work, to have different food, to improve the pest and noxious weeds control, diversification , take care of risks, etc.

Different types of horticultural crops: leaf-legumes (lettuce, cabbage, collards, cowpeas, amaranths etc), fruits (cucumbers, melons, pumpkins, tomatoes, peppers, and eggplants), grains (beans, peas), tubers (onions, garlic, carrot, turnip, radish), flowers, medicinal or ornamental plants, etc.

Reasons for doing gardening: to have fresh vegetables and fruits, to produce income, not to depend on markets, to have food security etc.

Horticulture crops needs: safe land, constant access to water for irrigation, etc.

facilitators' notes 2

MAKING A STAIRCASE GARDEN

The staircase garden has proven in JFFLS to be an opportunity for planting a variety of crops on a concentrated area, creating an "island of diversity".

MATERIALS:

About 10 empty gunny bags (cut open lengthwise) and wood pegs of varying lengths: at 2 meters height 4-6, 1 meter 8-12, 0.8 m 16-24, 0.6 meter 32-48.

STEPS:

1. Make a circle of diameter 1.2 meters and enclose it with the gunny bags to a level of 1.2 meters. Add subsoil into it to half then fill up the rest with a mixture of farm yard manure and top soil.
2. Measure 0.6 meters round this first inner circle and enclose it with the gunny bags to a height of 1 meter. Fill with soil as above.
3. Continue preparing two more outer circles in the same manner as above but reduce the heights to 0.8 and 0.6 meters respectively.
4. Ask the participants to plant different vegetables on the stair case garden now formed. Each stair case for instance can have a different crop type.

exercise 3

INTERCROPPING

OBJECTIVE:
To learn about advantages of mixing different crops in the same field, i.e. “intercropping”.

TIME:
About 1 hour

MATERIALS:
Flip charts and marker pens.

STEPS:

1. Ask participants to explain their experience in terms of mixing several crops in the same field: Which crops have been mixed and in which way?
2. Explain to the participants the general different ways of intercropping by drawing the following options visually on large sheets of paper:
   - **Mixed or multiple cropping:** cultivating two or more crops at the same time on the same field without arranging them in rows
   - **Row intercropping:** cultivating two or more crops at the same time and arranging them in rows
   - **Strip cropping:** cultivating different crops in alternate rows that are the same size.
3. Ask the participants if they can think of any advantages of intercropping. Write them down on the flip chart and fill in any missing information, based on the list below in the facilitators’ notes.

facilitators’ notes 3

ADVANTAGES OF INTERCROPPING

Advantages of intercropping includes:

- Reduces the pest populations because of the diversity of the crops grown. When other crops are present in the field, the pests are confused and they need more time to look for their favorite plants.
- Reduces the plant diseases. The distance between plants of the same species is increased because other crops (belonging to a different family group) are planted in between.
- Reduces erosion and protects topsoil, since the soil is better covered with vegetation.
- Attracts more beneficial insects, especially when flowering crops are included among the crops.
- Minimizes the amount of work needed to control weeds. A mixture of different crops oven covers the soil better, leaving less space for weeds to grow.
- Make better use of the crop field.
- Results in potential increase for total production and farm profitability.
- Provides two or more different food crops in one cropping season.
- Maximum utilisation of natural resources such as soil nutrients and moisture.
- For a farmer with a small farm, mixed cropping acts as an insurance, since if one crop fails the other one might still yield something.

exercise 4

UNDERSTANDING DIVERSITY IN CROP VARIETIES

OBJECTIVE:
To reflect about the diversity of crop varieties.

TIME:
About 15 minutes the 1st session and 30 min the 2nd session

MATERIALS:
Local and commercial seeds of a few common local crops.

STEPS:

1st session

1. Divide the participants into 4 groups.
2. Let each group pick on a common crop that is grown within the local area, for example maize, beans, sorghum etc.
3. Ask each group members to individually at home collect some seeds (from seed storage) for their chosen crop from their own homestead or neighbours.

2nd session

4. Ask each group to look at the seeds collected by the group members, and discuss possible differences in seed for the same crop (size, colour, etc.). Try to think of / remember how the crops of these seeds normally look like in the field, i.e. size, strength, yield etc. At this point the facilitator should add to the collection a few samples of commercial seeds for the different crops.
5. Discuss the advantages and disadvantages of local seeds vs. commercial seeds ask participants what kind of variety they would prefer for what situation.
6. Summarize the discussion by explaining briefly the aspect of different varieties in agricultural crops.

exercise 5

DIVERSITY IN LIVESTOCK BREEDS

OBJECTIVE:
To reflect about the diversity of types/breeds of goat.

This exercise used goats as an example since in many places there are differed breeds of goat available. However If there is another livestock species in the locality that is a better example of various breeds, use that species instead of goat for the focus of this exercise.

TIME:
About 30 minutes

MATERIALS:
Flipchart and marker pens, some pictures of various goat breeds.

STEPS:

1. Brainstorm in the group about the different breeds/types of goats that participants have heard about or seen and look at the pictures available.
2. In sub-groups make drawings of each of the different breeds/types on large sheets of papers.
3. Brainstorm in the group about the advantages and disadvantages of each of the breeds/types for example in terms of:
   - Size and appearance;
   - Housing and feeding needs;
   - Susceptibility to diseases and health problems;
   - Ability to cope with extreme weather conditions and drought;
   - Productivity; number/frequency of off springs, milk/meat yield;
   - Breeding considerations.
4. Complement the drawings of the various goats with images of the advantages and disadvantages discussed above.
5. Discuss which type of breed/type participants feel are suitable for what kind of context, i.e. considering climate, income/food needs, costs involved etc.
6. Summarize the benefits of maintaining diversity in livestock breeds and the risk of loosing genetic diversity.

BIODIVERSITY AND NATURAL RESOURCES

Humans depend highly on the resources produced by nature available in the locality, i.e. the natural resources. This includes the soil, water, trees, plants, etc. and such items that humans make use of on daily basis. These resources are also what commonly form the basis for the production of food, medicine, industry, cloths, healthy environment etc. However also other items that may seem unnecessary for humans such as wild plants and animals, micro-organisms etc. play an important role in the whole ecosystem.
In this topic participants will start to appreciate the importance of biodiversity and conservation of natural resources. They will also reflect on who has access and ability to make decisions over such resources in the community.

exercise 1

IMPORTANCE OF BIODIVERSITY AND NATURAL RESOURCES

OBJECTIVES:

- To understand the concepts of natural resources and biodiversity;
- To understand how various plants and animal species relate to each other?

TIME:

1 hour

MATERIALS:

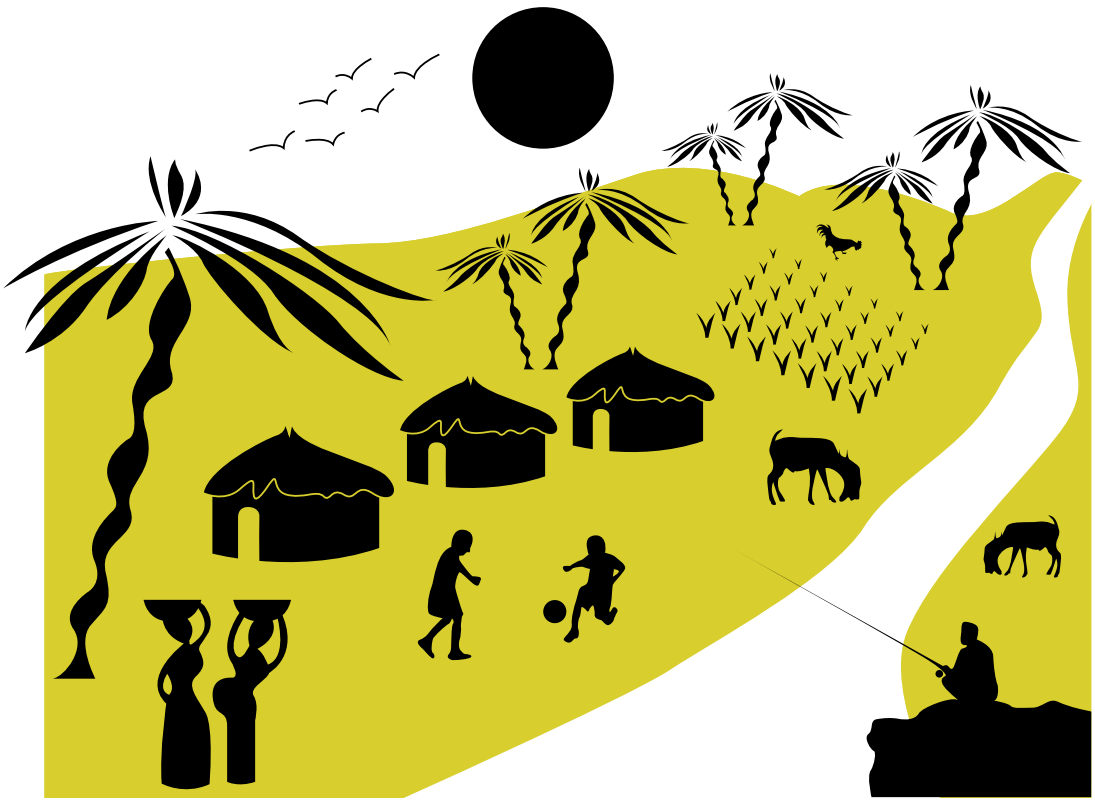
Flipchart and marker pens.

STEPS:

1. In plenary give examples of what humans use from the nature or environment (i.e. soil, trees, stones etc.) and how we use it. Explain that these things coming from the nature are called natural resources.
2. Ask if there exist organisms or things from nature that we don't directly use, for example bugs, snails etc? Explain that biodiversity includes all the things in the environment (see facilitator notes below). Explain that even the items that humans don't use are important and that each species or item has a role to serve in nature.

Role play: "Recognising different variety of species"

3. Tell the participants to think about a plant or animal species in nature which they would like to represent in a role play. Participants will **not be allowed** to tell each other which species they are going to represent.



4. Explain how the game will be performed: Everybody should represent through the mimics and sounds the animal or plant they have chosen, without talking! Each one should look for other persons who represent animals or plant of the same species (without talking) in order to group them by species (the representation of a plant is more difficult, considering that they don't walk and don't make sounds easily recognisable, but this difficulty will also increase the pleasure of doing this exercise.
5. Carry out the game as described.
6. When the groups are formed, ask the respective members to discuss between them selves if really they belong to the same species (this time each one should say who he/she is).
7. Afterward, each group should think about a positive characteristic of each animal or plant species.
8. Finally each group presents to everybody this positive characteristic, using simultaneously mimics and sounds (i.e.: "We are a rhino and cut of the fires").
9. Hold a plenary discussion about the different ways through which biodiversity helps people and about the fact that we couldn't live without this diversity of plant, animals, and micro organisms.

exercise 2

THE IMPORTANCE OF TREES

OBJECTIVES:

- To appreciate the benefits of forest and trees;
- To realise that benefits of trees might vary across gender groups.

TIME:

1 hour

MATERIALS:

Flipchart and marker pens.

STEPS:

1. Divide the participants in groups of girls and boys, in order to bring out their specific knowledge.
2. Ask each group to do a list of or draw "benefits" of forests and trees for our lives. Remind them about the benefits that they have observed in their households, in their schools and community in general.
3. Have each group present their lists/drawings.
4. Hold a discussion in plenary on the following aspects:
   - How do the presentations differ? Which aspects were more often mentioned and other ones forgotten?

- Ask the participants which benefits/uses of trees and forests are the most important for them and why? Ask for examples.
- How are the benefits different among girls and boys and why?

5. It is important that the facilitator values the local knowledge of girls and boys on trees and its various uses and benefits. Add some benefit not mentioned (see facilitator notes below) by the participants and conclude the exercise.

facilitators' notes 1

IMPORTANCE OF THE FOREST

While the size of the world's forest is declining explain the importance to plant trees in farms and the benefits they bring to farmers and to the ecosystem.

- Trees give shade.
- Trees produce fruits, nuts, other food stuff, and medicines for people and animals.
- Trees supply important raw materials for the industry, such as: rubber, wood, fibres, etc.
- Trees help to protect the cultivations and the soil from the effects of erosion caused by wind and water.
- Trees supply wood and fuel.
- Tree rinds and trunks are used to produce honey.
- Forests give food and shelter to different animals and insects, micro organisms, important plants, etc.
- Trees help to supply clean air, oxygen and a healthy environment.

exercise 3

GENDER ROLES AND DECISIONS OVER RESOURCES

OBJECTIVE:

To understand gender differences in using and deciding about the resources in the community.

TIME:

1 hour

MATERIALS:

Cards or papers, pens or markers, small stones to keep it still.

STEPS:

1. In plenary recap with the participants the results from the exercises already done about the gender roles and differences, for example the daily activity clock and crop calendar. Explain that in this exercise we want to discuss the use and decision about resources.
2. In sub-groups ask the participants to do a list of the main resources of the household, such as: land, house, animals, etc. After, ask them to draw those resources or wealth on cards or papers.
3. Review the list of items and pick out /prepare two drawings for each listed item, and place the two sets of drawings in different piles.
4. Make a table with three column on the ground with the drawings of a man, woman and man, and woman at top of the columns, with enough space between them.
5. Ask the participants to classify the first pile of cards, placing them under the three big drawings, according to **who is using the resource, if women, men or both**. Moderate the discussion between them about why they did this choice.
6. Put the second group of drawings and cards on the floor, below the first group.
7. Repeat the exercise, but this time **focusing on who has the control, property or decision making power** according to each resource. Moderate the discussion again between the participants about why they did this choice.
8. Ask the participants to compare the way of putting the two groups of cards and discuss the following questions:
   - Which resources have been used by men? By women? Both?
   - Are women, men, or both involved in the use of high value resources i.e.: land, livestock, and technology?
   - Which are the resources controlled by women? By men? Both?
   - Is it women, men, or both who decide about the high value resources?
   - How can we reduce these differences in order to create more equal opportunities for boys and girls?
9. Come up with conclusion from the discussion.

exercise 4

PRACTISING TREE PLANTING

OBJECTIVE:

To stimulate practise conservation of natural resources by tree planting.

TIME:

3 hours

MATERIALS:

Wheelbarrow, cord, paddles, hoes, rakes, shears, scion cutter, seeds, plastic pots, manure and arable soil. Different seeds of multi-purposes trees in order to create a nursery.

STEPS:

Plenary: Brainstorming and Discussion

1. Discuss in plenary about the acquired knowledge gained in the introduction of this topic; which resources would we like to receive from the trees (i.e.: Food security, manure and natural pesticides for our field, medicines, etc.)?
2. Considering the local conditions, choose different types of trees to be planted.
3. Provide information about the locally available trees.

Practising in the Learning Field

4. Review the benefits of nursery for vegetable crops and discuss why nurseries might also be relevant for trees?
5. Discuss the steps for preparing a tree nursery.
6. Explain the terms *nursery*, *plot*, *transplanting*.
7. Discuss also the necessary conditions and the best location to plant tree seedlings.
8. After practising, summarise the session (principle conclusions and recommendations).

WILD FOOD AND MEDICINAL PLANTS

Many plants that grow wildly in the environment have nutritious and medicinal values. If participants are well aware of the different kinds of medicinal plants that are growing in their community, where they can be found and how they can be used these can be of great benefit.

One activity that can be used to introduce the idea of wild and medicinal plants is called the community (or vsillage) map. The community map is a fun and useful tool that helps participants learn about the different resources their community has and where they are found. It is not so important that map be a perfect visual of the village. What is important is that the map reflects the participants' perceptions of what the resources are and where they are. The participants can help to decide on the contents of the community map. For example, the map could include major "infrastructural items (roads, houses, other buildings and transportation points), and natural resource such as water sites, agricultural land, forest land, grazing areas etc.

exercise 1

WILD FOOD AND MEDICINAL PLANTS AROUND US

OBJECTIVE:

To learn about the wild food and medical plants available in the locality and their uses.

TIME:

About 3 hours

STEPS:

1. Ask the participants to invite one or more people from the community whom they think might know much about wild foods or medicinal plants. (This should be arranged the previous session).
2. Have the resource person/s talk about the different wild foods that can be found and then take the participants on a "guided tour" of the community to show them the different kinds of wild and medicinal plants that can be found.
3. Tell the participants to keep a list of the different plants they see and make a drawing of each of them including where they are found and their different uses.
4. When back at the learning site ask the participants to name/recall the different plants they saw on their guided tour.
5. Divide the participants into groups, one group per plant.
6. Ask the groups to prepare a "fact sheet" on their wild or medicinal plant. Make sure they include information, such as: name of plant; where it can be found; how and when it grows; what it can be used for; how to prepare it and any risks.
7. Have each group present its fact sheet in front of all the participants.
8. Discuss the following aspects:
   - Do women and men, or older people and younger people, have the same access to these plants?
   - Who in the community decides who has access to the plants?
   - How do these plants assist in times of the year when food is scarce?
9. Summarise the exercise and discussion.

If applicable the exercise can be complemented by a practical session to demonstrate preparation of the food or treatments.

exercise 2

CULTIVATING MEDICINAL PLANTS

OBJECTIVE:

To establish a medicinal garden in the JFFLS learning field.

TIME:

About 2 hours

MATERIALS:

Small farming tools used in the learning field, large sheets of paper and markers.

STEPS:

1. Tell the participants that a small portion of the learning field will be dedicated to the growing of medicinal plants.
2. Based on the earlier exercise select a number of medicinal plants to grow in the learning field with emphasis on herbs or small plants found in the locality.
3. Divide the participants into groups and allocate the identified plant species to the various groups.
4. Ask the groups to walk around the community and look for samples of their plant and to carefully dig up some samples to bring back to the learning field.
5. Once several samples of each plant have been found, return to the learning field. Draw a diagram on the flip chart that shows the amount of space in the learning field that will be devoted to medicinal plants, and work with the participants to determine what plants will be planted where.
6. When the diagram is complete, ask the participants to plant their samples and to prepare an initial AESA, which will then be conducted regularly to monitor the performance of the plants.

DIVERSITY IN WHAT WE EAT[1]

This topic provides the “link to life” where participants will relate what they have learned about diversity to their daily life and in particular their food habits. The participants have learned that keeping a diversity of crops helps to keep their crops and their field healthy. In the same way, diversity in their diet will keep their own bodies healthy. A balanced diet provides the correct amounts of food energy and nutrients needed during the day to cover the dietary requirements. A balanced diet must be composed of a variety of different foods from different food groups so that it contains all the needed macronutrients and micronutrients. There are many ways to combine foods to ensure healthy, balanced diets. There are also ways to share meals so that all family members have enough to cover their dietary needs.

[1] Adapted from FAO’s The Family Nutrition Guide.

exercise 1

DIVERSITY IN WHAT WE EAT

OBJECTIVES:

- To understand the benefits of eating a variety of foods;
- To learn different ways to bring variety into our diet.

TIME:

1 hour

MATERIALS:

Large sheets of paper and marker pens.

STEPS:

1. Divide the participants into four groups: the “Breakfast Group”, the “Lunch Group”, the “Dinner Group” and the “Snack Group.” Ask each group to make a list of the things they normally eat during those meal times, and how often they actually eat it.
2. Have each group present its findings.
3. Review each list with the participants, asking them whether they think the list provides a balanced and healthy diet. If so, why? If not, what should be added or eliminated?
4. Review the topic of a healthy and diversified diet by help of the facilitators’ notes below.

facilitators’ notes 1

A GOOD MEAL

A good meal should contain a staple food. See the list below for examples of staple foods.

(Identifying the different groups of food with colours, makes it easier for children to memorize it: white, for cereals - energizers; red for meat, eggs -builders; green for vegetables and fruits – protectors and make them understanding that a good meal should have the 3 colours).

CEREALS	STARCHY ROOTS AND FRUITS
MAIZE/CORN MEAL	POTATO
MILLET	SWEET POTATO
SORGHUM	YAM
WHEAT FLOUR	FRESH CASSAVA
RICE	CASSAVA FLOUR
	PLANTAIN

A good meal should also include other foods that may be made into a sauce, stew or relish. These include legumes and/or foods from animals, at least one vegetable, and some fat or oil (but not too much) to increase energy and to improve taste. Use a variety of foods to make healthy meals.
It is good to eat fruits with a meal (or as a snack) and to drink plenty of water during the day.
Snacks are foods eaten between meals. Below are examples of foods that make good snacks, particularly when more than one food is eaten.

SNACKS
FRESH MILK, SOURED MILK, YOGHURT, CHEESE
ROASTED GROUNDNUTS, SOYBEANS, MELON SEEDS AND OTHER OILSEEDS
EGGS
FRIED FISH
BREAD, PARTICULARLY WHEN EATEN WITH MARGARINE OR GROUNDNUT
PASTE/PEANUT BUTTER
BOILED OR ROASTED MAIZE COBS
CHAPATIS, BEAN CAKES
BANANAS, AVOCADOS, TOMATOES, MANGOES, ORANGES AND OTHER FRUITS (INCLUDING DRIED FRUITS)
YOUNG COCONUT FLESH
DATES

Eating snacks like these is a good way of improving a diet which may lack some food energy and nutrient items.

exercise 2

CREATIVITY IN FOOD PREPARATION

OBJECTIVE:

To promote creativity in food preparation by developing new recipes.

TIME:

1 hour

MATERIALS:

Large sheets of paper and marker pens.

STEPS:

1. Divide the participants into sub-groups.
2. Ask each group to develop a new recipe, using different combinations of foods, or using new foods that are available locally but which they never tried before.
3. Have each group present its recipe and let the other provide feedback – does it sound tasty? Not so tasty? Ways to improve it.
4. Ask one person per group to write the finished recipes down on a clean piece of paper.
5. If possible ask the groups to prepare the dishes at their homes before the next session and bring samples for the JFFLS group to taste.

This exercise can be repeated throughout the JFFLS session. In this way, by the end of the cycle, the participants will have a new recipe book that they can distribute through the community!

MEN, WOMEN, GIRLS, BOYS – WHO DOES WHAT?

This topic provides another “link to life”. The participants have learned about crop diversity as well as diversity in the foods that they eat. Another form of diversity is to begin to understand and appreciated the different roles that various gender groups play in their communities and how these roles are often determined by whether one is a man, woman, girl or boy. The participants will in this section begin to analyse the different “gender” roles and experiment with understanding how the “other half” lives. This understanding might call for making changes to some of the existing roles and rules if they find them un-fair or not useful. The topic provides some exercises that can help the boys and girls begin to understand “gender roles”.

exercise 1

WHO DOES WHAT?

OBJECTIVE:
To reflect on the different roles of girls and boys and reasons for it.

TIME:
2 hours

MATERIALS:
Large sheets of paper and marker pens.

STEPS:

1. Divide the participants into small groups, girls and boys in separate groups.
2. Ask each group to list at least five responsibilities that they have that they think are based on the fact that they are a boy or a girl.
3. Once they have listed the responsibilities, have them answer the following questions on the flip chart paper:
   - Why do you think that only boys (or girls) are responsible for this task?
   - Do you think it is fair or unfair? Why?
   - Do you think that boys (or girls) could also handle this responsibility? Why or why not?
4. Ask one member of each group to present the group's findings.
5. After the presentations, lead a general discussion about the different roles that boys and girls play, and encourage the participants to speak out and refer to their personal situation or experience.
6. Ask each participant to choose one of the activities from the "other half" that he or she would desire to do, or would not like to do, and have them explain their choice.

exercise 2

WHEN I GROW UP...

OBJECTIVE:
To reflect on future aspirations and relate this to participants perceptions of gender roles.

TIME:
2 hours

MATERIALS:
Large sheets of paper and marker pens.

STEPS:

1. Divide the class into pairs, each of a boy and a girl.
2. Tell each pair that they will be making three drawings on their paper to answer and illustrate the theme "When I grow up...":
   - One drawing of what they would want to be if they were a woman.

- One drawing of what they would want to be if they were a man.
- The final drawing should be of what they want to be regardless of whether they are a woman or a man.

3. Explain to each group that they have to agree on what they want to be for each of the three drawings.
4. Ask each group to present and explain the drawings they have made. Make a list of the Male, Female and Gender-neutral responses they have given.
5. Hold a discussion with the class in which you ask the following questions:
   - Do all of the drawings of men have to be done by men? Why or why not?
   - Do all the drawing of women have to be done by women? Why or why not?
   - If you were the opposite sex, which drawing would you like to be the most? Why?
   - If you were the opposite sex, which drawing would you like to be the least? Why?

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1 – Diversity in agricultural farms

STEPS:

1. Divide the participants into 5 groups.
2. Let each subgroup pick on 4 different crops, one from each crop category (food, fruit, medicinal, vegetables) and one type of animal.
3. Ask each group to draw a simple farm plan indicating where they will grow each of those crops and where they intend to keep the livestock.
4. Ask them to discuss why it is important to have diversity in the farm for enhanced agricultural production.
5. Summarize by stressing the aspect of also including trees in the agricultural production.

ACTIVITY 2 – Switcheroo dramatization

STEPS:

1. Divide the participants into groups of four or five and ask them to prepare a five-minute sketch of a typical morning in their community.
2. Explain to them that one group member will act as the mother, one as the father and the others will be the participants. However, there is a catch – the boys must play the part of girls, and the girls must play the part of boys!
3. Give the participants about a half hour two prepare their sketches.
4. When they have finished, ask for volunteers to present their drama.

It is possible that no one will volunteer, as they may feel embarrassed at first. If this should happen, count the number of groups. For example, if there are five groups, write the numbers 1-5 on five small pieces of paper. Fold the pieces of papers, mix them up and ask one child from each group to choose one of the pieces of paper. After every group has their piece of paper, choose one of the numbers at random. Whichever group has that number comes forward to present their sketch.

ASSESSING PROGRESS

MAPPING FARM DIVERSITY

Pictures can be understood by all, and can be used to visualise the types of changes in the area. Sketches (and maps) can be made by the participants at the beginning of the JFFLS season (for assessment and planning purposes), during the JFFLS (for monitoring purposes) and at the end of the JFFLS (for evaluation purposes) in order to locate changes taken place and to analyse their causes and effects.

OBJECTIVE:

To provide an example of how a map or sketch can be used to measure change in farm diversity.

TIME:

1 hour

MATERIALS:

Sheets of paper and coloured pens.

STEPS:

1. Ask each participant to take a sheet of paper and a few pens.
2. Each person will now draw a sketch of their farm indicating which crops and plants that are grown where on the farm and also include trees, water sources etc.
3. When the farm sketch is done ask the participants to draw people on the farm indicating the main farm activities that they and their family carry out on the farm, i.e. planting, weeding. Tell them to indicate in their pictures if it's a man or woman who usually does the job. I.e. if normally women do the weeding they should draw a women weeding in the field etc.
4. Store the final drawings in a safe place for future use.
5. To monitor change in farm diversity practices, this exercise should be repeated at the end of the JFFLS cycle, followed by a discussion in the group, in order to identify the changes that have take place on participants' farms over the period, in terms of diversity of farming practices and gender roles.

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5

Protection

Junior Farmer Field and Life School – Facilitator's guide

Module 5: Protection

Junior Farmer Field and Life School – Facilitator's guide

TABLE OF CONTENTS

Module 5: Protection

INTRODUCTION

Protecting soils, crops and animals from threats such as erosions, pests, diseases etc is a constant concern in agriculture, but the idea of "protection" goes much further than that. For example in agriculture ones fields must be protected, the soil must be protected, and sources of water must be protected as well. Similarly biodiversity and natural resources must also be protected. Beyond the learning field and environment, the animals that a farmer raise must be protected and, perhaps most important, one must protect oneself. The "3 Hs" — Health of humans, Health of animals and Health of plants – are all vital to the well-being of the participants and their communities. While participants learn how to protect their crops from pests and disease the link to life will enable them to also learn how to protect themselves from threats such as HIV. This module can be complemented with some exercises from the "Threats and loss" module.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modifies and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of this module participants should:

- Identify and explain the different ways of protecting soil, field, crop, animals and humans;
- Describe different methods of protection;
- Understand what biodiversity is and why one should protect it;
- Relate protection of crops and animals to gender roles and human safety.

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

- **ENERGIZER AND FUN** (30 MIN)
- **IN THE LEARNING FIELD** (45 MIN)
- **AGRICULTURAL TOPIC** (45 MIN)
- **MAKING THE LINK WITH LIFE** (30 MIN)
- **CULTURAL ACTIVITIES (ART, DRAMA, SONG)** (30 MIN)
- **ASSESSING PROGRESS**
- **CLOSING ENERGIZER**

↘GETTING STARTED WITH "ENERGIZERS"

Some sample energizers that will also help to "break the ice" and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Natural enemies, pests and diseases

OBJECTIVE:

To recall names of natural enemies, pests and diseases.

TIME:

15 minutes

MATERIALS:

Chairs.

STEPS:

1. Ask the participants to arrange their chairs in a circle formation.
2. When they are settled, give the following directions:
   - When the name of a natural enemy is mentioned, everybody should sit at attention.
   - When the name of a pest is called out, everybody should change seats.
   - When the name of a disease is said, everybody should stand at attention, their faces showing an expression of shock.
3. Execute actions quickly. Eliminate participants who are not able to do the actions at the count of three.

Energizer: Protecting one's self

OBJECTIVES:

- To discuss why people protect themselves;
- To discuss the importance of the environment for the kind of behaviour a person develops.

TIME:

15 minutes

MATERIALS:

As many numbers as there are participants written on pieces of paper, tape.

STEPS:

1. Ask the group to form one big circle. Give each participant a number which she should tape to his/her back.
2. The object of the game is for each participant to protect her number. (**Note**: It should be explained that the number represents the person. The participant should by all means protect her number!) At the same time, the object of the game is to collect as many numbers as possible since the person who collects the most numbers wins. The game starts when the

signal is given. People then move from their places.

3. Discuss the following questions:
   - How did you feel about other people "attacking" you? (Remind them that their numbers were their persons. People trying to get their numbers were "attacking" them).
   - How did you protect yourself?
   - Did you feel that there was any person in the group who would not "attack" you?
   - Why do people protect themselves? What happens when people live in an environment where they always feel that others would hurt/harm them?

Energizer: Protecting chicks

OBJECTIVE:

To discuss why people protect themselves.

TIME:

15 minutes

STEPS:

1. Ask the participants to divide into subgroups of boys only and girls only.
2. Ask them to hold hands to enclose in a circle one the youngest.
3. Each team to choose the strongest person who will be sent to attack the opponent camp to try and snatch the young person. The team will do all they can to stop the opponent from touching any part of the young person who is in the centre of the cycle.
4. In plenary let the participants sketch the shape of shelter they created that provided safety and comfort for the young person.
5. Participants will discuss threats they are facing and ways to improve their protection.

Exercises

PROTECTING THE LAND AND SOIL

Large and intensive rains often produce high amounts of runoff. Runoff causes erosion as soil particles are detached and transported by the moving water. There are different ways that farmers can try to control runoff and erosion for example physical measures such as terraces, buns, barriers etc. and farming practices such as agro-forestry, minimal tillage etc. In this section participants will learn to understand the importance of soil protection and various methods and practices for it.

WATER: A FRIEND AND FOE

Water is our friend because it gives life to the crops and the trees and it fills the rivers and streams with the water we need. But fast flowing water is our enemy, because it steals our soil and disappears very quickly. We want the water to stay with us; we do not want it to run away with the soil.

Mr Mafuta, farmer in Zaka, Masvingo exercise 1

UMBRELLA![1]

OBJECTIVE:

To reflect on the need for soil cover.

TIME:

15 minutes

MATERIALS:

An umbrella, a hat and a pair of sunglasses.

STEPS:

1. Put on the sunglasses and ask the participants why they think people wear these.
2. Take off the sunglasses and put on the hat. If the hat is unknown to them put the common headgear or scarf.
3. Ask why they are wearing the headgear.
4. Pick one of the umbrellas and put it up. Ask why we use umbrellas (both sun and rain).
5. What if we use a small umbrella? And what when we use a big one?
6. Discuss the following questions:
   - What is the umbrella referring to?
   - What do you think the items (hat and umbrellas) symbolize?
   - Why is it important that the soil is protected from rain and sun?
   - What roles do trees have that is similar to umbrellas?

[1] Adapted from Discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006).

exercise 2

PROTECTING THE SOIL AND WATER RUNOFF BY SOIL COVER[2]

OBJECTIVE:

To demonstrate the impact of intense rainfall on the soil and the need to protect the soil by soil cover to reduce erosion.

TIME:

1 hour

MATERIALS:

- Two wooden boxes; about 30 cm wide, 40 cm long and 10 cm high with one end 2 cm lower than the other to provide an outlet over which the runoff can flow;
- Enough air-dry soil to fill the two boxes to 8 cm depth;
- A 5-litre watering can with a course sprinkler head;
- Two bowls;
- Chopped crop residues or grass to cover 1 box completely.

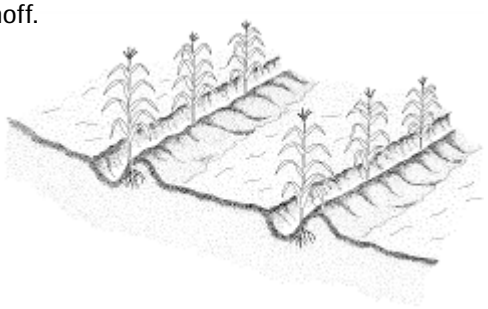
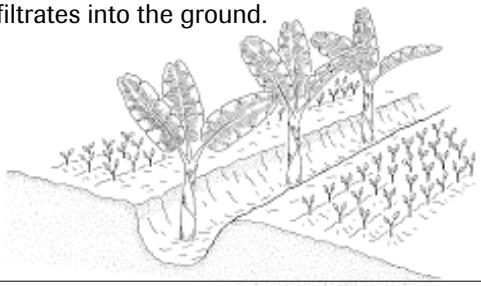
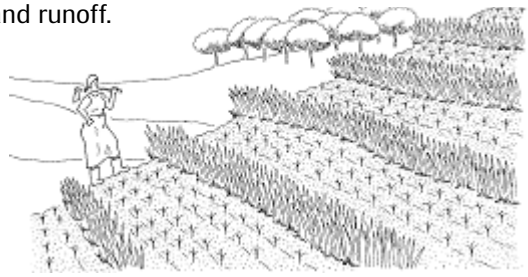
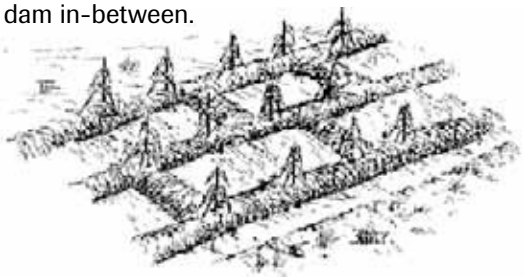
STEPS:

1. Remove stones and roots from the soil, and fill the boxes to 8 cm depth so that the soil at the lower end is level with the outlet.
2. Add a layer of chopped crop residue or grass of about 0.5 cm thickness over the soil surface in one box.
3. Place the boxes at an angle of about 25% with the lower sill of the boxes in the down hill direction (to simulate sloping land) and place a bowl beneath each outlet.
4. Simulate a heavy rainstorm by holding the watering can about 2 meters above the box and water the box as uniformly as possible.
5. Ask the participants to record the amount and the colour of the runoff water that accumulates in the bowl.
6. As soon as the runoff has ceased, excavate the soil at the downhill end of the box, and note the depth to which water has penetrated.
7. Repeat the procedure (5 to 7) on the soil box (without chopped crop residues) to simulate contour bunds and tied-ridges by tracing contour lines and grids with your finger.
8. Hold a discussing around the following questions:
   - In which box did water infiltrate the most, why?
   - How much water is stored in the soil?
   - What causes erosion?
   - Why is erosion a problem?
   - What is the influence of vegetation on erosion?
   - What is the relation between speed of the runoff water and infiltration of water in the soil?
   - What signs of erosion have you seen? (i.e. rills, gullies, tree roots have become exposed, shallow top soil).
   - Is erosion an individual problem for each individual farmer or for all the farmers involved?
   - What do you think can be done to reduce erosion in the learning field (cover crops, intercropping, control barriers, contour ridges, infiltration pits, trash or stone lines, etc).

[2] Discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006).

facilitators' notes 1

SOME WAYS OF MANAGING SOIL AND WATER[3]

Some ways of managing soil and water	
Contour farming means that the field activities such a ploughing, furrowing and planting are done along the contour. 	**Contour furrows** are small earth banks with a furrow on the higher side which collects the runoff. 
Retention ditches prepared along the contour catch and retain runoff and hold it until it infiltrates into the ground. 	**Grass strips** are a cheap alternative to terracing, that create barriers that minimise soil erosion and runoff. 
Bunds of earth traps water and slows down runoff. It's often used for fruit tree seedlings. 	**Stone lines** along the contour slows down the water and spreads it over the field. 
Tied ridges is a no-tillage practice that include ridges that are tied at regular intervals creating a dam in-between. 	**Cover crops** are usually legumes planted in-between other crops to cover the soil surface. 

[3] Adapted from A Study Guide for Farmer Field Schools: Water Harvesting and Soil Moisture Retention (Duveskog, 2001).

exercise 3

LOSS OF FARM NUTRIENTS – THE BOTTLE GAME[4]

Nutrients and organic resources on a farm are like money in the bank. They support the farmer's livelihood and the more resources are built up the better the quality of living and ability to cope with economic or climatic disasters. However, if we only draw on our capital without investing even the richest person will eventually become poor. The same is true for the nutrient capital on the farm in soils and organic resources. No matter how efficiently materials are recycled there are inevitable losses (including down the pit latrine) and when products are taken to the market. Unless these losses are restored the productivity of the farm will continuously go down.
This exercise provides an excellent icebreaker for discussions about ways of managing resources efficiently, the economic value of different resources coupled to their nutrient content.

OBJECTIVES:

- To understand the major nutrient flows in a farm;
- To understand how losses of farm nutrients might occur on the farm.

TIME:

1 hour

MATERIALS:

- 2 or 3 small plastic water bottles or soda bottles (these represent "crop and forage fields");
- 2 or 3 plastic bottles with the neck cut off (or plastic cups), one represents "the livestock pen", one the "market" and one the "homestead" (the livestock pen and homestead containers should have a small hole drilled in the bottom to represent leakage of nutrients as urine from cattle and human excreta down the latrine);
- A pot containing about 2 litres of water (not a jug so that water has to be poured out carefully to avoid spillage). This represents nutrient resources managed by the farmer (e.g. compost or livestock manure).

STEPS:

1. Draw a circle on the ground, about a 2 meters in diameter, to represent a farm or delimit boundaries with sticks or stones.
2. Place the bottles representing fields (and livestock) and homestead inside the circle; place the bottle representing the market outside the circle.
3. The pot of water represents the nutrient in compost or farmyard manure that is managed by the farmer.
4. The facilitator or a volunteer fills the field bottles from the pot to simulate that at the start of the cropping season nutrients are taken to the fields.
5. Harvest and marketing. About half of the nutrients in maize are in the grain and half in the stover. Decide how much grain goes to the market and household, and stover to livestock. Pour the rest of the water back into the pot (crop residues composted). About 0-20% of nutrients consumed by livestock are converted into milk or meat, depending on productivity, and can be consumed or sold. The remaining water represents nutrients in manure and household residues (like vegetable waste). The part not lost from the manure heap or as urine or from the pit latrine, can be returned to the pot with water (nutrient stock); also water from the household (vegetable waste) and from the livestock (manure) goes back into the

[4] Adapted from discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006).

pot.

6. Repeat the cropping cycle several times until the water pot is empty. Repeat the exercise in playing with reducing spillage as much as possible i.e. (“efficient” and “inefficient” farmers).

Questions to discuss and points to emphasize:

- Why has the water been lost? Discuss that spillage represents losses during handling, nutrients in water running out of the circle (erosion) or soaking into the ground (leaching). Note that water leaking out of the homestead represents the latrine: large amounts of nutrients are lost and not recoverable (every time you go to the latrine you throw money down the pit).
- What happens to urine leaking out of the homestead and livestock unit? How much is lost? Can it be recovered?
- How can we minimize losses from the cattle unit?
- What can be done to restore nutrients to the system and by what means?

MANAGING WASTE

When protecting the environment you live in, it is also important to consider what is done with the waste you produce, whether it is agricultural or household waste. This is especially important if the waste is hazardous and no local procedures are available to process this hazardous waste. Hazardous waste includes items that are dangerous for the human health – it can be flammable, reactive, corrosive or toxic. One need to prevent that this waste enters into the food chain. Hazardous waste should not be mixed with compost heaps nor end up in agricultural fields. In rural areas non-recyclable waste is normally dumped in rubbish pits on the own plot. It is important to prevent that these pits are too close to wells used for drinking water. Hazardous waste should not be dumped in these rural rubbish pits to prevent human contact. Such wastes are best brought to urban waste collection centres.

Agricultural and organic household waste can normally easily be recycled through a compost heap. Materials to be added to the compost heap from the household could be fruit and vegetable remainders.

exercise 1

BANANA BREAKDOWN[5]

Decomposition is performed mostly by bacteria. This activity will help participants to understand the conditions bacteria need to do their work. Like humans, bacteria are living organisms that need food, air and water to live. Banana peel is readily compostable. In general such food scraps decompose readily as they contain high nitrogen levels. When disposed of in a landfill, food scraps are among the first materials to decompose. If you have an existing compost heap, use this as a resource. Look inside and make observations. Fork through to see how different it looks underneath the top layer.

OBJECTIVE:

To demonstrate the decomposition of an easily composted material.

TIME:

1 hour

MATERIALS:

5 equal pieces of banana peel (each about one-inch square), 5 small see through containers, Cling film, Sellotape, Water, Moist garden soil, record sheets.

STEPS:

1. Set up the five trials by applying different treatments to the banana peel.
   - Trial 1 – water: place the peel in a container, cover with water
   - Trial 2 – soil: place the peel in a container, cover with moist garden soil
   - Trial 3 – sun: place the peel in a container and put in a sunny spot
   - Trail 4 – without air: wrap the peel with cling film and tape closed, place in a container and seal.
   - Trail 5 – in the dark: place the peel in a container and put in a dark cupboard
2. At the end of one week, observe all the jars.
   - Has the colour changed?
   - Has the texture changed?
   - What else has changed?
3. Record your observations on a records chart.
4. At the end of the second week, repeat the observations.
5. Record your observations.
   - Decide with the participants which, if any, trials to continue.
   - What conclusions can you draw about the needs of bacteria?

[5] Source: http://www.littlerotters.org.uk/

6. Questions/discussion:
   - Did the peels change in the same way?
   - Which changed the most?
   - What do you think caused it to decay the most?
   - Is the school compost bin in the best place?

exercise 2

CAN EVERYTHING BE TURNED INTO COMPOST?

Materials decompose at different speed depending on their content. Some change faster than others, and for example plastic does not change at all. Anything that was once living is called organic and will breakdown. Organic things can be used to make compost. This exercise helps in distinguish between organic and non-organic waste.

OBJECTIVE:

To observe how different materials decay over a period of 2 weeks.

TIME:

30 minutes the 1st session then 15 minutes daily for 2 weeks.

MATERIALS:

Banana peel, apple core, newspaper, leaves, crisp packet and other items chosen by the group.

STEPS:

1. Look at the different items and brainstorm on how participants think the items break down or decompose.
2. Place each of the items in different containers, cover with soil and put a lid on the container.
3. Ask for a volunteer, who will water the soil in each container every day (just enough to keep the soil damp), don't let it dry out. While watering he/she should also dig carefully in the soil to observe any changes in how the material looks, and take note of these.
4. After two weeks, divide participants in subgroups so that each group get one container.
5. Ask each group to observe their materials and also consult with the volunteer about what happened during the two weeks.
6. Each group thereafter present their findings for the other participants, followed by a discussion on how fast and to what extent various types of materials decompose.
7. Discuss the various forms of waste. Emphasize the difference between hazardous and non-hazardous waste. Also emphasize the difference between household recyclable and non-recyclable waste.

PROTECTING OUR FIELD

The learning field provides the cornerstone of the JFFLS approach and is an important parts of the participants lives. They therefore need to learn to protect it. In this module, the participants will learn to build a fence around their garden among other ways of protection. It is very important to work with the community leaders and the Primary School Director and ask for their help in making sure the learning field is protected properly. If they are convinced of the importance of the project, the protection of the field/garden will be successful and problems like robberies and animal intrusion will be more easily avoided. If security problems appear related to the JFFLS learning field, it might be necessary with a community meeting and get the leaders to discuss the matter and help in dealing with the issue.

EXAMPLE OF FIELD PROTECTION IN A JFFLS

One JFFLS came up with the following measures to protect its field and nursery: The school informed the community (with the agreement and support of the community leader) that the owners of cattle and other domestic animals had to keep their animals far away from the JFFLS field and if these animals were found inside and caught, the animals would be held for 15 days. At the end of this period, if the owner did not pay the fine for the damages caused, or if he/she did not offer to do some work instead of the fine, the JFFLS group would be allowed to keep the animal as theirs.

exercise 1

PROTECTING OURSELVES AND THE THINGS AROUND US

OBJECTIVES:

- To brainstorm about protection of oneself and things around us;
- To realise that protection is about much more than just the field in which they grow their crops.

TIME:

About 1.5 hour

MATERIALS:

Flipchart and markers.

STEPS:

1. Divide the participants into three groups. Name the three groups by: 1) Humans; 2) Animals; and 3) Plants.
2. Ask each group to make a list of at least five different things that they might need to protect themselves from to ensure that they stay safe and healthy.
3. Ask one member from each group come to the front of the large group to present his or her list. After each group has presented, ask the other participants if they would like to add anything to the list.
4. Ask the participants to go back into their groups and to think about how they might protect themselves from the items they have listed. For example, if the “Plant” group listed “wind” as something they need to protect themselves from, they should now try to write down how they might be able to protect themselves from the wind.
5. Ask a different member from each group to come to present his or her list for the large group. After each group has presented, ask the other participants if they would like to add anything to the list.
6. Hold a general discussion in which you ask the participants what they have learned about protection.

exercise 2

PROTECTING OUR FIELD

OBJECTIVE:

To understand the importance of protecting the agricultural field.

TIME:

About 2 hours

MATERIALS:

Flipchart and markers.

STEPS:

1. Hold a brief discussion among the participants to review all of the items that they had come up with before about what they need to protect their fields from. To help them remember, you may want to ask the following questions:
   - Why do we have to protect our field?
   - What might happen if we don't protect the fields well?
   - How can we improve this situation?
2. Divide the participants into four groups. Ask each group to write or to draw:
   - Two ways of protecting the field against animals who eat plants ;
   - One way of protecting it against drought;
   - Two ways of dealing with pests;
   - Two ways of protecting against robbery.
3. Have two members from each group present and explain the measures they planned together.

Examples of problems in non-protected fields

- Goats come in and destroy, and eat the plants.
- Cows come in and eat everything.
- Rabbits enter and eat young lettuce and cabbage.
- Rats enter and eat sunflower seeds.
- The harvest can be stolen during the night.
- The plants die due to the drought, insects or pests.

exercise 3

BUILDING FENCES

OBJECTIVES:
To agree on what type of fence are suitable for the JFFLS field.

TIME:
1st session about one hour, and 2nd session about half a day

MATERIALS:
Flipchart and markers, paper and pencils.

Note: Before conducting the 2nd session of this activity, you will probably need to talk with village leaders or committee members to make sure you have all the material needed to build the fence. Make sure that you use materials that you can find locally and that can be replaced and repaired easily.

STEPS:

1st session

1. Take the participants for a walk around the community and ask them to observe the different kinds of fences and enclosures that they see.
2. Ask them to interview some of the farmers that they come across during their walk. Some of the questions they may ask the farmers are:
   - Why did you choose that kind of fence?
   - What are the advantages and disadvantages of the fence you have?
   - What materials did you use to build the fence?
   - How did you build it?
   - How long did it take to build?
   - Are you happy with the fence?
   - Would you prefer to have a different kind of fence? Why or why not?
3. After the walk and the interviews, find a shady place to sit with down and hold a general discussion about what they have learned.
4. Discuss the JFFLS learning field and agree on what types of fences might be most suitable for protecting this field. Make a plan for how to find the materials that you will need to build a fence for the JFFLS field and if possible ask the participants to bring material for the fence from their home for the next session.

2nd session

5. For building the fences divide the participants into groups, making sure to mix their age and gender. Each group will have different responsibilities. For example, one group may be in charge of cutting wood to make stakes, another group may be in charge of weeding etc. However, make sure that all of the boys and girls get to do each of the tasks involved but remember that the younger ones may not be as strong for certain things. Also keep in mind the weight and the health of the participants when asking them to do different tasks.
6. It is now time to build the fence!

facilitators' notes 1

EXAMPLES OF PROPER FENCES

Using living plants or shrubs.

- It takes time to close the initial gaps well ==> Choose plants that grow quickly that will close the fence quickly.
- They give good protection against animals, if well built ==> Choose plants that sting and that animals do no like (i.e.: cactus, sisal, etc.)
- They give shade ==> This is an advantage but it needs to be pruned so it doesn't grow too much and prevent the crops from growing well.

Local materials such as: wooden stakes, weeds, etc.

- Economic, if locally available;
- Good protection against animals, if well built and maintained;
- It need to be repaired often.

Materials such as: nets, barbed wire, etc.

- Permanent materials;
- Expensive materials and not usually available locally.

PROTECTING OUR SMALL LIVESTOCK

Just like crops, livestock has to be protected against pests, predators and harsh weather conditions. Often housing or shelters for small livestock are not well prepared and as a result often small, overcrowded, poorly ventilated and unhygienic. This can result in high mortality rates in young stock due to disease, trampling by larger animals, or exposure to adverse weather conditions. In the following exercises the participants will discuss what can be done to protect their small livestock, and chickens. They will also appreciate the importance of protecting their animals.

exercise 1

PROTECTING SMALL LIVESTOCK THROUGH GOOD HOUSING[6]

OBJECTIVE:

To understand how different types of housing might affect the health of small animals.

TIME:

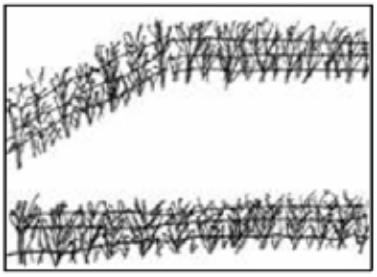
About 1.5 hour

MATERIALS:

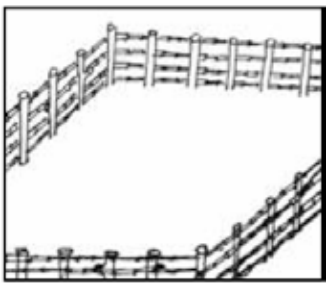
Large sheets of paper and markers.

STEPS:

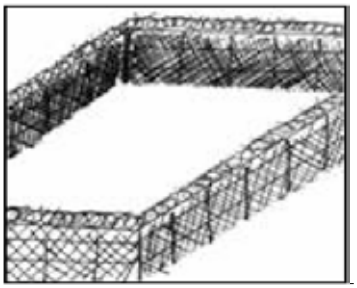
1. Divide the group into subgroups and ask them to walk through the community, noting as they walk the different approaches that are being used for providing shelter or housing for young stock.
2. The groups should be encouraged to talk to the owners of the animals so as to find out why different approaches to shelter/housing have been used and what the advantages and disadvantages associated with them are. They should also be encouraged to identify



opportunities for improvements using locally available materials. Encourage the participants to make drawings in their notebooks of the various housing types observed.
3. The subgroups then return to the host farm and discusses; “What did they observe?”, “Did



all the shelter/housing options seen meet the basic requirements of the young stock?”, “What simple improvements could be made to the shelter/housing in terms of construction or management?”



[6] Adapted from Pastoralist Field Schools: Guidelines for Facilitation (FAO and VSF Belgium, 2009).

facilitators' notes 1

HOUSING OF YOUNG STOCK

Reasons for sheltering small livestock:

- To protect the birds against predators;
- To protect from bad weather;
- To manage disease and pest;
- To increase production through saving energy (walking);
- To manure collection for making farm yard manure;
- To improve management and efficiency e.g. feeding, watering and population;
- To increase egg/milk/meat production;
- To immediate detection and removal of sick animals;
- To clean egg/milk production;
- To control breeding.

Features of good housing for young stock include:

- Adequate space for the number of animals;
- Good ventilation;
- Slanting floor to allow drainage;
- Sloping roof to channel water away and prevent leaks;
- Hygiene achieved by regular cleaning.

Ways to keep housing clean?

- Avoid wetting the floor;
- Frequent turning, of litter;
- Ideal and clean equipment;
- The surrounding of the unit must be clean;
- Roof, walls and floor should be cleaned;
- Regular removal of droppings.

exercise 2

PROTECTING CHICKENS BY USING BASKETS

OBJECTIVE:

To understand how different types of housing might affect the health of small animals.

TIME:

About 1.5 hour

MATERIALS:

Large sheets of paper and markers.

STEPS:

1. Refer to the energizer on protecting chicks earlier in the module.
2. Divide the participants in subgroups of about 6 persons each.
3. Ask the sub-groups to draw a picture of a happy hen with a bunch of healthy nice chicks recently hatched.
4. Then ask them to add in the drawing all the threats for the chicks that they can think of in terms of predators, such as birds, snakes, wild dogs etc.
5. Brainstorm in the group about what could be done to protect the small chicks.
6. Introduce the idea of the chicken basket and explain how it works.
7. Now ask participants to draw a chicken basket around the chicks signifying protection of the chicks.
8. Summarise the exercise and discuss the advantages and disadvantages of the basket system.

Chicks may be protected from animals or bigger chicken by confining them during the day. A good way to do this is to cover them in a special basket which can be moved around for feeding.

PROTECTING BIODIVERSITY

A very serious problem that rural farmers face is the decline of biodiversity and natural resources. For the health of the planet and future generations it is important that one protect biodiversity and natural resources in the world, starting from ones own environment. The participants will need to understand and appreciate the variety of life forms around them, and how each form brings something good to their environment. They will also need to begin to understand some of the practices that are harmful to their environment, as well as good practices that they should adopt to protect the natural resources around them.

exercise 1

PROTECTING BIODIVERSITY

OBJECTIVES:

- To define bio-diversity;
- To understand the need for protection of biodiversity.

TIME:

About 1 hour

MATERIALS:

Flipchart paper and markers.

STEPS:

1. Ask the participants what they think the word biodiversity means and what natural resources are. List the definitions down on a large sheet of paper.
2. Introduce the topic of the need to protect biodiversity.
3. Ask the participants why it is important to protect biodiversity. List the reasons given on a large sheet of paper.
4. Divide the participants in small groups and ask each group to discuss what threatens biodiversity and what they could do to protect biodiversity.
5. Ask the groups to present the results of their discussions.
6. Discuss the results of the presentations.
7. Discuss the following questions:
   - How do we benefit from our biodiversity?
   - What do we all collect from our biodiversity?
   - Have certain species disappeared during the last few years in the area?
8. What happened? Should this be stopped? How can we stop this?
9. Summarize the importance of protecting biodiversity and what farmers can do or should not do in order to protect biodiversity in their own area.

Key points for the facilitator

1. Biodiversity is the variety of all forms of life – animals, minerals, vegetables – and the way they interact with each other.
2. Natural resources are the resources that are produced by nature and that provide us with the basis for producing the food we eat.
3. The main threats against natural resources are erosion, fire and over-exploitation.

exercise 2

CONTROLLED BURNING

A major problem that happens in and around the fields are the uncontrolled fires that destroy so much valuable vegetation – and even animals – each year. Often these fires are the result of uncontrolled burning of agricultural fields. Children frequently help their parents in burning their field.

OBJECTIVE:
To understand why it is important to control the burning of fields.

TIME:
About 1 hour

MATERIALS:
Flipchart paper and markers.

STEPS:

1. Introduce the topic of controlled burning. Discuss the topic of controlled burning in relation to protecting biodiversity and natural resources.
2. Explain to the participants that a part of the fertility of a field is concentrated in the vegetation and that after a field is burned, that fertility will not return to the soil and will lost for the crops the farmer would like to grow. Ask the participants why farmers still choose to burn vegetation. List the reasons on a large sheet of paper.
3. Discuss all reasons given by the participants and ask them how farmers could deal with all these reasons for burning without burning the field.
4. Go with the participants to the learning field. Ask them what the farmer should consider first when he/she still would like to burn the field as part of land preparation.
5. Ask and discuss what can be done to minimize the risk of fire spreading outside the boundaries of the field.
6. Ask the participants to show, without actually burning, what needs to be done to burn the field in a controlled way.
7. Summarize what needs to be done to burn the field in a controlled way.

facilitators' notes 1

FIRES-PROS AND CONS

Using fire is an easy answer to the problem of clearing plant debris. However, the practice of bush burning has certain serious adverse **consequences**:

- Most of the nutrient nitrogen and sulphur present in the debris are lost to the atmosphere.
- Burning may destroy beneficial micro-organism.
- Burning may have adverse effects on soil structure.

On the other hand, burning may also be of some **benefit**:

- Burning is an easy and inexpensive way to get rid of plant debris.

- It may serve to kill pests, pathogens and weed seeds.
- Alkaline ash left on the soil after burning serves as a good soil amendment on acid soils.
- Ash also serves as an immediate source of certain mineral nutrients such as potassium and calcium.

In order to be able to **control fire**:

- Only burn when there is hardly any wind.
- Clear a fire break, i.e a few meters cleared of all vegetation and material that easily burns, around the field that is at least as wide as the vegetation is high.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1 – the protection song

TIME:

About 30 minutes

STEPS:

1. Divide the participants into three groups: plants, livestock, people
2. Ask each group to make up a song about what they need to stay healthy.
3. Have each group perform their song in front of everyone.

ACTIVITY 2 – the wash song – hygiene for protection

TIME:

About 30 minutes

STEPS:

1. For young participants, create a simple song about hygiene habits that will prevent locally prevalent diseases, such as eye diseases (trachoma and conjunctivitis), skin disease (scabies), diarrhoea, intestinal worms and hookworm (feet).The song should include the names of those parts of the body that may be infected by a waterborne disease (eyes, skin, stomach, bottom, feet) and the parts of the body involved in transmission or prevention (hands, feet).
2. Ask older participants to make their own song, individually or in small groups. Tell them the parts of the body that should be mentioned in the song.
3. Teach the young group the song. Ask them to point at, move or shake the relevant parts of the body.
4. Ask older participants to present their songs with accompanying body movements.
5. Ask volunteers to list on the blackboard the critical parts of the body (affected and transmitting).
6. After singing, start a discussion about the different diseases and their symptoms, transmission, prevention and treatment. For example, ask the participants if they, or their family or friends, have ever had an eye (skin, worm, etc.) infection.

ACTIVITY 3 – IPM story

TIME:

15 minutes

STEPS:

1. Whoever leads the activity may make up his/her own story. The principle behind the game is that members of the big group participate and therefore are active players in the story.
2. Divide participants into four groups. Assign each group to be one of the characters in the story. Assign a corresponding sound or action to each character. Group members should execute the action and make the sound of their respective character. For example:

Group 1: Farmer	whistle
Group 2: Field	clap hands
Group 3: Insect pests	stamp feet
Group 4: Natural enemies	laugh aloud

3. The facilitator may make up stories. For example:
4. One day, a farmer (group assigned whistles) was walking to his field (group assigned clap hands). He wanted to see what insect pests (group assigned stamp feet) and natural enemies (group assigned laughs aloud) were in his field (group assigned clap hands). While the farmer (group assigned whistles) was walking, he remembered that he forgot his sprayer. The farmer (group assigned whistles) decided to back to his house. The farmer ( ) did not know that in his field ( ) there were many natural enemies ( ) and only a few insect pests ( ). On his way to his field ( ), the farmer ( ) thought about looking at his field ( ) first. He saw that there were many natural enemies ( ). The farmer saw that there were only a few insect pests ( ). However, the farmer ( ) wanted to spray his field ( ). The farmer ( ) sprayed his field ( ) and killed all the insect pests ( ) and natural enemies ( ).

ASSESSING PROGRESS

exercise 1

MAPPING PROTECTION STRUCTURES

Pictures can be understood by all, and can be used to visualise the types of changes in the area. Sketches (and maps) can be made by the participants at the beginning of the JFFLS season (for assessment and planning purposes), during the JFFLS (for monitoring purposes) and at the end of the JFFLS (for evaluation purposes) in order to locate changes taken place and to analyse their causes and effects.

OBJECTIVE:

To provide an example of how a map or sketch can be used to measure level of protection mechanisms in place.

TIME:

1 hour

MATERIALS:

Sheets of paper and coloured pens.

STEPS:

1. Ask each participant to take a sheet of paper and a few pens.
2. Each person will now draw a sketch of their household and farm indicating houses, buildings, crop fields etc.
3. When the sketch is done ask the participants to draw the protection mechanisms in place for crops, seedlings, animals etc. Tell the participants that they can discuss among each others in order to make sure they don't forget some structures or mechanisms.
4. Then ask them to draw or indicate the protection mechanisms they have in place for them self or for family members. Aspects that are not easily drawn should be indicated with a symbol on the drawing.
5. Ask the participants to explain to each others their drawings in groups of 4-5 persons and to explain any symbols they might have indicate for human protection.
6. Store the final drawings in a safe place for future use.
7. To monitor change in protection mechanisms, this exercise should be repeated at the end of the JFFLS cycle, followed by a discussion in the group, in order to identify the changes that have take place in participants' households over the period, in terms of protection of crops, animals and family members.

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6

Water for life

Junior Farmer Field and Life School – Facilitator's guide

Module 6: Water for Life

Junior Farmer Field and Life School – Facilitator's guide

TABLE OF CONTENTS

Module 6: Water for life

INTRODUCTION

Managing water in a field is very important for growing a healthy crop. Too little or too much water makes a big difference in the way a crop develops. When growing a crop outside of the rainy season, a farmer has to find ways to supply water to the crop. Therefore it is critical that the participants understand the water cycle, and the best ways of collecting, using and conserving water.
Water is also essential in our own daily lives. We need it to drink, to prepare food and to wash. The participants need to understand the importance of clean water for preventing disease and for their own personal hygiene.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modifies and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of this module participants should:

- Understand how water circulates in the environment;
- Understand how water is taken up by the soil and plants;
- Appreciate different ways of irrigating crops;
- Appreciate clean water and understand why personal hygiene is important.

A typical JFFLS session (3-4 hours):

1. Energizer and fun (30 min)
2. In the learning field (45 min)
3. Agricultural topic (45 min)
4. Making the link with life (30 min)
5. Cultural activities (art, drama, song) (30 min)
6. Assessing progress
7. Closing energizer

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

- **ENERGIZER AND FUN** (30 MIN)
- **IN THE LEARNING FIELD** (45 MIN)
- **AGRICULTURAL TOPIC** (45 MIN)
- **MAKING THE LINK WITH LIFE** (30 MIN)
- **CULTURAL ACTIVITIES (ART, DRAMA, SONG)** (30 MIN)
- **ASSESSING PROGRESS**
- **CLOSING ENERGIZER**

Exercises

GETTING STARTED WITH “ENERGIZERS”

Some sample energizers that will also help to “break the ice” and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Bottle game

OBJECTIVE:

To enhance memory skills.

Participants stand in a circle. In the first round, a bottle of water is passed around the circle. Participants have to do something with the bottle, such as kiss it, rub it, or turn it upside down. In the second round, tell participants to remember what they did with the bottle, and do the same thing to the person standing on their right.

Energizer: Rainstorm

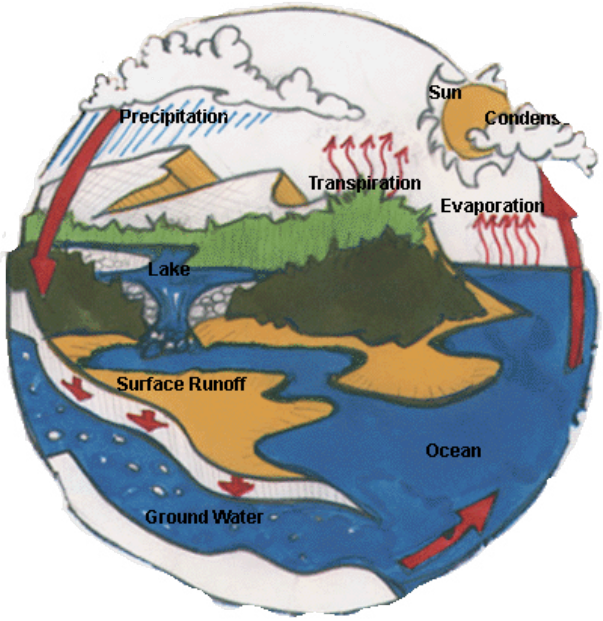
Everyone sits quietly in a circle, with their eyes closed, waiting for the facilitator’s first movement. The facilitator rubs their palms together to create the sound of rain. The person to their right makes this sound, and then the next person until everyone in the group is making the same sound. Once everyone is rubbing palms, the facilitator makes the rain sound louder by snapping his/her fingers, and that sound in turn is passed around the circle. Then the facilitator claps both hands together, and that sound is passed around the circle to create a rainstorm. Then the facilitator slaps their thighs, and the group follows. When the facilitator and the group stomp their feet, the rain becomes a hurricane. To indicate the storm is stopping, the facilitator reverses the order, thigh slapping, then hand clapping, finger snapping, and palm rubbing, ending in silence.

THE WATER CYCLE

Every human, plant and animal depends on water for survival. Water can not be created, nor destroyed. It can only be transformed into different forms. Let's explore the Earth's water cycle – what exactly is it?

The water cycle is a process that is constantly recycling the Earth's supply of water. It's controlled by the sun, which produces energy in the form of heat. This heat energy causes the water in the lakes, rivers, dams and puddles, to warm up and evaporate to the air. Below are the steps in the water cycle described:

1. When the sun heats up water in the lakes or rivers the water turns into vapour or steam (like when you boil water in a pot) and the water leaves the river or lake and goes into the air. This process is called **evaporation**.
2. Plants also give off water vapour (like when people sweat) and this is called **transpiration**. When plants loose more water than they can take up with their roots the leaves start wilting.
3. The water that evaporates or transpires rises into the cooler air, collects, and forms clouds. There, the water vapour molecules cool down and change back into liquid water. This is called **condensation**. You can see condensation if you pour a glass of cold water on a hot day and watch what happens. Water drops form on the outside of the glass. This water is water in the air that condensed.
4. As more and more water vapour cools into the clouds, the water droplets that form the clouds become larger and larger. These droplets get so big that the clouds can no longer hold them up and the droplets fall from the sky. **Precipitation** is the term for the falling, condensed water molecules, which come down as rain.



5. When water falls to the Earth, it enters into the soil because of the force of gravity, called **infiltration**. Or the water flows over the land and into bodies of water, such as rivers and lakes. Some of the water that falls in high elevations such as hills becomes **run-off water**, which is water that runs over the ground to lower ground and forms rivers, lakes and valleys. Sometimes this water collects nutrients from the soil it runs over, making the valley good for plant growth.
6. The water will eventually seep through layers of the Earth's surface, while impurities filter out, down to the ground water reserves. Or it may be held by the soil particles or taken up and used by plants and animals upon reaching the earth surface.
7. Then, the water is heated by the sun and is lost through transpiration from the plants or evaporation directly from the earth's surface, and the whole cycle begins again.

exercise 1

MAKE YOUR OWN MINI WATER CYCLE[1]

In this exercise you will discover how to make your own miniature water cycle with local material and observe the effect of sunlight on movement of water.

OBJECTIVE:

To understand the process whereby the Earth's supply of water is constantly recycling.

TIME:

About 1 hour

MATERIALS:

2 jars (preferably fairly big), small plants with roots, bottle caps, soil, sand, pieces of plastic, rubber band or string.

STEPS:

1. Fill two jars as in the picture (with sand and soil on the bottom and then a plant and bottle cap placed on the soil surface along the jar side).
2. Add about 1/4 cup water to soil the jars and fill the bottle caps with water.
3. Cover the jars with a piece of plastic (transparent if possible). Fasten a plastic wrap around the rim of the bowl with a rubber bands or strings. Then put a small stone on top of the plastic covers.
4. Place one jar in a sunny place and the other one in the shade.
5. After 30 minutes (or the time it takes for water drops to have formed on the inside of the plastic sheet on the jar placed in the sun) observe how the water cycle works.
6. Discuss the following questions:
   - How does this illustrate the water cycle?
   - What differences can be observed in the two jars?
   - How long does it take for water to evaporate and condense on the plastic wrap?
   - Where does the water go after it condenses on the plastic wrap?
   - Has any water in the plastic cap disappeared? Where did it go?
   - How does direct sunlight affect evaporation?

exercise 2

THE COTTON BALL CLOUD[2]

This is an easy and fun activity for the youngest participants to understand what clouds and rain is.

OBJECTIVE:

[1] Adapted from www.epa.gov/safewater.
[2] Adapted from http://www.first-school.ws/activities/science/drippy.htm.

To make participants understand what clouds and rain is.

TIME:
15 minutes

MATERIALS:
1 cotton ball for every child, some flat pans or containers filled with about a 1/2 inch of cold.

STEPS:

1. Give each child a cotton ball to hold. Tell them to pretend that they are holding a cloud.
2. Ask them how does the cloud feel: heavy or light, soft or hard?
3. Instruct the participants to place the "cloud" (cotton ball) gently over the cold water. Explain that water that has evaporated has travelled up to the cloud and it is a lot colder up in the sky, so the vapour turns into water, and it is filling up the cloud. Ask: Can you see the "cloud" (cotton ball) filling up with the water.
4. Ask the participants to gently pick up the "cloud" (cotton ball) from the pan. Ask: How does the "cloud" feel now; light or heavy, warm or cold? What is happening with the water? Yes, the water is dripping from the "cloud". Why? The cloud cannot hold all that water, is too, too, heavy. What do we call when water falls from the clouds because they are too heavy with water? Yes, you are right, rain! It is raining! And what happens to the water? Yes, it is coming right back into the pan, and the pan could be a stream, river, ocean or the ground.

exercise 3

UNDERSTANDING WATER SOURCES WITHIN OUR ENVIRONMENTS

OBJECTIVE:
For participants to identify the difference water sources in their environment.

TIME:
1 hour

MATERIALS:
Marker pens, flip charts, masking tapes.

STEPS:

1. Divide the participants into convenient groups.
2. Ask them to draw a community map with the different water resources within their community, such as streams, wells, watering points, pans etc. Ask if there are any problems with these resources and if there are any differences in quality among the various water sources.
3. Ask them what happens when the community don't take good care of these resources.
4. Also ask them to list the different methods they can use to harvest and store water for domestic use and irrigation.
5. Summarize the discussion highlighting the water resources available locally and elaborate on water harvesting.

exercise 4

COPING WITH DROUGHT

This exercise will explore ideas of what can be done to cope with drought and water shortage in the community. The “low-hanging fruit” activities can be used to discuss and plan new activities of any kind.

OBJECTIVE:

To make participants think and discuss coping mechanisms they can use during drought periods.

TIME:

About 2 hours

MATERIALS:

Paper, card, pens or markers.

STEPS:

1. Hold a discussion in the group on the causes and effects of drought and water shortage in the community. Encourage the participants to tell stories about their experiences related to water problems.
2. Ask the participants to draw a tree that has high branches and low branches. Explain to them that the purpose of this activity is to identify activities and services to cope with drought and water shortage. Some are easier, and some are harder.
3. Explain the idea of low hanging fruit: “low hanging“ fruit is the easiest fruit to pick from the tree and links with the idea that some services and activities would be easier to introduce and carry out. Fruit that is hanging higher on the tree is harder to pick.
4. Ask the girls and boys to draw new activities or services that they think should be introduced to cope with drought and water shortage on separate cards. Encourage them to think of activities related to livestock, crops and humans.
5. Then have them place the cards on the tree according to whether they think they are “low“ or “high“ hanging fruit.
6. Ask the participants to discuss ways of beginning these activities and things that might get in the way of carrying them out. Tell them that they can move the fruit higher or lower if during their discussions they change their opinion about how easy or difficult it will be.
7. Ask one of the participants to present a summary of the tree and encourage others to ask questions and make any comments or suggestions. Follow up the activity by leading discussions – either in this JFFLS session or future sessions – on irrigation, mulching and shade, and water harvesting.

MOISTURE IN THE SOIL AND IRRIGATION

As mentioned earlier, managing water in a field is very important for growing a healthy crop. When there is too little rain, a farmer has to find ways to supply water to the crop, this is called irrigation. It is important for participants to understand different ways of irrigation practiced in the area. They also need to understand how quickly the soil absorbs water (soil infiltration rate) and how much water the soil can hold (water holding capacity). Knowing these two things will help them to irrigate their field in the best possible way.

If we can reduce the amount of water that evaporates from the surface of the soil, there will be more water available in the soil to help the crop grow. Especially when water is limited, mulching could be a valuable tool to manage crop water. It is important for the participants to understand the importance of using crop residues and mulch to reduce moisture losses that happen through evaporation.

exercise 4

APPRECIATING DIFFERENT IRRIGATION METHODS

OBJECTIVE:

To understand what irrigation is and learn different ways of irrigating crops.

TIME:

1 hour

MATERIALS:

2 watering cans, two 20 litre jericans, growing plants, water, hoes.

STEPS:

1. Divide the participants into 4 groups and have them walk into the learning field.
2. Ask each group to identify a crop/plant they want to irrigate.
3. Those with watering cans will fill up the can and water the crop while the others are watching.
4. The other two groups will make two small perforations at the bottom of the jericans to allow water to drip through and another one on the top.
5. Dig up holes close to some identified plants ensuring they don't mess up with the root system to allow the jericans to fit in closer to the plants and water the plants through this system.
6. Ask the participants to answer the following questions:
   - Why should we water the plants?
   - What are the advantages and disadvantages of these two methods of irrigation?
   - When is each of the methods appropriate?
7. Summarize the lesson by elaborating the basket of irrigation options that the participants can employ in their areas.

facilitators' notes 1

BOTTLE IRRIGATION

One of the best ways to provide a steady water supply to your plants without your constant attention is the gradual watering system or drip irrigation. Through this method a device is employed that slowly delivers water into the soil directly around the roots. Using recycled materials you can make your own drip irrigation system for free.

The materials you will need are as follows:

- 2 litre plastic bottle that still has the lid.
- Nail and hammer
- Sharp knife
- Cutting surface

Make 4-8 small holes into the cap of the plastic bottle using the nail and hammer. If you want it to drip slower use less holes, faster use more holes. Don't make holes that are too small, they will become clogged up by debris. Remove the bottom of the bottle by cutting vertically across with a sharp knife. Removing the bottom of the bottle creates a funnel for you to easily pour water into.

The wide mouthed opening will also catch some water when it rains.

Dig a hole next to a plant or in between a grouping of plants that is deep enough to bury at least one third to one half of the bottle. If you position the bottle in amongst a grouping of plants it will be hidden from view. Place the bottle in the hole with the cap side down and secure it into the hole by pressing dirt around it. This will ensure that your bottle stays in place. Pour water into the bottle until it is full. You can add fertilizer to the bottle every few weeks so that your plants are fertilized right at the roots.

You will need to fill your bottle when it is empty, once a day or less depending on how much direct, hot sun your plants receive. Make several bottles to place in all your large containers or next to plants in your garden such as tomatoes that require a lot of water.


Drill 4-8 small holes into the plastic cap


Cut the bottom off of the bottle


Dig a hole in between a grouping of plants


Fill the bottle to the top with water or fertilizer

exercise 2

COMPARING THE CAPACITY OF DIFFERENT SOILS TO HOLD WATER[3]

OBJECTIVE:

For participants to discover that different soils have different capacity to hold water and discuss the implications for irrigation.

TIME:

45 minutes

MATERIALS:

3 small containers, knife, nail, volume graded water container, hammer, shovel.

STEPS:

1. Hold a group discussion on the topic of irrigation and ask the following questions:
   - What is irrigation?
   - Why do you think it is important to irrigate plants during the dry season?
   - What different methods of irrigating the crops have you seen?
2. Get three empty containers, say coffee or margarine tins.
3. Perforate the tins with a nail at the bottom end, putting 5-6 holes in them.
4. Select three places for taking the soil samples, one sandy soil, one clay soil and one soil with high organic matter content.
5. On each of the soil, turn one of the perforated tins upside down and press the open end firmly into the ground until the tin is completely filled with soil. If the soil is hard use a hammer to get the tins into the soil.
6. Turn the tin upright and level the soil at the brim of the tin with a knife. In order to not loose

[3] Adapted from A Study Guide for Farmer Field Schools: Water Harvesting and Soil Moisture Retention (Duveskog, 2001)

any soil in the tin it might be necessary to hold a shovel under the tin while removing it. The soil filled in the tin, now appears in the same way it is normally packed in the ground.

7. Pour water over the soil in the three tins with the volume graded water container. Be careful so that no water overflows and escapes on the sides of the tins. Stop pouring when water starts to come out of the bottom of the tins. All the empty pore spaces in the soil is now filled with water and there is not room for any more water.
8. Measure the water amount that was needed to fill each container and thereby evaluate which soil that can hold most water.
9. Summarise the findings of the experiment and discuss the following questions:
   - Which soil could hold most water?
   - What effect do you think the water holding capacity have on runoff, erosion and plant growth?
   - Which factors determine the water holding capacity of a soil?
10. Make the following conclusion of the experiment: A soil with higher water holding capacity can be irrigated less frequently but with higher quantities of water. On a soil with a higher infiltration rate, the water has to flow faster over the surface of the basin or furrow and therefore has to be constructed with a steeper slope.
11. Relate the experiment to the topic of irrigation by discussing the following questions:
    - How do we know that we have irrigated with enough water?
    - Do we have to irrigate every day or once every two or three days?
    - What is the influence of water holding capacity of the soil on this?
    - How can we check if a plant/crop needs to be irrigated?
    - What are the signs of shortage of water on a plant/crop?
    - How can we make use of the slope of a field to distribute water equally?
    - Does the crop needs the same amount of water every day?
    - What can a farmer do to reduce the flow of water in the furrow (furrow irrigation)?
    - Why do we have to think about drainage as well when we plan for irrigation?

exercise 3

MULCHING AND SHADE TO REDUCE EVAPORATION[4]

In this experiment the participants will discover the importance of crop residues and mulch to reduce water losses through evaporation. The experiment should be carried out in the dry season, since it is important that it does not rain while the experiment is carried out.

OBJECTIVE:

To understand the importance of crop residues and mulch to reduce water losses.

TIME:

2 hours the first day, 1 hours 3 days later and 1 hour a week later

MATERIALS:

Sticks, 20 litre bucket, mulch or crop residues to cover 1.5 m^2.

[4] Adapted from: Guidelines and Reference material on Integrated Soil and Nutrient Management and Conservation for Farmer Field Schools, FAO, 2000.

STEPS:

1. Introduce the topic of using mulch to reduce evaporation as a tool in crop water management. Ask the participants if they know what mulch is. (Mulch is a protective cover that is usually made up of organic matter such as leaves, straw or peat. It is placed around plants to keep moisture in, to keep roots from freezing, and to prevent weeds from growing).
2. Select a cultivated field on flat ground, without crops and with a convenient water source nearby. Mark out two plots of 1.5x1.5 meters, 5 m apart from each other.
3. Flatten the top-layer of the soil in the plots and remove stones, weeds or residues.
4. Gently apply 25 litres of water to each of the two plots.
5. Cover one of the plots with a 5 cm layer of mulch. Leave the other plot uncovered.
6. Return three days later and examine the soil moisture in the two plots. Try to disturb the soil surface as little as possible while checking the soil moisture and replace all mulch on the treated plot.
7. Return one week later, check the soil moisture in the two plots and make a final evaluation of the benefits of mulching.
8. Discuss the following questions:
   - What are the benefits of mulching?
   - Is mulching a feasible option on your farm?
   - Under what conditions is mulching useful?
   - What kind of materials can we use as mulch? What should we not use?

CLEAN WATER FOR HUMAN HEALTH

This section provides the “link with life”. Just as water is crucial for plants it is also equally essential for our own growth and health. It is therefore important to understand what clean water is and the need of clean water for personal hygiene and to prevent disease.

exercise 1

CLEANING DIRTY WATER WITH HELP OF THE SUN![5]

In rural areas it is often difficult to get hold of clean water. Can you think of a way of cleaning dirty water using the sun? How about getting dirt out of water using the sun? In this activity, you will be making a “solar still” that is able to do just that!

OBJECTIVE:

To learn how to clean dirty water with the help of the sun.

TIME:

1 hour (30 minutes initially and then 30 minutes again after about 4-5 hours)

MATERIALS:

- A wide plastic basin;
- A smaller jar or glass for collecting the clean water;
- A large piece of transparent plastic, plastic wrap can work;
- String or rubber band to hold plastic in place;
- A stone;
- Some dirt soil.

STEPS:

1. Discuss in the group what clean water is and why it becomes dirty sometimes. Then tell the participants that they will now do an experiment on how to clean dirty water.
2. Mix some dirt soil in water and stir until it dissolves.
3. Put the dirty water in the bottom of your basin. Make sure the water is below the height of your collecting jar. Place your collecting jar in the middle of your basin.
4. Cover the basin with the plastic wrap. Make sure that it is secured tightly at the edges. Use a string or rubber band to seal off the edges. Place a stone in the middle of the plastic wrap just above your collecting jar.
5. Carefully move your solar still into the sun.
6. After a few hours observe carefully when you take your solar still apart, look at the water in the collecting jar. What happened? Did you notice drops of water appearing on the inside of the plastic? Where did they come from?
7. Try to think about and describe the two changes of state that have occurred to the water that collects in the collecting jar.
8. Explain to the participants what happened: when water evaporates it leaves all of it’s impurities behind. If there are any bacteria, soil or dissolved salts, they are left behind in the basin. Only pure water evaporates and is condensed on the plastic. This is why the water in the collecting jar is not dirty.
9. Discuss how and in what situation this method could be used in the community for purification of water.

[5] Text by Lauri Kubuitsile, Botswana.

exercise 2

CLEANING WATER WITH MORINGA SEED

OBJECTIVE:

For participants to learn how to clean dirty water using local available materials.

TIME:

1 hour

MATERIALS:

Ripe moringa seeds, clean water and dirty water.

STEPS:

1. Ask the participants to collect ripe moringa seeds. Remove the seed coat with the wings, to remain with just the white kernel.
2. Let them grind the kernels to a fine powder.
3. Ask them to mix this powder with a little clean water and stir it, or shake it in a bottle fast for about 5 minutes. The water should look like sticky lime juice.
4. Ask them to stir this liquid into the dirty water you want to clean. Let them stir slowly in one direction - only about 20-60 times a minute. Caution the participants not to stir faster since the water will not clean if they do so.
5. Ask them to leave the water to stand for two hours or until the dirt has settled on the bottom.
6. Remove the clean water carefully and throw the dirt at the bottom away.

Note: The amount of seed needed depends on how dirty the water is, so it is necessary to experiment with different quantities to find out the right amount of seed for your water quantity. Only a few seeds are needed for each bucket of water.

exercise 3

THE LINK BETWEEN WATER AND DISEASES

OBJECTIVE:

To create understanding of the importance of water in our life, and the role of the clean water for our own hygiene.

TIME:

2 hours

MATERIALS:

Flipchart and markers; ingredients to prepare SRO (water, salt and sugar) a rehydration solution for people.

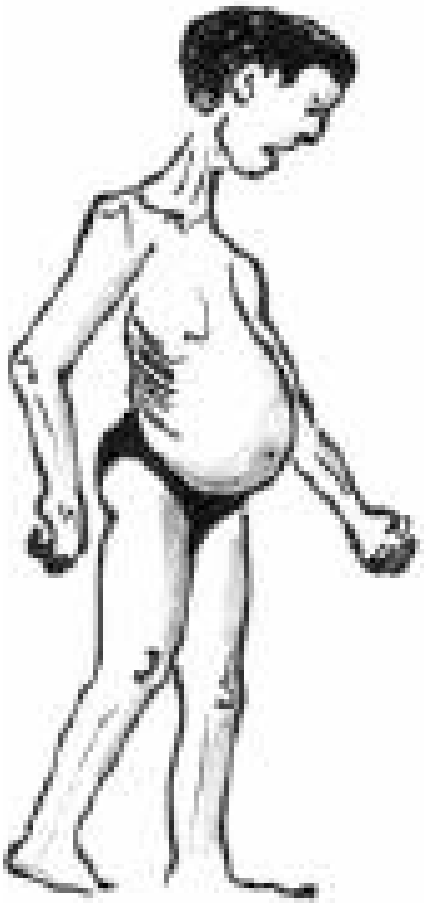
STEPS:

1. Ask participants to volunteer to tell a story about a person who gets sick from cholera, or another disease that shows how people can get sick if they don't use clean water, etc.
2. Discussion the story in the group:

- Why did the person get sick?
- What happens when people drink unclean water and food has been washed with dirty water?
- What causes the sickness? (i.e.: diarrhoea)

3. Divide the group into subgroups:
   - Ask the girls and boys to draw the different ways we can contract and be infested with parasites, see box below for guidance!
4. Discuss in the group ways of how to avoid intestinal worm infections, if the below mentioned ideas are not mentioned bring them up in the discussion:
   - Wash your hands with soap after going to the latrine (changed a baby's nappy) and before touching food;
   - Drink boiled or filtered water;
   - Wash fruit before eating it;
   - Covering food to avoid flies;
   - Use a well built and clean latrine. Build latrines (and also waste dumps or corrals) at least at 40-50 metres from the well and on lower land;
   - Keep your well in good repair, cover it and do not use it for waste disposals and/or allow animals to drink from it;
   - Wash al containers well before filling them with water.
5. Ask them to discuss the following question: We cannot live without water in our body. How can we avoid getting very sick because of dehydration, when we suffer from vomiting and/or diarrhoea etc?
6. Demonstration how to prepare SRO mixing of:
   - 1 litre of clean water (boiled and cooled);
   - + ½ tea spoon of salt;
   - + 8 tea spoons of sugar.

   Mix well and drink, the mix should have a taste that is slightly saltier than tears. Explain that this good if you are suffering from dehydration or loss of water through sickness)
7. Hold a concluding discussion: How long can a person or animal survive without water? What happen if a drought occurs?



People can fall sick because of intestinal worms in a dirty environment. Most of the time, intestinal worms enter an organism through the mouth, dirty hands, non-boiled water, and carelessness in food preparation. There are people who can have two to three different species of worms in their intestines at the same time. These worms feed themselves on our blood and our food. They cause wounds inside the intestine and affect our health very much, making us become weaker. They don't let us grow-up healthy and study well.

exercise 4

GOOD GROOMING AND PERSONAL HYGIENE

OBJECTIVE:

To explore the different personal grooming practices used to stay clean and reasons for applying them.

TIME:

1.5 hour

MATERIALS:

Water, soap, ashes, commercial toothbrush, stick toothbrush, nail cutter, comb, toothpaste, salt foam from plants (if available), flash cards, slips of paper/cards/slates, pens or chalk, beans or seeds.

STEPS:

1. Prepare a song for the participants that allow them to mime specific habits of personal hygiene. For example: "This is the way we wash our face… we wash our face… we wash our face. This is the way we wash our face… early in the morning. This is the way we comb our hair, etc. Brush our teeth… Cut our nails," etc. until all personal hygiene activities have been covered.
2. Encourage the participants to describe their own personal hygiene habits, by for example asking them what they normally do in the morning or the evening.
3. Ask the participants to give examples of where they have seen or experienced poor hygiene among themselves or others.
4. Teach the participants to sing the first couplet of the song.
5. Encourage them to come up with their own examples of hygiene.
6. Hold a group discussion covering the following topics:
   - Why is personal hygiene and each of the mentioned practices important?
   - What implements do you need for it? What else you can use (e.g. certain twigs for a toothbrush, ashes for soap)?
   - How are diseases prevented by using these practices and implements and why?
   - How can you improve your own hygiene?

exercise 5

THE REASONS AND METHODS OF HAND WASHING

OBJECTIVE:

To understand the importance of hand washing.

TIME:

1 hour

MATERIALS:

Soap, wood ash, leaves, a bucket of clean and transparent water, a basin.

STEPS:

How clean are my clean hands?

1. Ask participants who think that they have clean hands to come forward.
2. Ask these participants to line up and wash their hands in a common basin with water.
3. Fill a transparent glass with this water and another glass with water that has not been used for hand washing.
4. Let the participants analyse the difference. What are their observations and conclusions?

The effect of soap!

5. To experience the effect of soap, ask some participants to wet their hands with water and dry them on a white cloth.
6. Ask other participants to wash their hands firmly with soap and rinse the soap off thoroughly and then dry their hands on a second white cloth.
7. Ask the two groups to compare their cloths to decide the difference made by washing with soap.
8. Ask which alternatives can be used if soap is not available or too expensive.

Discussion

9. Ask the participants to explain why it is important to use the correct method of washing both hands with an agent or rubbing, and clean running water.
10. Ask the participants in which situation hand washing is extra important. If the don't mention the following situations bring them up for discussion; after toilet use, before preparing food, before eating food, and after cleaning up babies' or infant faeces and cleaning their bottoms. Then explain that good habits, but not crucial in blocking transmission of diarrhoea, are washing when getting up, after eating, and after coming home from work or school.-

Some easy hygiene refreshers

- Have some equipment for personal hygiene in school, such as a pair of nail clippers. Encourage participants to ask to use the equipment. Supervise the participants in using the equipment and clean it after use.
- Put questions about personal hygiene into a box or basket. Ask some participants to pick a question from the basket, read the question to the other participants and give the answer.
- Put drawings of equipment or real equipment into a box or basket for younger participants. Ask them to pick one in turn and explain their use and benefits.
- As a home assignment, ask older participants to list which simple items of personal hygiene are present in their homes, such as a comb, soap, a nailbrush, a nail cutter, etc. In class, ask the participants to give the name of the first item, write it on the board (or let the participants do this) and then tally, or let them tally how many participants have the item at home. Do the same with the next item, until all items have been listed. Discuss where and how improvements can be made.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1 – A role play about Drippy the raindrop

This activity will allow the participants to express their understanding of water and the water cycle movement.

TIME:

45 minutes

STEPS:

1. Tell the participants that you are going to read the beginning of the story about Drippy the raindrop and that afterwards they will create the end of the story.
2. Ask for two volunteers and tell them to animate the content of the story as you read it out loud.
3. Read the story below:

Drippy the Raindrop was having fun. He was doing his favorite thing, floating on the lake. Looking up, he smiled at his friend, Mr. Sun who had just come up.
As the day wore on, Mr. Sun rose higher and higher in the sky. Drippy became hot, very hot. “I’m hot!” said Drippy.
Suddenly, Drippy noticed a cloud moving across the sky. Drippy said to himself, “That cloud sure looks nice and it is so hot down here. I wish I could fly up to it, and cool off”.
And just as soon as he thought those words, he was flying! Up, up, up in the sky to his cloud. Drippy was evaporating!
Soon Drippy landed on his cloud. While coming down, he was spotted by another raindrop. This raindrop said “Hi there, welcome!”.
“I came off here to cool down” said Drippy to the other raindrop.
“So where do you come from?” asked the other raindrop. Drippy leaned over the edge of the cloud and pointed to the water below. “I was floating on the lake there” he said.
“A storm is coming”, said the friend. “When things get rough get ready to jump off the cloud”, he continued.
Suddenly the clouds began to bounce. Drippy got ready to jump and turned and waived goodbye to his new friend.
Jumping from the cloud, Drippy fell with the rain towards the ground. He looked down as he fell and saw a stream of water winding through the bush in the hills below him. “I wonder where would be a good place to land”, he said!

4. Divide the participants in three sub-groups. Tell them that each group now are going to make up a play for the continuation of the story, according the following directions:
   - Group 1: Drippy lands on the top of the hill, what happens to him from there on? Include in the story a part where drippy experience erosion!
   - Group 2: Drippy lands on a field of maize, what happens to him from there on? Include in your story a part where Drippy infiltrates and transpires!
   - Group 3: Drippy lands in the water stream, what happens to him from there on? Include in your story a part where Drippy evaporates!
5. Assist the groups to develop a story while at the same time act out the story as a play.
6. After about 20 minutes have each group present their plays for the others.
7. Discuss the adventures of Drippy: What else could have happened to Drippy? What makes Drippy sad or happy?

ASSESSING PROGRESS

exercise 1

HOW FULL IS THE GLASS?[6]

OBJECTIVE:

To evaluate the general feeling of content among participants at the end of a learning session.

TIME:

10 minutes

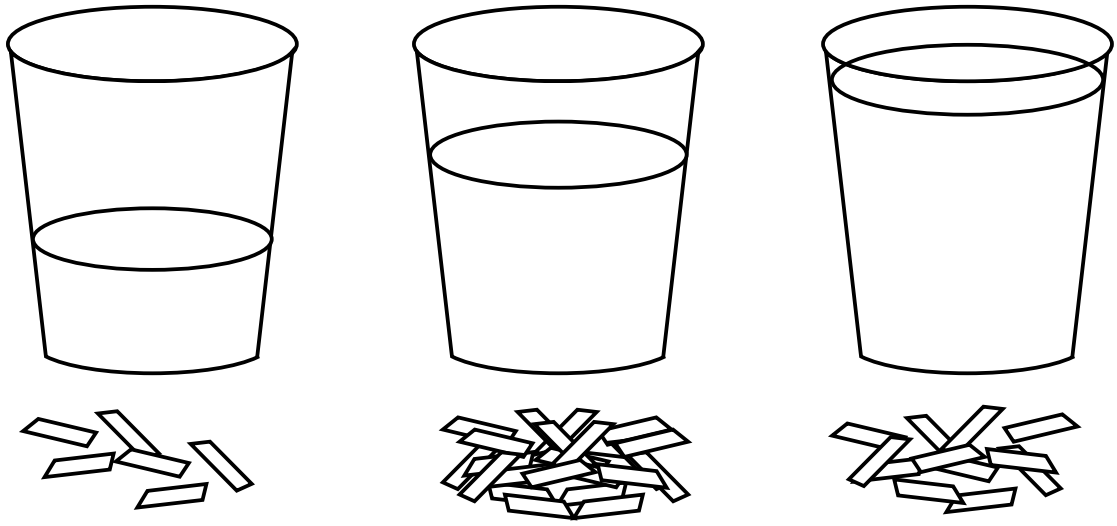
MATERIALS:

A box or bag, paper, flip chart and markers of different colours, three glasses and water.

STEPS:

1. Before the session, prepare three glasses of water: one almost empty, one half-full and the other full. The almost empty glass represents a low level of satisfaction, the half empty glass means that one is partially satisfied and the full glass represents a completely fulfilled person.
2. Each participant has a small slip of blank paper.
3. At the end of the PFS session, the participants decide which glass represents their feelings.
4. The participants put their piece of paper next to their chosen glass. Give people privacy when they are selecting, otherwise they might be intimidated to make a socially accepted choice instead of their own.
5. Count how many "votes" there are for each glass.
6. Ask: "Why is the score as it is?" and "Why did people decide to pick that specific glass?" The analysis should be aimed towards finding out how participants feel and what can be done to tackle dissatisfaction.

Full glass of water = very satisfied; half-full glass = not completely satisfied; almost empty glass = not satisfied



[6] Adapted from Livestock Farmer Field Schools, Guidelines for Facilitation and Technical Manual (Groeneweg et. al., 2006).

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7

Threats and loss

Junior Farmer Field and Life School – Facilitator's guide

Module 7: Threats and loss

Junior Farmer Field and Life School – Facilitator's guide

TABLE OF CONTENTS

Module 7:
Threats and loss

INTRODUCTION

A farmer has to learn to deal with many different types of threats and he or she has to take many forms of preventive action in order to avoid losses in farming. Plants and animals are often affected by pests and diseases and it is the young plants or animals that are affected harder by such threats. Income levels might also be compromised or reduced due to poor planning. If such losses are prevented farming has the potential to provide much higher returns and benefits to households.
Just like losses occur in agriculture loss is also part of life and occurs in the lives of both children and adults. Family members or friends might pass away or land or household assets might be lost due to for example thieves or natural disasters. Grief (or how we cope after a loss) can be more traumatic and severe for an adolescent than an adult. The outcome of grief is less predictable and may be more emotionally crippling because the young person is in the process of building a foundation for emotional growth and developing coping strategies.
Therefore, learning strategies to help people cope with losses both in agriculture and in their every day human life is an important aspect of the JFFLS.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The activities should serve as samples to be modifie and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of this module participants should:

- Understand the need for and ways to protect their crops, animals and produce;
- Understand the need to protect themselves from diseases and other threats, HIV in particular;
- Appreciate the benefits of medicinal plants;
- Be able to cope better with stress.

A typical JFFLS session (3-4 hours):

1. Energizer and fun (30 min)
2. In the learning field (45 min)
3. Agricultural topic (45 min)
4. Making the link with life (30 min)
5. Cultural activities (art, drama, song) (30 min)
6. Assessing progress
7. Closing energizer

OBJECTIVES

A typical JFFLS session (3–4 hours):

- **ENERGIZER AND FUN** (30 MIN)
- **IN THE LEARNING FIELD** (45 MIN)
- **AGRICULTURAL TOPIC** (45 MIN)
- **MAKING THE LINK WITH LIFE** (30 MIN)
- **CULTURAL ACTIVITIES (ART, DRAMA, SONG)** (30 MIN)
- **ASSESSING PROGRESS**
- **CLOSING ENERGIZER**

Exercises

↘ GETTING STARTED WITH “ENERGIZERS”

Some sample energizers that will also help to “break the ice” and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Killer wink

1. Before the game starts, ask someone to be the “the killer” and ask them to keep their identity a secret. Explain that one person among the group is the killer and they can kill people by winking at them. Everyone then walks around the room in different directions, keeping eye contact with everyone they pass. If the killer winks at you, you have to play dead. Everyone has to try and guess who the killer is.
2. Following the energizer, discuss what could be a “killer wink” in their daily life and what one can learn from it.

Energizer: Picking Fruit

1. Somebody reads out the following story while everybody tries to act out the story as it is read. “We are going to pick fruit (oranges, apples, jamun… whatever) from a tree. Together with me, pick up a ladder and put it on your shoulder. Pick up a basket. Walk over to the tree. Put the ladder against the tree. Climb the ladder carefully. Hang the basket on a small branch. Start picking. Reach far to the right, then far to the left. The basket is nearly full. OH NO! THE BRANCH HAS BROKEN AND THE BASKET HAS FALLEN. THE FRUIT IS ALL OVER THE GROUND. Climb down. Get down and pick up the fruit and put it back in the basket. Some have rolled far away. Get them all. Now you have them all. Pick up the basket –it’s heavy. Put the ladder on your shoulder. Carry them home and put them away.”
2. Discuss what one can learn from this story related to threats and loss.

PROTECTING THE CROP

Crops have to be protected from pests, diseases and weeds. This topic will help the participants to understand how pests can pose a problem to plants in the field and how this can be mitigated by IPM practices. If the participants are able to appreciate the importance and the value of maintaining the plant life always in health, they will do so also in relation to the necessity of maintaining the value of human life always healthy.

exercise 1

PROTECTING CROPS AGAINST FIELD PEST AND IPM PRACTICES

OBJECTIVES:

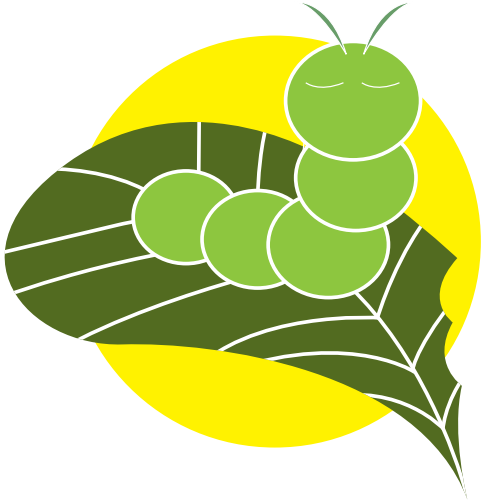
- To reflect on pests in relation to crop production;
- To review the practices and benefits of IPM.

TIME:

About 1 hour

MATERIALS:

Flip charts and marker pens.



STEPS:

1. In plenary facilitate a brainstorming around the issue of pests in the crop field. If needed use the following guiding questions to probe the discussion:
   - Have you seen crops being destroyed by pests? Which pests and what kind of damage did they do?
   - In what kind of field, or on what types of crops are pests a bigger problem than others?
   - What do you or the farmers around you do to avoid loosing their crops to pests?
2. Review the earlier lesson on IPM practices by discussing the following questions:
   - What is IPM and is it a good method, if so why?
   - Which are the 4 principles of the IPM? Ask the participants to draw these principles.
   - Which are the 5 different methods to check pests and diseases according IPM? Ask the participants to draw these methods.
   - What are the predators (or natural enemies)? Give 2 examples of how could we attract them (or at least avoid destroying them).
3. Ask the participants to draw and discuss links between IPM and human health care.

exercise 2

UNDERSTANDING WEEDS AND WEED CONTROL METHODS[1]

Farmers should be encouraged to differentiate the management practice according to the type of weeds and labour availability. This exercise aims to assist participants in identifying weeds, assess the threats of different weeds and recognize appropriate weed control practices.

OBJECTIVE:

To understand weeds and weed control methods.

[1] Discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006).

TIME:
2 hours

MATERIALS:
Flip charts and marker pens.

STEPS:

1. Start the session with a discussion about weeds:
   - How can weeds that provide much leafy material and woody materials be used beneficially?
   - Which weeds need to be controlled more carefully - those that stand erect, those that climb up the crop and/or those that grow tall rapidly - and why?
   - How does rooting of certain weeds affect the crops? Are there any benefits of deep-rooting weedy species?
   - Why are some plants such as Striga so harmful to the crop? Are there some crops that hinder growth of certain weeds?
2. Divide the participants in small groups of about 5 persons each.
3. All groups gather on a cropped field and then walk in small groups in different directions
4. Each group observes weed characteristics in the identified site(presence, abundance, height, etc.); the Facilitator should refer to the discussion questions above and below before farmers go off in groups so that he/she can prompt.
   - The small groups come back to compare the samples and discuss.
   - Each group presents its results in a plenary.
   - Facilitate a discussion using the questions below.
     - What is the weed status in the plot?
     - What are the dominant weeds? (Record local names)
     - Are there weeds you discovered for the first time?
     - How would you classify the weeds, which weeds are difficult to control and why?
     - Is it worthwhile to weed? What are the costs and benefits?
     - How do you control weeds in your fields?
     - What do you use for weeding?
     - Is the method effective?

exercise 3

PREVENTING LOSS AFTER HARVESTING

OBJECTIVES:

- To reflect on the losses that can occur after harvesting;
- To realise the need for measures to protect the harvest.

TIME:
1 hour

MATERIALS:
Flip charts and marker pens.

STEPS:

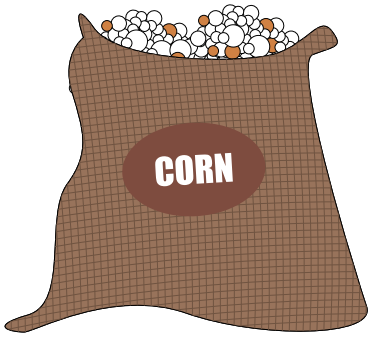
1. Discuss the existence of different types of loss after harvesting and ask the participants when and why these losses occur.

2. Discuss how we could avoid the different types of losses listed.
3. Move with the participants to a local homestead that has a good example of a granary in place. Ask the participants to look at the granary and discuss the following questions:
   - What is the function of this structure?
   - What are you trying to avoid when we build improved structures like these?
   - How can a good granary help you and your household?
   - What are the characteristics of a good granary?
   - What do you need to think about before putting the harvest in the granary, in order to make sure the harvest conserve well?

facilitators' notes 1

POST HARVEST LOSSES

What are the losses after-harvesting?



- Complete loss of the products.
- Loss in weight of the product.
- Loss in colour, flavour and taste.
- Loss of the nutritional value (degradation in proteins and vitamins).
- Quality loss in cooking, mashing, or cooking in the oven.

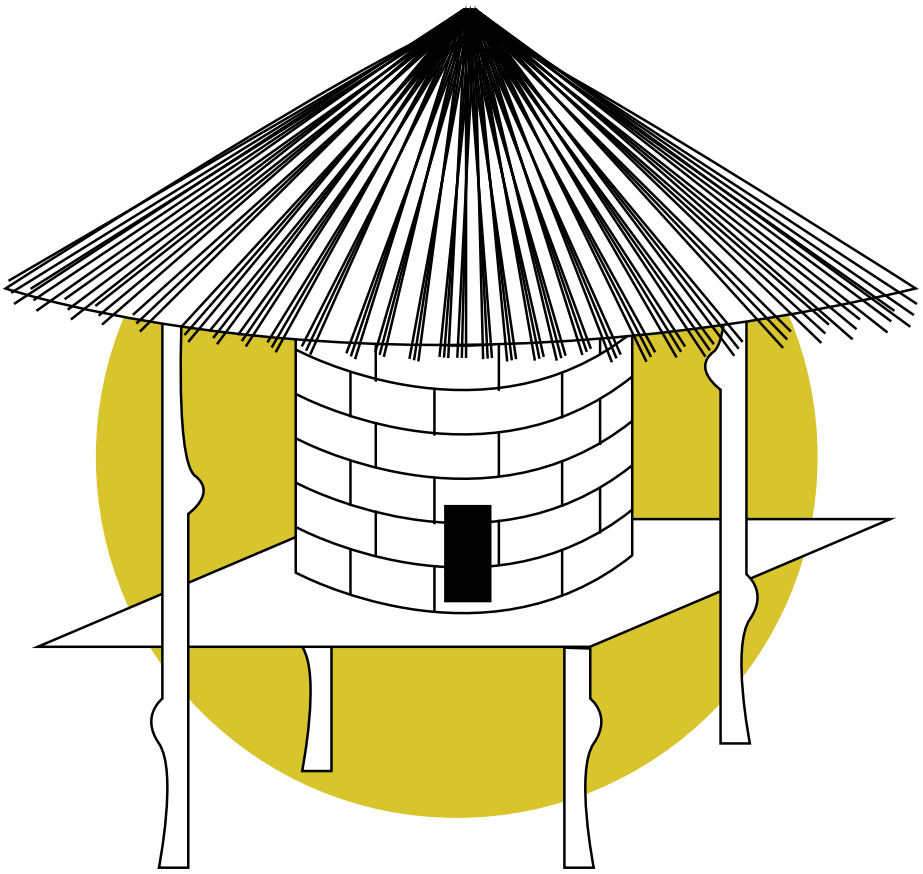
When and why do the losses after-harvesting happen?

- During the harvesting: inadequate harvesting methods, without care.
- During the transport: inadequate transport and loading, without care.
- During the drying: insufficient drying before storage, inadequate structure.
- During the mashing: inadequate manipulation, mashing, peeling, cleaning and separation.
- During the storage: inadequate structure, temperature/humidity too high, insufficient cleaning, inadequate protection against infestations.
- During the processing: inadequate methods, insufficient hygiene.

Good principles after-harvesting

1. Cleaning well in order to avoid pest or disease infestation:
   - Cleaning carefully and sun-dry the bags, baskets, etc. and the dust granary, dirty and old grains (burn or to pot residues that can be infested).
   - Using smoke to frighten the insects out of the granary or storage.
2. Keep dry the granary/warehouse:
   - Dry enough the product before storage.
   - Waterproof the warehouse and store up to a pallet.
   - Let space between the bag lines.
3. Keep the temperature constant and fresh inside the granary/warehouse:
   - Provide shade for warehouse or silos.
   - Storing on pallets in order to improve the aeration.

4. Take more measures to protect the product from pest infestations:
   - Protect with natural measures.
   - Build the granary on stilts with measures to restrict rodents from entering.



KEEPING OUR LIVESTOCK HEALTHY

Just like crops, livestock has to be protected against pests and diseases. This can be done by preventive as well as curative measures. In the following exercises the participants will discuss what can be done to protect their small livestock and chickens in particular.

exercise 1

PROTECTING CHICKENS AGAINST PEST AND DISEASES

OBJECTIVE:

To appreciate different methods of protecting chickens.

TIME:

About 2 hours

MATERIALS:

Large sheets of paper and markers.

STEPS:

1. Introduce the topic of protecting small livestock.
2. Ask the participants what they think can be done to protect small livestock against pests and diseases. List all the protection measurements on a large sheet of paper. If needed add missing measurements to the list.
3. Discuss the different protection measures that can be taken.
4. With the participants visit a flock of chickens and ask the participants to examine the animals to see if they look healthy or not.
5. If some of the animals are sick, discuss what should be done to prevent other animals from getting sick as well. If all animals are healthy, discuss what should be done to keep them healthy.
6. Make sure to include the following topics during your discussions:
   - The importance of housing animals;
   - The importance of the hygiene of animal housing;
   - Tools used in managing animals;
   - The importance of feed in having animals grow up healthy – do not forget to link to human and plant health and hygien.
7. Ask the owner of small animals what he or she does to protect the animals against pests and diseases.
8. Summarize all measurements discussed to protect small livestock against pests and diseases.

facilitators' notes 1

PESTS AND DISEASES IN CHICKEN

How to keep chickens disease and pest free?

- Always have a footpath, which must be used by anybody entering the house.
- Clean the unit using a disinfectant.
- Regular removal of litter.
- Sealing of cracks on walls and floor.
- Sufficient ventilation.
- Disinfect the equipment.
- Attendants should observe high level of hygiene.
- Spread rows of ash, to protect it from safari ants.
- Buy hens from good source.
- Restrict chicken movement (avoid unnecessary transfer of birds).
- Ensure that the incoming birds are disease and pest free.
- Remove/treat sick birds immediately.
- Practice the recommended vaccination programme for a given area
- Ensule balance feeding.

Poultry parasites and their control

Parasites	Where Found	Control measures
Flea	Nests and around eyes	Hygiene
Mites	On skin, under wing and rectum	Treat with disinfectant
Lice	Cracks, chinks, perches, walls	
Ticks	Skin, around eyes and comb, wattle	Poultry dusts (Sevin dudu dust)
Intestinal worms	Intestines	Deworming regularly i.e. after every 2 monthes using Ascarex

Common poultry diseases and their control measures

Disease	Symptoms	Control
Newcastle	Green-yellowish diarrhoea, loss of appetite, and droopy wings, gasping, coughing, sneezing, nervous symptoms, misshapen eggs. The disease affects respiratory and nervous system	• Vaccination • Strict hygiene • Slaughter all infected birds
Fowl typhoid	White diarrhoea, ruffled feathers, sudden death of chicks	• Maintaining high standards of hygiene • Vaccination • Use of broad spectrum antibiotics
Fowl pox	Lesions on combs and wattles, skin disease	• Vaccination • Paint warts on combs and feet with iodine
Cocciodiosis	Dead chicks	• Good sanitation • Antibiotic mixed with feed • Amprol mixed with drinking water

PROTECTING OURSELVES AGAINST DISEASES

Just like our crops and animals need to be protected against diseases humans also do. In this topic protection of crops and animals will be related to human health.

exercise 1

THE SPREAD AND CONTROL OF LICE

OBJECTIVE:

To be aware of the risks of contamination by lice and ways to prevent it.

TIME:

45 minutes

MATERIALS:

A hat, a chair, a pillow, a lamp, a coat, a scarf, a book, a blanket, a photo of a girl's head, a photo of a boy's head, dried lentils, box or transparent pot labeled "Lice sanctuary".

STEPS:

1. Discuss with the participants the subject of lice.
2. Place the material in front of the group.
3. Hand out 10 lentils to each learner.
4. Explain that each lentil represents a louse. Therefore each pupil has 10 lice.
5. Divide the group into pairs. Each pair then has 20 lice.
6. Explain that the aim of the game is to get rid of the lentils.
   Rules: 3 stages, corresponding to 3 basic themes (What are lice? Where are they found? How do we get rid of them?)
   - At each stage, asks the group 10 questions.
   - After a question, pairs consult each other, and raise their hand if they think they know the answer.
   - Questions the first pair to raise a hand.
   - With every correct answer, the pair puts 2 lentils in the lice sanctuary.
   - With every wrong answer, they get 1 lentil to the team.
   - The first team to get rid of all their lentils wins.

Suggested questions and answers
Part 1 – What are lice? Answers: True or False.

1. The louse is an insect. True.
2. A louse measures about 3 mm. True.
3. There are male and female lice. True.
4. A louse egg is called a nit. True.
5. Nits latch on to the ends of your hair. False.
6. A female louse lays a hundred nits a day. False.
7. Lice feed on blood. True.
8. Lice can be seen with the naked eye. True.
9. Lice are dangerous. False.
10. Lice only like dirty hair. False.

Part 2 – Where do lice hide? Answers: Yes or No.

Question the participants on the objects previously put out at the front. For each object, the

teacher asks “Do lice hide in...?

1. Hats. Yes.
2. Chairs. No.
3. Pillows. Yes.
4. Lamps. Yes.
5. Coats. Yes.
6. Scarves. Yes.
7. Books. No.
8. Blankets. Yes.
9. Girls’ hair. Yes.
10. Boys’ hair. Yes.

Part 3 – How do we get rid of lice? Answers: True or False.
Problem: I’ve caught lice at school. What should Mum do? What should I do?

1. I should tell my parents if my head itches. True.
2. Mum thoroughly washes my clothes and sheets. True.
3. Mum washes my hair with ordinary shampoo. False.
4. Mum warns the teacher and my friends to look out for lice. True.
5. I can lend my scarf. False.
6. I don’t lend my comb or hairbrush. True.
7. I should not lend my hat. True.
8. Mum should wash my hair with lice treatment shampoo. True.
9. There is no longer any need to keep a watch on my hair after the lice treatment shampoo. False.
10. I cannot go to school if I have lice. False.

After the game discuss similarities and differences between protecting crops, animals and humans from pests.

exercise 2

WHAT A DISEASE IS?

OBJECTIVE:
To understand what disease is.

TIME:
1 hour

MATERIALS:
Large sheets of paper and markers.

Note: If possible invite a doctor or a local nurse to come and attend the session and speak to the participants about diseases.

STEPS:

1. In plenary facilitate a brainstorming around the following questions:
   - What is a disease?
   - What different diseases occur in your community?
   - How do people fall sick? How do you call “microbes” in the local language?
   - How can we help sick people?
   - How can we protect ourselves from diseases?
   - Refer to the earlier lessons on nutrition and ask participants to draw parallels between nutrition, food habits and diseases.

facilitators’ notes 1

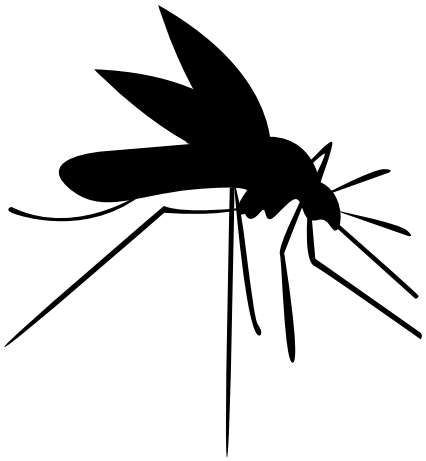
MICROBES

What are microbes?

- A lot of diseases come from microbes that attack our body.
- We cannot see the microbes with our eyes, but they live everywhere: in the land, in the water, in the air, into the plants, into the animal and human bodies.
- The microbes cause diseases when enter into our body and, in most of the times, for not having observed the basic cares (i.e.: with good hygienic, sanitation, and environmental practices).
- There are several species of microbes: for people, some are good and other are bad:
  - **Examples of “good-microbes”:** those who help our intestine to digest the food.
  - **Examples of “bad-microbes”:** those who provoke diarrhoea, constipation, malaria and other infections.

How do people are affected through microbes?

- Several times, microbes are transmitted through sick persons’ excrements and “carriers” (people who have contracted the microbes but not show the disease).
- The excrements will contaminate water and people’s hands (if they are not always well washed) and the crops (those that are irrigated with waste water, or contaminated, or that are prepared by dirty hands).
- The contaminated water transfers the microbes to: persons, cloths, table settings, food (fish, clams, sea food that live in contaminated waters...).
- Flies (and other bags, such as: cockroach, fleas, rats, etc.) stay on the excrements and on the wastes transporting the microbes to the food and cloths.
- The **Immune System** defends the human health and fights the microbes causing diseases. Although, in some cases, it’s necessary to take measures that help the immuniser system to fight or prevent the disease.



- The **Immune System** defends the human health and fights the microbes causing diseases. Although, in some cases, it’s necessary to take measures that help the immuniser system to fight or prevent the disease.

“Our best defence against the microbes and the diseases is to know them in order to make possible to prevent and to avoid falling sick!”

Microbes in agriculture: remind that during the AESA

- We are looking for pests and natural enemy (or predators) around the plants; we observe insects, bags and animals which are farmers’ friends and

enemies.

- In the same way than for human diseases, in plants we have microbes that provoke those diseases.
- Although, there are also farmers' friend microbes... They are those who assist developing a fertile soil, to decompose the leaves and other residues until obtaining a good compost, to attack and kill pests. etc

facilitators' notes 2

PROTECTION AGAINST MALARIA

Protecting ourselves against Malaria

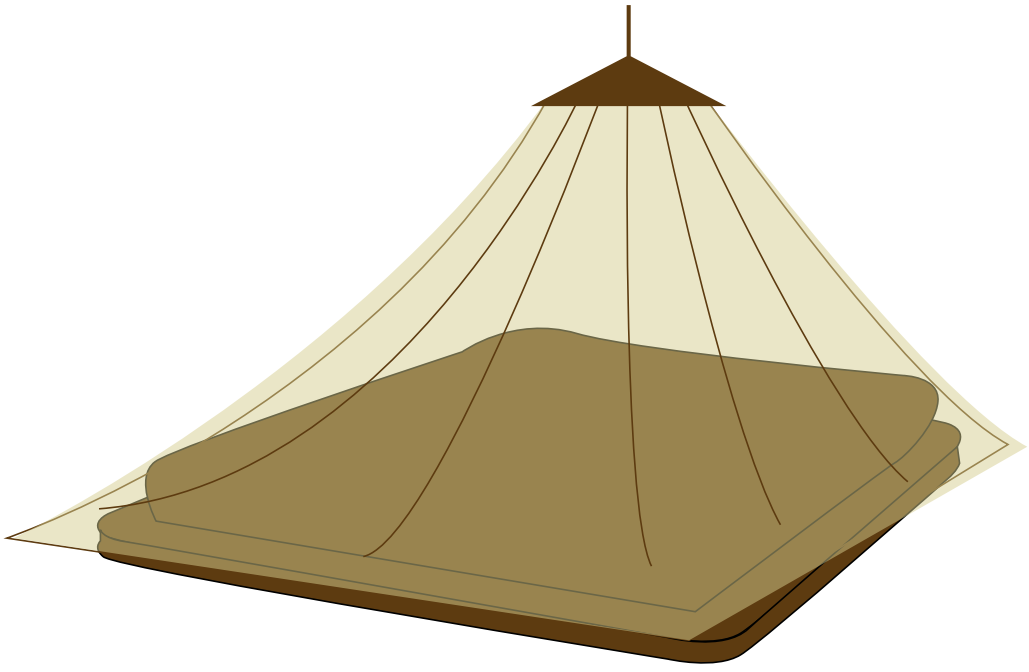
Malaria is a serious disease caused by parasites (a type of microbe) transmitted through mosquito's bites. Malaria could be the first cause of death in many African countries. It represents also a serious health problem for pregnant women, resulting in forms of serious anaemia in women and children underweight.

How can we protect ourselves from Malaria?

- The best way to avoid these bites is to sleep under an insecticide-treated mosquito net.
- When it starts the sunset, use cloth that covers arms and legs (long sleeves, trousers or skirts).
- The mosquitoes give birth in stagnant water (i.e.: planting holes, tile drainage, in wet weeds and shrubs); they can also give birth along the stream edge and in water recipients, in tanks and in fields of rice. It is possible to prevent malaria if the households and the communities will take measures in order to avoid the mosquitoes' reproduction such as:

Good practices for a sanitary environment

- Coverage or drainage of the places where the water is collected.
- Coverage of the water recipients and tanks.
- Pouring burnt oil on the top of small reservoirs in order to avoid breathing to the mosquito's larva.
- Cleaning the vegetal area around the households.



exercise 3

UTILIZATION OF MEDICINAL PLANTS

OBJECTIVE:

To help participants to learn about how to use and profit from medicinal plants.

TIME:

1 hour with practical follow-up time

MATERIALS:

- Paper and markers, agricultural tools;
- Paper and markers + examples of local medicinal plants;
- Seeds; agricultural tools;
- Cooking utensils; ingredients.

Note: Deal with this topic very carefully, because there is a lot of false knowledge in this area.

STEPS:

1. Take a walk around the community with the participants and ask them to point out and show the medicinal plants they know and those that their family use to treat health problems in the household?
2. Ask the participants what they know about the plants and ship in with any additional information. You can invite some elderly person from the community to talk to the group about their knowledge.
3. Discuss the role of the medicinal plants: can we rely completely in them? Invite a health mother to join the discussion.
4. Plan with the group how to select and plant a few of the medicinal plants on their farm, and use the knowledge gained about nursery establishment.

UNDERSTANDING AND PROTECTING OURSELVES FROM HIV

It is critical for young people to understand how to protect themselves from diseases, and in particular HIV/AIDS. HIV/AIDS is one of the most sensitive topics, but it is essential that participants understand the facts about it, as well as the skills they need in order to protect themselves from becoming infected. Here are several activities that you can use to help the participants understand HIV and AIDS. Although all the activities don't need to be covered in this module, it is best to keep them in the sequence in which they are presented.

N.B. Invite a health worker or an HIV expert from your comunity to help you during these sessions.

exercise 1

HIV BALL QUIZ

OBJECTIVE:

To quickly covers all the basic facts about HIV and AIDS.

TIME:

About 1.30 hour

MATERIALS:

Ball, large open space (preferably outdoors), paper and markers.

STEPS:

1. Invite participants to stand in a circle.
2. The first participant throws the ball to another participant. That person must catch the ball and throw it to another person and so on.
3. If a person cannot control the ball (can't catch the ball or throw it nicely to somebody else), he or she must answer a question regarding HIV and AIDS (see example questions below). If he/she answers correctly, then the game continues. If not, then that person comes out of the game.
4. The game lasts until all questions have been asked or only one person is left.
5. After the game is finished, sit together with participants and go over each question again. Explain each HIV/AIDS fact carefully and encourage participants to ask questions.
6. Ask participants to compare the spread and prevention of HIV with the spread and prevention of crop and livestock diseases.
7. Encourage participants to illustrate on paper or record through song and dance each of the HIV/AIDS facts. If they cannot illustrate or record all of the facts because of time limitations, encourage them to do as many as possible.

Game questions:

1. True/False: You can get HIV the first time you have sex. (Answer: True)
2. What does AIDS stand for? (Answer: Acquired Immune Deficiency Syndrome)
3. True/False: Once you have HIV, you will always have HIV. (Answer: True)
4. What part of the body does HIV attack? (Answer: The immune system)
5. True/False: HIV can be spread by shaking hands. (Answer: False)
6. What does it mean to be faithful? (Answer: To only have only one sexual partner at a time).
7. True/False: A person with HIV can live longer if he or she eats well and does exercise. (Answer: True)
8. What is the period called, immediately after infection, when a person might have HIV but can still test negative? (Answer: Window Period)
9. Which part of the world is most affected by HIV? (Answer: Africa)
10. What is the only 100% safe way to protect yourself from HIV? (Answer: Abstinence, and being careful of sharing needles, razor blades and other sharp objects).
11. True/False: You can tell by looking at a person that he/she is HIV positive. (Answer: False)

12. True/False: Mosquitoes can transmit HIV. (Answer: False)
13. What are two of the six fluids that transmit HIV? (Answer: Blood, semen, vaginal fluid, pus, and blister fluid)
14. What are another two of the fluids that can transmit HIV?
15. True/False: Condoms reduce the risk of transmitting HIV. (Answer: True)
16. True/False: HIV positive mothers can pass HIV to their babies. (Answer: True)
17. What doe HIV stand for? (Answer: Human Immuno-deficiency Virus)
18. True/False: HIV and AIDS are the same thing. (Answer: False. HIV is the virus that causes AIDS).
19. True/False: A sexually transmitted infection, or STI, increases a person's risk of getting HIV. (Answer: True)

exercise 2

THE EPIDEMIC GAME

OBJECTIVE:

To understand how HIV can be contracted and its effects.

TIME:

About 1.30

MATERIALS:

Large open space, small pieces of paper, pen or marker.

STEPS:

1. Using a marker or pen, write the letters A, H, C or N on small pieces of paper. (For example, if there are 12 learners in the group, make 3 "A" pieces, 3 "H" pieces, 3 "C" pieces and 6 "A" pieces). Fold the pieces of paper so that the letters cannot be seen.
2. Give one piece of paper to each learner and tell them NOT to open it. Instruct the learners to walk around and shake hands with three different people. They must remember with whom they shake hands.
3. Instruct everyone to go back to their places, sit down, and open their papers.
4. Tell those who have the "H" written on the paper to stand up. Tell them that these learners have HIV.
5. Tell everyone who shook hands with the learners who have HIV to stand up. Tell everyone who shook hands with those people to stand up. Do this until all learners are standing.
6. Tell the learners who have the "A" to sit down. Congratulate them for abstaining from sex and protecting themselves from HIV.
7. Tell the learners who have the "C" papers to sit down. If they are adults, congratulate them for wearing condoms and protecting themselves. For the younger children, make it clear that they cannot be congratulated.
8. Tell the learners with "N" that they did not have HIV at the beginning of the game. However, if they shook hands with a person who had an "H" paper, they became infected.

9. Explain that in this activity, shaking hands symbolizes sex. Emphasize that in real life, shaking hands does not transmit HIV. Also, be careful that the group does not stigmatize the learners with the "H" papers.
10. After the activity, lead a discussion using the following questions as guidelines:
    - How did the HIV infection spread among the group?
    - How is this similar to how HIV can spread throughout a community?
    - How did it feel to discover you had HIV?
    - How do you think people feel when they learn they have HIV?
    - How did it feel to be told you did not have HIV?
    - What could group members have done to protect themselves from getting infected?
11. Ask participants to compare how HIV spreads and can be prevented, with how crop and livestock diseases spread and can be prevented.
12. Review with participants the facts about HIV and AIDS (from the "Kickball HIV/AIDS quiz" activity). Answer all questions.

exercise 3

REDUCING HIV VULNERABILITY – THE STEPPING STONE GAME

OBJECTIVE:

To helps participants to understand the obstacles that keep people from protecting themselves from HIV even when they know all the facts, and to learn how to overcome these obstacles.

TIME:

About 2 hours

MATERIALS:

Several sheets of paper cut into "stones" and "crocodiles", marker or crayon, a long piece of string (if you are doing the activity outdoors, you can mark a line in the ground).

STEPS:

1. Begin the activity by asking learners: "Even if we have all the knowledge about HIV, do we always have the skills to make healthy choices? Listen to their responses. Explain that we often know a lot about HIV and the risk of sexual activity. However, we don't necessarily put that knowledge into practice. Ask them "Why is this?" Discuss some of the responses.
2. Explain that HIV prevention is more than just sharing information. It includes life skills, learning to make correct decisions and knowing how to act on those decisions in the best (and safest) way possible. If we can stop risky sexual behaviours, we can prevent many new HIV infections.
3. Tell participants to think of a "Healthy Life" as the opposite side of a valley or river. (Lay down the piece of string or make a mark in the sand). Explain that this side of the river represents the "Present Situation" or "Problems in the Community".
4. In the river, there are stones and there are crocodiles – just like in life, there are things that can help us get to a positive, healthy and happy future, and things that can make it difficult for us. These stepping stones represent all the skills a person needs to lead a positive, healthy

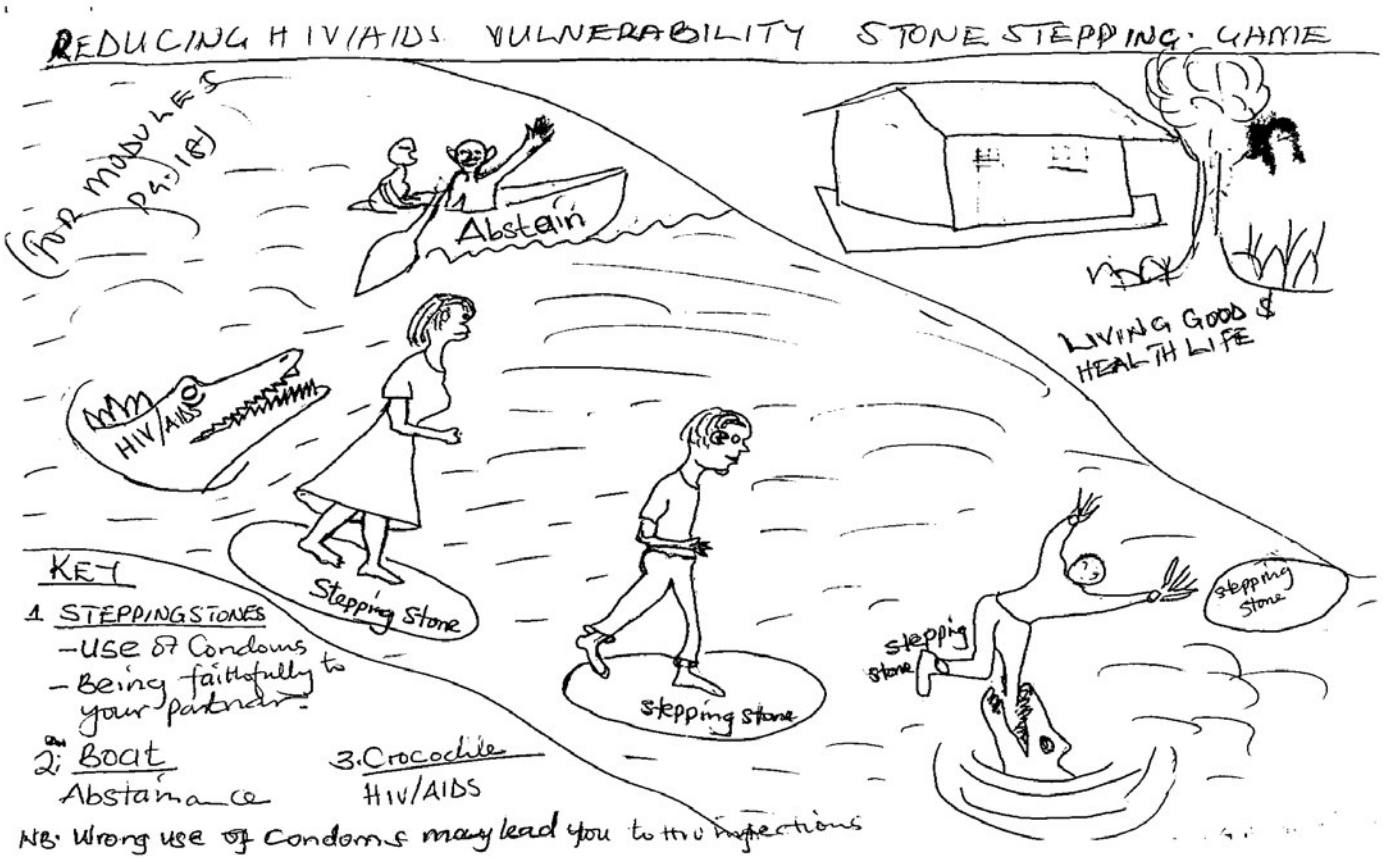
lifestyle. Without those skills or support, people may make poor or unhealthy decisions – which can lead to HIV infection.

5. Tell the participants to stand on one side of the river. Ask them: "You know that you want a healthy future, but what are some things that can help you to have that?" (Examples: positive friends' support, after-school activities, goal setting, positive attitude) Have participants write each idea on a piece of paper, or "Stepping Stone".
6. Then ask the children: "What are some of the things that can prevent us from making good decisions and having a healthy life?" Discuss present issues/problems that concern them. (**Examples**: peer pressure, drugs, unemployment). Have participants write each idea on a separate piece of paper, or "Crocodile."
7. Ask the children: "What can happen to young people if they do not use their knowledge to attain a healthy, safe lifestyle?" (**Examples**: Pregnancy, STI and HIV infection, drop out of school) Explain that these things are like a river – if young people don't have all the things that are listed on the "Stepping Stones," they risk making decisions that will lead to pregnancy or HIV infection.
8. Ask the children: "What do they need to overcome these issues/problems?" In other words, how do we build a bridge from the "Present Situation" to the other side, "Healthy Life"? Write each idea on a piece of paper and add these to the other "Stepping Stones" you already created.
9. Ask the participants to cross the river by walking across the stepping stones, while avoiding the crocodiles. Point out how easy it is to cross the river when all of the "Stepping Stones" are in place.
10. Take away a few of the stepping stones and ask participants to try to cross the river again. Point out that even if a few "Stepping Stones" are missing, a person will have a harder time crossing the river.
11. Ask the participants to compare the "Stepping Stones" and "Crocodiles" they face in life with the way they identify crop "defenders" and "enemies" in the field.
12. End the activity by encouraging the learners to illustrate on paper the present issues and problems, crocodiles and stepping stones in their own lives.
13. Ask for some of the participants to volunteer to explain their illustrations.
14. After their explanations, lead a group discussion on the kinds of issues and problems that participants may face. Ask them for suggestions on how to cope with these problems.

As this is a very personal activity, every child may have different ideas about his or her "Present Situation," what would be a "Healthy Life," and the kinds of "Stepping Stones" and "Crocodiles" that can help or hinder them. There are no right or wrong answers; encourage all participants to share their ideas and experiences, without pressuring anyone to do so if he or she does not feel comfortable.

example

Present issues/problems	Crocodiles	Stepping stones
Cultural/Religious beliefs	Negative peer pressure	Good role models
Fear of pregnancy	Lack of knowledge	Knowledge
Knowledge about HIV and AIDS	Ignorance	Decision-making skills
STI facts	Don't care	Communication skills
Family Expectations	Unwanted pregnancy	Negotiation skills
	Resistance to peer pressure	Understand consequences
	Alcohol and drugs	Strength
	STIs	Self-respect
	Death from AIDS	Empowerment
		Gender equality
		Sensitize boys/men
		Goals for future



exercise 4

NEGOTIATING CONDOM USE

OBJECTIVE:

To develop role plays that demonstrates effective ways to negotiate condom use and/or delay sex.

TIME:

About 1.30

MATERIALS:

Index cards or small sheets of paper, pens or pencils, a prize for the winning team.

Important note for facilitators: this exercises should be used only with adult learners and not for the under age, or for the JFFLS participants in primary school irrespective of their age.

STEPS:

1. Select three judges (at least one boy and one girl) and break the rest of the group up into teams of three to four people. Distribute several index cards or sheets of paper and a pen to each team.
2. Tell the participants that you will read a scenario out loud (see the examples below) and afterward they should work as a team to develop a response to the scenario and write it on a card or sheet of paper. The response should be a way to delay sex or negotiate condom use.
3. After each scenario, the judges will read each team's response and decide on the winning response. Award a point to the team with the winning response. Continue with scenarios and award a prize to the team with the highest number of points.

4. After finishing all the scenarios and awarding the prize, discuss with participants: Which scenarios were the easiest? Why? Which were the most difficult? Why? In real life, what would help you to negotiate these situations effectively?

   Here are some possible scenarios. Feel free to revise them according to the age level and experience of your group:

   - Your boyfriend/girlfriend says that if you want to use a condom, you must not trust him/her.
   - Your boyfriend/girlfriend says that if you truly love him or her you'll have sex.
   - Your boyfriend says that using a condom turns him off because he can't feel anything.
   - Your girlfriend says that using a condom hurts her too much.
   - Your girlfriend says she knows that she is disease-free because she hasn't had sex with anyone for awhile.
   - Your boyfriend says you'll use a condom next time - just this once let's not use a condom.
   - Your boyfriend says he won't have sex with you if you insist on using a condom.
   - Your girlfriend says she is on the pill so you don't need to use a condom.
   - Your boyfriend says that none of his other girlfriends insist on using condoms.
   - Your girlfriend says that if you won't have sex with her, she'll find someone else who will.
   - Your boyfriend says it will physically hurt him if you don't have sex with him now.

5. After finishing the game and discussing the scenarios, ask the participants to form new groups of three or four, mixing those who did well at the game with those who did less well. Have each group pick one scenario and response and either develop it into a role play to perform in front of other participants.

HELPING EACH OTHER TO COPE WITH STRESS

It is important to help each other in time of need and crisis such as after a major loss in life. Sometimes it might be enough to just be there for somebody else and listen to their story. The exercise below will build skills in “empathic listening”. By being able and willing to listen with empathy you provide the support your friend is in need of. Empathic listening is a way of listening and responding to another person that improves mutual understanding and trust.

exercise 1

EMPATHIC LISTENING[2]

OBJECTIVES:

- To learn how to support a friend in crisis by empathic listening;
- To build trust and respect, and reduce tensions.

TIME:

30 minutes

STEPS:

1. Divide the participants in pairs of the same sex.
2. Introduce the idea of empathic listening by explaining the following guidelines.
   - Be a sounding board - allows the speaker to bounce ideas and feelings off without you laughing or criticizing.
   - Don't ask a lot of questions.
   - Act like a mirror - reflect back what you think the speaker is saying and feeling.
   - Don't disregard the speaker's feelings by using phrases like "It's not that bad," or "You'll feel better tomorrow."
   - Indicate you are listening by providing short responses such as "Uh-huh," "I see." and by giving nonverbal acknowledgements, e.g., head nodding, facial expressions matching the speaker, open and relaxed body expression, eye contact.
   - Give invitations to say more, e.g., "Tell me about it," "I'd like to hear about that."
   - Don't interrupt the speaker or change the subject.
   - Don't give advice to the speaker.
3. Now ask the pairs to practice empathic listening. Each pair will rotate the role of speaker and listener and each person will choose a story to tell the listener. The story should be of a difficult and hard moment experienced by the speaker.

exercise 2

HOW TO COPE WITH STRESS

OBJECTIVE:

To assist participants learn different ways of coping with stress.

TIME:

1 hour

STEPS:

1. The facilitator tells the participants a story about a christian family where one of the children was caught red handed stealing a radio from the neighbour's farm.
2. This situation put both parents and the boy who stole in a very stressful situation.

[2] Adapted from www.beyondintractability.org by Richard Salem, 2003.

3. Ask the participants how they understand the situation and what could assist this stressed boy.
4. You may take the discussion further by asking the following questions:
   - What could have made the boy steal?
   - What would you do to reduce stress on this boy?
   - What advise would you give to the boy?
   - What advise would they give to the parents?
5. Ask them to post their advice onto flip charts.
6. Summarize the discussion.

exercise 3

THE PASSING CLOUD STORY

OBJECTIVE:

To learn how to deal with stressful situations.

TIME:

15 minutes

STEPS:

1. The facilitator tells a story about a training session that took place at Mashaka conference centre.
   "This was in an area and a country that had been recently affected by Post Election Violence. When the training started on the first day, the trainer realized that the mood in the class was so tense. He wondered what could be the problem and then remembered that people were still affected by the past post election violence. The trainees were not sure of their neighbours in class! The trust levels were very low such that nobody was ready to utter a word lest he is recognized by tribe! The trainer, realizing this requested all trainees to stand up, hold hands together and close their eyes for a minute. He requested them to try and put aside the memories of post election violence and let that CLOUD pass over. The trainees were then asked to open up their eyes shake hands and tell their neighbours 'THATS GONE AND IT'S OVER!'"
2. Allow them to discuss while answering the following questions:
   - Did the trainer do the right thing?
   - How would you have dealt with such a situation?
   - Do you think this assisted in opening up a discussion on PEV and relieved the stress amongst the participants?
   - Do you think the cloud passed and a relaxing mood manifested itself in class?

exercise 4

PROBLEM THROWING

OBJECTIVE:
To understand how to deal with stress.

TIME:
15 minutes

MATERIALS:
Score cards, marker pens, some fire.

STEPS:

1. Give each participant a score card.
2. Ask each one of them to write any tragedy that befell them and has been emotionally disturbing them.
3. Once they have done that ask them to close their eyes for some seconds.
4. Let them open up their eyes and straight throw the score card or PROBLEM into the fire.
5. They should now forget the past and focus into the future.

facilitators' notes 1

STRESS MANAGEMENT

Avoid unnecessary stress

- **Learn how to say "no":** know your limits and try to stick to them. Don't let people ask you do do things that are too difficult or heavy for you.
- **Avoid people who stress you out:** if someone consistently causes stress in your life and you can't turn the relationship around, limit the amount of time you spend with that person or end the relationship entirely.
- **Take control of your environment:** try to avoid places that you know trigger stress for you.

Alter the situation

- **Express your feelings instead of bottling them up:** if something or someone is bothering you, communicate your concerns with friends or people around you, don't keep the worries for yourself only.

Adapt to the stressor

- **Look at the big picture:** take perspective of the stressful situation. Ask yourself how important it will be in the long run. Will it matter in a month? A year? Is it really worth getting upset over? If the answer is no, focus your time and energy elsewhere.
- **Adjust your standards:** stop setting yourself up for failure by demanding perfection. Set reasonable standards for yourself and others, and learn to be okay with "good enough."
- **Focus on the positive:** when stress is getting you down, take a moment to reflect on all the things you appreciate in your life, including your own positive qualities and gifts.

Accept the things you can't change

- **Don't try to control the uncontrollable:** many things in life are beyond our control— particularly the behaviour of other people. Rather than stressing out over them, focus on the things you can control such as the way you choose to react to problems.
- **Look for the upside:** as the saying goes, "What doesn't kill us makes us stronger." When facing major challenges, try to look at them as opportunities for personal growth.
- **Learn to forgive:** accept the fact that we live in an imperfect world and that people make mistakes. Let go of anger and resentments.

Make time for fun and relaxation

- **Set aside relaxation time:** include rest and relaxation in your daily schedule. Don't allow other obligations to encroach. This is your time to take a break from all responsibilities and recharge your batteries.
- **Connect with others:** spend time with positive people who enhance your life. A strong support system will buffer you from the negative effects of stress.
- **Do something you enjoy every day:** make time for leisure activities that bring you joy, at least a few minutes every day.
- **Keep your sense of humour:** this includes the ability to laugh at yourself. The act of laughing helps your body fight stress in a number of ways.

Adopt a healthy lifestyle

- **Eat a healthy diet:** well-nourished bodies are better prepared to cope with stress, so be mindful of what you eat. Start your day right with breakfast, and keep your energy up and your mind clear with balanced, nutritious meals throughout the day.
- **Get enough sleep:** adequate sleep fuels your mind, as well as your body. Feeling tired will increase your stress because it may cause you to think irrationally.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1. Song about the protecting measures against diseases

TIME:
20 minutes

STEPS:

1. Ask the participants in groups of about 4-5 persons each to come up with a short song about the protection measures against diseases.
2. Get the groups to share their songs with the rest of the group.

ACTIVITY 2. Creating an imaginary safe place

Sometimes when going through tough time in life it is nice to be able to close your eyes, relax and imagine yourself somewhere else. This exercise helps the participants to create an imaginary safe place that they can always return to when thing feel tough.

TIME:
20 minutes

STEPS:

1. Ensure that things are quiet around the learning site without any disturbance that might obstruct the concentration of the participants.
2. Ask the participants to sit down comfortable and to close their eyes. Tell them to listen carefully to the instructions given.
3. Slowly read out the following:
   - Image a safe place - it can be a real or imaginary place:
     - What do you see - especially colors?
     - What sounds do you hear?
     - What sensations do you feel?
     - What smells do you smell?
     - What people or animals would you want in your safe place?
   - Imagine a protective bubble, wall or boundary around your safe place.
   - Imagine a door or gate with a guard at your safe place.
   - Image a lock and key to your safe place and only you can unlock it.
   - You can draw or make a collage that represents your safe place.
   - Choose a souvenir of your safe place — a color, an object, a song.
   - Remember and keep your souvenir with you so that you always can come back to it when you need to.

ACTIVITY 3. Collecting medicinal plants – role play

1. Ask the participants to act a role play on the confirmation of a herbalist.
2. Let them assemble the necessary drums and other important items.
3. One of them should act as the herbalist to be.

4. One of them should act as the chief herbalist.
5. When the songs and dance start the herbalist to be will be away collecting medicinal plants. Let him/her pick as much as possible.
6. The chief herbalist and others will be waiting at the dancing area.
7. When the herbalist in waiting comes to the dancing area he will be met by the chief herbalist. He will then come with his collection and remove one herbal plant after the other. As he does that the chief herbalist will be explaining all about each medicinal plant and how useful it is.

ASSESSING PROGRESS

exercise 1

THE EVALUATION WHEEL

OBJECTIVE:

To determine the level of protective measures taken by participants to deal with threats and losses.

TIME:

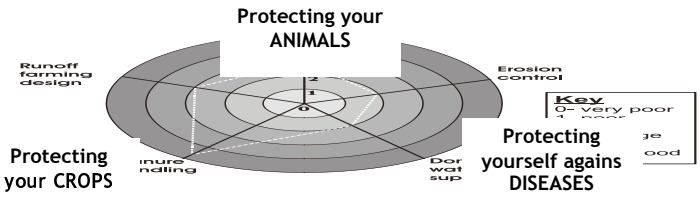
45 minutes

MATERIALS:

Large sheets of paper and coloured pens

STEPS:

1. Brainstorm in the group on the various threats and losses that they have learned about in JFFLS. Try to identify 4-5 major categories of losses, such as livestock diseases, getting sick from HIV etc.
2. On individual basis ask each participant to reflect on to what extent their behaviours and actions help in preventing each of the mentioned losses on a scale of 1-5 where (0=nothing, 1=poor, 2=fair, 3=average, 4=good, 5=very good). I.e. 0 means no effort and 5 very much effort to prevent losses.
3. Prepare the evaluation wheel on a large piece of paper, and ask each person to make a tick on each wheel arm at the appropriate level as identified above.
4. Ask a couple of the participants to try to establish an estimated average of ratings on each wheel arm and then draw a line between all average points.
5. Discuss and review the outcome of the exercise:
   - What behavioural gaps have been identified?
   - What adjustments and revisions should be made to the JFFLS schedule and curriculum based on the identified needs?
   - Should any special topics be held or resource persons invited in order to respond to the identified needs?



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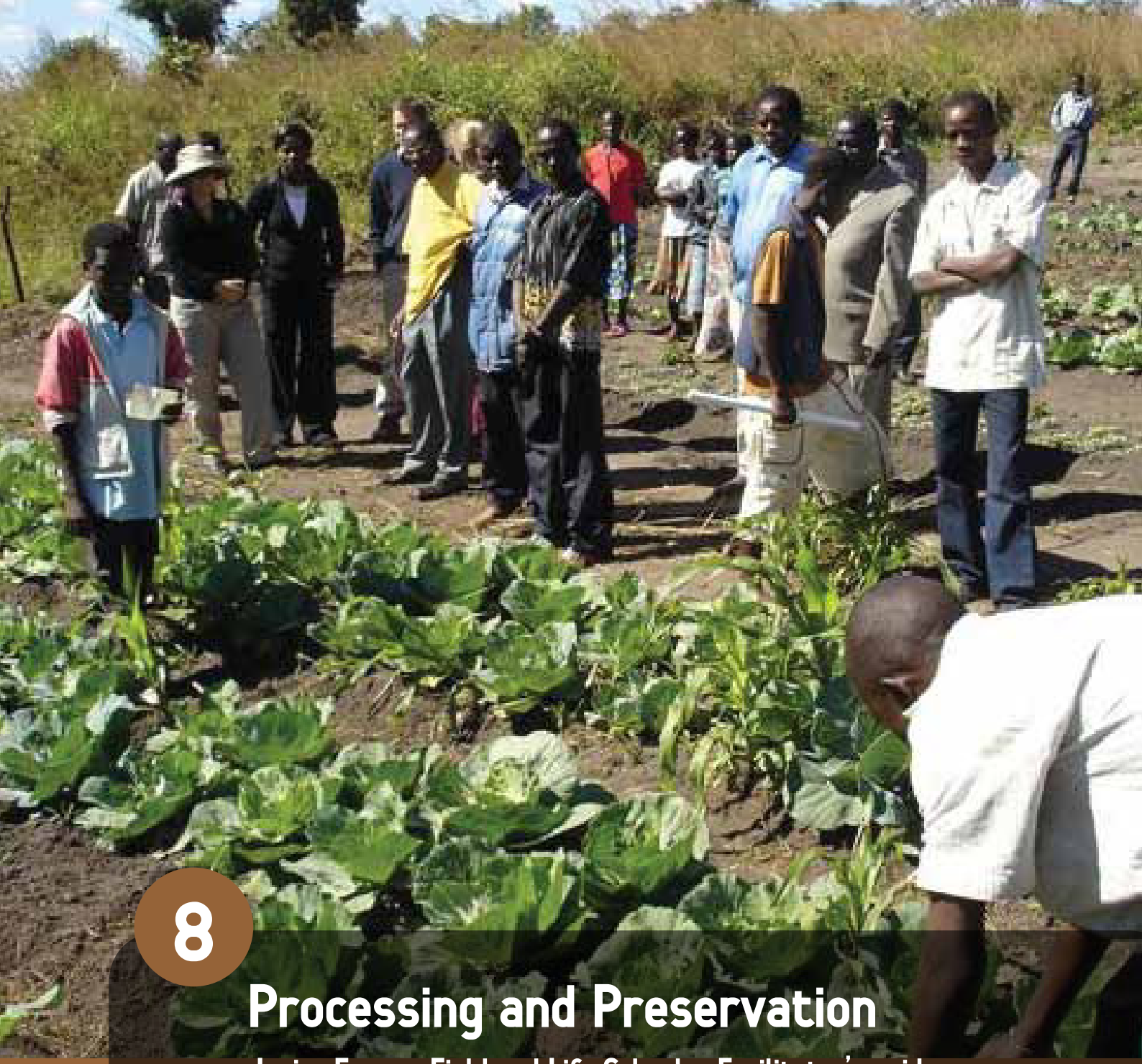

8

Processing and Preservation

Junior Farmer Field and Life School – Facilitator's guide

Module 8: Processing and Preservation

Junior Farmer Field and Life School – Facilitator's guide

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Module 8: Processing and Preservation

INTRODUCTION

In this module the concept of processing and preservation will be explored from different angles. The module ends the agricultural cycle in JFFLS and the discussions about the processes of life. Food Security forms the first topic, in which different issues discussed during previous modules will be complemented and new ones will be introduced, in order to give a complete perspective of food in life. Food processing and livestock products will also be discussed as this can assist in making food available throughout the year to close the seasonal gap and fluctuations in availability of certain nutrients during different times of the year. Various recipes for crop and livestock related products are also introduced so that participants can try these out in the JFFLS setting before implementing them in their homes.

The skills that are developed though planning and implementation of processing and preservation will also aim to strengthen participants' entrepreneur skills. Thereby assisting in developing economic empowerment, something that is very important for the prevention of risk factors among young people such as HIV and gender based violence or risky coming strategies such as transactional sex.

The module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modifies and applied as appropriate. The important thing is that all main building blocks of a typical JFFLS session are included in each learning session.

By the end of this module participants should:

- Be able to explain what food security is;
- Understand how to plan food availability over the year so as to close the seasonal food gap;
- Gain knowledge on how to select and store seeds;
- Understand the importance of food processing and preservation.

OBJECTIVES

A TYPICAL JFFLS SESSION (3–4 HOURS):

- **ENERGIZER AND FUN** (30 MIN)
- **IN THE LEARNING FIELD** (45 MIN)
- **AGRICULTURAL TOPIC** (45 MIN)
- **MAKING THE LINK WITH LIFE** (30 MIN)
- **CULTURAL ACTIVITIES (ART, DRAMA, SONG)** (30 MIN)
- **ASSESSING PROGRESS**
- **CLOSING ENERGIZER**

Exercises

↘ GETTING STARTED WITH “ENERGIZERS”

Some sample energizers that will also help to “break the ice” and make participants feel comfortable while at the same time introduce the module focus are provided below.

Energizer: Fruit salad

OBJECTIVE:

To get the group active and awake, especially good after lunch or to break a long passive session.

TIME:

10 minutes

MATERIALS:

Chairs arranged in a circle; one fewer than total number of participants and trainers. If there are enough chairs then these could be set up ahead of time in another space, such as an adjoining room. If not, then ask participants to bring their chairs with them.

STEPS:

1. Decide on the number of groups that are needed, as this will determine the number of fruits selected. Set up a closed circle of chairs, one fewer than the number of people who will join the exercise.
2. Ask participants to sit in the chairs. The trainer begins the game by standing in the middle. Explain that this is an energizing exercise, which will require their (very!) active participation.
3. Let the participants name as many fruits as you need sub-groups, for example four fruits, if you need to form four sub-groups. Ask one person to choose a fruit, their neighbour another fruit, the next neighbor another, and so on until the desired number of sub-groups is reached. The next person in the circle takes the first fruit, the next the second, and so on until everyone including the trainer has a fruit name (such as mango, papaya, lemon, pineapple, banana etc.).
4. If necessary, you can then write the fruits on a large sheet of paper or on the board, especially if there are more than five fruits to remember.
5. Before you start, ask all the oranges to put up their hands, then the melons etc. This will just remind everyone once again of their fruit.
6. The person in the middle calls out the name of one fruit. All those participants who are that fruit must change chairs - no exceptions! The person in the middle will also try to get a seat, and should succeed as they have only half the distance to travel.
7. One person will be left in the middle who then repeats the process by calling out another fruit. When “fruit salad” is called out, then everyone must change chairs.

Energizer: Drawing entrepreneurship

OBJECTIVE:

To get sub-groups motivated by involving them immediately in an easy task.

TIME:

1 hour in order to create a common understanding about the concept

MATERIALS:

Pen and paper.

STEPS:

1. Divide the groups into sub-groups of 4-7 participants.
2. Ask each group to construct a picture of the concept “entrepreneurship”. If the term is not clear to all let some participants explain their interpretation of the term.
3. The sub-groups are given 30 minutes to discuss and draw, after which a spokesperson presents their diagram. Alternatively, put up the diagrams in an exhibition and encourage everyone to walk around before the discussion.
4. Conclude by asking the participants the following questions:
   - What elements were common to all groups?
   - What elements were only represented in one group?
   - Why did these similarities and differences happen?
   - What disciplinary biases are apparent in the diagrams?
   - How do you think a villager might represent the same concept and what assumptions about him/her are you making?

FOOD SECURITY AND GOOD NUTRITION ALL YEAR AROUND

This topic aim to create an understanding of what food security is and how we can avoid risks in attaining a good nutrition throughout the whole year.

exercise 1

INTRODUCTION TO FOOD SECURITY

OBJECTIVES:

- To understand the meaning of food security;
- To reflect on how availability of food in quantity and quality varies around the year.

TIME:

2 hours and 15 minutes

MATERIALS:

Flipchart and markers for 4-5 groups, + 100 seeds/beans/stones for each group.

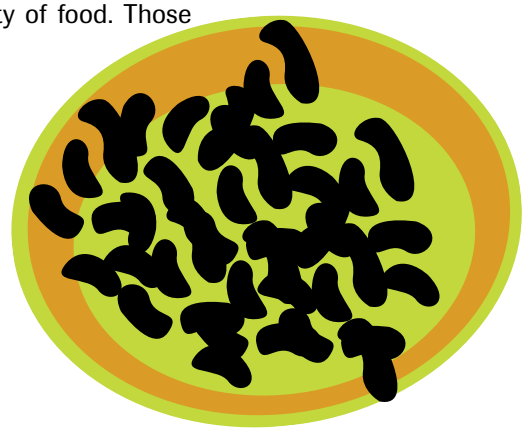
STEPS:

Part 1. Brainstorming

1. Ask the participants: What do you need for living? (Food and water, cloths, shelter, friends, family, education, etc.)
2. Tell them that food is one of the basic needs for our survival.
3. Ask them to discuss: What are we eating and where do we find the food we need?
4. Conclude by summarising the term “Food Security”.

Part 2. 100 seeds exercise

5. Explain that you are going to perform an exercise, called “100 seeds”, in order to understand better what Food security is.
6. Split the participants in groups of 5-8 people and give to each group 100 seeds (or stones).
7. Explain that the 100 seeds represent all the available food during the year for a certain unit (i.e. community in general, group of orphan and vulnerable children participating in the JFFLS).
8. Define the kind of food to which we are referring: if only that produced by the group/ community, if besides to that we can add food purchased, the school feeding, or others.
9. Each group should present a calendar with 12 columns, representing the 12 months of the year (this can be done in a flipchart paper and also on the floor). Ask the participants to distribute the 100 seeds by the months according to the availability of food. Those months with a lot of food will keep more seeds and those with less food, less seeds (see the example in the table below). In this way we could visualise the food availability during the year.



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1	6	7	11	22	21	13	8	3	3	3	2

10. Ask the participants in groups of 3 people to think 10 min. about:
    - The different reasons for lack of food during the year.
    - The different measures we could take in order to overcome these problems.
11. In plenary, make two columns on a flipchart: Reasons for the lack of food/Measures to overcome these problems.
12. Ask the small groups to discuss, present their conclusions and prepare a list of all the contributions.
13. Explain that now we can think all together about what we need in order to plan our food security for the next year.
14. Summarise the discussions in order to explain again what Food security is.

facilitators' notes 1

FOOD SECURITY

What is Food Security?

- Having enough food, nutrient, adequate and safe during the whole year in a way that allows everybody to have an active and healthy life.
- The Food security also implies the capacity to look for adequate and nutritive food, through incomes, productions or informal trading.

So, food security includes two components:

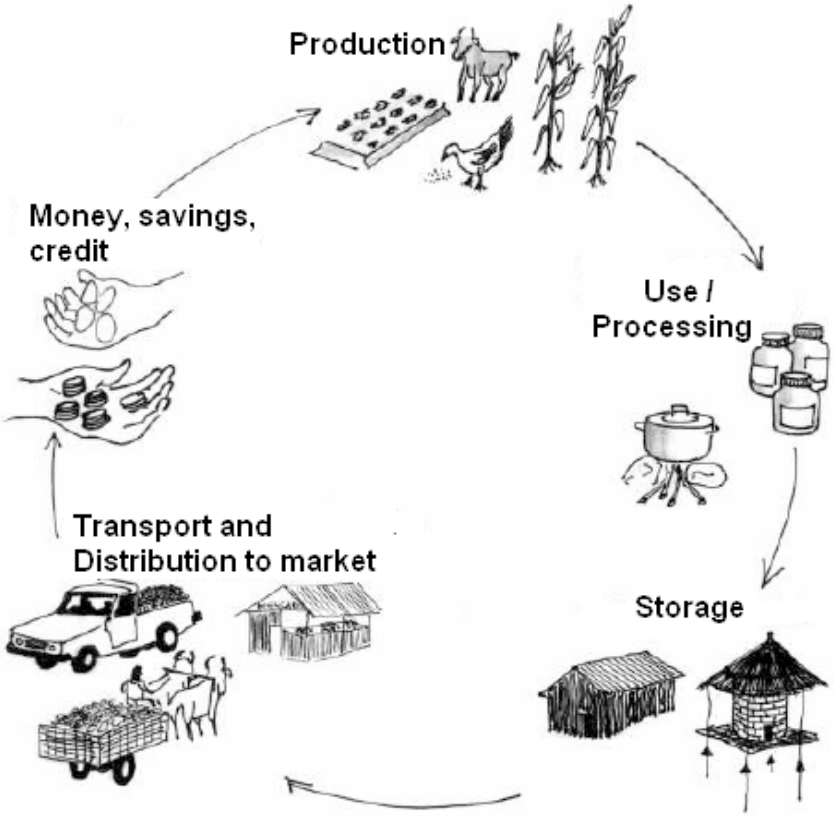
- **Food availability:** adequate food supply in terms of quantity, quality and variety in a stable and regular way.
- **Access to food:** the capacity of acquiring food, though buying or trading products, including land ownership and other productive resources.

To evaluate the food security situation in the community, one should observe different aspects, such as:

- **Food production:** implies the access to fertile land, clean water, labour, seeds, knowledge, healthy environment, and also to collect data on the produced quantity for self-consumption, trading or both.

- **Use of food:** instead of the healthy aspect (people have to eat well and in a varied way in order to maintain their energy and health) it is necessary also to look at the quantity of products that have been sold, traded, stored or consumed.
- **Food conservation:** communities need areas to store food in order to let them last for long periods of heat or drought. If rats would eat half of the food, it means that they will suffer hunger. It is necessary to have enough food for 3 to 4 months, in order to cover the hunger period and guarantee the food security in most communities.
- **Food transport and distributions to the market:** if bringing food to the market is not possible, and if people are not able to access the market, their food security will be compromised. Also if an unequal food distribution is done, a part of the community will benefit from it and another one will suffer.

- **Money, savings and credit:** for communities and households depending on money for buying food, a fundamental aspect of the food security depends on the availability of enough money or easy access to credit to buy food. Even if a household doesn't depend only on money to buy food, it needs some agricultural incomes to ensure the food security (to buy seeds and other agricultural inputs, to pay medical costs, labour, maintaining small size animals, education costs, etc.).



Some causes for the lack of food in "starving periods"

- Weak knowledge in agricultural techniques and in conservation methods, bad management and planning of agricultural residues.
- Lack of seeds, weak harvest, lack of fertile land.
- Irregular rains.
- Low crop diversification and other agricultural sectors.
- Low labour to produce enough food, lack of time due to illness or involvement in other activities.
- Low diversification of income sources (i.e.: a household depending only from agriculture).

Some measures to mitigate problems of food shortage

- Learning improved production techniques (i.e.: improved seeds, etc.).
- Diversifying crops and other agricultural sectors.
- Improving or introducing small species of livestock.
- Add types of crops, including vegetables, fruit and nuts trees with different harvesting periods, drought resistant crops, etc.
- Learning improved methods of Conservation Agriculture.
- Building improved granaries and driers.
- Good use of Integrated Pest Management (IPM).
- Improved soil conservation and fertilisation methods.
- Improved water conservation methods.
- Adding or improving the food agro-processing for consumption and market. Looking for market opportunities with crops that can generate income, such as: pine apple and cashew.
- Diversifying the income sources, i.e.: developing a small business, participating in an producers' association or performing some seasonal works.
- Participating in savings and credit schemes.
- Performing community activities (i.e.: community granaries).

exercise 2

PLANNING FOR FOOD SECURITY

OBJECTIVE:

To reflect on reasons for seasonal food gaps and how to avoid this.

TIME:

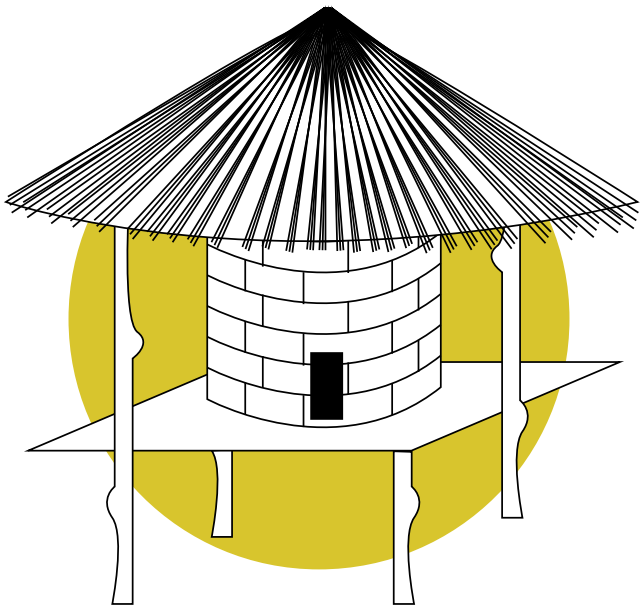
1 hour

MATERIALS:

Flipchart and markers.

STEPS:

1. Refer to the exercise on food security above.
2. Split the participants in groups and ask each group to discuss and write down why we have plenty of food in some months and why we have the lack of food in others.
3. Let each group discuss how this situation can be addressed in order to have food available throughout the year.
4. Have each group present their findings in plenary.
5. If the following strategies were not mentioned bring them up for discussion: A) Storage/ Conservation, B) Selling, C) Saving, D) Other, such as crop diversification.
6. Summarise the discussion and the presented outputs.



SEED SELECTION AND GRAIN STORAGE

In this section participants will learn about how to select which seeds to keep for planting the next season and how to best store seed and grain.

exercise 1

SEED SELECTION AND STORAGE

OBJECTIVE:
To reflect on what one should consider when selecting seeds for planting.

TIME:
1 hour

MATERIALS:
Paper and markers, agricultural tools.

STEPS:

1. In plenary discuss the reasons around why people keep and conserve seeds.
2. Introduce the topic of seeds selection and storage for the next year and explain some key points.
3. Move with the participants to a field planted with a grain crop, for example maize, and discuss the following issues:
   - What should one think about when selecting seeds?
   - In this field which seeds would you select for keeping and why?
   - How and when should you select the seeds?
4. Back in the learning site divide the participants in groups of 4-5 persons and ask the groups to discuss and write down/draw their ideas related to:
   - What storage methods people use to protect grains, edible crops, beans and seeds against pests?
5. Have each group present their findings in plenary.
6. Summarize the presented methods and introduce other missing ones.

facilitators' notes 1

GRANARY STORAGE

Steps in the storage of products and seeds in the granary

1. Cleaning

- Clean well the containers, bags and the granary.
- If necessary, **smoke the granary** in order to help in disinfecting or sterilising the area.

2. Select seeds

Select those plant seeds:

- That were not attacked by pests;
- That show a good harvest;
- That are well adapted to the local environment;
- That will have similar characteristics over the next generation (i.e.: assuring that they didn't have pollination with other existing similar crops around the field, given that these can acquire undesirable characteristics over the following

generation);

- That are not hybrids (they should have had an “open pollination” in order to produce good seeds.

3. Processing seeds for preservation

- Pulp fruits with wet seeds (i.e.: tomato, egg-plant, cucumber, pumpkin, etc.):
  - Select very ripe fruits of healthy plants.
  - Take out the seeds and place them in fruit juice in a clean container. Cover well the lid. Let it rest for 4 to 7 days. The mixture will start to ferment lightly.
  - Mix lightly the container with the fermented juice and put the content in a bucket.
  - Add clean water. The good seeds will sink to the bottom and the bad ones will float.
  - Carefully take out the water and the bad seeds in order to keep only the good seeds.
  - Wash the selected seeds (with clean water!) and put them to dry on a cloth to the top of a wire structure situated in an elevated and shade place for 2-4 days.
- Pulp or dried fruits with dried seeds (i.e.: chilli, paprika, bean, cabbage, lettuce, onion, etc.)
  - Fresh fruits: put all the fruits in a dry cloth.
  - All the fruits: put the dried fruit in a bag and mash them until they release the seeds.
  - Divide the seeds and put them in a bag or on matting and let them dry for 2 to 3 days.
  - Sieve the seeds and take out the cockle.

4. Preservation of products and seed in the granary

Seed storage:

- Keep the dried seeds in a pot or bottle that doesn’t allow air entering and put it in a fresh and dry place. Label the container, indicating the type of plant and the date of harvest.
- In order to keep the seeds fresh, mix them with cold ash from the stove (about 0.5 kg of ash for 1 kg of seeds). Sometimes, put the seeds in the sun in order to keep them in a low level of humidity.

5. Protect grains, seed and any product from pests.

6. Preservation period:

Preferably sow the seeds after having kept them for 3-6 months. Do not keep seeds for more than 2 years, given that they will not germinate.

exercise 2

UNDERSTANDING GRAIN STORAGE METHODS

OBJECTIVE:
For participants to familiarise themselves with different methods used for seed storage.

TIME:
1 hour

MATERIALS:
Flip chart, marker pens, masking tape.

STEPS:

1. Divide the participants into 4 groups.
2. Give each group a flip chart and marker pens.
3. Brainstorm in plenary different seed storage methods, and define four very different methods that are allocated one to each group.
4. Ask them to describe and list down the advantaged and disadvantages of each method on the flip charts.
5. Allow them to present in the plenary.
6. Summarize the learning session.

facilitators' notes 1

GRANARY PEST PROTECTION

Protection Measures against pest

1. **Using layers of sand alternated with grains**

   The idea is to fill the empty spaces between the stored grains in a given container (for beans, corns, etc.), removing in this way the air spaces and eventually, avoiding the development of insects.

   How to do: start and end with sand layers. Pay attention to not leave grains out of the sand. Later you will need to sieve the grains in order to separate them from the sand.

2. **Mixing wood ashes with grains**

   The ash forms a protecting layer against the insects. When the insect enters in contact with the ash, it will cause the insect's skin dehydration and eventually its death.

   How to do: for each 100 kg of cleaned and dried grains (leguminous and cereals) add about 10 kg of sieved ash. Keep in raffia bags, wooden boxes or another kind of available container.

3. **Keeping in Chilli or *Margoza* powder**

   Chilli and *Margoza* prevents the development of different pests.

   How to do: Pour a fine layer of chilli in a container (mashed until it becomes very well minced). Cover the layer of chilli with another layer of dried and clean grains. Alternate the layers, ending with the last layer of chilli. Keep in raffia bags, wooden boxes or other kind of available container.

4. Protect the ears (Corn) with eucalyptus, tobacco or *lantana camara* leaves

The eucalyptus *citrodurus*, tobacco, or *lantana camara* leaves, repel plum curculios in the granary.

How to do: cover the bottom of the granary with a layer of leaves. Alternate layers of ear with leaves. Ending the last layer with leaves.

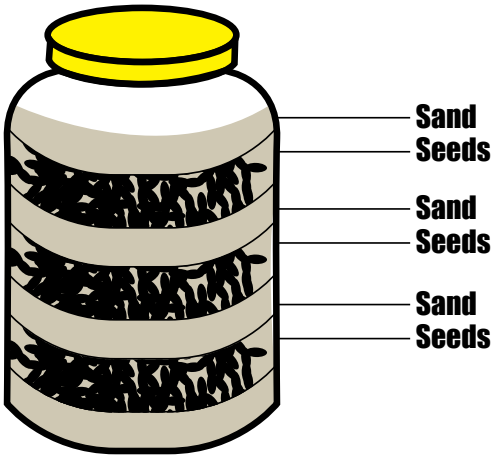
Note: Renew tobacco leaves every 6 months; eucalyptus leaves every 90 days.

5. Keep with flowers/repealing leaves

How to do: Plant *chrysanthemum* flowers or *catharanthus* or other plant with repelling leaves (such as: Tagetes minuta of *Myrtaceae* family and *Datura stramonium* of *Solanaceae* family) around the granary in order to make escape the insects because of the bad smell exhaled from the repelling plants.

6. Grain preservation through smoking

How to do: Prepare a low but long burning fire under the granary to get the smoke to impregnate the stored seeds and grain.



FOOD PROCESSING AND PRESERVATION

Food processing and preservation is a set of physical, chemical and biological processes that are performed to prolong the shelf life of foods and at the same time retain the features that determine their quality, like colour, texture, flavor and especially nutritional value. Food preservation is achieved by destroying enzymes and micro organisms using heat (blanching, pasteurization), or preventing their action by: removal of water, or increasing acidity or using low temperatures

exercise 1

FOOD PROCESSING AND PRESERVATION

OBJECTIVE:

To understand the importance and how to do food processing for food security and a good nutrition during the whole year.

TIME:

45 minutes + practice time (2 hours and a quarter)

MATERIALS:

Flipchart, markers, ingredients and tools to conserve and cook the food.

STEPS:

1. In plenary brainstorm with the participants to review the contents of Food Security. Guide questions:
   - What can we do at home in order to plan and enhance food security? I.e. How can we increase the availability of food during the whole year and diversify our food intake?
   - What is the interest and the importance of food processing?
   - Which are the different processing methods? (Fill a list, adding the list already in key points to the facilitator).
2. Divide the participants into 3-4 groups and ask each group to choose 3 methods.
3. Ask each group to explain and write down the methods chosen and, if possible, give an example.
4. Each group should present one method to the plenary for further discussion (each group for a different method).
5. The Facilitator should explain with easy words the methods that have not been chosen. Ask: which methods are possible in your community?
6. Practice with the participant how to process and preserve some selected recipes.

facilitators' notes 1

FOOD PROCESSING AND PRESERVATION

Why process the food?

- The family food security depends on the regular supply of diversified and adequate food in terms of quantity and quality during the whole year.
- The production of the majority of food is on a seasonal basis (practiced in certain period of the year). For this reason, we have to think on how to increase the food availability of this period.
- Food can rot (going off) in different ways: by internal reactions between its components, by the reaction of the components with water and air or through enzymatic and toxic effects, due to the development of micro organisms and to the presence of chemical elements.

So: Food proceeding is done for:

- Slowing down the rotting process interfering into the physical and chemical reactions, reducing the development of unwelcome micro-organisms;

- Increasing the food flavour;
- Making the food more attractive for the consumer;
- Facilitating its commercialisation.

In summary:
The food processing allows increasing the food availability beyond the area and the period of production, guaranteeing its supply and increasing the food security at National and Household level.

Main methods of food processing

- Cooking
- Preserved food
- Oiling
- Adding chemical preservatives
- Sterilising
- Freezing
- Drying
- Salting
- Fermenting
- Germinating

Freezing
This reduces the temperature of the food so that micro-organisms cannot grow, yet some may still survive. Enzyme activity is too slowed but not stopped during freezing.

Drying
Drying removes most of the moisture from the foods thus micro-organisms cannot grow and enzyme action is slowed down. Dried foods should be stored in airtight containers to prevent moisture from rehydrating the products and allowing microbial growth.

Canning
It is the process in which foods are placed in jars or cans and heated to a temperature that destroys micro-organisms and inactivates enzymes. Air is driven from the jars during heating, and as it cools, a vacuum seal is formed. The vacuum seal prevents other microorganisms from decontaminating the food within the jar or can.

Main steps in food processing

1. Choose only good quality and fresh vegetables and fruits. Fruits shouldn't be green, but they shouldn't either have reached complete ripening.
2. Wash well the products in order to remove the dust.
3. Wash carefully the hands and sterilise all the tools you are going to use, such as: tablecloth, cooking pots, recipients, etc.

facilitators' notes 2

STERILISATION OF POTS/BOTTLES

How to sterilise pots/bottles

1. Wash the recipients (also taps and corks) with soap and water. Dry well with running water.
2. Put the clean recipients into a cooking pot coated with a cloth or wooden grid.
3. Put some water into the cooking pot, filling until the half of its capacity. Close the lid and let it boil for 15 minutes.
4. While the water is boiling, put inside the cooking pot the tabs and corks of the recipients that will be used in order to keep the conserves. Let them boil for 5 minutes.
5. Take out the taps and corks from the cooking pot in which they have boiled, using a clean wooden spoon.
6. Put the pots turned upside down on a clean cloth, out of air currents in order to avoid that the recipients break (due to the thermo shock). The pots shouldn't be dried with a cloth, but naturally.
7. Do not touch with your hands inside the pots/bottles, taps or corks.
8. Put the label on the pots/bottles (type of preserves, date of production, used ingredients, etc.).

facilitators' notes 3

PRESERVATION METHODS

Preservation by chemical action
Acids, salts and sugars are the prime food preservatives. The acids found in fruits help in preservation of jams, juices and marmalades.

Preservation by the addition of sugar
Sugar is generally added in the processing of jams, jellies and sweets. A concentration of 65% sugar preserves the food by drawing out water from the food and preventing micro-organisms from growing. The fruit must be boiled, after which the sugar is added in variable amounts, depending on the kind of fruit and the product being prepared. The mixture must then continue to boil until it reaches a high level of soluble solids, 65-70% which allows for its preservation. The addition of sugar combines with certain fruit substances to produce a gel-like consistency, which characterizes the texture of jams and jellies. To achieve this, appropriate acidity levels and sugar content, together with pectin, form a proper gel. Individual characteristics of the fruit products depends on type of fruit used, preparation method, proportions of the various ingredients in the mixture and the cooking method.

Preservation by adding salt
Pickled vegetables and fruits are fermented products. The particular fruits or vegetables used depend on availability and include red/white cabbage, cucumbers, onions, garlic, cauliflower, tomatoes, under ripe mangoes, grapes, peaches and pears. The growth and fermentation of vegetables by more than one species of lactic-acid bacteria are influenced by especially salt concentration and

temperature. The wrong temperature and/or salt concentration can produce the wrong bacterial population resulting in soft and hollow pickles with off-flavours. In fermentation salt plays a role in sorting the micro-organisms permitted to grow on the basis of salt tolerance.

facilitators' notes 4

PROCESSING ROOTS AND TUBERS

Processing roots and tubers

The common roots and tubers in most countries are sweet potatoes and cassava. These are:

- Easy to grow, adoptable to various agro-ecological zones and are good security crops.
- High source of carbohydrates, fibre, calcium, phosphorous and potassium, but low in proteins and fat, and in fat soluble vitamins (A, D, E, and K). They are rich with vitamin C-which reduces during cooking. Varieties like orange fleshed sweet potato varieties are rich in beta-carotenes (precursor of vitamin A).

Value addition for raw/fresh roots and tubers should be done right from planting to marketing. The stages in the value chain at which value can be added are as below:

- Variety selection
- Planting methodology
- Management
- Method of harvesting
- Sorting/washing
- Grading
- Packaging
- Transportation to market
- Marketing

Sweet potato processing

Traditional methods of processing sweet potato in most countries have been limited to washing, peeling and boiling. In some communities, the roots are washed, peeled, cut into small pieces and lemon or tamarind juice added, then dried in the sun and milled together with sorghum into flour that is used in making porridge.

Some farmers make chips, sun dry, store and later reconstitute by adding water then cook by boiling. Others dry the grated product, mill and then add to other flours to make composite flours.

Improved processing methods have been developed to help overcome some of the problems associated with traditional method, in order to produce sweet potato flour with improved odour, colour and nutritional qualities.

Steps of processing dried chips and flour

1. Selection of raw materials-select only healthy roots.
2. Cleaning, peeling, and trimming: remove any soil using a clean knife and trim any damaged part.
3. Washing: using a large saucepan of water wash the roots thoroughly.
4. Slicing/chipping: the roots are pre-dried in a clean place to remove the surface water, and then chipped manually or mechanically into pieces about 5 mm thick.

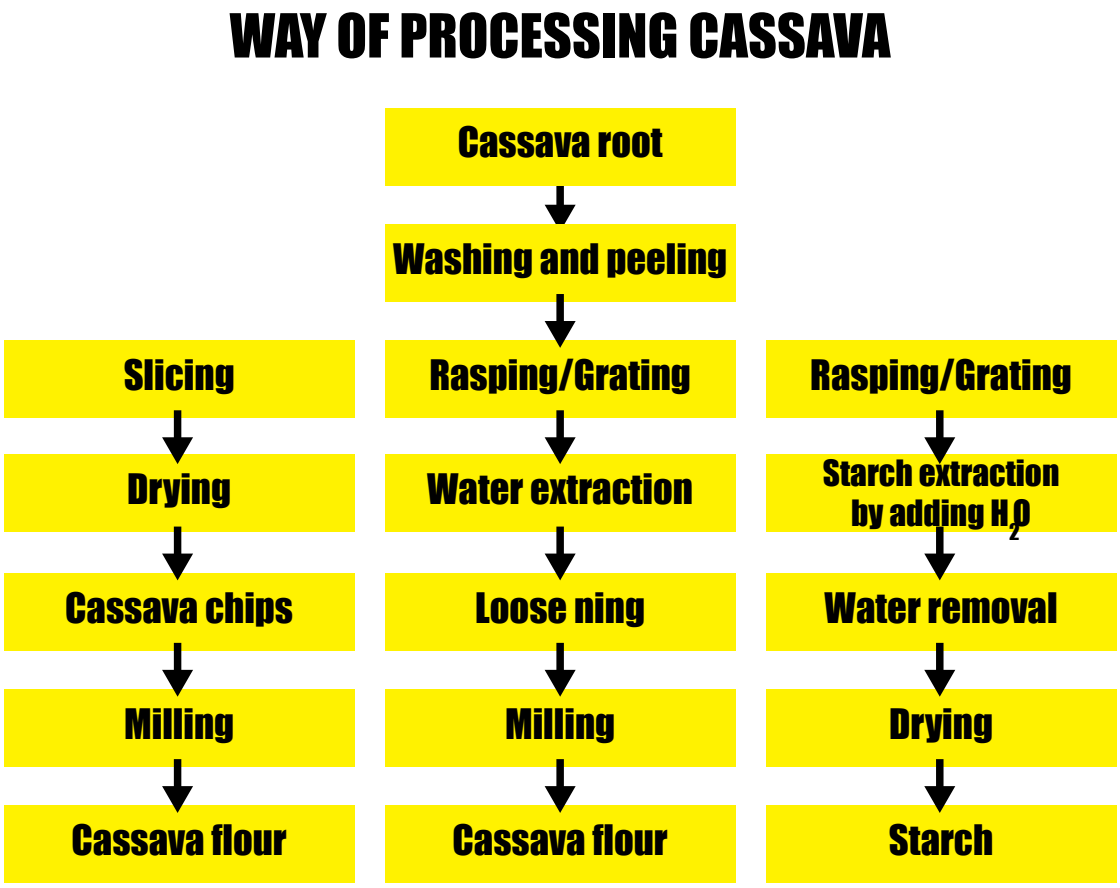
5. Soaking: soak the slices in clean water twice the weight of slices for 90 minutes. The water should be enough to cover all the slices.
6. Drying: sun dry the slices on a raised tray for approximately 4-6 hours if weather conditions are suitable or in a conventional dryer using firewood or charcoal as fuel.
7. Sorting: sort the dried chips for uniformity before packaging or further processing.
8. Grinding: mill the dried chips into flour.
9. Packing and storage: pack the flour in polythene bags or other suitable containers with well fitting lids.
10. Sweet potato can store in clean sisal, polypropylene sacks or polythene bags.
11. Store in a cool dry well ventilated place.
12. Packages should be labeled to trace origin of the root and the chief processor.

Cassava processing

The traditional processing of cassava is labour intensive and time consuming and produces low quality and quantities of materials. The common method of preparing cassava is boiling, roasting, stewing, or frying. It can also be peeled, washed, grated, dried and milled to obtain cassava flour.

Cassava toxicity and detoxification

Some varieties of cassava include substances that are toxic to humans when the cassava is consumed raw. When a small amount of the toxic (hydrogen cyanide) is consumed over a long period (chronic toxicity) the individual develops goiter, cretinism, mental retardation and neurological disorders. Peeled tubers can be detoxified by grating followed by sun or oven drying at temperatures less than 700c. Detoxification can also be achieved by fermenting grated pulp.



facilitators' notes 5

PROCESSING FRUIT AND VEGETABLES

Preservation by reduction of water content

Drying of fruits and vegetables

Drying is one of man's oldest method of food preservation. It is also the most widely used method of food preservation. Drying of foods yields highly concentrated material nutritionally. Dehydration which means removal of water is presently done by drying by artificially produced heat under carefully controlled conditions of temperature, humidity, and air flow. The drying rate depends on temperature, humidity and speed of air, type of drier and size of food pieces with fruits and vegetables generally drying at 38-60 c. The drying process is critical in that air temperature and circulation must be monitored to avoid microorganism growth and spoilage. Dried products are easy to store and have long shelf life, reduced weight and bulk for transport and distribution costs, and provide raw materials for further processing. However there are risks such as loss of quality in drying products, contamination is high and case hardening may occur. The removal of moisture prevents the growth and reproduction of micro-organisms causing decay and minimises many of the moisture mediated deterioration reactions:

- It brings about substantial reduction in weight and volume minimizing packing, storage and transportation costs.
- Dehydration involves the application of heat to vaporize water and some means of removing the water.
- Drying which employs high temperatures for short times does less damage to food than drying processes employing lower temperatures for longer times.

Blanching

Blanching is the process of heating vegetables sufficiently to inactivate enzymes. Enzymes are the biological catalysts that facilitate chemical reactions in living tissue. If certain enzymes are not inactivated, they will cause colour and flavour to deteriorate during drying and storage. Blanched vegetables, when dried, will have better flavour and color than unblanched ones. Blanching - exposing fruit and vegetable to hot or boiling water or steam - as a pre-treatment before drying has the following advantages:

- It helps clean the material and reduce the amount of micro-organisms present on the surface.
- It preserves the natural colour in the dried products; for example, the carotenoid (orange and yellow) pigments dissolve in small intracellular oil drops during blanching and in this way they are protected from oxidative breakdown during drying.
- It shortens the soaking and/or cooking time during reconstitution.
- When the blanching time is completed cool the product immediately to prevent over blanching.
- As a rule fruit is not blanched due to damage from heat sogginess, and juice loss.
- You may blanch with hot water or with steam.

Water blanching usually results in more leaching of vegetable solids, but it takes less time than steam blanching under kitchen conditions.

With water: Use only enough water to cover the product. Bring the salty water (at a ratio of 5 liters water to 50g/5 table spoons salt) to a boil and gradually stir in the vegetable. Re-use the same water for additional lots when blanching the same vegetable, adding new water as necessary. Keep the lid on the kettle while blanching.

Sun and solar drying

Drying practices

- A large quantity of same maturity raw material should be used.
- Remove damaged parts, wash in clean water, trim and cut into 3-7 mm sizes (use same thicknesses).
- Bananas, tomatoes and other vegetables or fruit are sliced with stainless-steel knives or similar equipments.
- As a general rule: plums, grapes, etc. are dried as whole fruits without cutting/slicing.
- To prevent bananas, apples etc. slices from going brown they must be kept under water until drying can be started.
- The main problems for sun drying are dust, rain and cloudy weather.

Preservation by concentration with sugar, acid and salt

Sugar preservation

70% sucrose in solution will stop growth of all micro-organisms in foods. Fruits can be preserved in sugar in form of jams, jellies, marmalades, juices, squash or whole fruits. A concentration of 60% sugar can preserve fruits for as long as one year.

Preservation with salt

Salt levels of about 18% to 25% in solution generally will prevent all growth of micro-organisms in foods.

Preservation with acid (Vinegar)

Fruits and vegetables can be preserved in vinegar and sugar, and then stored in glass containers. Fruits and vegetables stored in vinegar can keep for as long as two years or more and also improves in flavor e.g. chutney, pickles and sauces.

Removal of water by concentration also increases the level of food acids in solution (particularly significant in concentrated fruit juices).

facilitators' notes 6

FRUIT AND VEGETABLE RECIPES

Selected recipes

- **Dried leafy vegetables**

1. Prepare blanching solution and bring to boil.
2. Select and wash the vegetables in cold water.
3. Chop the vegetables and blanch for 3 minutes.
4. Drain the vegetables well.
5. Dip in cold water (same time as blanched) to avoid further cooking.
6. Spread the blanched vegetables on drying trays in thin layers.
7. Load the dryer and keep turning till crisp dry.
8. Remove from the dryer.
9. Pack the dried vegetables in clean and moisture proof containers.

10. Remove as much air as possible from the container and seal well.
11. Label the package with the name of the product, date of processing and expiry, method of pretreatment and source.
12. Store in cool, dry, dark place.

- **Dried Mango Slices**

INGREDIENTS:
Mangoes, lemons, water.

METHOD:

1. Select and weigh hard ripe fresh mangoes.
2. Wash the fruits thoroughly in clean water.
3. Peel the mangoes and slice into uniform slices.
4. Prepare lemon juice: water solution (1:20).
5. Then arrange the sliced fruits on drying trays in single layer and sprinkle with lemon juice.
6. Load the trays in the dryer (the dryer should face the sun).
7. Shift the trays in the dryer and occasionally turn the slices until dry.
8. Unload the dryer.
9. Sort and pack the dried slices in moisture proof containers.
10. Store in cool, dry, dark places.

Note: 15 kg fresh mangoes give 1 kg dried.

- **Pawpaw Jam**

INGREDIENTS:

- 3 cups pawpaw pulp
- 3 cups sugar
- 0.5 cup lemon juice

METHOD:

1. Wash ripe pawpaw, cut into halves and scoop the seeds.
2. Scoop flesh and pound to make a pulp.
3. Wash the lemons and squeeze out the juice.
4. Measure the ingredients and boil under moderate heat stirring continuously until thick.
5. Test for setting (See below).
6. Pour the jam into clean hot sterilized jars.
7. Cover and seal immediately.
8. Process the packed jars.

Jam setting Tests:

1. Flake test. Using the stirring spoon, scoop some jam from the boiling mixture then raise it about

one foot (30 cm) above the pan and out of reach of the steam. Hold the spoon horizontally for a few seconds then pour the jam from the spoon. If the jam falls in clear drops, it is set. If it runs on a continuous flow, it needs to be cooked a little longer and tested again

2. Cold plate test: Pour a little amount of the jam onto a cold plate and wait to cool. When cold, press the jam with a finger, if it forms wrinkles and a skin forms on top then the jam is ready.

During this testing, the rest of the jam should be removed from the fire to avoid overcooking.

- **Tomato Sauce**

INGREDIENTS:

- 2 kg ripe tomatoes
- 0.25 cup sugar
- 1 teaspoon salt
- A pinch cayenne pepper
- 2 cups vinegar
- 0.5 teaspoon ground ginger
- 0.5 teaspoon ground mace
- 0.5 teaspoon paprika

METHOD:

1. Clean and cut tomatoes.
2. Cook till soft and then pass through a sieve.
3. Put into a pan and add all the other ingredients mixing well.
4. Bring to boil and reduce heat to simmer in an open pan until the consistency is that of a thick cream.
5. Pour into hot bottles and process for 30 minutes and seal.

- **Passion fruit squash**

INGREDIENTS:
Passion fruits, lemon juice, sugar.

METHOD

1. Wash the fruits and cut into halves.
2. Scoop out the flesh with pips.
3. For each cup of flesh and pips, add 0.5 cup water.
4. Sieve the mixture to get juice. Add two tablespoons of lemon juice.
5. For every 2 cups of fruit juice add one cup of sugar.
6. Heat the mixture slowly until the sugar is dissolved. Do not boil.
7. Pour the hot juice into a clean hot bottle, cover and process.

LIVESTOCK PRODUCTS

Livestock products like milk, meat and eggs tend to be consumed by rural households in small amounts and some of the production is sold or given out in the raw form. In the local shops we find products that have been made by transforming the raw products (milk, honey, meat etc.) to better, tastier and more durable products. These new products are sold for better prices.

exercise 1

PROCESSING LIVESTOCK PRODUCTS

Some animal parts or by-products can be made into unique items such as for example key holders from cow horns etc.

OBJECTIVE:

Participants will recognize the range of products that can be made when an animal is slaughtered.

TIME:

1 hour

MATERIALS:

Flip chart, marker pens, masking tape.

STEPS:

1. Participants will make a drawing one the common livestock species in the village.
2. Participants then label all the animal's body parts (head, tails etc).
3. Ask the participants to present the drawing with labels to the whole group.
4. Each label will be re-written on a small piece of paper. The papers will be folded and placed in a basket.
5. The basket will be passed round for the teams to randomly pick a label of an animal part that can be transformed into a unique product that can be sold at an agricultural trade fair.
6. The group then make drawings of all the products they can create.

facilitators' notes 1

MAKING MILK PRODUCTS

Making cheese

What is cheese?

Cheese is the solid part of milk, also known as curd, obtained by separating it from the liquid part (known as whey) by a chemical reaction. Curd is separated from the whey by adding an acid, bacteria culture and/or starter (rennet). Cheese can be described according to its texture as hard, semi-hard or soft or it can be described according to extent of maturing as fresh or ripened.

MATERIALS:

To make cheese you need:

- Good quality milk: with a low bacteria content, from healthy cows: do not use milk from cows with mastitis or other diseases or milk which could contain antibiotics. Also do not use colostrums (milk from animals that have calves that are only 2 days old).
- Clean equipment: make sure you clean and sterilize your milking utensils and rinse you utensils thoroughly in clean water.

To make cheese follow these steps:

1. Use fresh whole milk. Reduce the fat content by allowing the milk to stand for about one hour,

and then skim off the top layer.

2. Heat the milk to about 85˚ C to destroy most of the bacteria present and also to increase yield through the precipitation of the whey protein.
3. Dilute lemon juice with an equal quantity of clean water so that the lemon can be distributed uniformly. Add about 30 ml (about 3 tablespoons) of lemon juice per litre of milk. Stir the milk while carefully adding the lemon juice. The curd precipitates almost immediately.
4. Continue stirring for about 3 minutes after adding the lemon juice.
5. Allow the curd to settle for 15 minutes. Separate the curds from the whey by draining through a sieve or a cloth (use a cotton cloth folded twice).
6. While draining the whey, stir the curd to prevent excess matting (coagulation).
7. Add salt to the curd at the rate of about 4g (about a level tea spoon) per 100 ml of curd and mix thoroughly. The amount of salt may be varied to cater for different consumer tastes and preferences.
8. Transfer the curd to a mould lined with cheese cloth. The mould may be cylindrical or square shaped and may be made from metal, plastic or wood.

Making fermented milk (Mala)
What is Mala?
This is milk that has undergone the fermentation process due to introduction of a specific bacterium either from a commercial culture or by adding a small amount from a previous batch of fermented milk. The process described below is based on a traditional process.

How to do it and materials
The process for making fermented milk is:

1. Use good quality milk, i.e. free from antibiotics and preservatives, not adulterated.
2. If making sweetened cultured milk, add sugar at the rate of 20 to 25 kg per 500 litres (40 to 50 g per 1 litre).
3. Heat the milk to 92 to 95°C for 3 to 5 minutes or 85° C for 30 minutes or just bring to the boil.
4. Cool to 22 to 25° C (warm room temperature).
5. Inoculate with a commercial fermented milk culture or mix with a small amount of fermented milk.
6. Incubate at 22 - 25° C (warm room temperate) for 16 to 18 hours.
7. Cool to 20° C (just cool to the touch) in 30 minutes.
8. In case of flavoured cultured milk, add flavour and colour.
9. Stir until smooth.
10. Pack at 20° C.
11. Refrigerate for 10 to 12 hours to help recover thickness lost during stirring.
12. Distribute for consumption and/or sale.

Making yoghurt
What is yoghurt?
Yoghurt is a form of fermented milk whereby fermentation is achieved through the introduction of

specific “friendly” bacteria into milk under very carefully controlled temperature and environmental conditions. The source of bacteria can be a small amount of plain live yoghurt bought from the shop or one may obtain a commercial starter culture.

How to do it and materials needed

The process for making yoghurt is:

1. Use about 5 litres of good quality milk, i.e. free from antibiotics and preservatives, not adulterated.
2. Bring the milk to 85° C over a stove and keep it there for two minutes (or just boil for two minutes) to kill any undesirable micro organisms.
3. Pour the milk into a tall, sterile (rinsed with boiling water) container and allow to cool to 43° C (just warm to touch with the back of the hand).
4. Take about half a cup of plain yoghurt (bought from the shop) and warm it slightly, i.e. to the same temperature as the milk.
5. Mix the warmed yoghurt with the milk and cover tightly.
6. Put the mixture in a constantly warm place (e.g. food basket) at 43° C (just warm to the touch) and leave it for six hours.
7. Remove and leave it for about 30 minutes to cool to room temperature.
8. Add flavour and colour if required while stirring gently.
9. Pack into sterile containers.
10. Store in the fridge for 10 to 12 hours.
11. Distribute for consumption and/or sale.

CULTURAL ACTIVITIES

The following activities will help the participants to reflect on what they have done or learned by a creative outlet for expressing it such as singing, drawing, poetry, drama, Of course, you can also use cultural activities of your own choice or you may want to ask the participants if they have any activities of their own that they enjoy!

ACTIVITY 1. The need to control effects of micro-organisms

TIME:

30 minutes

STEPS:

1. Mark out a large circle on the ground. It should be wide enough for someone to run round it in about 3 minutes.
2. Mark out a smaller circle at the centre of the larger circle, a fort. (It represents the milk, meat that must be protected from decomposing agents).
3. Find the middle of this second circle and mark a spot for placing the ball (it represents the micro-organisms that have secretly attacked our foods stuff).
4. The participants are divided into two teams that will compete.
5. Each team will identify a person who is good at hitting balls hard and also running round the large circle fast to win points for their team.
6. Team A starts by hitting the ball and competing with the runner from Team B round the large circle. Other members of Team A run to find the ball to give it to their runner when s/he completes running round the big circle. They will also try to secure access to the centre. Team A player must successfully place the ball back at the centre to finish the race. Team B members must try to prevent access to the fort (inner circle).
7. The roles are changed and Team B will choose a runner to run around the big cycle competing with Team A runner. Other members of Team B will look for the ball and try to keep an access to the circle (fort) while Team A protect the middle circle so that the opponents do not return the ball in case they get it before a Team B member gets it.
8. Participants are asked to draw a link between the game and the following critical factors in preserving foodstuff.
9. The facilitator gives a list of the aspects in the second column (key aspects in preserving and processing products) in an incorrect order. Ask sub groups to draw arrows that link the step in the game to the correct interpretation.

The game	The key aspects of preservation and processing foods
The ball	Micro-organism to be removed, destroyed from the product
Hitting the ball	Removing micro-organisms
Running round the big circle	Tough conditions that destroy the micro-organism such as heating
Guarding the inner circle	Preserving factors used (salt, oils, sugar, vinegar, friendly micro-organisms)
Sending a team to search for the ball	Removing all possible micro-organisms

ASSESSING PROGRESS

Pair-wise interviews among JFFLS participants[1]

This exercise allows participants to assess each others management practices and adoption of improved practices at their households and thus provides for informal evaluation of JFFLS impact. Participants are stimulated to reflect upon reasons and constraints for adoption both in their own context and among their fellow farmers.

OBJECTIVES:

- To evaluate management practices on individual JFFLS members' farms;
- To share experiences among participants;
- To think about constraints and opportunities in relation to applying the knowledge gained in the FFS on individual farms.

TIME:

1 hour during the 1st session and 2 hours during the 2nd session

Note: This exercise should be applied towards the end of the JFFLS cycle.

MATERIALS:

Large sheets of paper and coloured pens

STEPS:

During the 1st session:

1. Inform the participants that they will be visiting each others' farms to conduct farm interviews. Half of the group will be visiting another member and the other half will host a visit on their farms.
2. Ask the participants to split in small groups and develop a checklist of issues and questions to explore during the farm visit. The questions should relate to the impact of FFS on household and farm level, and on the use of the knowledge gained through FFS, including adoption of practices. In particular the questions should cover issues such as food security situation, efforts to ensure enough high quality food, storage of seed and grain and experiences with processing of products.
3. Randomly, divide the participants in two groups and tell one group that they will be the ones conducting interviews, and the other group will be the ones hosting the farm visit. Thereafter, pair each of the persons in the "interviewers" group up with a person from the "farm visit host" group. Take into consideration the distance between participants when finalizing the pairs.

[1] Adapted from Discovery-based Learning on Land and Water Management: Practical Guide for Farmer Field Schools (FAO and IIRR, 2006).

4. Tell all that during the coming week they have to arrange in their pair for the farm visit and interview to take place, and that during the following session the interviewer will report the findings of the visits. The information gathered during the interview should be documented in a record book.

During the 2nd session

1. Ask each "interviewer" to summarise the finding of the farm visit interview, and especially explain in what way their fellow FFS member appears to have made use of the knowledge gained in the FFS, and any constraints and/or opportunities related to the uptake of practices.
2. In plenary discuss the results of the exercise. Some suggested questions for processing discussion:
   - Does there appear to be a trend among group members in relation to which practices are adopted or not?
   - What are the key factors affecting the transfer of knowledge gained in the FFS to the individual farms?
   - How did the "farm visit hosts" perceive the exercise – did the interview exercise make them think of issues they had not previously thought of?
   - How can the transfer of knowledge from the FFS to the household/farm level be improved and/or quickened?

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Aquaculture

Junior Farmer Field and Life School – Facilitator's guide

Cover photo: © U. Nermark / FAO

Module: Aquaculture

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Module: Aquaculture

INTRODUCTION

Sustainable capture fisheries and aquaculture play a critical role in food and nutrition security and in providing for the livelihoods of millions of people. Aquaculture accounts for a growing share of the global aquatic food production. The term aquaculture covers all forms of farming of aquatic animals and plants in freshwater, brackish water and saltwater. Aquaculture has the same objective as agriculture – the controlled production of food to improve the supply for our consumption. In the case of aquaculture, the products are aquatic animals and plants that grow in the water.

Even in small quantities, fish can have a positive effect on the overall health and nutrition of humans. Fish is an important source of nutrients such as vitamins A, B and D, calcium, iron and iodine. Fish also provides vital amino acids that are often lacking in staple foods such as rice or cassava. It is therefore vital to the food security of many of the world's poor, especially in coastal areas and in small island developing States. Through aquaculture, we can produce protein and nutrient-rich food throughout the year.

Low-income farmers who invest in fish farming will be able to generate additional income and food for their family and potentially for the market. To be successful, an aquaculture operation requires much careful planning. The available natural resources, such as water and land, but also the local temperature and other factors influence the choice of the species to be farmed and the production system to be used. Climate does not limit the scale of aquaculture but it can determine the species that can be grown. Aquaculture can be done in a pond, a river, a lake, an estuary or in the sea. The availability of high-quality water is usually the most crucial resource when making decisions about where, what and how much fish to farm. The most common small-scale aquaculture systems are small-pond fish farming and fish farming in lakes, rivers, dams and reservoirs.

Climate change may have various negative impacts on aquaculture, including sea-level and temperature rise, rainfall fluctuations, and natural hazards such as floods and drought (FAO, 2009). Sea level rise, for example, may threaten inland freshwater aquaculture by causing saltwater and brackish water to move further upstream and into rivers. Existing waterbodies may also shrink or their water levels may decrease owing to erosion, drought and increasing temperatures. Increasing temperatures may also lead to lower levels of dissolved oxygen in the water, which would increase mortality of fish.

Through various exercises, such as small group discussions, hands-on tasks and demonstrations, Junior Farmer Field and Life School (JFFLS) participants will learn about the various types of aquaculture that can be used to provide new business opportunities for farmers and fishers. They will also learn about the importance of preliminary planning and management of daily activities and procedures to ensure a successful aquaculture business.

At the end of the module participants will:

- be aware of the various types of aquaculture;
- value aquaculture as a means of livelihood diversification and as a business opportunity;
- understand the importance of careful planning.

The purpose of the module is to provide guidance, making available different exercises that facilitators can use as applicable, and adapt as necessary, to the specific socio-economic and cultural contexts and needs of each target group and country in which the module will be used. This JFFLS module is complementary to other JFFLS modules, in particular *Capture fisheries* and *Post-harvest issues in fisheries and aquaculture*, and can be combined with them to enhance economic opportunities.

↘ OPENING ENERGIZER

OBJECTIVE:

Break the ice by getting to know one another and by introducing the topic of aquaculture.

TIME:

30 minutes (15 minutes per exercise).

MATERIALS:

Stopwatch or clock; whistle or other noisemaker.

STEPS (EXERCISE 1):

1. Explain participants that one after the other they should say their name and a food item that begins with the same letter as their name, such as “My name is Elsa and I like to eat eggplant” (alternatively a place or a city can be said, for example, “My name is Brittany, I am from Bangladesh”).

2. To make the game more challenging, ask participants to remember all the names and foods/places of all those who speak before them: “The last person will have to try to repeat all the participants’ names and foods/places.” For young children, it is easier to ask them to only repeat the name of the child who precedes them.

STEPS (EXERCISE 2):

1. Ask students to form pairs of two (ideally a male and female participant), to introduce themselves to their partner and to chat for about 5 minutes about what they know about aquaculture, for example by answering the following questions:

   - What do you think aquaculture means?
   - Do you know somebody who farms fish?
   - How long does it take to grow a fish?
   - Does your family or neighbour or a relative grow fish?

2. When 5 minutes are up, blow the whistle and gather as one big group.

3. Ask each of the participants to introduce his/her partner to the whole group and to briefly report on what the partner knows about aquaculture.

Exercises

FACTORS FOR SUCCESS

Globally, an enormous variety of waterbodies, including rivers, irrigation canals, flood plains, lakes and ponds, can be used for fish farming. To be successful, it is very important to focus aquaculture production on species that are easy to maintain and that can live with available resources (e.g. natural habitat, feed, including household waste). Some fish and shellfish are relatively easy to breed and grow and require no or little technology or intervention. Normally, it is easier to farm fish that eat plants rather than fish that eat smaller fish species and can have complex life cycles that are difficult to recreate in our aquaculture systems. A little homework ahead of time to understand which species can be farmed with locally available resources will save money, time and frustration.

exercise 1

MAKE YOUR OWN MINI POND IN A BOTTLE

OBJECTIVE:

Recreate and observe the fish life cycle to understand the complexities of growing fish on a small scale and the importance of having a balanced ecosystem.

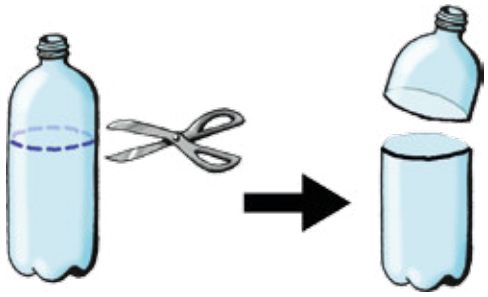
TIME:

About 2 hours and additional observations for 4 weeks.

MATERIALS:

- 2 two-litre transparent bottles, clean and without label (one bottle for each group of 5–6 people).
- Thermometer.
- Pipette or straw or piece of tubing.
- Tape.
- Pond water.
- Sand.
- Two species of juvenile fish from a local pond (for example, cichlids and catfish; three for each bottle).
- Pond cultures of algae (if available).
- Water plants (for example, African elodea or water hyacinth).
- Aquatic snails and other invertebrates (for example, pond snails , apple snails or pulmonate snails).
- Scissors.
- Writing support.
- Pens.

STEPS:



1. Divide the group into small gender-balanced groups of 5-6 people, depending on class size.
2. Have each group cut the top curved portion of the bottle off and keep it.
3. Ask participants to put about 7.5 cm of sand into the bottom of the bottle and carefully add the pond water until the bottle is about half-full.
4. Invite participants to plant the water plants. A good rule of thumb is to plant two plants for each fish.
5. Participants should slowly add more pond water, being careful not to disturb the sand or plants, and fill the bottle to within 2.5 cm of the top.
6. Ask participants to add the snails and any other invertebrates (maximum of 5 invertebrates per bottle).
7. Place the bottles in a safe and dry place and leave them undisturbed overnight.
8. The following day, participants should add two or three small fish to each bottle. After the fish are in the water, the top with the bottle cap can be put back on the bottle and sealed with tape.

9. The bottle ecosystem should be placed near a light source, but be careful that the temperature does not go above 25°C. Algae growth should be encouraged. Feed the fish only if you feel they cannot survive.

10. Once a week each group should add a few drops of water with the pipette, straw or piece of tubing.

11. Invite each group to observe the ecosystem in their bottles over the following weeks and to register their observations (e.g. temperature, water level, condensation, general health of animals). It would be best if a different group member could take the bottle home for a week and make daily observations. The bottle can then be passed to another group member the following week, etc.

12. After a few weeks, discuss the following:
    - Is one ecosystem developing better than the others?
    - Is one species in the bottles more aggressive?
    - If too many fish are in the bottle, what happens?
    - If the fish are dying, what should be done to correct it?
    - If too many decomposers are in the system, the water may become cloudy. What should be done?

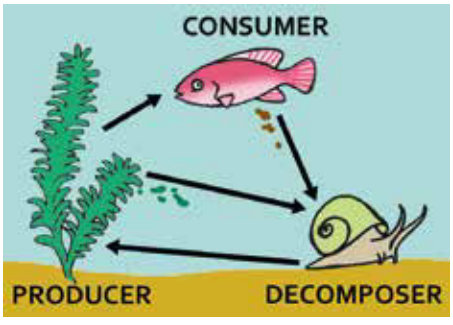
13. Close the discussion with the entire group by talking about the importance of a balanced ecosystem for aquaculture.

facilitators' notes

All ecosystems, whether on land or water-based, require three basic components: producers, consumers and decomposers. Producers, consumers, and decomposers must all remain in balance for the ecosystem to thrive. Too much of one of these will result in disaster. For example, if there are too many fish and not enough plants, the fish will starve or will suffocate from lack of oxygen. Therefore, it is important not to overcrowd the environment.

The producers are the plants, so named because they produce their own food and are the base of the food web. They also produce oxygen, essential for the consumers. After a few days of observing, it may be necessary to add more plants to provide food and oxygen if some of the fish begin to die.

Consumers are the animals and living organisms that feed off the producers, so named because they consume things in the environment. Consumers also contribute carbon dioxide and waste to the ecosystem.



Decomposers are the garbage cleaners of the ecosystem because they recycle the waste products. Decomposers include bacteria and worms. In a water system, snails and ghost shrimp are decomposers.

exercise 2

RESOURCE INVENTORY

OBJECTIVE:

Have participants think and discuss about their locally available resources.

TIME:

About 1 hour.

MATERIALS:

Flip charts, markers.

STEPS:

1. Ask participants to identify some of the natural resources they come across in the environment during their day-to-day activities and record all the responses on a flip chart.

2. Divide the participants into gender-balanced subgroups of 5–6 persons.

3. Ask each of the groups to make a map of water sources in the area. The map should have enough detail to show rivers and streams that may flow into it, trees, fields etc. Each group should also map other local resources that support fish farming (e.g. feed sources, fish markets, fish processing sites, transport facilities, financial services, extension services).

4. When the groups have finished, they should nominate one group member to present their map.

5. Participants should compare the different communities presented and discuss what the differences are and which resources for aquaculture are missing in the different communities.

6. Discuss with participants:

   - Is there any problem with these resources?
   - Are there any differences in quality among these resources?
   - What happens when the community does not take good care of these resources?

7. To conclude, summarize the discussion highlighting the constraints and advantages for aquaculture production in the area.

exercise 3

PLANNING OUR FISH PRODUCTION

OBJECTIVE:

Identify the type of aquaculture that will work best for the community and understand which factors are important for fish farming.

TIME:

2 hours.

MATERIALS:

Flip charts, markers.

STEPS:

1. Take the group to the nearest body of water.

2. Divide the participants into gender-balanced sub-groups of 5-6 persons.

3. Ask them to develop a step-by-step plan of what they have to do in order to farm fish, thinking about species selection, site selection, system preparation, feed selection, fertilization, harvesting methods, post-harvest storage etc.

4. Bring the participants back together and have them present their plans to the full group.

5. Conclude the session by asking the following questions:

   - Is it a good idea to make a plan? Why or why not?
   - What basic steps do we need to follow to make a plan?
   - Was it easy or difficult to make a plan in a group?
   - Did everyone participate in the discussion? Why or why not?

6. If available a local aquaculture producer can also be brought in to allow for a similar exercise related to the production of products.

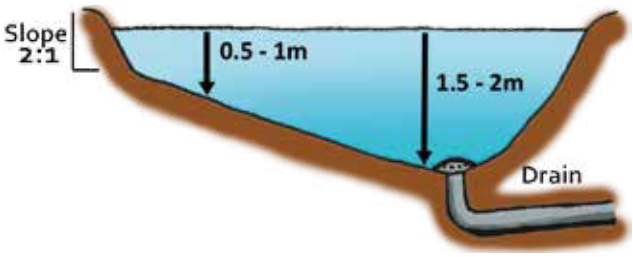
facilitators' notes

The two most common small-scale aquaculture systems are local pond fish farming and fish farming in open waters such as lakes, rivers, dams and reservoirs. Small-scale fish farming is mainly a secondary occupation for farmers, and ponds tend to be small (less than 1 000 m2) and without water drainage facilities.

POND CULTURE

Site selection: Site location depend on a number of factors including: the fish species to be farmed; soil quality, which affects water quality and productivity; an adequate supply of unpolluted water; land ownership; access to markets; fish feed and other inputs available to the farmer; and the capacity to retain water for more than 1 m for at least 6 months of the year. If possible, the pond should be located to take advantage of the effect of the wind on the surface of the pond to mix the water; although locations that are too windy can cause erosion. If the site is very windy, the long side of the pond should be at right angles to the prevailing wind. Hedges and trees can be used to protect the pond.

Pond size: Ideally, the fishpond should be 0.5–1 m at the shallow end and sloping to 1.5–2 m at the drain end. Drain valves or tilt-over standpipes should be incorporated into the design. It should be possible to drain the pond within three days. The edges of the pond should have a slope of 2:1 or 3:1 on all sides.



Pond facility management: There are many potential problems to be considered, including, for example, broken pond banks. To prevent this, pond walls should be checked on a regular basis. Grazing animals can damage the pond banks and should be kept away. An irregular water supply can also be an issue, providing too much water in the wet season and too little in the dry season. Predators are another threat to production, and the pond needs to be checked regularly for signs of snake and rat holes. In the pond, silting or a buildup of organic matter can be prevented by regular checks of the bottom of the pond and scooping out of silt when required. Mud on the bottom of the ponds can be agitated with a rope to release harmful gases. To avoid leakage, the pond inlet and outlet need to be checked on a regular basis. The fish itself has to be checked for diseases on a regular basis.

OPEN WATER FISH FARMING

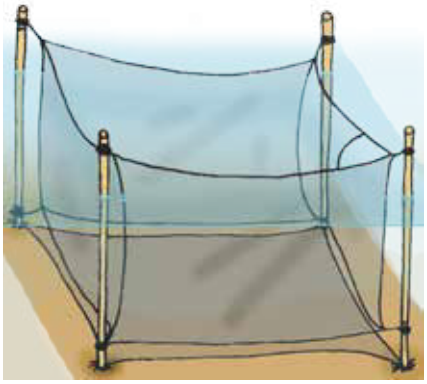
Cages or pens are used to separate an area of larger waterbodies for fish farming. The selected water source should be of good quality with low turbidity. Dams and reservoirs primarily exist to store water but as a secondary function these bodies of water can be stocked with fingerlings or fry and the fish can be harvested later by using nets. In river locations, a slow current is necessary and there should be little disturbance from water traffic.

There are several disadvantages to open-water fish farming that should be considered. These include that fish farmers have little control of the water, as they do not own the dam or reservoir. The risk from theft and vandalism is a serious problem in some places. It is more complicated to feed the fish or fertilize the water, creating a higher reliance on naturally occurring fish food. In larger waterbodies, there are likely to be more predators. A significant expansion of cage culture activities in some villages could have negative environmental impacts, leading, for example, to the local depletion of snails on which other animals depend (e.g. birds).

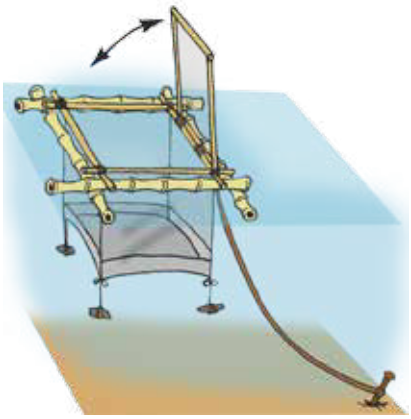
Fish cages: A cage is a simple means of restraining fish in one place, and it can be easily made using local materials. Cages are used within flowing or large bodies of water and can also be used in small pond fish culture to protect fingerlings in the initial stages of development. Small cages with a capacity of 1 m^3 are suitable for fingerling protection. Cage design must incorporate certain physical properties, including the ability to hold fish securely but also to be within the financial means of the cage operators. The cages currently used are small, measuring between 1 and 2 m^3, inexpensive and simple to construct. Bamboo poles can be used to form an outer frame that is covered in netting; inside is a "nursery" section for the younger, more delicate fish; and floats are added at the corners. Farmers use both fixed and floating cages. In general, fixed cages are installed in waters where the depth is relatively low and poles can be fixed into the river bed or substrate. Floating cages do not have this limitation and can be used in deep water. Floating cages tend to be easier to manage, but when selecting the type and design, the following points should be considered: input availability, risk of natural disasters, type of waterbody, water depth and current, and water retention period over one year.

CAGE MANAGEMENT

Fixed cages: Fixed cages are very easy to construct and only require a small amount of capital investment. The materials needed to make fixed cages are netting with an 8 mm mesh size, bamboo, rope, twine and sinker. Routine management is difficult for these cages, and storms, strong currents,



tidal surges and flooding may cause damage if precautionary measures are not taken. Fixed cages are difficult to move from one place to another during water fluctuation. A top cover is usually provided on cages to reduce the risk of fish escaping, especially in areas prone to flash floods where water levels rise very quickly. A small opening is kept at one edge or in the middle of the top covering for feeding purposes. A feeding platform made of fine mesh is placed on the bottom of each cage to minimize food loss. To fix the cage, four bamboo poles are fixed in the substrate and the four top and bottom corners of the cage are tied to the bamboo poles with nylon rope, allowing the cage netting to stretch. To minimize installation cost and to reduce daily management and labour, cages are sometimes fixed in rows with a narrow space between the adjacent cages.



Floating cages: The size of the cage is usually 1 m3. A top net is always used to minimize escapees because the cage is only a few centimetres above the water surface. The top of the cage is on hinges that can be opened to allow feeding, the checking of fish, the removal of waste and harvesting.

A layer of fine mesh net is placed along the bottom of the cage and 10 cm up each side to reduce food loss. However, where the water has a high turbidity, the use of fine mesh is not recommended as it clogs up the mesh and causes structural stress on the cage frame. In these areas, feeding trays should be used instead of fine mesh. Buoyancy is achieved by using four plastic floats (buoys) tied to the four horizontal frames, about 10 cm from the top of the cage. There are several advantages to using fixed cages. The cost per unit is very small and they are not damaged by storms. They are easy to construct and the water volume remains constant even with a fluctuation in the water level. Lastly, in tidal waterbodies, the effective cage depth is greater.

Cage maintenance: Maintenance includes: the cleaning of aquatic weeds nearby; removal of water hyacinth; cleaning of waste feed from cages; cleaning of deposited silts from cages; removal of dead fish; checking cage frames, floats, ties, anchors, feeding trays, etc.; cage shifting; considering the water level; checking water pollution; and guarding. The care of the net includes the removal of algae to ensure water exchange and the prevention and repair of holes. Profitability depends on proper attention to fish growth, and regular, adequate and quality feed is important. Feed can be of local origin, including aquatic weed or a mixture of rice bran, oil cakes, kitchen waste, chopped snails or cow dung. Fish health should be monitored regularly.

Fish types: The selection of suitable fish species for farming will depend on various biological and economic factors, such as market price, growth rate, ability to reproduce and available fish feed. Water temperature is also an important criterion in assessing which fish species is suitable. Common types of farmed fish are tilapia, Nile perch and catfish.

Feeding the fish: It is possible to feed fish on kitchen and agricultural waste, duck weed, oil cake, rice bran and snails, which will provide all the nutrition required. If available and not too costly, the diet may be supplemented with commercially available compound feeds.

FACTORS FOR COMMERCIAL SUCCESS

You should consider a variety of factors when venturing into aquaculture for commercial purposes. It is important to plan wisely and to do your homework. In addition to the available natural resources, evaluate other resources you have, including time, access to energy and financial resources. It is also crucial to assess the market of the region or community in which you want to sell your fish. Is there a demand for what you are going to produce? Can you make a profit? How are you going to sell your product?

exercise 1

WHAT SHOULD I PRODUCE AND WHO WILL BUY IT?

OBJECTIVES:

Identify local markets and their needs.

TIME:

3 hours.

MATERIALS:

Paper, pens, writing support, markers.

PREPARATION:

Before doing this exercise, meet with local fish traders to arrange for a group visit when they are not too busy. If there are many traders, contact several of them to distribute the group. It will also be beneficial to arrange a visit when customers will be purchasing product to capture their views as well. Based on the finding of the pre-exercise visit, decide the most appropriate size of the subgroups.

STEPS:

1. Introduce the task to the whole group. Working in subgroups, they will decide on two questions each for the consumer and the trader to better understand the market needs. Explain that the subgroups will have 15 minutes to complete this task.

2. Form smaller gender-balanced groups (adjust the size of the groups to the number of fish traders and customers, so as not to overwhelm the individuals) and provide them with paper and pen. These groups will work together throughout the exercise.

3. After 15 minutes, have a representative from each group present their questions to the class. Write the questions on the flipchart. Once completed, ask the participants if there are any more questions they would like to add. Use the questions in the Facilitator Notes to stimulate ideas within the groups.

4. Participants should use all the questions as a guide to engage in conversation with both the consumers and traders. Explain that a list of questions could make people uncomfortable and that it is better to have a casual conversation in which the questions are inserted. Participants should record the major points, but avoid writing the answers word for word as this can make the person being interviewed feel as if they are not being listened to. Participants should always be polite and thank everyone for their time.

5. Bring the participants to the prearranged location and give them an hour to meet with the traders and consumers. Agree on a meeting point.

6. When back, discuss what the participants learned. Based on their feedback, which product would they want to farm and why? Emphasize the importance of a market survey and explain how it is done and how it relates to the exercise the groups just participated in.

facilitators' notes

Participants should have an understanding of how to perform a market survey that allows understanding the conditions and the needs of a market. They can use this technique in their local communities but they can also use the survey questions as guides when speaking with other important players, such as exporters. Identifying a market is only part of the process; it is also important to make sure that any product chosen to be produced will be sustainable and profitable (for more, see module Post-harvest issues in fisheries and aquaculture). Participants will want to choose a product that is unique or in demand, rather than to produce one that is already being produced and meeting current demand. Shifts in the availability of certain fish species owing to climate change can open the door to new and profitable aquaculture endeavours.

SAMPLE QUESTIONS FOR MARKET SURVEY

For traders

- What are the most popular products?
- Are any of the popular products produced through aquaculture?
- What are the most expensive products? Do they sell well?
- Does the trader have a problem with obtaining a steady supply of certain products?
- Are there times of the year when certain products are more popular (e.g. festive seasons)?
- Is there a preference from the customer as to whether certain products are from aquaculture or wild caught?
- Are there any export markets for products from aquaculture?
- What products are imported for sale?

For consumers

- What is their preferred product to purchase?
- Do they know the difference between fish from capture fisheries and aquaculture fish?
- What is the biggest factor when deciding what to buy (price, taste, aquaculture vs. wild, etc.)?
- Are there any other fishery products they would like to see available?
- Are they able to find their favourite products at all times? Can they afford their favourite products at all times?
- Are there special items they would like to see available at certain times?

exercise 2

WHO WANTS TO BUY MY FISH?

OBJECTIVES:

Understand the dynamics of supply and demand in the local market.

TIME:

2 hours.

MATERIALS:

Paper, pens, writing support, markers, a local fish trader or local fish exporter (this session can include both or be done on two separate occasions with different individuals).

PREPARATION:

Make arrangements with a local fish trader or exporter in advance to inform about the purpose of the group visit and agree on a time for the visit.

STEPS:

1. Invite participants to imagine that they are going to start their own aquaculture operation. Before they make the initial investments, they have to look for local fish traders and exporters to identify local and international market needs.

2. Each participant should come up with two questions, which would help choosing the aquaculture species to obtain the greatest return on their investment.

3. Tell the participants to also consider laws and regulations related to selling and exporting fish, as this may be a significant cost factor in their production process. Inform the participants that a trader or exporter will be answering their questions.

4. Compile all questions on a writing support before the arrival of the guest to avoid asking the same question twice. Assign questions to each participant to engage them with the trader or exporter.

5. Begin the session by introducing your guest. Have him/her explain to the participants what his/her position is and ask to provide a brief overview of his/her job.

6. Open the floor so that participants can ask their questions. Encourage the trader or exporter to elaborate and ask questions back to the participants.

facilitators' notes

Fish traders and exporters have direct access to the consumer market; they know the drivers that affect demand and supply better than anybody in the value chain. These drivers can come from the consumers themselves. For example, increased consumer demand for certain wild species can contribute to increasing capture fisheries pressure on local stocks to satisfy this demand. This in return can reduce these stocks and there can be an increase in the demand for certain aquaculture products to substitute these capture fisheries products. There are also external drivers that can affect supply. For example, climate change may put limits on what species can be produced now and into the future; it is important to keep this in mind when thinking of products to produce.

WHAT ARE THE RISKS?

Aquaculture can be conducted in a wide range of environments from freshwater to marine water, in simple ponds or even in high-tech indoor recirculation systems. Each of these production systems has some specific risks. Certain risks may affect all production systems, for example, risks of disease outbreaks, equipment failure or natural hazards. Risks that may specifically affect aquaculture include water-quality degradation and competition with products from capture fisheries. The decrease in production from any risk results ultimately in an economic loss. In order to mitigate these risks, it is important to understand them. For example, preventive actions can be taken to minimize the risk of the outbreak of diseases. Risks cannot be eliminated but they may be reduced or managed. There are a number of options available to manage each potential risk; however, each option has associated costs and benefits, which should be understood in order to address them.

exercise 1

IDENTIFY RISKS

OBJECTIVE:
Identify the risks associated with aquaculture.

TIME:
1.5 hours.

MATERIALS:
Writing support, pens, index cards or a piece of paper.

STEPS:

1. Ask participants to discuss the types of aquaculture they are conducting or that occur in their community, and list them. Ensure that participants provide as much detail as possible: Does it occur in freshwater or saltwater? Which species are farmed (fish, shellfish, etc.)? Which method is used?

2. Hand out index cards to participants or ask them to fold a paper in half. Have participants write the possible risks associated with aquaculture production (these will become the risk cards for the game in the next exercise) and ask them to be as specific as possible. Only include one risk per card/paper and only write on one side.

3. Collect all cards.

4. Review the cards with the participant to see if there are any duplicates and remove them. Move on to exercise 2 (see facilitators' notes after exercise 2).

exercise 2

HOW TO MITIGATE RISKS

OBJECTIVE:
Work in teams to identify ways to mitigate risks.

TIME:
2 hours.

MATERIALS:
Risk cards (from previous exercise), blank game board (see below), dice, game pieces, timer.

STEPS:

1. Explain risk mitigation: Risk mitigation aims to reduce the probability that an event occurs as well as the possible negative consequences that can derive from it. For example a risk mitigation measure is the building of fences to reduce the likelihood that floods occur as well as to reduce the impact of floods (exposure).

2. Divide the participants into smaller gender-balanced teams.

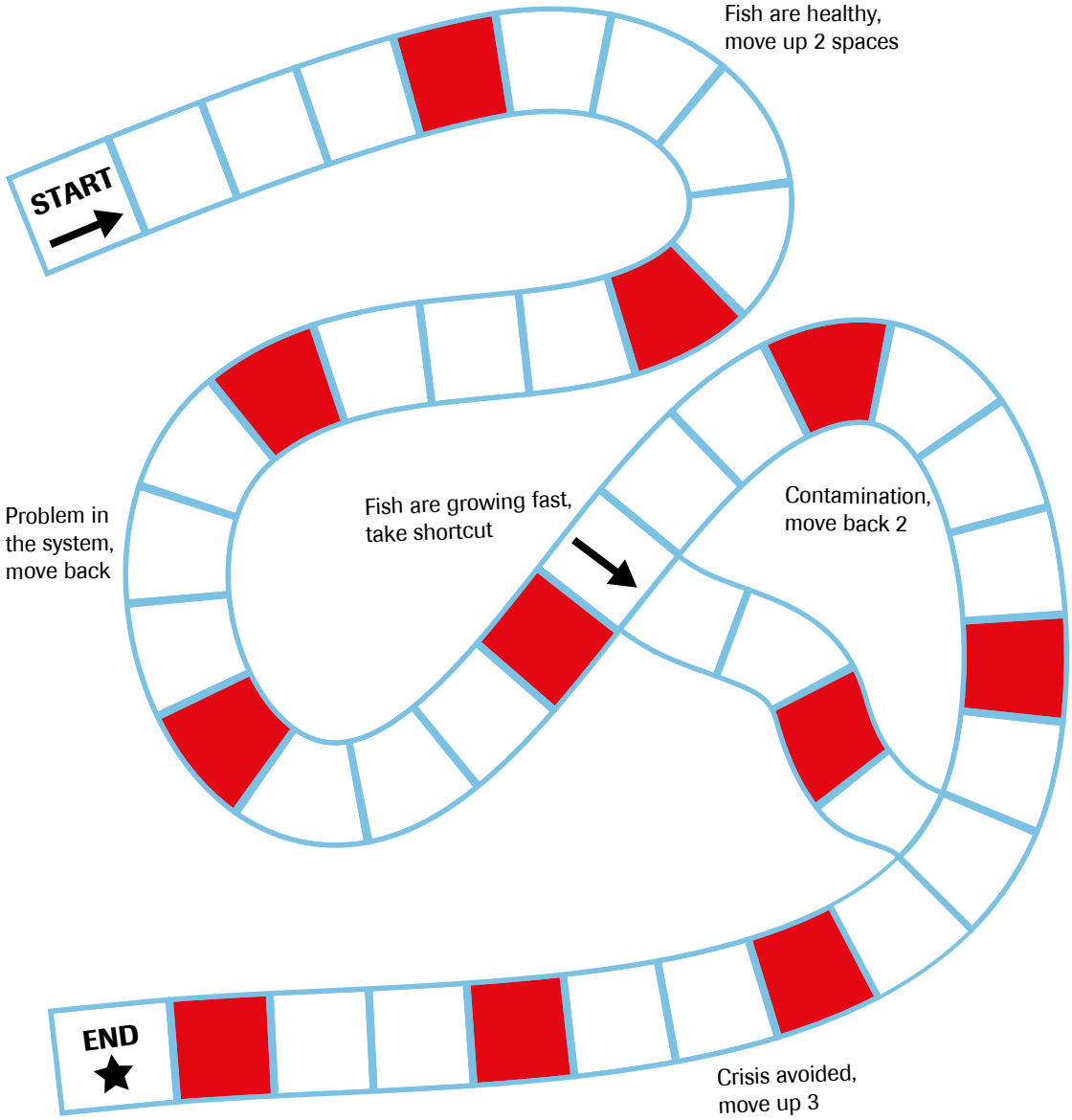
3. Each team will roll the dice in turns as they move around the game board. When they land on a red square, they pick up a risk card, read the risk aloud, and as a group discuss how they

can mitigate the risk. They have 1 minute to come up with an answer. If they come up with a solution, then they roll the dice again. If they cannot figure out a solution, they move back two spaces. If they cannot come up with a solution, the other teams have an opportunity to come up with a solution. If another team answers the question, they take over the turn and roll the dice. Along the way, there are additional squares that help teams advance or force them to move back.

4. The first group to reach the end wins.

5. Keep track during the game of the answers the teams come up with for ways to mitigate the risks. When the game is complete, as a group discuss the solutions and decide if they are the most appropriate and what other possible solutions there are to the different risks.

6. If not all risk cards have been played during the game go through the rest of the cards with the whole group and ask participants to come up with possible solutions for each risk.



facilitators' notes

Risk is defined as a combination of the likelihood of an undesired outcome occurring and the severity of the consequences. Risks can be broken down into different categories, including for example environmental, occupational, and those related to food safety and public health.

Environmental risks:

- Escapes: Escaped farmed fish that can interbreed with local stocks is considered a serious environmental threat. This occurs when farmed fish are being raised in net pens or cages in the wild. The introduced species may carry diseases or parasites that can significantly affect the native population. The introduced species may also out-compete the native stock for food and there may be inbreeding which potentially weakens the genetic fitness of the wild populations.
- Water pollution: Fish and feed wastes from aquaculture facilities, which contain large quantities of nutrients, can be potentially harmful to the environment when discharged untreated into coastal and ocean waters. Another form of pollution is the use of chemicals such as medical treatments, including antibiotics, when not disposed of appropriately or discharged into the environment.
- Climatic conditions and natural disasters: These can cause issues in aquaculture production. For example, flooding can cause physical damage to the production site, pathogens as well as predators can be introduced, or the cultured species may escape. Drought can also affect the facility by decreasing the amount of water available and thereby ultimately reducing the carrying capacity of the facility.

Occupational risks:

- Physical hazards that affect workers include mechanical injuries from the equipment. Other physical injuries include cuts, sprains, and fractures. These injuries can all be prevented by the use of the appropriate safety equipment.
- Workers are susceptible to bites from fish depending on the species raised or that they are exposed to in the facility, especially on outdoor fish farms. The use of appropriate protective gear can help prevent this.
- Chemicals are sometimes used in aquaculture facilities for a variety of reasons, thereby exposing workers to hazards that can cause a multitude of reactions. Fertilizers, pesticides, disinfectants and other laboratory chemicals can cause skin irritations as well as respiratory ailments or even worse problems. Proper use of equipment and hygiene can help prevent these reactions from occurring.

Food safety and public health:

- Diseases and parasites: Infectious diseases caused by bacteria, viruses and parasites are a major concern in aquaculture. One way to reduce the spread of diseases is by adhering to best practices in the handling and marketing of fish. Disease and parasite outbreaks on fish farms can be addressed with antibiotics and other chemicals in fish feed as well as using vaccinations for farmed fish, but it is preferable to prevent any disease outbreak as antibiotics and chemicals have potential negative environmental impacts as well as on the quality of the fish.

ORGANIZATIONAL STRUCTURES

A large proportion of aquaculture production today comes from small-scale operations. Small-scale fish farmers face many challenges, including having secure access to markets and the ability to purchase the necessary inputs for production. Often, small-scale producers also have limited access to knowledge about improved production technologies, progress in dealing with disease, etc. When working alone, these challenges can become a hindrance to running a profitable business. However, there are many ways for small-scale fish farmers to join forces and overcome these problems together.

exercise 1

ORGANIZATIONS

OBJECTIVE:

Illustrate how organizations can assist small-scale farmers to run a sustainable business.

TIME:

4 hours.

STEPS:

1. Divide the group into three gender-balanced groups. Each of them has to prepare a little play to be presented to the others. Suggested scenarios:

    - The price of fish feed has gone up. How can you afford to buy it from the only dealer that sells it?
    - There has been opposition to the expansion of your small-scale cage farm from the local non-governmental organization (NGO), which is worried about the environmental impact. How can you assure it that you are using best management practices?
    - The trader you usually sell to has just told you that the hygiene regulations are becoming stricter. What can you do?

2. Discuss the plays with the whole group to see if there are other options than the ones presented.

facilitators' notes

Increasing globalization and trade is leading to a change in supply chains in aquaculture. In some cases, large integrated production–distribution chains marginalize small-scale fish farmers. Powerful companies controlling the markets can impose prices and production requirements on small-scale producers who do not have a voice.

In particular for exports, the market demands a product that is safe, healthy, high quality and has been produced in an environmentally sustainable and ethical system. The presence of unfair working conditions and the use of child labour can exclude small-scale producers from benefiting from global value chains.

Organizations have been used in farming for centuries. Some benefits of collaboration for small-scale farmers include:

- bulk purchasing of production inputs such as feed at reduced costs;
- collective processing and marketing facilities and opportunities;
- effective management through sharing of best management practices;
- access to new information and extension services;
- easier access to certification for groups.

There are several models for aquaculture organizations: producer organizations, clusters or cooperatives, marketing organizations and community-based organizations with wider social objectives. Informal organizations often exist but they do not have legal rights and may face difficulties in obtaining loans, credit or technical assistance.

Associations are membership-based organizations that have easier access to services and benefits. Usually, they are not established for business activities but rather for non-profit purposes. In such cases, they cannot distribute profits to members, and members are liable for the association's debts.

Cooperatives are traditionally controlled and owned by their members, who have equal shares and voting rights. The main purpose of a cooperative is to provide competitively priced services to their members and to make a profit from the members' sales. The profits are then distributed to members. Common activities and services of organizations are:

- input supply: provide products to members at lowest possible price;
- production services: provide technical assistance and extension services and training;
- financial services: facilitate access to cash loans and credit;
- additional training: in addition to technical training, many provide training in literacy, numeracy, basic accounting and record-keeping;
- quality control: monitor and control the production process and quality of the final product, possibly leading to branding or certification;
- coordinating production: to take advantage of markets and needs of the buyers, they can act to coordinate the supply throughout the year;
- output marketing: analyze market information, identify opportunities and negotiate sales and contracts, collect, store and transport produce and pay members on time;
- trading and intermediation: can act as major intermediaries and negotiate contracts with buyers and purchase product from their members;
- processing: can process to add value;
- advocacy: promote and defend the rights of members and provide a voice that can be heard;
- community development: may take on projects such as donating money for local schools;
- environment and conservation activities: can help to offset negative impacts of aquaculture through activities such as replanting mangroves.

FOOD SAFETY AND HYGIENE

With the increase in seafood production through aquaculture, concern is growing the about the quality and safety of these farmed finfish and shellfish products. Safety concerns range from the threat of exposure to chemical contaminants and toxins that occur naturally in the environment to the improper use of chemicals during processing and handling. If proper food safety and hygiene measures are not respected, cross-contamination can occur along the supply chain (production, processing, storage, transport, consumption) and potentially cause larger public health issues. Therefore, the production of safe and healthy quality fish from aquaculture requires effective hygiene practices throughout the food chain, from growing the fish through to its consumption.

exercise 1

LEARNING HYGIENE PRACTICES

OBJECTIVES:

Raise awareness about the importance of food safety and hygiene and learn good practices.

TIME:

3 hours over several days.

MATERIALS:

Fresh food items (including fish), small piece of paper (big enough for the food item to fit on), paper and pens.

STEPS:

1. Break participants into small gender-balanced groups. Give each group a food item which was cut into two halves. Draw the participants' attention to the freshness of the product. Let the groups decide where to leave each half of the item for the remainder of the day/training (e.g. outside in the shade, on a shelf, in a sunny area).

2. Have participants write their names on a piece of paper together with what they think will happen to the item. Place the papers close to the food item.

3. On the next day, have participants explain what happened to their food item.

4. Have them monitor the food item throughout the following days, observing closely and at the end, report the results. Provide details on how the food looks, smells, if there are insects on the item, etc. Discuss the differences based on where the items were located, the temperature differences in those locations and how that made a difference (e.g. indoors versus outdoors), and any other observations participants made.

5. Lead discussion on the effects of bacteria, parasites and other microbial organisms on humans if they consume or even touch food that has been contaminated.

6. Based on the observations, ask participants to identify proper storage/cooling strategies for food items, especially fish.

facilitators' notes

It is important to remember that aquaculture is the production of fish for food, either for direct consumption or for trade. Therefore, when producing this food item, it is important to keep in mind that proper food safety and hygiene measure are essential. By not respecting these measures, the fish product can suffer and the consumer may end up sick in the long term.

Hazards can be microbiological such as bacteria, viruses and parasites. There are fungi in the air that can make food mouldy and make it rot. The fungi like warm, wet and light conditions so keep food cool and dry. Temperature is the most important factor affecting the rate of multiplication of micro-organisms and deterioration of food products especially fish. Therefore, icing, chilling or refrigeration is key to keeping fish fresh and safe. Hazards can also be chemical including heavy metals, biotoxins and histamines, and they can be physical such as hazards related to glass and metal fragments that enter the product during the production cycle.

When transporting fish products, an appropriate cool temperature should be maintained at all

times. If the product is frozen, then chilling equipment or ice should be provided. If the animal is alive, then the temperatures should be tolerable for that species.

Many processes designed to preserve food involve a number of food preservation methods. Below are some food preservation techniques to lengthen the shelf-life of perishable food items:

- **Drying**: Drying (air drying, sun drying, wind drying, or drying near an open fire) is the process of preserving food by removing water from it. Removing water prevents decay and the growth of microorganisms.
- **Freezing**: There are different methods of commercial freezing, but they are all based on two principles:
  – very low temperatures inhibit growth of micro-organisms and limit enzyme and chemical activity;
  – the formation of ice crystals draws available water from the food, also preventing growth of micro-organisms.
- **Pickling**: Pickling is the process of preserving food in an acid (usually vinegar).
- **Salting**: Salting is the process of preserving food with salt and drying it. This method draws out moisture that causes decay. Also, most bacteria fungi and other disease-causing organisms cannot survive in such a salty environment.
- **Smoking**: Smoking is achieved by exposing the food to smoke from burning plant materials such as wood.

exercise 2

HOW GERMS SPREAD

OBJECTIVE:
Understand how microbes spread through contact with objects or people.

TIME:

MATERIALS:
Flour, variety of objects, writing support, pens, water.

STEPS:
1. Divide the flour and objects into four sets.

2. Separate participants into four gender-balanced groups and give each group the flour and a set of objects.

3. Have one participant from each group thoroughly cover his/her hands with flour. Then have them go around touching the objects of their set.

4. Explain to the participants how, when surfaces are touched, the “germs” spread as can be seen by the flour spreading from object to object.

5. Rinse off the objects so that no flour remains.

6. Next, have a different participant from each group sprinkle flour on his/her hands and pretend to sneeze into the hands while standing over the set of objects (the goal is to disperse the flour onto the objects showing how germs are spread when sneezing – some flour should remain on the hands).

7. Then have these participants shake hands with someone else in their group and touch a couple of objects to transfer some of the “germs” onto those objects.

8. Finally, have another participant in the group put flour into his/her hand and pretend to sneeze again. This time, however, have them cover their face with their arm. Ask participants to notice what happened. They should note that much less flour and fewer “germs” made it out of the participant’s hand. This shows how properly covering when sneezing and coughing can help prevent the spread of germs.

9. Bring all the groups together. Have participants discuss ways to prevent cross-contamination when dealing with food items, and register key words on the writing support for all to see.

facilitators’ notes

When dealing with fish and fish products, people that come into contact with them either directly or indirectly should maintain an appropriate degree of personal cleanliness. Good hygiene practices should include washing hands, the wearing of appropriate protective clothing (e.g. goggles, gloves, masks) and the use of other proper equipment when handling food (e.g. hand washing sinks, footbaths). Training of staff in recommended practices is an important step to ensure food safety and hygiene. Some good practices are listed below:

- Wash your hands frequently, preferably with soap and warm water.
- Keep your nails short to avoid dirt accumulating under them.
- Stay home if you are sick (so you do not spread your disease to other people).
- Cover your nose and mouth when sneezing and coughing (or cough into your elbow).
- Wash your hands after coughing, sneezing or using tissues.
- Do not touch your eyes, nose or mouth (viruses can transfer from your hands and into the body).
- Do not share cups, glasses, dishes or cutlery.
- Clean and disinfect frequently touched surfaces at home, work or school, especially when someone is ill.
- Have plenty of sleep, be physically active, manage your stress, drink plenty of fluids, and eat nutritious food.

Also see the JFFLS Facilitator’s Guide Protection, specifically activity 2, the Wash Song on page 36.

HOW TO GROW FISH

There are numerous fish species cultured in the world. Fish are cultured in ponds, tanks and cages. Here, we concentrate on pond aquaculture, which is widely used all over the world. Freshwater pond aquaculture has changed a lot in recent years. The intended species to be grown in a pond is a primary consideration in determining the size of a pond. Site selection and available water supply are also factors to consider. Cage aquaculture can be also done in fish ponds if they are large and deep enough. Cage aquaculture is growing fish in a confined netted structure that allows easy access and harvesting by the fish farmer. Cages allow for protection from natural predators.

exercise 1

BUILDING AND USING A BAMBOO FRAME CAGE

OBJECTIVE:

Understand the effect of different stocking densities and species on growth.

TIME:

3 hours set up and continued maintenance during the following two months.

MATERIALS:

Twelve one-metre-long bamboo sticks (about 2 cm in diameter), fixed into the holes of the angles, one angle for each corner, giving a box shape and sinkers. This will produce a 1 m^3 bamboo cage (see Facilitator Notes).

STEPS:

1. Discuss with the participants the concept of cage aquaculture. Explain that cages are used as a form of farming within flowing or large bodies of water and that cages can also be used in small pond fish culture to protect fingerlings in the initial stages of development. Ask participants if any relatives or friends are currently doing cage aquaculture and discuss the responses.

2. Explore with the participants which materials are needed to build a cage, where to obtain them and what they cost. If they do not know, help them.

3. Divide the participants in four groups, give them the materials and explain the steps to construct the cage (see Facilitator Notes).

4. Catch about 20 juvenile fish of two local fish species, ideally cichlids and catfish.

5. Place 15 juveniles of one species of fish in one cage and 5 of the same species in another cage.

6. Place 12 juveniles of the other species in the third cage and 8 of the same species in the other cage. (Note: the number of the fish can vary but it should be an unequal distribution in order to demonstrate the effect of density).

7. Place the cages in a local pond, river or lake, and feed the fish on a daily basis by fertilizing the water. To fertilize the water, add compost, animal manure or plant materials so that there will be natural food for the fish to eat. Make sure that you are feeding the fish based on the number of animals in the cage.

8. Assign a group member to check the cage every day to assess the mortality of the stock and remove any dead fish. Each group member should take a turn at this for a two-week period if possible. Multiple turns may be required. Remove any debris caught on the cage or any fouling by plants and detritus that has built up.

9. Discuss with the participants the need for daily maintenance of the cages. Will they be able to do all the work themselves or will they need to hire someone? Will the cost outweigh their profits?

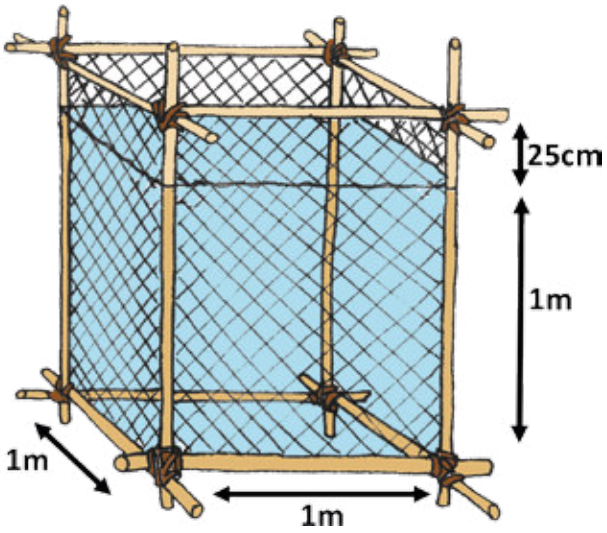
10. After two months, discuss the results with the group: Are the cages of each group performing differently? Does the stocking density make a difference in terms of productivity and survival rate of the cage?

facilitators' notes

Fish cages offer an efficient way to feed and harvest fish. Fish cages also offer cover to protect fish from predators. Once a day, you can easily pour feed in, inspect the cages and check for mortality. Fish should be pulled periodically from the cage and inspected to see how they are growing and if there are any health issues. At harvest time, the cage can be pulled to shore where you can wade in and net the fish. In order to be financially viable, the revenue should be higher than the costs of the initial investment for materials and labour. However, there is a minimum number of fish needed to make growing fish financially viable.

Bamboo or wooden trap

The cage can be small or large depending on the number of fish that you want to raise. However, when you first begin, start by building a small cage. You will need fewer materials and it will be easier to take care of. You can begin with a cage of about 1 m^3 (1 m × 1 m × 1 m) of space for the fish.



Cut 12 one-metre-long bamboo sticks (about 2 cm in diameter). Make a hole in each end of the sticks large enough to allow another stick to fit into in it. Put the sticks into one another and secure with some twine. You will now have a box shape.

Cover the frame with 8 mm fish netting and secure it with twine by wrapping it through the netting and around the frame until all openings are covered. If you cannot obtain fish netting, you can use either plastic mesh or woven material made from split bamboo or wooden strips. The openings in the material that you use to cover a cage must be small enough to keep the smaller fish from getting out. However, if the openings are too small, they may become filled with dirt.

Attach a rope and a buoy if you want it to be a floating cage. If you would like it to a fixed cage, add sinkers to the bottom corners of the cage.

exercise 2

FEEDING OUR FISH

OBJECTIVE:

Become aware of different feeding behaviour of fish.

TIME:

1 hour.

MATERIALS:

Pictures with mouth types of fish (see below), fresh fish, fishing line, clothes peg, soft edible fruit and hard bread, scissors, writing support, pens.

STEPS:

1. Inform the participants that this exercise will help them understand the importance of learning about the fish they will stock in their ponds, which will help them determine the most appropriate feed.

2. Begin the exercise by reviewing the fish mouth types on the pictures (terminal, subterminal, up-pointing, specialized – see facilitators' notes). Explain that fish mouths have developed to adjust to specialized lifestyles. The size of fish mouths can give a clue to its feeding habits, especially when considered with the type and placement of teeth.

3. Divide the participants into pairs, ideally a male and a female.

4. Observe the fresh fish. Based on the introductory discussion and the observations invite participants to think of the different ways fish feed and where their mouthparts are located.

5. Gather one set of materials for each group (fishing line, clothes peg, edible fruit or bread, and scissors).

6. Tie the fishing line to the clothes peg. Clip the food onto the clothes peg and then hang the line and the clothes peg at various heights from an overhead structure (light, tree branch, etc.). Have one group member try to eat the food from the clothes peg without using their hands.

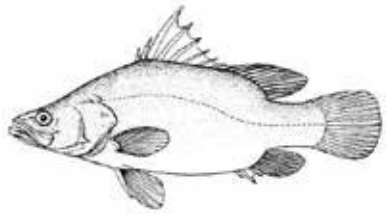
7. Now have the other member of the group try the exercise, reminding them that they cannot use their hands.

8. Discuss what type of feeder we as humans are (terminal, subterminal, up-pointing, specialized).

9. What kind of feed would be best for the fish you think you would like to raise in aquaculture (household edible waste, floating or sinking pellet, live feeds, or microalgae)?

facilitators' notes

Fish have a wide variety of mouth types. Some species have terminal mouths. Fish that catch their food directly in front of them as they are swimming through the water have a terminal mouth (Figure 1). Bottom-feeding fish have downward-pointing or subterminal mouths (Figure 2). Fish that tend to swim on the surface and capture their food there have up-pointing or superior mouths (Figure 3). Fish that are flat, like the ray, and feed directly off the ocean floor have a mouth on their belly, or ventral side. This kind of mouth is called an inferior mouth and makes it easy to scoop fish and invertebrates from the ocean floor. This can be considered a specialized mouth (Figure 4). Other fish have highly specialized mouths. Each of these mouth types has evolved to accommodate efficient feeding on prey items.



© http://www.fao.org/fishery/species/2275/en

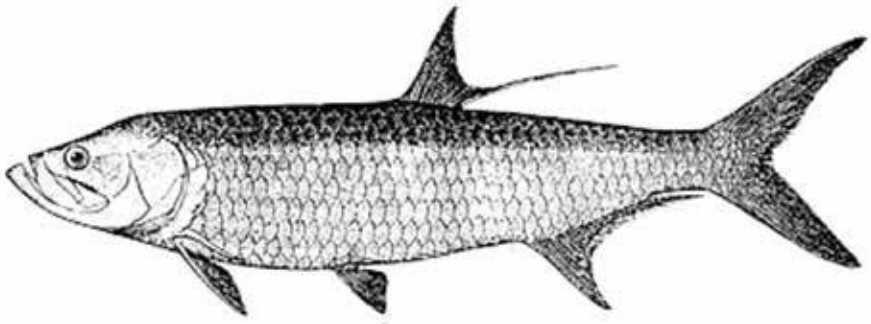
© http://upload.wikimedia.org/wikipedia/commons/6/60/Syngnathus_acus_Schlegel.jpg

Figure 1. Nile perch and pipefish with terminal mouth.

© http://www.globefish.org/upl/various/CFC/tilapia.jpg

© http://www.globefish.org/upl/freshwater/catfish.jpg

Figure 2. Tilapia and catfish with sub-terminal mouth.



© http://www.gma.org/fogm/images/tarpon.gif

Figure 3. Tarpon with up-pointing mouth.

© https://s-media-cache-ak0.pinimg.com/736x/99/09/cc/9909cc205cbac21bf1195e3815968d604.jpg

© http://britishseafishing.co.uk/wp-content/uploads/2012/06/RS-Underside-of-a-ray-Credit-ltd1.jpg

Figure 4. Seahorse and ray with specialized mouth.

exercise 3

HOW TO GROW FISH IN A POND – GETTING STARTED

OBJECTIVE:

Identify key factors in the pond site selection and management and understand selection criteria for species for the pond.

TIME:

3 hours.

MATERIALS:

Paper, pens, clay and soil and sand samples, containers, water.

PREPARATION:

Invite a local fish farmer to the class. Brief the person about the objective and format of the lesson. Ask the participants to collect and examine samples of clay and other soil textures from a nearby area that could be used for a pond. Together with the fish farmer, identify a nearby area suitable for pond construction that can be visited by the class.

STEPS:

1. Have a local fish farmer who has a pond come into the classroom. Let him/her explain to the participants about the species of fish he/she is raising, if/what type of cages are being used and the location of the pond.

2. Have the speaker ask how participants imagine the construction of a pond in as much detail as possible (e.g. materials, equipment, size).

3. Develop a list that summarizes the details and equipment that the participants name. This will provide an opportunity for participants to explore how ponds should be designed, constructed and used in aquaculture. Ask the fish farmer to comment on the list.

4. Discuss the characteristics of an excavated pond (the most common one used in small-scale aquaculture) and what site characteristics should be considered in its construction.

5. Have the fish farmer explain that the soil that will form the pond's main structure must be of soil that will hold water. Seepage can result in large losses of water and create the additional expense of pumping more water to the pond. Locations should have soil that will restrict the entry of contaminated groundwater.

6. Ask participants to compare the soil and clay samples they brought. Explain that the fine texture of clay allows it to hold water.

7. Ask participants to wet the clay with some water in the containers and to mould it into a small vase or container that will hold water temporarily. Demonstrate that sand will not do this.

8. If possible, make a visit with the fish farmer to a nearby area that could be used for a pond. Break the group into teams of 5–6 participants. While at the site, discuss that a site should be investigated to determine whether it is subject to flooding by rivers during seasons of heavy rainfall. Ask participants to name some grasses that are locally suited for erosion control.

9. Return to the classroom. Review the fact that careful planning is needed before the construction of a pond. Ask participants to sketch the layout of their pond operation, taking into consideration the area just visited.

10. Disease is another big problem in fish ponds. Discuss the types of disease that can occur in ponds, and then ask participants and the fish farmer to explain how diseases could be transferred.

11. Discuss with the participants and the fish farmer what species can be grown easily, and have participants make a list of ones that they can think of. Examples are tilapia, shrimp, catfish, milkfish and carp.

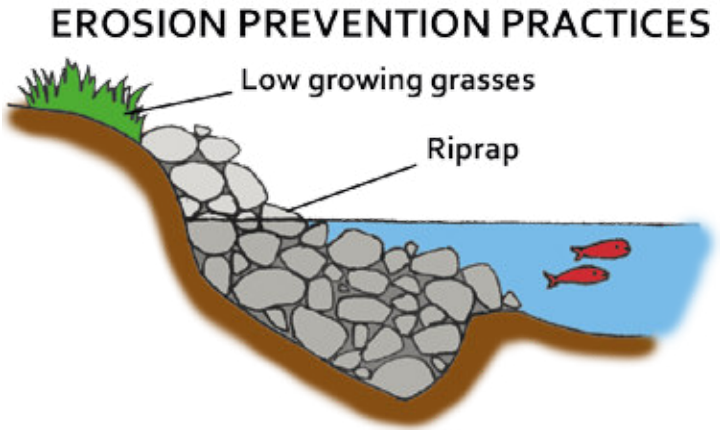
12. Feeding is another factor to be considered. It is important that the farmer is able to make sure the feed is available in a form the fish can eat. Most farmers use commercially prepared feed formulated to meet the nutritional needs of the species being cultured, but many leftovers from the household can also be used. Obtain information from the fish farmer on this.

13. Have a closing question-and-answer session with the fish farmer to allow the participants to gather information about topics not discussed.

facilitators' notes

Clay soil particles are very small and hold water. Percolation is the term used to describe the movement of water through soil, and soils high in sand do not hold water well. Soil at the pond site should have a clay content of at least 20 percent. If available, soil survey maps or textural classifications can be used in assessing site suitability.

Erosion prevention practices should always be used around ponds. Bare earth should be seeded with low growing grasses, and riprap can be used around the perimeter of the pond. Riprap is the use of bags of rocks to prevent drainage and erosion.



Debris should always be removed from the pond site. The decay of trees and debris ties up oxygen the fish need to grow.

Over-flooding can result in the loss of a fish crop. Flooding also contaminates the water left in the pond once the flood has subsided. Climate change increases these risks, as do natural disasters.

Frequency of feeding is important with some species. Some species grow better if fed two or three times a day. The amount to feed varies with the species of fish, stocking density and size of fish. A general rule is to feed no more than will be eaten in a few minutes. A 10-minute time frame is often used as a guide. Another rule of thumb is the amount fed should be no greater than 3 percent of the live weight of the fish. You can demonstrate how to calculate the amount to feed using the general rule of 3 percent (example: 1 000 kg live weight, 3 percent = 30 kg).

POTENTIAL IMPACTS ON THE ENVIRONMENT

Aquaculture systems can have significant environmental impacts. The degree of these impacts depends on the size of the facility, the species, type of feed being used, location, etc. Impacts can include pollution from fish feed as well as waste, escapes from the aquaculture sites, habitat modification from the aquaculture structure, and disease and parasite outbreaks and the resulting use of antibiotics or other chemicals. It is important to understand these impacts because preparation is key to help alleviate their impact and plan for the future.

exercise 1

WHAT'S WRONG WITH THIS PICTURE?

OBJECTIVES:

Increase awareness about the environmental impacts of aquaculture and potential methods to reduce these.

TIME:

1.5 hours.

MATERIALS:

Aquaculture system poster (or handouts, see below figures 1 -3 for examples), paper, pens, writing support.

STEPS:

1. Break the class into small gender balanced groups of 5-6 participants.
2. Give each group a handout, a writing support and pen. Be sure to cover up cover up descriptions with pieces of paper or tape. When one of these problems is identified the paper can be removed.
3. Inform the participants that each group should review the handout and write down the problems shown in it.
4. After they have identified the problems in the handout, ask them to think of any problems that are not shown in the pictures. They can write these down too.
5. Ask one member from each group to present the problems that the group identified.
6. Write down the problems on a large writing support for the whole class to see.
7. For the second part of the exercise, assign a problem to each group until there are no more problems left (if there is a small number of groups more than one problem can be assigned).
8. Inform the groups they will have 25 minutes to discuss their assigned problems and come up with possible solutions.
9. Each group will present their solutions and ask for feedback from the rest of the class.
10. Add the suggested solutions to the writing support for the whole class to see.
11. When the exercise is complete you will have a list of problems and possible solutions..
12. Ask them to discuss the following question: Is there any local issues related to the problems and solution that have been discussed before? Or are there any other problems existing in the community which have not been mentioned? And if so, what possible solutions could help to overcome these problems?

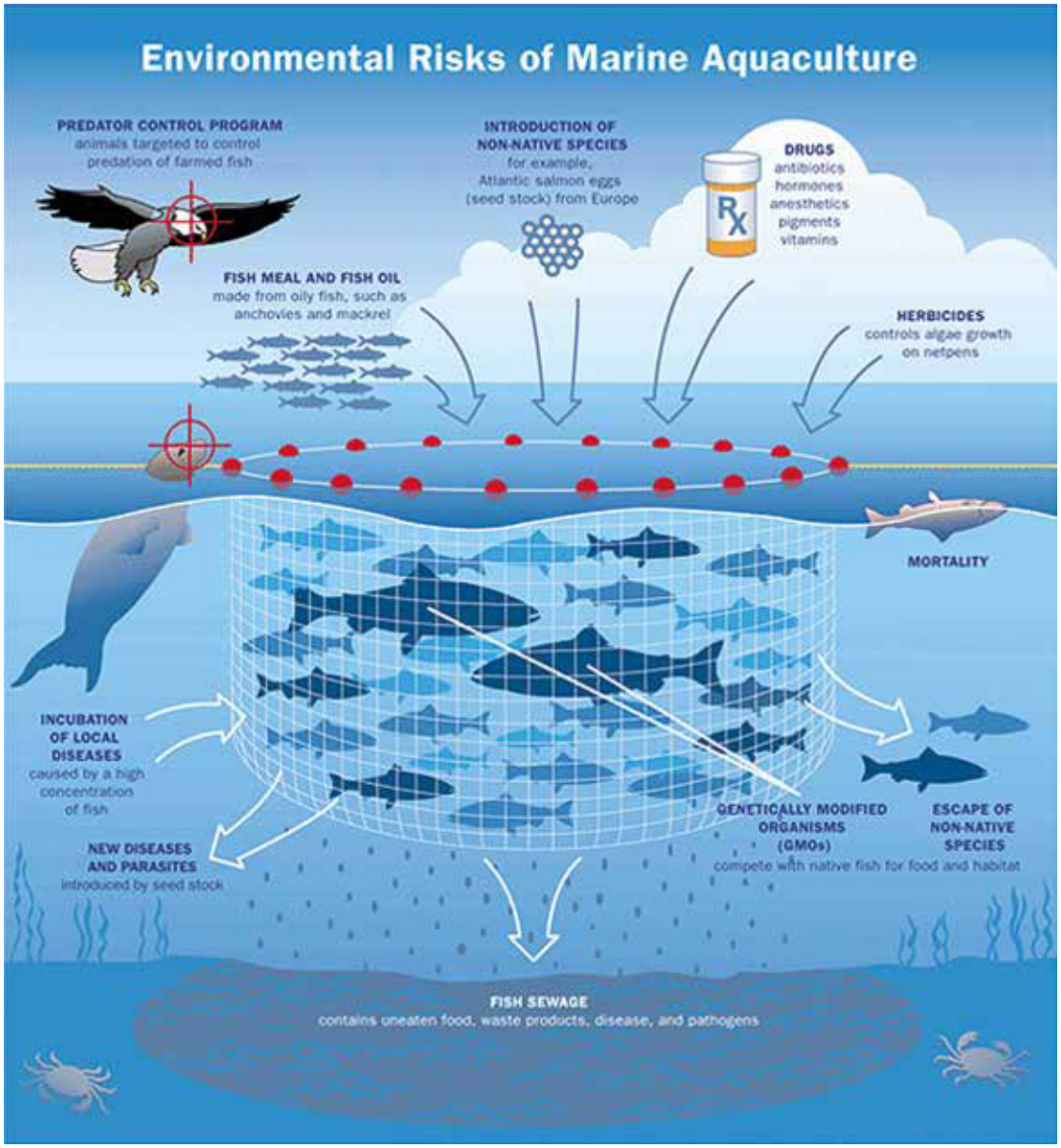


Figure 5: Source: www.motherjones.com/environment/2006/03/aquaculture-environmental-impact

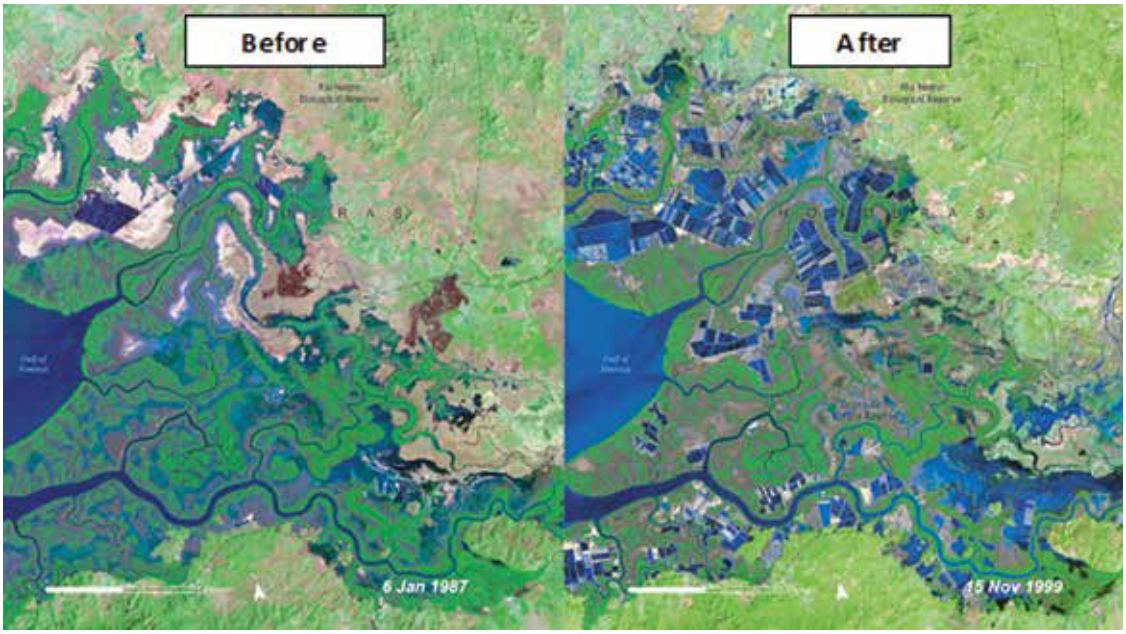


Figure 6: Source: UNEP, 2005. One planet, many people

Figure 7: Source: http://en.wikipedia.org/wiki/Mariculture

facilitators' notes

Figure 5 shows a variety of the risks deriving from open water aquaculture.

- Fish sewage or feed waste results in pollution and can change the nutrient composition and other quality aspects of the water.
- Escapees: farmed fish may escape and out-compete the wild population, interbreed and introduce disease to the wild population.
- Farmed fish may be treated with antibiotics and other chemicals that are then introduced into the environment, or herbicides are used to control algae growth of cages.
- The aquaculture structure may cause habitat modification or damage to the environment, especially in very susceptible areas such as mangrove forests.

Figure 6 shows aerial photographs of the Gulf of Fonseca, Honduras, before and after the introduction of shrimp aquaculture. The rapid growth of shrimp aquaculture has had serious impacts on the environment as well as on the local communities in the area. The results include the cutting of mangroves and the use of wild shrimp post-larvae for the farm production. This had led to a decline in biodiversity, water quality, natural protective barrier to storms and hurricanes, as well as a decline in the artisanal fishing industry. In the second image, the blue rectangles are the lagoons for industrial shrimp production that were once mangrove forest.

Figure 7: The image on the left shows an aquaculture site with dense growing conditions, which can cause quality loss owing to dense concentrations of fish, and physical loss due to mortality from disease or lack of oxygen. On the right, the picture illustrates mangrove destruction, which reduces natural biodiversity, removes important shrimp breeding grounds and increases the vulnerability to climate change and natural disaster impacts.

Recognizing possible environmental impacts will help design systems that work with the environment and not against it. Preventing degradation of the local environment will help sustain ecosystem biodiversity that will benefit both the environment and the community. Learning how to identify disease at an early stage will reduce transmission to the farmed population as well as wild populations Taking measures to prevent escapement will help ensure that no invasive species are introduced and that the wild genetic population is maintained.

While increasing the availability of fish, aquaculture can also compete with the products of local fishers and threaten traditional livelihoods. Prices and demand for fish products may change if new species are introduced in markets. Aquaculture production may also create competition over productive resources, in particular with regard to access to and use of water (both marine and freshwater). This is particularly important in view of potential impacts of climate change, which may reduce the availability of water in some areas.

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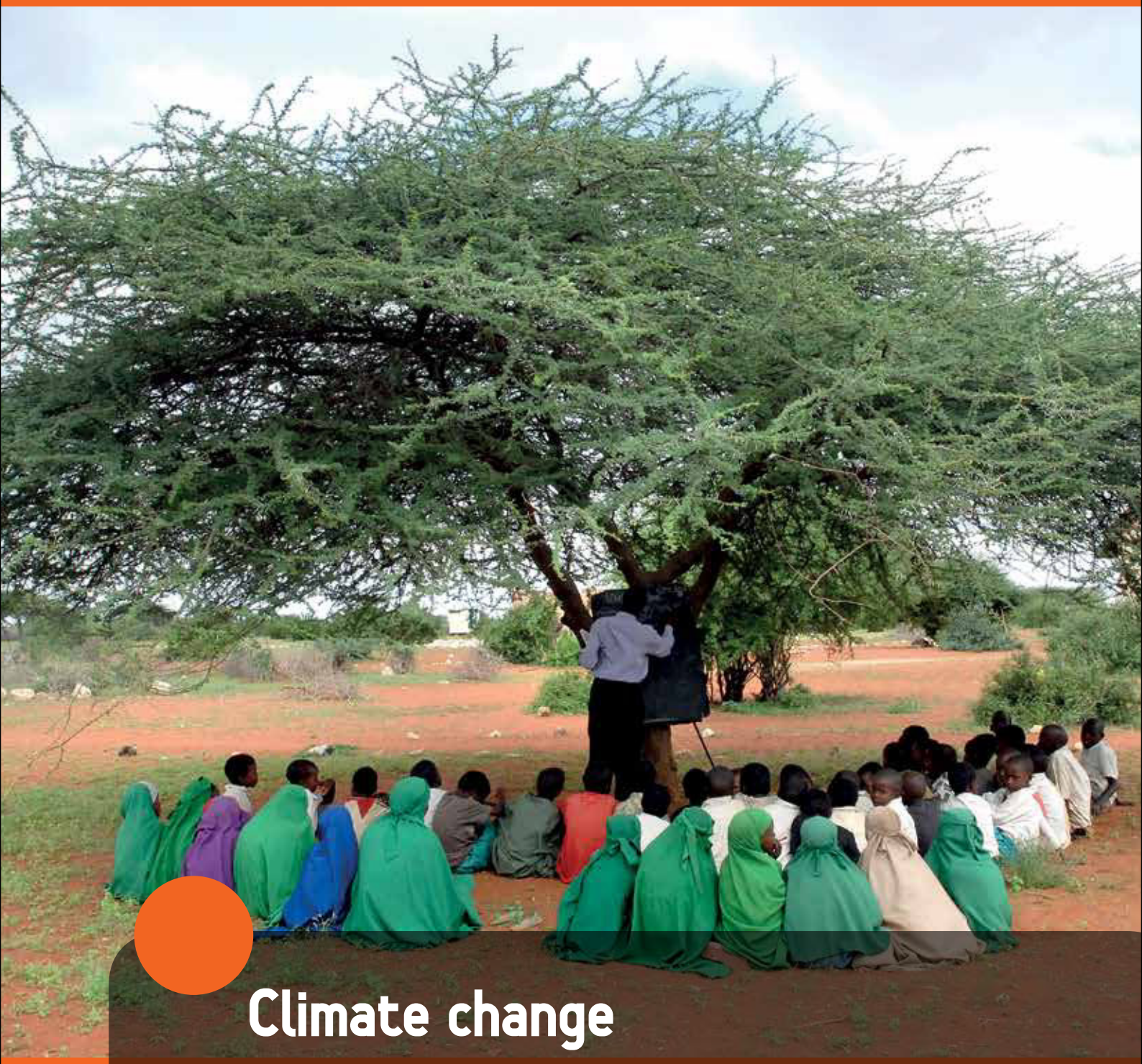

Climate change

Junior Farmer Field and Life School – Facilitator's guide

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Module: Climate change

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Module: Climate change

INTRODUCTION FOR THE FACILITATORS

Scientific evidence shows that our planet is getting warmer. As a result of the increase in the Earth's average temperature, glaciers are melting, sea levels are rising, weather patterns are changing and extreme weather events, such as droughts, floods and storms are increasing. Global warming is occurring due to the significant increase in emissions of greenhouse gases (carbon dioxide, nitrous oxide and methane) into the atmosphere, which trap heat that would otherwise escape from the Earth.

In the coming years, food production needs to increase by 60 percent in order to be able to feed the growing world population, while at the same time coping with changing weather conditions. Climate change may affect the agricultural sector in different ways depending on the geographical location, such as increasing or reducing crop yields, increasing or reducing availability of water resources and increasing the spread of pests and diseases.

Many people, in particular those who are dependent on agriculture for their incomes and livelihoods, will be heavily affected. Raising awareness about these climatic changes and increasing and exchanging knowledge on methods and practices, in particular climate-smart agricultural practices, such as mulching, intercropping and integrated farming systems, that may help to increase yields, reduce production losses, remove and/or reduce greenhouse gas emissions and contribute to building sustainable and resilient livelihoods is therefore very important.

AIM OF THIS JFFLS MODULE

The aim of this module is to provide Junior Farmer Field and Life Schools (JFFLS) facilitators with information to enable them to discuss the topic of climate change, in particular its impact on agriculture and actions that farmers can undertake to reduce their vulnerability to climate change.

Through a series of exercises, story-telling and discussions, climate change issues in relation to agriculture are highlighted. The module also helps the participants of the JFFLS to learn about agriculture's role in climate change, the impacts of climate change on agriculture, and ways to reduce these impacts by applying relevant actions, methods and practices such as climate smart agriculture practices.

The exercises can be undertaken at different points in the JFFLS cycle and/or this module can be used as a stand-alone topic.

Exercises

exercise 1

SHORT STORY OF A FARMER

OBJECTIVE:

To start a discussion on climate change among the JFFLS participants. The story provides an illustration of people's observations regarding climatic changes.

TIME:

45 minutes

MATERIALS:

None

STEPS:

1. Tell the JFFLS participants that you are going to read a short story. Ask them to listen carefully to the following story:

   Emile Jean is 54 years old and lives in a small village in the south of Madagascar. Emile is a farmer and cattle breeder, just like his father and his grandfather. He owns a few cattle, but mainly plants maize and vegetables. Half of what he produces is sold, while the other half is grown to feed his family. Emile and his wife have eleven kids – six boys and five girls.

   During the past years there have been noticeable changes in the rainfall patterns. Five years ago, the annual rainfall fluctuated between 800 to 900 mm, while nowadays it rarely reaches 500 mm. Storms have become less frequent but more intense. The temperature has also been increasing every year. And there is a longer dry period (seven to eight months) and a shorter rainy season (two months), which make it harder for farmers to plant crops all year round.

   Emile says: 'When my father was young, they had a 'bad year' every seven years, but now it's every two years'. A bad year is a year when the dry season is longer than normal. It did not regularly happen 20 or 30 years ago, but now bad years are becoming more frequent and the former bad years are now becoming the normal years (Oxfam International, 2010).

   This story can be adapted to suit the local conditions and the following steps can be used to guide the discussion:

2. Discuss with the participants whether they have observed similar climatic changes in their country in the past years (see facilitators' notes 1).

3. Ask the participants whether they know the difference between 'climate' and 'weather' (see facilitators' notes 2) or whether they have heard about 'greenhouse gases', the 'greenhouse effect' or 'global warming' (see facilitators' notes 3).

4. Ask the participants how these climatic changes are affecting agricultural activities related to crop production, livestock, forestry and fisheries (see facilitators' notes 4 and 5).

5. Summarize the main points discussed by the participants.

facilitators' notes 1

For generations, farmers and their communities have changed and adapted their practices on the basis of changes in temperature, rainfall and dealing with extreme weather events like drought, floods and storms. This is not something new. However, it is foreseen that in the future these extreme events will be more intense and will happen more frequently. For example, in Malawi it is said that 'bad years' (a year when the dry season is longer than normal), which in the past only happened every 5 years, are now believed to be more frequent. Dry spells and strong winds are destroying crops, and people, in particular the poor and marginalized, will be heavily affected by the effects of climate change. They will have to deal with the unpredictable weather, which will impact their food security and livelihoods as they are often heavily dependent on agriculture.

SCIENCE VS. RELIGION

In some countries, in Ethiopia for example, people believe that changes in the climate happen because of God and that He determines when (or if) it rains. In exchange for God's protection during difficult times they sacrifice a zebu and promise to protect nature and the forest. However, nowadays there is less and less rainfall and the village elders look for signs of rain and make many sacrifices in order to keep God happy, although the rain is not coming.

In the past, farmers were able to use their traditional or indigenous knowledge that has been carried over from one generation to the next. However, with climate change becoming more apparent, farmers are less able to rely on their knowledge and practices to adapt to climatic changes. For example, in the past the rainy season 'normally' started in June, whereas this year it may start in August and next year it may start in May. Communities with rain gauges and knowledge of how to read and interpret them are able to collect rainfall data and have more accurate data to make more accurate predictions regarding future rainfall patterns. This can help them, especially if they have access to up-to-date seasonal weather forests (three monthly, monthly and 10 days) so that they can decide what, when and which crop to plant and are therefore better able to better adapt to climate change.

facilitators' notes 2

DIFFERENCE BETWEEN WEATHER AND CLIMATE

The difference between 'weather' and 'climate' can be distinguished as a measure of time:

- **Weather** refers to what we experience over a period of hours or days in terms of temperature, precipitation, wind and so on.
- **Climate** focuses on the average conditions of the atmosphere over relatively long periods of time. It also indicates climate variability, for example the seasonal minimum and maximum temperatures and the frequency of extreme events, such as hurricanes, cyclones. Therefore, climate is the average weather for a particular region over a particular period of time. It is usually calculated for periods of at least 30 years, for example Indonesia's rainfall data for the period of 1981-2010.

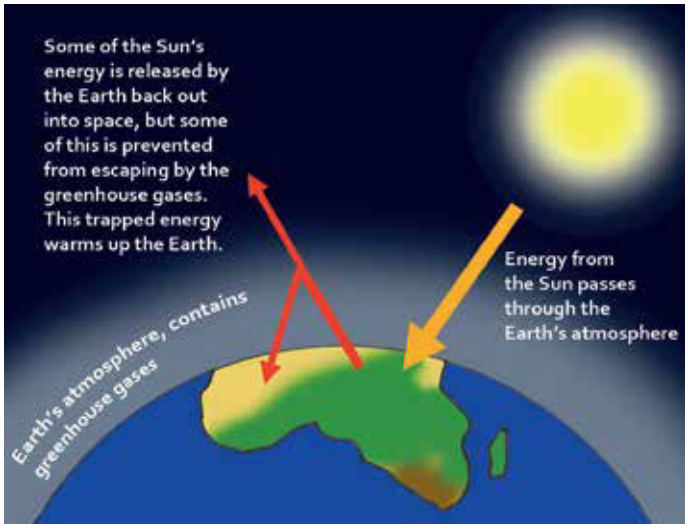
facilitators' notes 3

GREENHOUSE EFFECT AND GLOBAL WARMING

The Earth's climate has changed over time. Since its formation about 4.5 billion years ago, there have been both warmer and colder periods, for example, during the glacial periods (Ice Ages) most of the planet was covered in ice. According to data from the last 650 000 years, temperatures and carbon dioxide levels in the atmosphere have fluctuated.

Carbon dioxide is a 'greenhouse gas', which exists naturally in the atmosphere. Greenhouses gases, like carbon dioxide (CO2), trap heat in the atmosphere so that the Earth is warm enough for humans, animals and plants to live. This process is called the 'greenhouse effect' and works as follows:

The sun provides energy, which the Earth receives in the form of sunlight. Some of this energy is absorbed by the Earth's surface and causes it to warm up, whilst some of it is reflected back into space as infrared radiation, which helps the Earth to cool down. However, greenhouse gases form a layer that prevent part of this radiation from being released back into space and instead the heat is trapped in the atmosphere and warms the Earth's surface as a result.

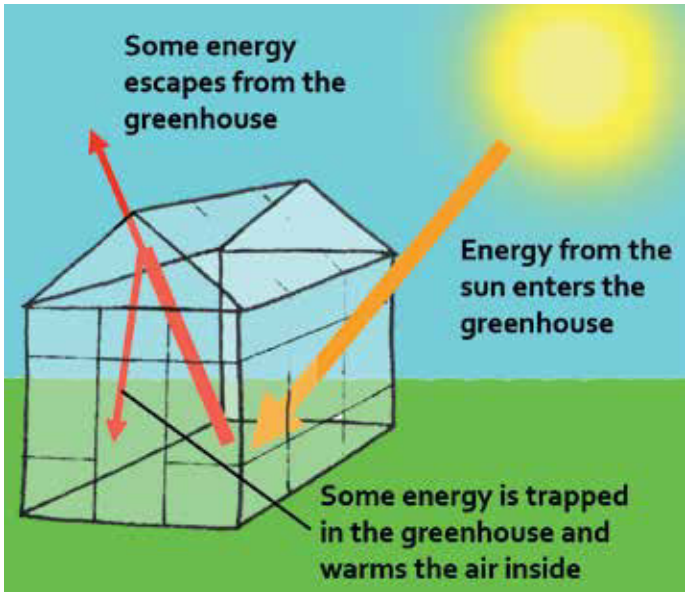


Source: Sarah Bisbing, 2012 http://earlycareerecologists.files.wordpress.com/2012/11/greenhouse_effect2.jpg (Adapted)

The greenhouse effect can be depicted as the warming of a glass greenhouse via the Sun's energy, where some of the energy in the form of heat is trapped due to the glass walls, which represent greenhouse gases like carbon dioxide.

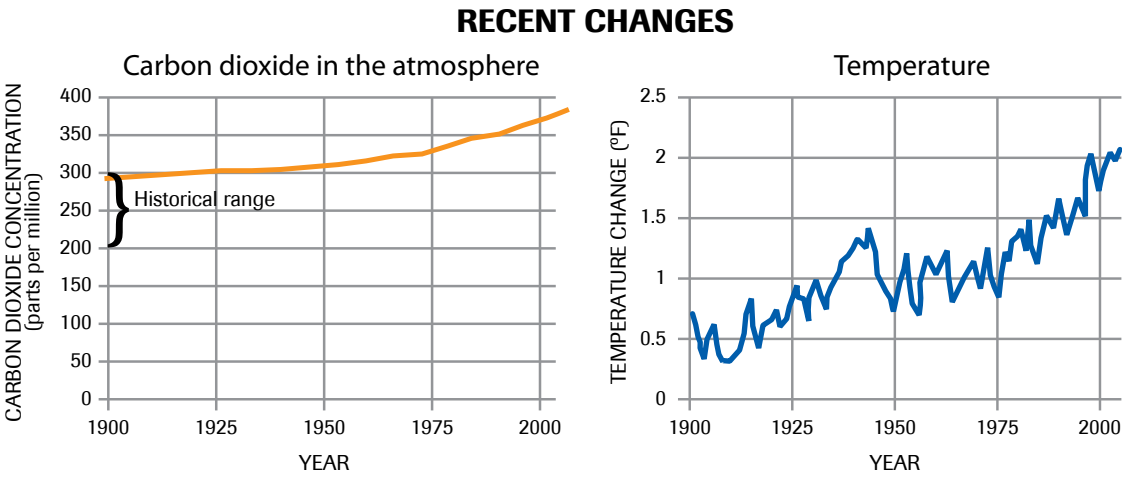
Carbon dioxide levels have varied at different times in the Earth's history. However, scientists believe that the average temperature of the Earth has been increasing, especially since the late 19th century. This is called 'global warming'.

For over 100 years now, humans have significantly added greenhouse gases to the atmosphere by burning large amounts of fossil fuels, such as coal, oil and natural gas to power factories, vehicles and their homes. Burning fossil fuels releases carbon dioxide into the atmosphere. The



Source: Sarah Bisbing, 2012 http://earlycareerecologists.files.wordpress.com/2012/11/greenhouse_effect1.jpg (Adapted)

upper graph below shows that since 1900, the concentration of carbon dioxide in the atmosphere has significantly increased to nearly 400 parts per million, compared to the historical range of between 200 and 300 parts per million. As a result of increased carbon dioxide, heat is trapped in the atmosphere and the Earth's surface warms up. This is further adding to the 'greenhouse effect'.



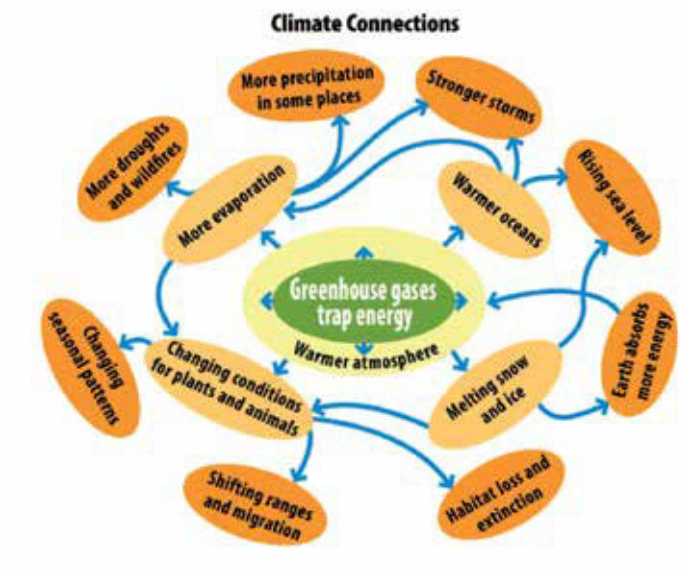
Source: EPA's Climate Change Indicators, 2010 and Petit et al., 2001

Besides carbon dioxide, other greenhouse gases are also released into the atmosphere, such as methane (CH_4) and nitrous oxide (N_2O). Current agricultural practices both directly and indirectly release these greenhouse gases into the atmosphere. For example, methane is released from cows, humans, rice farms and waste water; whereas nitrous oxide is part of fertilizers and pesticides used for crop cultivation. Deforestation, which can occur to make way for agriculture, is also one of the contributors to global warming as it reduces the number of trees that would normally absorb CO_2 from the air, thus reducing the concentration of CO_2 in the atmosphere. As well as being one of the major sectors that contributes to global warming and the changing of the climate, agriculture is also strongly affected by it.

facilitators' notes 4

EFFECTS OF CLIMATE CHANGE

The figure below shows the many interactions and feedbacks between the different effects of climate change, such as the changing conditions for plants and animals, the increase in evaporation[1], warmer oceans and the melting of snow and ice.



Source: EPA, 2006

facilitators' notes 5

IMPACTS OF CLIMATE CHANGE ON AGRICULTURE

There are still many uncertainties with regards to climate change. However, small changes in the Earth's average temperature can result in large shifts in climate and weather. Therefore, agriculture, as a sector that is highly climate sensitive, is extremely vulnerable. For many people in developing countries, agriculture is critical for their food and livelihood security.

Although the impact of climate change on agriculture will differ among continents, regions and between and within countries, some examples of expected impacts of climate change on crop production, livestock, forestry and fisheries are outlined in the following paragraphs.

Impact of climate change on crop production:

- Increases in temperature can make some crops grow faster as warmer temperatures increase growth. However, for other crops, faster growth reduces the amount of time that seeds grow and mature, which can reduce yields;
- Increase in weeds, pests and fungi, which thrive under warming temperatures;
- Increase in extreme weather events, such as floods and drought can affect crops and reduce yields;
- Higher CO_2 levels may increase yields of some crops, although if these crops do not have adequate levels of water and nutrients, yields may be reduced.

Impact of climate change on livestock:

1 Evaporation is the change of water from liquid to gas.

- Higher temperatures and heat waves can cause distress to animals, which can increase their vulnerability to diseases, reduce their fertility and milk production;
- Climate change may increase the spread of livestock diseases and parasites;
- Higher CO_2 levels may increase the yield of some grass species on which livestock feed, although according to research the quality of some of the forage may decrease;
- Water scarcity and drought may reduce the availability of drinking water and forage for livestock, thereby affecting livestock production (FAO, 2009; IFAD, 2009).

Impact of climate change on forestry:

- Climate change can affect the growth and productivity of forests. If trees have enough water and nutrients, higher CO_2 levels may help trees to be more productive. Higher temperatures may increase the length of the growing season, but may shift certain tree species to different geographical locations;
- The expected increase in the frequency and intensity of extreme weather events such as, drought, wild fires, flooding, hurricanes and wind storms can cause damage to forests, which can reduce forest productivity. Drought can make trees more vulnerable to insect outbreaks and wild fires of which the latter can also contribute to climate change, because CO_2 is quickly released into the atmosphere;
- Insect outbreaks may increase because higher temperatures may enable some insect species to develop faster. These outbreaks can weaken and kill trees, which results in CO2 that was stored in these trees being released into the atmosphere, further contributing to global warming.

Impact of climate change on fisheries and aquaculture:

- Rising sea levels, due to melting glaciers, ice sheets and as a result of thermal expansion[2], will affect fishing communities, in particular those that are living in low-lying countries, deltas and coastal areas. These areas will become more susceptible to, among others, flooding;
- Climate change may change marine and freshwater species as some species can only live in a certain water temperature range and as water temperature increases some may not be able to survive;
- Some fish diseases may become more prevalent in warmer water;
- Temperature increase may increase the salinity (saltiness) of ocean water and inland water supplies;
- Changes in temperature and seasons may impact the timing of reproduction and migration;
- Extreme weather events, such as hurricanes, changes in monsoonal rainfall patterns, droughts, or flooding are currently affecting fisheries, aquaculture[3] production and infrastructure, and the human lives and livelihoods that depend on them. Extreme drought, as a consequence of climate change, is impacting inland water fish stocks and habitats in particular.

[2] The expansion of ocean water as it warms up.
[3] Aquaculture refers to the cultivation of various fish species in fish farms or ponds.

exercise 2

THE TIMELINE

OBJECTIVE:

This exercise helps the JFFLS participants to get an insight into past disasters and changes that have taken place in natural resources (e.g. deforestation) as well as human measures taken to reduce their vulnerability to these disasters and future human, livestock, economic and social losses.

TIME:

45 minutes

PREPARATION:

- Invite an elder community member to act as a resource person to help participants remember which disasters have happened in the few past years, when they have happened, and what kind of measures farmers and the community members undertook to reduce the impact of the disaster;
- Draw a line on a flip chart and place it in a way so that all participants can see this line (see facilitators' notes 1).

MATERIALS:

- Flip charts
- Pens

STEPS:

1. Show the participants the line that you have drawn on the flip chart and ask them whether they know what a time line is and what and how data can be recorded and shown on this line (see facilitators' notes 1).

2. Ask a volunteer to come up and help record the data on the time line.

3. Ask the participants if they can remember which disasters have taken place that affected their crops, livestock, forestry or fisheries. Also ask them whether they remember in which year these events happened. Ask them what actions their parents and/or other community members took after the disaster had happened (see facilitators' notes 2).

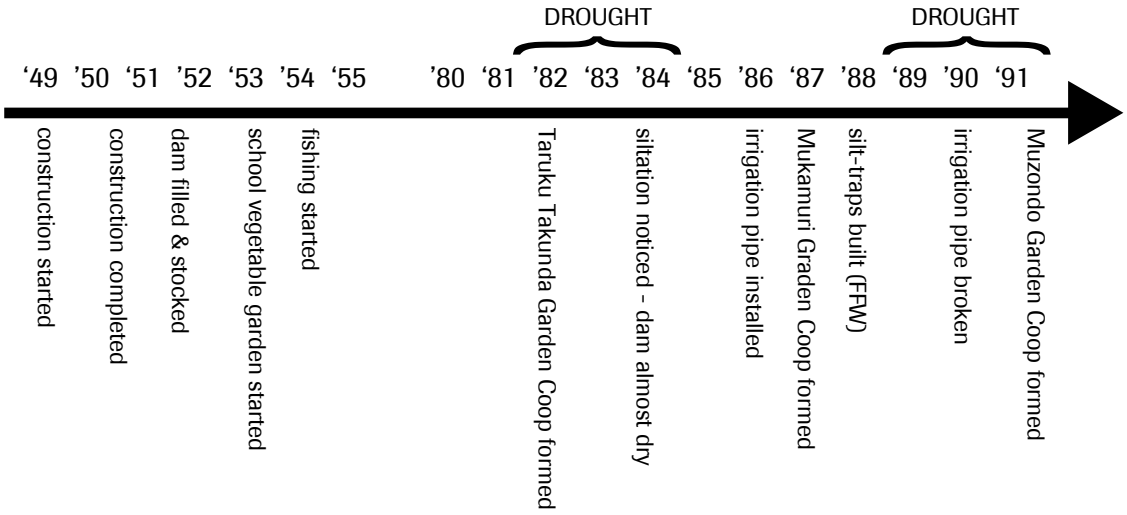
4. Introduce the resource person and explain that the participants can ask him/her additional questions about past events that he/she remembers to help fill in the time line.

5. Once the events and the actions remembered by the participants and the resource person have been recorded on the time line, analyze the timeline with the participants by asking questions, such as: i) were similar actions undertaken for the same disaster or did the actions change over time; ii) can we still apply these actions and will they be effective or should we undertake other actions and if so which ones?

facilitators' notes 1

WHAT IS A TIME LINE?

A time line is a very simple tool that visually shows the history of disasters and significant events related to changes in natural resources that have happened in a community. This exercise helps participants observe changes related to their surroundings and describe what has changed, how it has changed and the time period over which it changed and the different actions or coping measures the community has undertaken (Abarquez and Mushed, 2007).



Source: FAO, 1996

facilitators' notes 2

DEFINITION OF 'DISASTER'

A disaster is any event or situation that results in losses and damage to people, their property and their environment, that they and their community are not able to recover from by using their own resources (UNISDR, 2009).

Examples of disasters that can result in large losses and damage to food and agriculture include floods, hurricanes, tsunamis, earthquakes, landslides, drought, wild fires, and transboundary animal and plant pests and diseases.

exercise 3

SEASONAL HAZARD AND CROP CALENDAR

OBJECTIVE:

This exercise helps the JFFLS participants to think about which natural hazards occur during the year and when they occur, as well as if and when they affect specific cultivation activities of certain crops. This exercise can be done in combination with the cropping calendar exercise.

TIME:

45 minutes

MATERIALS:

- Flip charts
- Coloured pens
- The flip charts of the cropping calendars made by the participants during the cropping calendar exercise

PREPARATION:

Draw a hazard calendar on a flip chart. This will serve as an example of how to draw a hazard calendar, as shown below:

TYPE OF HAZARDS	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC

STEPS:

1. Inform the participants that this activity will use the cropping calendar that was done previously.

2. Ask the participants to divide into small groups (preferably the same groups in which they made the cropping calendars). Give them back their cropping calendars.

3. Ask each group to copy the hazard calendar onto a flip chart, which was prepared in advance.

4. Ask the participants which natural hazards affect the area (see facilitators' notes 1).

5. Tell the groups to write the different types of hazards in the first column on the left: one hazard per row.

6. Ask the groups to answer this question: during which months do the hazards occur? Encourage the participants to discuss among themselves.

7. Once they have agreed, they can tick the columns associated with the months where the hazard usually takes place, as shown in the following example:

TYPE OF HAZARDS	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
FLOODS							X	X				
PESTS										X		
DROUGHT			X	X								
FIRES				X								

8. Ask the groups to compare the hazard calendar with the cropping calendar and answer the following questions:

   - Do hazards occur during cropping periods?
   - Do hazards coincide with peak working seasons?
   - Do hazards threaten peak production periods or the harvest?

Encourage the participants to discuss among themselves.

9. Ask each group to select a person to present their results to the whole group. The selected person presents the hazard and cropping calendars and what the group has discussed when trying to answer the questions asked by the facilitator during the previous step.

10. Allow time for questions. You can ask additional questions, such as: which crops are the most threatened by which hazards?

facilitators' notes 1

DEFINITION OF A 'HAZARD'

A hazard is a dangerous event, situation or condition that may lead to losses and damage to people, their property and their environment (UNISDR, 2009).

A hazard may not necessarily develop into a disaster if people and their community have sufficient resources to recover from the losses and damage caused by the hazard. Examples of hazards that may cause significant losses and damage to food and agriculture include floods, hurricanes, tsunamis, earthquakes, landslides, drought, wild fires, and transboundary animal and plant pests and diseases.

facilitators' notes 2

WHAT IS A SEASONAL HAZARD AND CROPPING CALENDAR?

- Hazard calendars indicate seasons during which hazards usually occur;
- Cropping calendars indicate the growing and harvesting seasons of typical crops for a particular area.

When combining both calendars it visually shows which hazards occur, during which months of the year and whether these hazards have an impact on specific cultivation activities of certain crops. An example of a seasonal hazard and cropping calendar in Juye, Shandong province, China is illustrated below.

Cropping calendar Juye, Shandong, P.R. China

KEY CROPS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Cotton												
Wheat												
Corn												
Soybean												
Rice												

Seasonal calendar of natural hazards Juye, Shandong, P.R. China

HAZARDS RISKS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Flood												
Drought												
Hot wind												
Hailstorm												
Strong wind												

Source: FAO, 2008

This example of a seasonal hazard and cropping calendar shows that during the cultivation of cotton, corn, soybean and rice, the plants and crops are exposed to flooding, hail storms and strong winds as hazard risks. The hazards might especially affect the harvest of the corn and soybean crops. With this information, farmers can make informed decisions and identify actions or measures to reduce the impact of this hazard on their farming activities.

exercise 4

SMALL GROUP DISCUSSION ON ACTIONS TO PREVENT AND REDUCE THE IMPACT OF CLIMATE CHANGE ON AGRICULTURE

OBJECTIVE:

To discuss different options, methods and practices that farmers can apply in order to reduce the impacts of climate change on agriculture.

TIME:

45 minutes

MATERIALS:

- Flip charts
- Coloured pens

STEPS:

1. Divide the participants into small groups of five to six people and provide each group with a flip chart.

2. Ask each group to draw a table with two columns, as shown below:

Hazard	Actions to prevent and reduce losses and damage caused by a hazard
e.g. Drought	
Floods	
Storms	

3. Ask the participants to discuss in their small groups what actions, methods or practices can be implemented to reduce the losses and damage done by the different hazards that were identified in the seasonal hazard and cropping calendar exercise.

   Questions that can be asked to the participants to help them with this exercise:

   - When there is water scarcity during the dry season, what do or can farmers do to prevent

and reduce the impact of drought? Are there specific measures or actions that farmers do during the wet season?
- When there are heavy storms, how do farmers protect their crops or livestock?
- How do farmers plan the cultivation of crops when they know that floods, storms or droughts will occur during planting or harvesting?
- Do farmers use different crop varieties that reduce losses and damage due to floods or drought?
- What do farmers do to prevent and reduce losses and damage due to pests and insects?

4. Ask each group to present their findings and discuss the final outcomes of the different groups.

5. The facilitator provides comments and adds suggestions to the findings that the participants mentioned (see facilitators' notes 1).

facilitators' notes 1

PRACTICES TO PREVENT AND REDUCE THE IMPACT OF CLIMATE CHANGE ON AGRICULTURE

- **Flexible planning**
  Agriculture is heavily dependent on the weather and climate. Even though there is still a considerable amount of uncertainty about the exact implications of climate change on this sector and on natural ecosystems, the ability of farmers to adapt will be very important so that they can better respond to future changes in climate. Crop cultivation should be flexibly planned, so as to accommodate these climatic changes.

- **Early or late planting and or harvesting**
  Farmers could adapt to climate variability by using early or late planting and or harvesting, depending on the seasonal conditions and climatic changes.

- **Select crop varieties that are more drought or flood-resistant**
  Depending on the specific context and location, crop varieties that are more drought or flood-resistant could be used by farmers.

- **Integration of trees, agricultural crops and/or livestock**
  Combining trees with crops and livestock has various benefits, among others, trees enhance soil fertility and this increases agricultural productivity by reducing the need to use fertilizers. Multi-purpose trees can be used that help to provide food in the form of fruit, nuts or leaves, or to provide firewood. Alley cropping can also be practiced, which involves growing a long-term tree crop along with agricultural crops. Tree species like walnut, oak, ash and pecan are among the species used in alley cropping systems. Trees also act as natural buffers that protect crops from strong winds, floods, storms or pests and store carbon dioxide. Certain forage species can serve as feed for the animals and their manure can be used as fertilizer to improve soil health. This practice can contribute to increases in productivity, resilience and reductions in CO2 emissions.

- **Diversification of crops and livestock**
  Cultivating different types of crops instead of mono-cropping or rearing fish and animals, such as pigs and chickens, helps to: diversify farmers' products; reduce the risk of total production losses; and contribute to their food security and livelihoods by possibly generating additional income.

- **Reduce loss of water through irrigation, mulching, and minimum tillage to reduce wilting of seedlings**
  In case of drought or severe dry spells, water loss can be reduced through irrigation measures, as well as through the use of mulching and minimum tillage, in order to reduce the chance of the seedlings wilting. Improved water harvesting and retention practices, such as pools, dams, pits, retaining ridges and water-use efficiency mechanisms like irrigation systems, are fundamental for increasing production and addressing irregular rainfall patterns. Irrigation is currently practiced on 20 percent of the agricultural land in developing countries, but it is estimated that it can generate 130 percent more yields than rain-fed systems (FAO, 2010).
  Mulching involves adding an additional layer of material over the soil, such as leaves, grass clippings, peat moss, wood chips, bark chips, straw, hay or plastic sheeting to cover the soil, which helps to keep the soil moist and fertile, protects it from the sun, rain and wind and reduces weed growth. It also conserves and enhances biodiversity as well as reducing greenhouse gas emissions because the extra plant coverage over the soil helps to absorb CO_2 and means that less nitrogen fertilizer is needed.
  Minimum tillage focuses on reducing tillage so that there is minimal disturbance of the soil, which helps to reduce soil erosion and keeps the soil fertile by retaining nutrients.

- **Targeted fertilization and applying fertilizer in smaller quantities and more frequently**
  Targeted fertilization helps to ensure balanced fertilization, which focuses on finding a balance between the nutrients externally added to the soil and those nutrients that are already available in the soil. Moreover, adding fertilizer in a targeted way instead of using the broadcast method will also help to increase the efficiency and effectiveness of the applied fertilizer. If there is a high variability in rainfall during the cultivation period, applying fertilizer in smaller quantities and more frequently during the cultivation period will help to reduce the washing away of fertilizer as a result of heavy rainfall.

- **Reduce vulnerability to flooding through e.g. growing crops on raised beds, using drainage systems, building embankments, floating vegetable bed cultivation**
  In areas where short periods of intense rain occur followed by short periods of hardly any rain, a practice that can be used is to grow crops on raised beds. This practice helps to reduce water logging and flooding; it uses water more efficiently so as to reduce the risk of crop failure. If longer periods of rainfall occur, adequate drainage systems, such as trenches, can be used. By using the slope of the land or gravity, these trenches help to remove excess water away from crops and livestock. Embankments can also be built to protect rice farms from floods.
  In fields that are flooded for certain periods of time, vegetables can be grown on floating beds. Floating gardens[4] are established by growing crops such as water hyacinth and/or use paddy straw and other material like coconut straw, bamboo and rope, which will help to make a platform or raft on which vegetables are grown.

Some of these practices, such as mulching, intercropping using multi-purpose trees and integrated farming management are **climate-smart agriculture** (CSA) practices[5], which aim to increase yields and income, contribute to making agriculture more resilient to climate change and reduce or remove where possible greenhouse gas emissions. CSA also includes practices, such as improved weather forecasting, use of drought-resistant and flood-tolerant crops and risk insurance.

[4] For more information about how to establish a floating garden, refer to the following link: http://www.fao.org/climatechange/17849-0e277b46b31f98942e6bc81bb22319243.pdf.
[5] See for more information http://www.fao.org/climatechange/climatesmart/en/, http://www.climatesmartagriculture.org/en/

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Community seed banks

Junior Farmer Field and Life School – Facilitator's guide

Module: Community seed banks

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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Module: Community seed banks

INTRODUCTION

Seed saving is a practice that farmers and their families have been engaged in for millennia. It has allowed them to cultivate a large number of different local varieties, which have been able to adapt to different environmental conditions and changes, such as to the shortages of water, strong winds, limited soil nutrients and so on. Although seeds can be saved at the global level, such as in the Svalbard Global Seed Vault[1], this may not be enough to ensure diversity at local level. In this regard, community seed banks can help farmers to access seeds to grow crops during the next planting season or they can be used as an emergency seed supply when their crops are damaged and destroyed, for example, due to flooding.

As climate change has a significant impact on agricultural production, growing local varieties, which have a high degree of genetic diversity, is highly important because these varieties have the ability to better withstand and adapt to environmental stresses and changes. Setting up community seed banks may help farmers to acquire varieties that are adapted to local conditions; these varieties may not be accessible through formal seed systems, may be costly or may suffer from erratic supplies. If farmers, in particular small holder farmers with poor resources, can access these locally adapted varieties, it can help them to get access to seeds for the next planting season as well as provide them with an emergency seed supply in times of crisis, thus making them less dependent on the formal seed systems.

Community seed banks will help to preserve seed of the most adapted varieties for the region, either local varieties or new ones coming from breeding programs. The selection of the most suited varieties for a region needs time and trials with technical support, but after the identification of best varieties, the community seed bank plays a very important role in maintaining the availability of quality seed. Seed diversity is enhanced and additional income is generated when seeds are exchanged and sold to neighbouring communities. Diversification of crops and varieties is also highly important in terms of people's food security, because it reduces the risk of total production failures and contributes to strengthening communities' resilience.

AIM OF THIS JFFLS MODULE

The aim of this module is to provide Junior Farmer Field and Life Schools (JFFLS) facilitators with information in order to be able to discuss the topic of community seed banks, in particular its importance regarding seed and food security, agro-biodiversity and sustainable agriculture. Through a series of small group discussions, role-plays, drama and case studies, this topic of community seed banks is highlighted.

This module helps JFFLS participants to increase their knowledge on the importance of saving seeds, in particular traditional varieties, as well as how to set up and sustainably manage a community seed bank to contribute to diversifying and sustainably improving their livelihoods.

The exercises can be undertaken at different points in the JFFLS cycle or this module can be used as a stand-alone topic.

[1] For more information on the 'Svalbard Global Seed Vault', see the 'Seed Portal' at http://www.nordgen.org/sgsv/ and the 'Global Trust Diversity Fund' website at http://www.croptrust.org/content/svalbard-global-seed-vault

Exercises

exercise 1

WHAT ARE COMMUNITY SEED BANKS?

OBJECTIVE:

This exercise helps participants to understand the concept and objectives of a community seed bank through a discussion.

PREPARATION:

Read the *facilitators' note 1* before conducting this exercise.

TIME:

About 15 minutes.

MATERIALS:

None.

STEPS:

1. Start a discussion with the participants about the concept of a community seed bank, begin by asking the question: Does anyone know what a community seed bank is?

2. Ask additional questions that help with the exchange of knowledge and ideas regarding this topic. Other questions that can be asked include:

   - Where do seeds come from?
   - Why are seeds important?
   - Why establish a community seed bank?

   Additional questions that help to provide the facilitator with an idea of the knowledge and skills of the participants:

   - How do you select high quality seeds and how do you know which ones are not good seeds?
   - Do you know how to clean, dry and store seeds?
   - Do you know people in your community that save and exchange their seeds?

3. Encourage all participants to share their knowledge and ideas.

4. Summarize and try to ensure that everyone is clear about what a community seed bank is and what its objectives are.

facilitators' notes 1

Community seed banks store and manage seeds that aim to provide community members with seeds to use. Seeds are obtained from the farmers in the community and are selected and stored depending on the agreed storage system. Community seed banks can take different forms, for example, seeds can be stored in pots in a shed or community buildings, or in clay pots on the floor, in a family granary or on the kitchen shelf. Once the seeds are collected from the farmers, they are stored in a community seed bank until they are needed.

One of the purposes of a community seed bank is to serve as an emergency seed supply when farmers experience a shortage of seeds, due to failure or destruction of crops as a result of floods, droughts, pests and diseases. Community seed banks are also important in promoting and sustaining the cultivation of a variety of crops. By making seeds of both local and improved varieties available, community seed banks can therefore contribute to the maintenance of more genetic diversity in farmers' fields. By ensuring farmer seed security and improving availability and accessibility of seeds through offering seeds at lower costs than acquiring them through seed vendors, community seed banks can be essential instruments for conserving local varieties, restoring 'lost' varieties and sharing knowledge and expertise among farmers (Lewis and Mulvany, 1997; Shrestha et al. 2012).

Just as some people put their savings in a regular bank, and whenever they need extra money they can take out their savings, seed banks acts as farmers' savings for future planting. They therefore serve as a buffer against environmental and economic losses. Community seed banks are crucial for ensuring seed and thus food security: without seeds, farmers are not able to grow crops. Especially for resource-poor farmers, in particular women, the local seed system offers the main supply of seed (Pionetti, 2006).

Through a community seed bank, farmers play a key role in the development, maintenance and promotion of agro-biodiversity, in particular women given their traditional roles in selecting and saving seeds as well as in raising awareness on the diversity of traditional varieties among all members of a community.

With the introduction of the improved, high yielding varieties (HYVs) of seeds in the 1950s, the genetic diversity of dominant crops has rapidly decreased because the varieties that are currently cultivated have a high degree of genetic uniformity within each variety. It is estimated that since the 1900s, approximately 75 percent of plant genetic diversity has been lost, mainly due to the replacement of local varieties by HYVs.

At the global level, a measure has been taken in 2008 through the establishment of the 'Svalbard Global Seed Vault'. This seed bank is located in the permafrost on a remote island off the coast of Norway and has become the most diverse seed repository in the world. The seeds are kept in three underground chambers and are duplicate samples of seeds held in gene banks around the world and therefore represent an insurance against the loss of seeds. This type of conservation is called 'ex situ', which literally means 'offsite conservation'. This is the opposite of 'in situ' conservation strategies where conservation is conducted in their natural environment. Ex situ conservation is a useful additional measure, but it is not, on its own, an ideal approach. This is because the highly advanced facility only holds a relatively small proportion of diversity, even for major crops. And most importantly, ex situ conservation does not allow the crops to continue to evolve in farming systems, which is essential in order to sustain agro-biodiversity in the longer-term. In order to ensure efficient and long-term conservation of genetic diversity, it is widely agreed that an integrated application of ex situ and in situ[2] conservation strategies should be promoted.

[2] 'In-situ' conservation refers to the maintenance and management of plants and crops in nature and in farmer's fields.

Box 1: Community seed banks in Paraíba, Brazil

The Semi-Arid Paraíba Network (ASA/PB), established in 1993, is a network of 350 civil society organizations, which aim to strengthen the autonomy of small-scale farmers throughout the Paraíba state. This state is one of the smallest states in Brazil, where over half of its population reside in its semi-arid region. Small-scale farming is widely practiced, with 94 percent of farmers practicing this type of farming in the central-eastern part of the state. These small-scale farmers grow different varieties of, among others, common bean, cowpea, maize and various fruits and vegetables, and are engaged in small-scale livestock production.

Until now, the network has helped to establish more than 800 community seed banks (CSBs) and has involved over 800 families in 63 municipalities. Through ASA/PB's support, nearly 300 crop varieties were rescued through the recovery, maintenance and recognition of local varieties in this semi-arid region. Community seed banks vary in terms of the number of members participating in the bank. For example, a CSB in the municipality of Vieirópolis has 157 members, while one in Camimbas only has eight. In addition, the number of seeds stored at a bank can differ (e.g. a large bank can store up to 7000 kg of seed). The number of varieties that are maintained can also vary, i.e. the CSB of São Thomé in Nova Alagoa contained the seed of only two types of common bean in 1974. Since then the CSB has expanded and now also includes, among others, cowpea, lima bean, sorghum, pigeon pea and local maize varieties.

CSB members establish their own rules regarding the operation of the bank. For example, in the CSB of Lagoa do Gravitá, in the municipality of Lagoa Seca, an association was founded during an assembly meeting where 35 households participated, which also includes members from five other communities. In addition, a committee consisting of three members were appointed to be engaged in the day-to-day management of the bank and a return rate of 20 percent on the amount of provided seeds to a beneficiary household was agreed upon. However, during lean periods, the CSB members can decide to relax the rules to ensure the sustainability of the bank.

Each member of a CSB is responsible for maintaining samples of local varieties and through a mechanism developed by ASA/PB, households can borrow seed from the bank as long as they promise to return the same amount plus an additional relatively low percentage during the harvesting period. The selected association manages the bank with regards to storage, delivery and return of the seed. A 'mother bank' is sometimes established at municipal or regional level, which receives the seed varieties that the farmers have saved, just as in the local CSB. As a result of these seed banks, an in situ seed reserve is established, which helps to maintain farmers' traditional knowledge and their local varieties.

ASA/PB undertook participatory varietal selection (PVS) trials, which showed that in all the PVS sites the local varieties were performing better than the improved varieties. The organization is using these results in policy dialogues and has been organizing Seeds of Passion (the seed of local varieties is called sementes de paixão in Paraíba) festivals every two years since 2004 to raise awareness on the importance of farmers' access to these local variety seeds.

Source: Da Silva, 2013

exercise 2

WHY IS IT IMPORTANT TO SAVE SEEDS?

OBJECTIVE:

This exercise aims to increase participants' understanding about the importance of saving seeds through a drama.

PREPARATION:

Read the *facilitators' notes 2* before conducting this exercise.

TIME:

About an hour.

MATERIALS:

None.

STEPS:

1. Divide the participants into three groups: each group should represent one of the following three communities:

   - Community A – Farmers in this community have lost all their crops and none of them are saving seeds.
   - Community B – Some farmers in this community have the habit of individually saving small portions of their seeds.
   - Community C – Farmers in this community have created a community seed bank and have over the years increased their seed stock and variety.

2. Explain to the participants the context in which this drama is set: there has been a heavy downpour in these three communities in the region and farms have been flooded. How does this event affect these communities?

3. Explain that all the groups should display:

   - The frustration that farmers go through during such periods.
   - The impact of the floods on farmers' crops, income, and their lives of these different communities.

4. Explain that in addition, community A should also show:

   - The regrets that some poor farmers have for not having saved seeds as they do not have sufficient financial resources to get access to other sources of seed supply.
   - How the richer farmers get access to new seeds.

5. Explain that in addition, community B should also show:

   - How those farmers that have saved seeds will be able to recover from the floods.
   - The social relationship that some have, which allows them to exchange seeds when they are in need.

6. Explain that in addition, community C should also show:

   - How the different members of the community are trading seeds, which helps them to increase their income and enhance their seed diversity.

7. Allow sufficient time for the different groups to discuss and prepare their scenarios.

8. Encourage the groups to be as creative as possible. They can take up different roles, such as farmers, market women, mothers/wives, men and children and act how these people will be affected by the situation.

9. Summarize after all groups have finished and discuss with the participants the various lessons learnt and key messages of the different communities.

facilitators' notes 2

In order to cultivate certain types of crops, farmers need to have access to these seeds. This makes seeds the most valuable input for farming. They are not only needed for farming, but also serve as food, for example wheat, maize and rice and can be sold to generate income and contribute to improving people's livelihoods. Acquiring seeds through the formal seed sector may be too costly for farmers, there may not be varieties available that are adapted to specific local conditions, or the supply of seeds may be erratic, meaning seeds are not available at specific times. Farmers that save seeds, can access them to grow crops during the next planting season or use them as an emergency seed supply when their crops are damaged and destroyed, for example, due to flooding. In this way, farmers do not need to buy seeds from external buyers and it helps them to diversify by cultivating several crop varieties that are highly adapted to the environmental conditions of their region, which builds up their resilience.

exercise 3

WHY IS DIVERSITY OF CROPS AND VARIETIES IMPORTANT?

OBJECTIVE:

This exercise aims to increase participants' understanding of the importance of seed variety.

PREPARATION:

Read the *facilitators' notes 3* before conducting this exercise.
This exercise is adapted from the JFFLS Facilitator's Guide "Module 4: Diversity", exercise 4, page 17.

TIME:

To be conducted over a period of two weeks: about 20 minutes for the 1st session and 45 minutes for the 2nd session.

MATERIALS:

Flip charts, pens and tape.

STEPS:

1st session

1. Ask each of the participants to discuss with the person next to them, the differences and similarities between themselves, for example in terms of hair type, length, colour, eye colour, clothes, etc. In this way, the facilitator introduces the topic of diversity.

2. Divide the participants into four groups.

3. Ask each group to pick a common crop that is grown within the local area, for example maize, beans, sorghum, etc. The facilitator should make sure that there is some diversity in the crops selected by the groups.

4. Ask each group member to bring some seeds of the selected crop from home, family members, friends or neighbours.

2nd session

5. Ask each group to discuss the similarities and differences between the seeds, in terms of size, colour and appearance, and compare it with what the crop looks like in the field. The facilitator should provide each group a few samples of commercial seeds for the different crops. Each group should write their findings on a flip chart.

6. Once all groups have completed the exercise, one person from each group should present their findings to the whole group.

7. Discuss the advantage and disadvantages of local seeds versus commercial seeds.

8. Summarize the discussion by briefly explaining the importance of diversity in crops and varieties. The facilitator can also use the case study about the Irish potato famine (box 2) as an example.

facilitators' notes 3

There are many crop varieties, for example, there are different varieties of maize and each variety has its own specific characteristic, some have yellow kernels and others have white kernels; some maize plants grow taller, others shorter; some varieties offer better protection against pests and diseases while others are more drought or flood tolerant and so on. The variation of genes within species, varieties and populations of grains, legumes, vegetables and fruits that we grow and eat are referred to as Plant Genetic Resources for Food and Agriculture (PGRFA). These resources are the basis for food production, people's livelihoods and countries' agricultural and economic development. Apart from being of direct use, they also constitute a potential source of basic genetic material for adapting crops to changing climatic conditions, improving productivity and developing the quality of the products.

Local varieties are genetically more diverse, which makes them more stable for withstanding climatic variation, pests, diseases and other stresses. When seeds from different varieties are not saved, diversity is lost. By planting different varieties, farmers can benefit from the ones that provide higher yields, as well as those that are less productive but more tolerant to drought or floods. By diversifying their produce, farmers can reduce the risk of economic losses and maximize their food security rather than maximizing yield *per se* (FAO, 2004a; Worede, 2011; Shrestha *et al*., 2012).

Some local communities have survived for thousands of years by cultivating unique local varieties, which have adapted over centuries to specific environmental conditions, for example, to shortages of water, strong winds, and limited soil nutrients. As a result, these local varieties are often specifically adapted to the environmental conditions characterizing the particular area, for instance being resistant to certain pests, diseases or climatic conditions. With the challenge of climate change, preserving these locally adapted crop varieties is highly important and the best place to do this is on the farmer's field.

Commercial or new varieties, coming from national breeding programs, are usually created using local varieties as a base and then by selecting the best performing plants. These varieties can therefore be very well adapted to local conditions, but attention needs to be paid to the fact that some new varieties may be based on plants from a very different environment and may not be well adapted to specific local conditions. Therefore the performance of varieties at local level still needs to be checked in order to be able to select the most suitable ones.

Box 2 below shows the importance of variety and box 3 explains the International Treaty on Plant Genetic Resources for Food and Agriculture and the importance of this Treaty for the access and benefit sharing of genetic resources and knowledge.

Box 2: The importance of variety shown by the Irish potato famine

Potatoes do not originally come from Ireland. All Irish potatoes originate from a handful of potatoes that were brought back to Europe from South America. In the 1800s, Ireland, faced with a growing population, started to feed its population by cultivating the 'lumper' potato variety. All of these potatoes were clones, which means they were genetically identical to one another. In the 1840s, there was an outbreak of a disease called 'potato blight' that turned all non-resistant potatoes into inedible slime. Because the potatoes in Ireland were all clones, they were almost all affected by the disease and there were no edible potatoes.

Due to Ireland's dependence on the potato to feed its people, one in eight people died of starvation during the Irish potato famine in the 1840s. Although there were other reasons for the famine, the scale of the disaster could have been smaller if farmers had cultivated potatoes with more genetic variation so that some were more resistant to the disease. Subsequently, scientists discovered resistant genes in a potato variety from South America, where farmers have preserved the genetic variation of potatoes by growing many varieties alongside the potato's wild cousins. It is estimated that there are still about 5 000 potato varieties grown in the Andes (FAO, 2008).

Thus, when farmers rely solely on one variety, the low genetic variation can lead to widespread diseases among the crop. This case study shows that conserving and preserving traditional varieties is important for adapting to changing environmental conditions caused by climate change.

Source: University of California, 2013

Box 3: International Treaty on Plant Genetic Resources for Food and Agriculture – Access and Benefit Sharing (ABS) of genetic resources and knowledge

In the case study in box 2, we saw that the European explorers brought back potatoes from South America, but this was not the only thing, cacao, tobacco, coffee, medicinal plants and herbs were also brought back from different parts of the world. These products were used by, among others, companies related to the food, pharmaceutical, perfume and other industries. The benefits gained by accessing these genetic resources and knowledge, however, were never shared with the local communities and the traditional owners were never compensated.

The International Treaty on Plant Genetic Resources for Food and Agriculture has three objectives: the conservation of plant genetic resources; their sustainable use; and the sharing of benefits that are derived from the use of plant genetic resources with the countries where they originated. The process that led to the Treaty began in the 1970s as an effort to solve tensions over access to plant genetic resources. The tensions occured because most of the world's agricultural diversity existed in developing countries, which are rich in biodiversity, but poor in modern technology and financial resources; meanwhile the demand for those genetic materials came from developed countries' agro-industries and research institutions that had the technology to improve the resources as well as the legal means to take advantage of their improvements by claiming intellectual property rights over their innovations.

With the overall goal of food security, the Treaty allows governments, genebanks and agricultural research centres to pool their genetic resources and share the benefits from their use – thus protecting and enhancing our food crops while giving fair recognition and benefits to local farmers who have nurtured these crops for centuries. The Treaty facilitates the access to crops in order to make them freely available to researchers who agree to share any future commercial benefits from their use in modern plant breeding or biotechnology. This recognition and benefit sharing are designed to ensure equity and encourage farmers to continue to conserve and use the diversity in their fields.

Source: FAO, 2013. Image: © Cespoli/FAO

exercise 4

WHAT CAN WE LEARN FROM LOCAL KNOWLEDGE?

OBJECTIVE:

This exercise will help participants to discover the wealth of local knowledge through a brainstorming of proverbs in small groups.

PREPARATION:

Read the *facilitators' notes 4* before conducting this exercise.

TIME:

About 40 minutes.

MATERIALS:

Pens, flip charts.

STEPS:

1. Divide the participants in groups of five to six people.

2. Provide each group with a flip chart and pens.

3. Ask them to brainstorm for 15 minutes in their groups on proverbs related to 'seeds', 'planting' and 'farming' and to write down the various proverbs that they have discussed in their group on a flip charts.

4. Ask them to identify one person in the group who will present the result of the discussion to the whole group.

5. Summarize and provide additional examples of proverbs, including:

   - Good seed make a good crop (Dutch proverb)
   - No matter how much you eat, save some seeds for sowing (Latvian proverb)
   - If hunger forces a farmer in a particular year to eat both his yam tubers and the seed yams, the succeeding years would still be worse, because he would have no yams to eat and none to plant (Nigerian proverb)
   - A tree starts with a seed (Arabic proverb)
   - One sesame seed won't make oil (Burmese proverb)

A proverb can be defined as a 'popular saying, which contains advice or states a generally accepted truth…most proverbs have their origin in oral tradition…are generally worded in such a way as to be remembered easily…function as 'folk wisdom'...general advice about how to act and live…often strongly reflect the cultural values and physical environment from which they arise. Proverbs are used to support arguments, to provide lessons and instruction, and to stress shared values' (National Council of Teachers of English, 2013: 1).

facilitator's notes 4

Local knowledge is not restricted to tribal groups or to original inhabitants of an area. It is described as 'the knowledge that people in a given community have developed overtime, and continue to develop. It is:

- based on experience
- often tested over centuries of use
- adapted to the local culture and environment
- embedded in community practices, institutions, relationships and rituals
- held by individuals or communities
- dynamic and changing (FAO, 2004b: 1)

Local knowledge consists of larger knowledge systems, which include the knowledge that is labelled as 'traditional'[3] or 'indigenous'[4]. Traditional and indigenous knowledge are closely related, overlapping or even sometimes synonymous with local knowledge.

Communities use their local knowledge to meet their communities' food security, nutritional, medicinal, cultural and spiritual needs. The selection of the seeds as well as seed saving, storage and exchange are often based on knowledge, which have been tried and tested by them for thousands of years and allowed for continued innovation in plant breeding. Traditionally, it has been the role of women to preserve seed, as they were involved in the selection, and deciding upon the quantity and variety of seeds to be stored. In this regard, women played a major role in the conservation of diversity at the farm level. However, with the introduction and increased use of the high yielding varieties, this traditional role has been somewhat eroded. Although, in general, it can still be said that women are more dependent on local systems, whereas men, in general, are more involved in growing commercial crops, which result in gender differences regarding local seed knowledge and skills (Center for Education and Documentation, 2009; World Bank, FAO, IFAD, 2009).

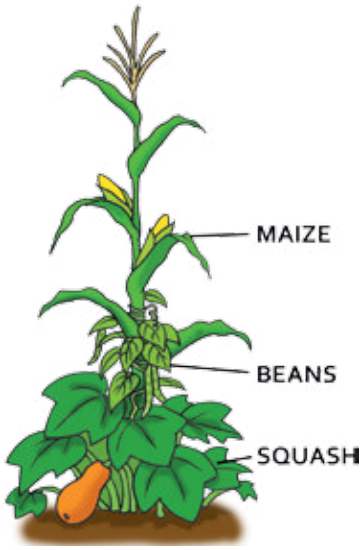
Seed saving was once a skill that was passed on from generation to generation but it is now disappearing due to the increase in formal education. As a result, this has limited, to a certain extent, the transfer of knowledge from parents to children. However, restoring this knowledge and teaching youth how to save seeds is highly important in the context of climate change and the need to reduce biodiversity loss, particularly as scientists are discovering the wealth of local knowledge that is available in communities and the remarkable amount of agro-biodiversity that is primarily sustained by small-scale farming communities (Bendsen & Motsholapheko, 2003).

Below is a case study on 'the three sisters', which shows the benefits of 'the three sisters' farming method, stemming from indigenous traditional knowledge of Native American farmers.

[3] Traditional knowledge implies that people living in rural areas are isolated from the rest of the world and that their knowledge systems are static and do not interact with other knowledge systems. (FAO, 2004b: 1)

[4] Indigenous knowledge is often associated with indigenous people thus rather limiting for policies, projects and programmes seeking to work with rural farmers in general. (FAO, 2004b:1)

Box 4 Native American farmers discovered the benefits of cultivating 'the three sisters' together



Corn, beans, and squash are also called 'the three sisters' because Native American farmers observed that these three vegetables grow stronger when cultivated together rather than separately.

Each of these crops helps the other grow. As corn grows straight and tall, beans cling onto the strong corn stalks for support. The leaves of squash keep the moisture in the soil especially during warm days and provide protection from marauding animals. Squash and corn need abundant nitrogen from the soil, which beans provide as they breathe in atmospheric nitrogen, absorb it into the nitrogen-fixing nodules on their roots, and then release it into the soil. This agricultural practice has evolved over generations of farmers and reduces the need for other inputs like water, fertilizer and land. Researchers are just now beginning to discover scientific reasons why 'the three sisters' method is such an effective farming system.

Source: Kaufman, 2001

exercise 5

HOW TO SET UP AND RUN A COMMUNITY SEED BANK?

OBJECTIVE:

This exercise helps participants identify the different activities that should be undertaken in order to set and run a community seed bank through a brainstorming activity undertaken in small groups.

PREPARATION:

Read the *facilitators' notes 5* before conducting this exercise.

TIME:

About 30 minutes and if the community seed bank is established, the duration would be over the course of one cropping cycle and if the bank is maintained, then it is implemented over several cycles.

MATERIALS:

Flip charts and pens

STEPS:

1. Divide the participants in small groups of five to six people.
2. Provide to each group a flip chart and pens.
3. Ask them to brainstorm for 15 minutes on the different activities that need to be undertaken in order to set up and run a community seed bank and to write down the identified activities.
4. Ask them to identify one person in the group who will present the results of the discussion to the whole group.
5. Summarize and try to ensure that everyone is clear about the different activities that should be initiated and implemented in order to set up and run a community seed bank. Depending on the amount of time available throughout the JFFLS, activities such as seed collection, selection, cleaning, drying, storing and record keeping can be undertaken with the participants.

facilitators' notes 5

When establishing a seed bank in a community, some of the steps to be taken are:

1. Establish the objective of the community seed bank.
2. Establish a community management committee.
3. Collect and select the seeds.
4. Clean and dry the seeds.
5. Analyze seeds.
6. Record information about the seeds.
7. Store the seeds.
8. Restock seed supplies and enhance seed diversity.

1. ESTABLISH THE OBJECTIVE OF THE COMMUNITY SEED BANK BY INVOLVING THE FARMERS AND OTHER COMMUNITY MEMBERS

All farmers and other community members should be involved when setting up a community seed bank. They should agree on the establishment of the bank and as well as the objective(s) of the bank: for example, whether it is primarily to act as a supply seed stock in times of crises or to conserve indigenous seed varieties and/or to earn income through the sale of seeds to neighbouring communities. Other issues that should also be addressed include, among others, who and how the bank will be managed; which, how and where seeds will be stored and maintained.

2. ESTABLISH A COMMUNITY MANAGEMENT COMMITTEE TO MANAGE THE SEED BANK

Once they have agreed on how they want the bank to be run, the set up needs to be prepared. Setting up a community seed bank does not have to be very expensive. The community should operate within their budget and should make use of the available material and storage items, for example, farmers who have extra space in their homes can volunteer until the community has located a better area to store the seeds. However, all farmers should try to contribute and continue to use their seed selection and storing techniques as this may be highly effective and cost-effective. In order for the bank to function well and be sustainable, it is recommended to establish a community management committee. This committee can consist of different community members who can each take up different activities related to the management of the bank, including collection, selection, cleaning and storing of seeds, as well as record keeping, enriching seed diversity (Green Foundation, 2013). However, it is highly important that the committee defines in advance who is entitled to receive seed in case of a disaster or an emergency, how much seed each family is entitled to (if only farmers that deposited seed are entitled or other farmers could be entitled as well) and the cycle of years from deposit to regeneration of seed.

3. COLLECT AND SELECT THE SEEDS, INCLUDING TUBERS AND CUTTINGS

a. Collection of seeds

Collecting seeds can be easy and inexpensive but can be somewhat time-consuming. The ideal time for seed collection is as soon as the seed is mature.

A few things to remember regarding seed collection:

- Seed handling in the field affects the quality of the seed. It is highly important that they are not exposed to high temperature and high levels of humidity;
- Collect only those fruits that are healthy, well-formed and are not infected by any pests or diseases;
- Collect the seed or fruits when most of the seed is ripe. If you wait for everything to mature, it may be lost to birds or other animals. For example, collect the entire pot of plants, which

have seeds that ripen in pods, just before they open so that the seeds can continue to ripen in the pod as it dries;
- Document where and when the samples were collected, especially those seeds from other communities (see step 5 for further information) (University of Illinois Extension; Pollard and Canavis, 2007).

b. Seed Selection

Seeds are usually selected based on size, shape, colour, absence of pests and diseases or the yield of the parent plant. The way seed is selected depends to some extent on the selected plants. The amount of seed to be collected will also largely depend on the species. What is important is not only to collect a certain amount of seed but that farmers have access to high quality seeds. If the seed is of low quality, then the added inputs such as labour, water, fertilizer, etc. may be wasted.

A seed should have good physical, physiological, seed health and genetic qualities as this will help farmers to produce a healthy crop and a high yield. However, rainfall, agronomic practices, soil fertility and pest control are also crucial.

- The physical qualities of the seed refer to whether the seed is damaged; whether it is free from weed seeds, chaff, stones, dirt and seed of other crops; whether it carries micro-organisms that have attacked or will attack the seed; and whether it has reached a certain size (as mature medium and large seed will, in general, have a higher germination rate).
- Physiological qualities refer to the performance of the seed that is indicated by the germination percentage. This percentage 'is an indicator of the seed's ability to emerge from the soil to produce a plant in the field under normal conditions' (FAO, 2010: 9). Seed vigour is also important; this 'is its capacity to emerge from the soil and survive under potentially stressful field conditions and to grow rapidly under favourable conditions' (FAO, 2010: 9).
- Seed health refers to the presence or absence of organisms that cause pests and disease, including insects, nematodes, bacteria, fungi and viruses.
- Genetic quality refers to certain genetic characteristics of the seed variety. Seeds of a certain variety present the same characteristics and plants produced from such a variety can be reproduced from one generation to another (FAO, 2010).

4. CLEAN AND DRY THE SEEDS

Because the seeds are collected from the farm, they may have some dirt, stones and weed on them, so they need to be cleaned and dried in order to ensure high quality seeds are stored. This process involves the cleaning through shaking, threshing or soaking and finally drying of the seeds.

The seed of beans, peas, onions, carrots, corn, most flowers and herb seeds mature and dry as long as possible on the plant itself and then these seeds are then often threshed; this is called dry processing. Threshing involves the separation of seeds from their containers. For example, by placing the seeds in a large cloth bag, and beating it on the floor, rolling the seed heads between your hands or by pressing the seeds through a screen, so that the seed is separated from the rest of the seed head material and chaff. If there is a moderate and consistent wind, this latter process can also be undertaken by gently tossing seeds into the air for the wind to catch the chaff.

Another method of cleaning seeds is wet processing. Seeds that are contained in fleshy fruits, such as tomatoes, melons, squash and cucumber require this type of cleaning. Remove the seeds from the fruits and place them in a small amount of warm water for two to four days, so that viruses are killed through the fermentation process. As a result, the good seed is separated as it sinks to the bottom of the container while the non-viable seeds, pulp and mould float. The seeds need to be fully dried before they can be stored, because the drier the seeds are, the longer they can be stored and the higher their germination rate will be when they are planted. If the seeds are not fully dried, moisture combined with high temperatures may result in seed deterioration as they are susceptible to damage,

insect infestation and fungi attacks. The amount of time it takes for seeds to be fully dried depends on various factors, such as the species, the humidity and the equipment used (Poles, 2010).

In order to ensure that seed is of good quality, a germination test can be undertaken. Germination is the ability of the seeds to germinate so that they can develop into normal seedlings. It is the development of the seed embryo with essential structures, including shoot and roots, into a normal plant, under favourable conditions, including sand, moisture, temperature, sufficient oxygen and light.

When undertaking a germination test, use sand that is clean and moist in a tray or another type of container which has drain holes in the bottom. Place the seeds, one seed per hole, in 1–2 cm holes in a 10 x 10 pattern, as this allows observation and evaluation during the test. The rule of thumb is that the planting depth should be twice the length of the seed.

The results from the germination test can be divided into four categories:

- normal seedlings, which develop into healthy plants;
- abnormal seedlings, which often do not have a shoot and/or a root and these will not develop into a healthy plant;
- dead seed, which absorb water and decay;
- hard seed, which do not absorb water during the germination test.

When recording the termination test results, include:

- the percentage of the total germination of normal seedlings, based on the average of the four replications of 100 seeds;
- the percentage of the total abnormal seedlings and dead seed, based on the average of the four replications of 100 seeds;
- the percentage of the total hard seed on average over the four replications of 100 seeds.

5. RECORD INFORMATION ABOUT THE SEEDS

Record keeping can be time consuming but it is highly important in order to ensure proper seed management. It is important to know where the seeds come from, whether they were obtained from on-farm saved seed, from seed saved by family members and neighbours or from purchased seeds from known seed breeders or seed merchants.

The information that should be recorded includes, among others, the name (local/other name), specific variety name or species, when it was brought in, where it comes from (seed source), year of harvest, germination test and date of germination test repeated each year, maturity data, the characteristics of the plant (e.g. regarding yield, productivity, growth, colour, shape and size of the fruit), disease resistance or susceptibility, and expected time to be kept in the bank. Which seed lot the harvested seed originated from (parent seed lot) can also be recorded. It is recommended to add a lot number to each seed sample, including:

- 2 digits for year of harvest;
- 2 digits for the variety code;
- 2 digits for the farmer that produced the seed;
- 2 digits for the individual seed lot number.

Thus, according to this recording method species no. 22, harvested in 2013, by farmer no. 12 with seed lot no. 2, can be recorded as: 13221202.

Records should also be kept regarding which seeds were taken out of the bank, and when, in case the objective of the bank is to generate income, expenses and profits made should also be recorded.

In addition, information on the required planting conditions and crop management practices should be recorded as this, to a certain extent, determines the yield that is obtained from the seed. It is thus advised not only to label each container with this data, but also to keep detailed records in hard copy file and/or in a computer database (Lewis and Mulvany, 1997; McCormack, 2004).

6. STORE THE SEEDS

As mentioned above, the way seeds are dried will determine how long they can be stored. Proper storage is important in order to keep the seed viable and ensure their quality by protecting them from insects and pests. Before storing, proper handling of seeds is equally, if not more, important. Proper handling of seeds involves, for example, minimizing insect and pest diseases through timely harvesting, removing seeds from the field, ensuring that seeds are adequately dried, removing any seed that are infested by insects before storage, and controlling insect infestation by treating seed with organic (ash, natural compounds) or chemical insecticide after harvesting. In order to ensure that seed are effectively stored, the seed need to be adequately dried and kept in a clean, well-ventilated area. Periodic inspection should be carried out.

Factors that should be considered when storing seeds include, among others, the type, size, shape and material of the containers as well as their cost and reusability (Gold and Manger, 2008). If seeds are properly stored (meaning that seeds are kept cool and dry) the length of storage can be divided into short, medium and long periods of time. The seeds of corn, leek, onion, parsnip and spinach, among others, should in general not be kept longer than one season (short time periods). Beans, carrot, celery, chard, eggplant, parsley, peas, pumpkin, salsify, scorzonera, and squash seeds, when properly stored, can be stored up to at least three years (medium time periods). While beets, all brassicas (broccoli, Brussels sprouts, cauliflower, cabbage, collards, kohlrabi), chicory (endive, escarole, radicchio), cucumber, kale, lettuce, melons, mustard, peppers, radish, rutabaga, sunflower, tomato, and turnip seed can be kept five years or longer (long time periods) (University of West Virginia Extension Services, 2008; Saling, 2011).

7. RESTOCK SEED SUPPLIES AND ENHANCE SEED DIVERSITY

In order to ensure sustainability of the bank, a constant and possibly increasing stock of seeds should be maintained. Therefore, measures to ensure that farmers at least return the same seeds should be put in place, such as offering in-kind seed loans, barter and transfer based on social relations. However, varieties can be increased through sale, purchase and exchange of seeds, for example by organizing seed fairs with neighbouring communities, thereby increasing seed diversity, including locally-adapted varieties. Box 5 provides information about the community seed fairs that were organized by FAO in Tanzania in 2005.

Box 5: The organization of community seed fairs in Tanzania

Through the FAO-LinKS project, two studies were funded in the southern highlands of Tanzania and in central Tanzania. The research focused on the relationship between local knowledge and management of agro-biodiversity for food security. Following these studies, four community seed fairs were organised in 2005.

The seed fairs provided farmers with the opportunity to show and exchange small quantities of their seeds as well as meet and discuss local practices and knowledge linked to specific seed varieties. It was observed that in general more female than male farmers attended and/or displayed crops and seeds at these fairs. Furthermore, far more local varieties than modern crop varieties were displayed. Some lessons learned from this project, in particular on the planning and implementation of a community seed fair, were translated into guidelines for seed fairs in the future.

In order to make seed fairs affordable for rural farmers, they should be organized on a small scale and cover only a few communities. The advantage of small-scale seed fairs is that smallholder farmers can easily participate. Another advantage of local seed fairs is that the seeds displayed are easily accessible, as they rely on local resources rather than on those from outside the community. This makes follow-up easier for the farmers; when they have exchanged seed varieties, they can discuss their experiences, thereby strengthening further exchange and communication, including through the establishment of local networks

Source: FAO, 2006

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ADDITIONAL RESOURCES:

- Global Crop Diversity Trust. Svalbard Global Seed Vault. Available at: http://www.croptrust.org/content/svalbard-global-seed-vault
- Svalbard Global Seed Vault. Available at: http://www.nordgen.org/sgsv/

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Post–harvest issues in fisheries and aquaculture

Junior Farmer Field and Life School – Facilitator's guide

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This Facilitator's Guide on Post-Harvest Issues in Fisheries and Aquaculture complements a number of existing Junior Farmer Field and Life School (JFFLS) Facilitator's Guides on other subjects (available at: www.fao-ilo.org/fao-ilo-youth/fao-ilo-jffls/en/. It is a joint production of the FAO Fisheries and Aquaculture Department, Economic and Social Department and Natural Resources Management and Environment Department with financial support of Sweden through the FMM FAO Multidonor Mechanism. It has been prepared by Dr. Kathleen Castro, Laura Skrobe, Barbara Somers and Christopher Parkins of Fisheries Specialists under the supervision of Nicole Franz and Daniela Kalikoski as part of youth development initiatives within the Fisheries and Aquaculture Department. FAO staff from the above-mentioned departments offered valuable input and feedback on the draft. Special thanks are due to Francesca Dalla Valle, Yvette Diei-Ouadi, Katrien Holvoet, John Ryder, Reuben Sessa, Susanna Siar and Tamara van 't Wout.

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Module: Post-harvest issues in fisheries and aquaculture

INTRODUCTION

In addition to being a valuable source of protein and nutrients for many people in the world, fish also provides an income for those involved in bringing the fish to the consumer. Many people are involved in the fisheries system and many business opportunities exist. However, care must be taken to use good and sustainable business practices especially when dealing with a highly perishable product.

The harvesting of fish (wild or farmed) starts a whole chain of activities. The supply chain for fish starts in the fishing ground, at sea or in inland waters, or at the aquaculture site, and it ends with the consumer, who can be in the same country or in another country. The supply chain links a network of harvesters, retailers, distributors, transporters, storage facilities and suppliers that all work together to produce, deliver and sell a product to the consumer. A fisheries value chain describes how value is added to the fish as it is moves through the system to the consumer. This can be done, for example, by processing the fish into dried, smoked or any other type of processed product. Fish supply and value chains are affected by many factors: product demand, available processing materials, regulations, access to markets and competition. Climate change and natural disasters can also affect the supply and value chain of fish. It is therefore important to understand the different linkages and to consider how fishers and producers can react and adapt to fluctuations in fish supply and changing marketing environments.

At the end of this module participants will:

1. be aware of different types of fish products
2. better understand quality and safety issues
3. develop a business approach to post-harvest activities
4. appreciate the role of organizations
5. understand the value chain

The purpose of the module is to provide guidance, making available different exercises that facilitators can use as applicable, and adapt as necessary, to the specific socio-economic and cultural contexts and needs of each target group and country in which the module will be used. This Junior Farmer Field and Life School (JFFLS) module is complementary to other JFFLS modules, in particular with Aquaculture and Capture Fisheries, and can be combined with them to enhance economic opportunities.

↘ OPENING ENERGIZER

OBJECTIVE:

Get to know one another, help a group of individuals become a collaborative team, and help them feel comfortable together.

TIME:

About 30 minutes.

MATERIALS:

Ball or some other object that can be thrown, large pieces of paper with different elements of the fisheries system written or drawn on them (see Figure 1 in the facilitators' notes).

STEPS:

1. Ask each participant to pick a piece of paper from the pile.

2. Have all participants stand in a circle and display their piece of paper.

3. Throw the ball/object to one participant and ask him/her to say his/her name and role in the fisheries system.

4. Invite that participant to throw the ball to another participant, who should also give his/her name and role in the fisheries system. Continue until all participants have received the ball.

5. Break the circle and help the participants to reorder themselves depending on their role in the system, from habitat to consumer.

Exercises

ENTERING THE FISHERIES SYSTEM

Fisheries is a system. The capture fisheries system is different from the aquaculture system, but at some point they merge when the fish is brought to the consumer. The system starts with the fish in its habitat and the interactions that occur there. Once the fish is harvested, the aquatic natural system is linked with the human system as the fish moves from the boat or aquaculture farm to the processing centres, markets and eventually to the consumer. A change in one part of the system will have an effect on all parts of the system.

exercise 1

SUPPLY AND VALUE CHAINS

OBJECTIVE:

Introduce the concepts of supply chain and value chain.

TIME:

1 hour.

MATERIALS:

System diagram (see facilitators' notes).

STEPS:

1. Briefly introduce the system diagram with its various elements.

2. Together with the participants choose a local fish species and ask them to identify the different elements of the supply chain for it.

3. Once all the elements have been identified, lead a discussion about:

   - What would happen if one of the elements of the chain disappeared?
   - Who are the different players in the chain? Are they men, women, children, local community members, others?

4. Introduce the difference between supply chain and value chain. Invite students to think about the efforts needed to produce and transform a product at each stage. For example, what do fishers need in order to catch the fish? What do fish farmers need? What types of processing is done and what materials are needed for that? What are main costs that occur? Are they one-time-only costs (such as a boat) or do they occur often (such as fuel)?

facilitators' notes

Supply chain: The supply chain includes all links from the point of production (point of catch or farm site in the case of aquaculture) to the end user or final consumer. The supply chain for fish and fishery products can involve a large number of people between the fisher or fish farmer and the final consumer.

The supply side of fish and fishery products is affected by factors such as: market demand, prices, seasonality, climatic conditions, population dynamics, economic situation, fuel prices, policy and legal environment. The perishable nature of fish requires special attention to handling, grading and packing, and the market price is usually dependent upon the quality of fish (although this is not always true when demand does not match supply). Supply chains are concerned with how long it takes to present the good for

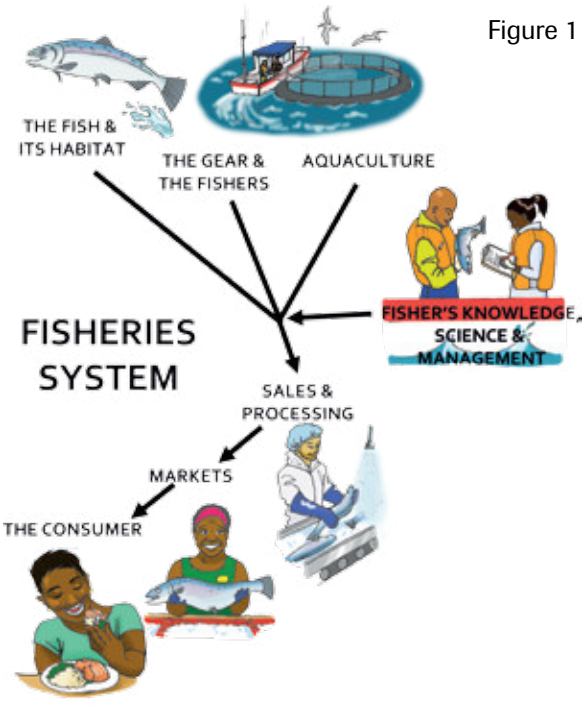
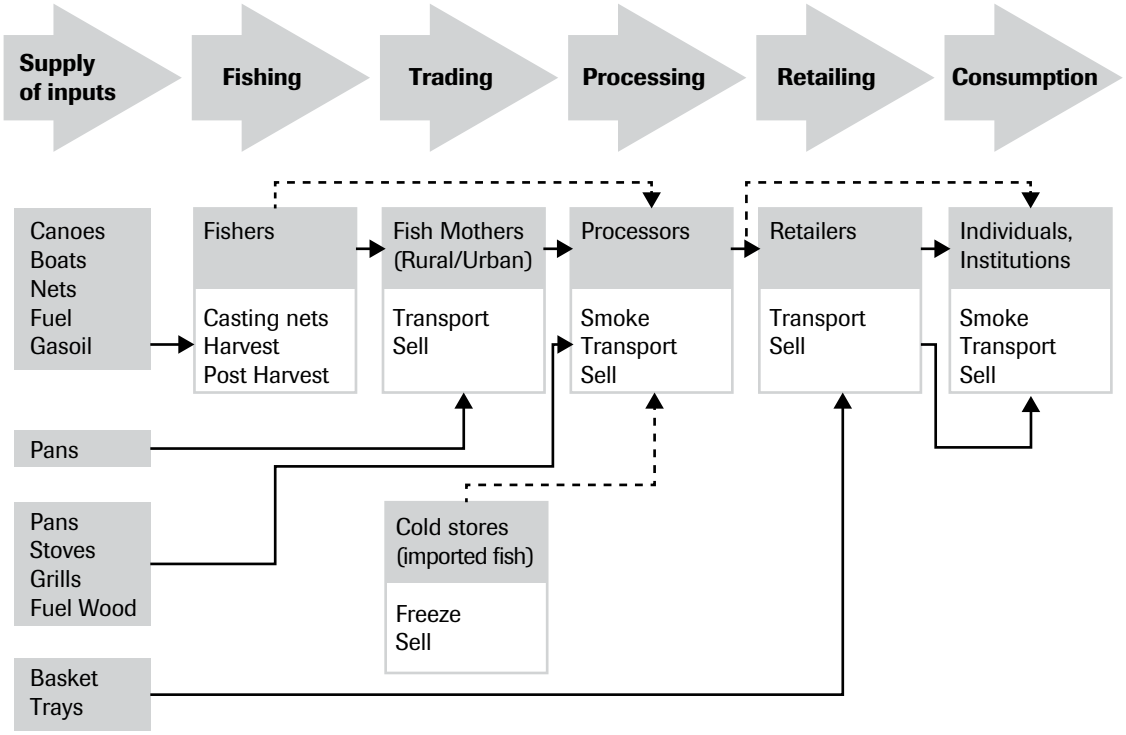


Figure 1

sale. The main objectives of supply chain management are to reduce the number of links and to reduce bottlenecks, costs incurred, time to market, etc. Good supply chain management is essential to develop a value chain

Value chain: A value chain is a supply chain where at every stage value is added as the product moves from production or the landing site to consumption. The product gains value, for example, through processing or packaging. Value chains are concerned with what the market will pay for a good or service offered for sale. Market considerations differ from country to country, region to region and have close connections with food habits and consumption patterns. The main objectives of value chain management are to maximize profit and long-term sustainability.

Example of a supply and value chain for smoked fish in Ghana:



Source: Gordon, Pulis and Owusu-Adjei (2011).

THE VALUE OF ORGANIZATION AND COLLABORATION

There are many types of organizations in fisheries and aquaculture. Some are formed to represent groups of fishers to have a voice in management decisions; some are formed to market their product together; others serve as joint production and distribution centres. The need for an organization will be based on many factors, such as: the type of activity; the power relations along the value chain; the possibility to access production inputs, including capital; the ability to deal with the impact of climate change and disasters; and the availability of transportation and distribution infrastructure as well as of processing equipment and infrastructure.

There are many advantages to working together – being stronger, more visible and having a voice increases bargaining power. If you work together as a group, you can obtain better prices for your inputs, which reduce production costs. You may also obtain better prices as you can produce larger and more stable quantities. As a group, it is also easier to buy larger quantities of inputs at better prices, to optimize transportation to cut operational costs, to obtain access to credit and operate savings scheme, to share ideas, information and experiences and to help one another. As summarized from a popular African proverb: If you want to arrive fast, you go alone, but if you intend to arrive further, go together!

exercise 1

ALONE OR TOGETHER?

OBJECTIVE:

Demonstrate how organizations can help each individual member.

TIME:

1 hour.

MATERIALS:

Hand-made puzzles (e.g. taking a picture from a magazine or hand-drawn picture and cutting it into pieces of various shapes and sizes).

STEPS:

1. Provide each participant with a puzzle and invite all to solve their puzzle. Allow 15 minutes for the activity, depending on the level of difficulty of the puzzle.

2. Ask students if they solved the puzzle. Was it difficult and why? Did they have fun?

3. Redo the exercise with students placed in preferably gender-mixed groups of three people. Ask the same questions. What did they learn about the value of working with one another?

exercise 2

TYPES OF ORGANIZATIONS

OBJECTIVE:

Familiarize students with different types of organizations.

TIME:

At least 3 hours.

MATERIALS:

Fisheries system diagram (Figure 1), case studies linked to the local context (see examples in facilitators' notes).

STEPS:

1. Ask students to examine the fisheries system diagram. Where can organizations help individuals? How can they help solve problems?

2. Have a discussion: Are there already organizations in their community? What are the advantages/disadvantages? Are there any youth groups? Are participants engaged with them? Can youth groups be established in fisheries organizations in the community?

3. Divide participants in smaller ideally gender-balanced groups and provide them with a case study. Ask them to answer the following questions, based on their own personal values and experiences:

    - Is this a good use of the organization?
    - What factors will determine the success of this venture for the individual and for the organization?
    - What factors might cause them to fail?
    - How much and what kind of outside assistance will they need?

4. Ask each of the small groups to prepare a brief representation of a possible scenario for their case study, showing the value of organizations, which they present to the whole group at the end.

facilitators' notes

Below is a list of different types of organizations and their advantages for members.

Management organization:

- Obtain better access to fisheries resources.
- Protect fisheries from overexploitation, for example, through participatory surveillance and monitoring.
- Make it easier to obtain outside support, training courses, extension services, financial assistance, technical assistance, construction of facilities, access to insurance.
- Provide political representation and better social recognition.
- Offer help to group members.

Input supply/producer organizations:

- There is a benefit from purchasing supplies as buying in bulk is usually cheaper than piecemeal.
- Can run a shop for fisher/fish farmers providing essential supplies at reduced costs.
- May be able to provide credit.
- May make it easier to obtain credit from another source.
- Could operate their own facilities such as an ice plant.

Marketing organization:

- Manage fish market facilities or landing centres with good hygiene standards.
- Act as financial intermediary for fisher and trader, improving cash flows.
- Improve fish quality and reduce panic selling of surplus fish by providing storage facilities.
- Develop fish processing facilities such as freezing, smoking, canning.
- Operate a marketing and distribution service, opening up new markets and providing market information (e.g. through mobile phone messages).

↘ SAMPLE CASE STUDIES FOR EXERCISE 2

CASE STUDY 1: TILAPIA AQUACULTURE IN UGANDA

Michael is a small-scale fisher and works from his sail-powered canoe on Lake Victoria. There is a non-governmental organization (NGO) that is promoting cage aquaculture for tilapia. Michael is interested in trying this as catches of tilapia have been decreasing recently. He could continue to fish while his wife and children look after the cages and feed the fish. The Beach Management Unit for his village is talking about setting up a cooperative to have better access to aquaculture inputs such as fingerlings and fish feed; to provide training in record-keeping and technical issues; and to develop a transport system for delivery of the product to the regional buyer. Michael would have to share part of the profit he makes with the cooperative. Should he join the group?

CASE STUDY 2: OYSTER ORGANIZATION IN THE GAMBIA

Fatou is the head of a household in Lamin, a small village in the mangrove community in the Gambia. Her husband has passed away and she has three small children to support. She does not read or write and did not attend school. She is worried about paying school fees for her children and has decided to go into the mangroves to harvest oysters. She will then sell them on the side of the road after she has cooked them. She has been told about an organization called TRY that is helping many of the women in the village. TRY has been able to give the women gloves and boots, made

them uniforms to wear when they sell, set up refrigeration units to store oysters if they are not sold, and TRY even provides classes for the women on sewing and how to handle money. TRY is also facilitating the participation of its members in decision-making about the management of the oyster resource, including, for example, the agreement on closed seasons and minimum sizes. Fatou would have to pay a small annual fee and respect the quality standards developed by TRY members. Should she join them?

CASE STUDY 3: HARVESTING COOPERATIVES IN CHILE

Manuel is a loco abalone fisher in northern Chile. The resource has been overfished and he is trying to find a way to help the resource rebound and still continue to fish. In the next village, there is a Territorial User Rights Fisheries (TURF). The TURF belongs to a group of fishers who formed a cooperative and it provides exclusive rights to the area in front of their village. The resource in the TURF is healthy, and there is even a closed area for spawning and an agreed minimum size for harvesting abalone. The fishers work with the government to determine how much they can harvest and who is allowed to fish. They have developed a relationship with an exporter who will pay a premium price for the bigger products. Manuel would have to pay an entry fee, adhere to stricter regulations than those he has now and work many hours as a volunteer to support the cooperative. Should Manuel join?

Refer to the JFFLS module Entrepreneurship (www.fao-ilo.org/?id=20904) for some of these principles (e.g. planning, marketing, sales, and accounting).

WHAT TYPES OF FISH PRODUCTS EXIST?

Fish can be sold in many forms. The simplest form is a whole fresh fish. However, many ways of processing have developed to either increase the appeal of the product (e.g. fillets) or increase the shelf-life (e.g. drying, salting, smoking, freezing). Some techniques are based on temperature control. These include icing the fish, refrigeration or freezing. Other techniques involve the removal of water from fish. These include drying, salting and smoking. The choice of the processing method depends on the type of fish, the available processing materials and sources of energy (wood, electricity, fuel, sun, etc.), the storage facilities and the costs of each method as well as tradition and market demand. Proper handling and processing is extremely important to ensure that the final product is a safe, nutritious and tasty product to eat.

exercise 1

COMMUNITY SURVEY

OBJECTIVE:

Design and conduct a survey to gather information on different types of processing methods.

TIME:

4 hours.

MATERIALS:

Paper, pencils, a rough hand-drawn map of market area.

PREPARATION:

Make a visit to the market to identify traders and explain to them what you are planning. Also check that the area is safe for the participants and identify a meeting point.

STEPS:

1. Explain to the participants that they will do a survey in the local market to gather information about different types of processing methods and techniques and products produced by the local community.

2. With the group, prepare a map of the area to visit and decide on a route through the market/ processing area for the visit.

3. Form gender-balanced groups of 5–6 people and ask them to identify some questions for their survey. As a minimum, they should:

   - determine the most common fish species in the market;
   - identify different processing methods;
   - learn about the details of each method, and the limitations and advantages of each method;
   - for a particular species/processing type: Who is doing which activity? Role of women? Role of men? Are children involved?

4. In the market, the groups should follow the planned route through the market drawn on the map, but talk to different traders. All members of a team must stay together and meet again at the agreed meeting point after 1.5 hours.

5. When back, ask each group to choose one member to report their experiences to the whole group.

6. At the end, have a discussion with the whole group: What are the advantages of having this survey done? Are there any organizations using these kind of surveys? Can you think of other situations where you would use this survey? Do you think this survey would be useful for future use – and if so, how?

exercise 2

GOING DEEPER INTO FISH PROCESSING

OBJECTIVE:

Provide more in-depth information about processing.

TIME:

3 hours.

MATERIALS:

Paper, pen, fresh fish from local markets, salt.

PREPARATION:

Invite community members involved with different fish processing activities to explain and show to students how they do their work and what types of things can go wrong. Alternatively, discuss whether students can visit them at their place of work.

STEPS:

1. Open the topic by asking participants which current or traditional fish processing methods are used by them, their families, relatives or friends.

2. Invite the fish processors to present themselves and to explain their activity.

3. Open the discussion with the participants and the processors, encouraging participants to ask more details about the steps in the process, to identify vulnerabilities (e.g. impact of pests, heat, hygiene issues, waste, access to clean water, effects of climate change in the form of excess rain or heat, changes in forest production owing to the use of wood for smoking, the use of child labour).

4. Lead the discussion towards improving vulnerabilities in processing (such as a simple hazard analysis and critical control points [HACCP] plan).

5. To conclude, ask students to take the fresh fish and to cover two completely with salt. Put one salted and one normal fresh fish in a shady, protected place and one salted fish and one normal fish in a sunny but protected place. Observe and discuss what happens to the fish over a week.

facilitators' notes

Fish caught from non-polluted water is usually clean and the flesh is safe for consumption. The problem starts when rough or unhygienic handling, or bad control of time/temperature allow for contamination. Fish refrigeration involves either icing (which can be done in containers with ice), chilled sea water or through cool air circulating around the fish. Freezing fish tends to be a very expensive technique that uses a lot of energy. However, it best preserves the nutritional value and extends the storage life of fish.

Dry salting is a technique that allows for the juices of the fish to be extracted. It can be done just about anywhere but the fish should not be spread out on the ground directly but on aired racks to dry. Layers of fish must be separated by layers of salt. This method is inexpensive, requires no energy source, increases the shelf-life and maintains a reasonable nutritional value.

When preserving fish through smoking, the actual process is the withdrawal of moisture or drying. Smoking is one of the oldest preservation methods in combination with other techniques such as salting and drying. Smoking exposes the food to smoke and heat in a controlled environment. A variety of elements are released during smoking. Some of these act as preservatives, some add flavour, while others can be toxic to people and may have health effects. The temperature used for smoking is an important variable, and lower temperatures are better, as long as they are hot enough to preserve the fish before the flesh starts to deteriorate. It is important to be aware that smoking requires large amounts of wood and can contribute to deforestation. Smoking of fish is often done in ovens that are walled in to increase efficiency. However, this makes the working environment difficult and unhealthy for the smokers themselves. Some more modern ovens have been developed, the first among them is called the Chorkor oven.[1] It is fuel-efficient and safe for the smoker. The Chorkor consists of a combustion chamber and a smoking unit with a set of trays. The combustion chamber is rectangular and usually made of mud that has stoke holes for a fuelwood inlet and fire control. A set of 5–15 trays can fit depending on the fish to be smoked and the trays are made of wood with wire mesh.

Fermenting fish is a way of processing and preserving fish by encouraging beneficial bacteria to grow. In this particular method, the development of a distinctive flavour is both the result and principal objective. Fermentation is often combined with salting and/or drying because fermentation often results in the softening and breakdown of the fish muscle. The final product is often used as a condiment or in the preparation of sauces.

Fish canning is a relatively modern technique of processing fish. Fish are sealed in a storage container for long periods – from a few months up to several years. The fish is usually headed, gutted, cleaned and trimmed, and then pre-processed either through salting, brining, drying, smoking, cooking or a combination of these. Vacuum sealing is another method of packaging fish that has already been processed in some other manner. In this method, all the air is removed from the package prior to sealing, thereby extending the shelf-life.

Cooking provides a short-term preservation. There are a variety of methods used to cook fish. Basic methods include boiling or poaching in which the fish is cooked in hot water. Frying fish uses hot oil. Other methods include baking, breading, etc. Generally, cooked fish products should be consumed immediately. However, by utilizing some of the packaging techniques mentioned above, the shelf-life can be extended.

Changing weather patterns affect fish processing, especially fish drying. This is especially true for places where fish is sun dried. Because of changes in climate, it can now rain in months when it never did, and be sunny in months that used to be the rainy months (unpredictable weather patterns). In some areas, there are no longer pronounced rainy or dry seasons. Changing weather patterns can also reduce the amount of fish available for processing.

In many countries, women are in charge of the processing of fish, and in some communities, it is the main economic activity of women. In many instances, they are also responsible for marketing the

1 For more information on the Chorkor oven: http://tcdc2.undp.org/GSSDAcademy/SIE/Docs/Vol5/improved.pdf

fish and are the financiers of the fishers. There are efforts to develop and promote drying systems using renewable energy in order to control the drying operation.

Planning is important to reduce vulnerabilities. A Hazard Analysis and Critical Control Points (HACCP) plan can help to reduce the vulnerability in processing. To conduct a hazard analysis, it is necessary to analyse the food supply chain needs to determine where biological, chemical and physical hazards may occur. Then, critical control points (CCPs) need to be identified as the last controllable points within the chain were those food safety hazard can be prevented. For these points, critical limits need to be established (e.g. max./min. time and temperature) that the CCPs must meet to prevent/reduce hazard. The entire system needs to be monitored with procedures using proper tools that alert you to food safety problems when critical limits are met. If this occurs, predetermined corrective actions need to be taken. All of this should also be documented to provide evidence that food is handled and prepared safely. The plan also needs to be regularly verified to confirm CCPs/ limits are appropriate and monitoring/corrective actions are adequate. The HACCP system is not only for processing sites. Even a fish trader can have a simple HACCP plan, as can a fisher or a fish farmer.

Sometimes, children can be involved in the fish value chain. If the tasks they carry out prevent them from attending school or harm their health and development, this is considered child labour, which is not acceptable. There are international standards developed by the International Labour Organization to protect children and eliminate child labour.

More information can be found in the JFFLS module Child Labour Prevention In Agriculture (available at www.fao.org/docrep/013/i1897e/i1897e.pdf).

PRODUCT QUALITY

In order to ensure the highest quality of fish products for the consumer, care must be taken from the time the fish is caught to the time it reaches the consumer. It is easy to lose the nutritional value of fish as it can spoil rapidly, and there are many points in the supply chain where fish is exposed to hazards.

exercise 1

WHAT'S WRONG WITH THIS PICTURE?

OBJECTIVE:

Increase the ability to identify the risk of post-harvest losses at various points in the supply chain and understand how to reduce these risks.

TIME:

30 minutes.

MATERIALS:

Picture handouts or drawings with post-harvest loss scenarios, paper and pens.

STEPS:

1. Ask the participants to form gender-balanced groups of 5–6 participants.

2. Give each group a handout, paper and pen.

3. Discuss what type of losses can occur during different stages of the fish supply and value chain, e.g. during aquaculture production, fishing, storing fish on board, offloading the catch, fresh fish marketing, processing and packaging or storage.

4. Give each group ten minutes to look at their pictures and to identify where there is post-harvest loss and of what type. After the ten minutes, ask each group to present to the others what they have found.

5. Discuss potential solutions to prevent these losses with the whole group.

Handouts: (can also be replaced by local pictures or drawings)

1. **Aquaculture site**

http://en.wikipedia.org/wiki/Mariculture

http://en.wikipedia.org/wiki/Mariculture

2. **During fishing**

www.fish2fork.com

www.fish2fork.com

3. Storing fish on board

© FAO/Giulio Napolitano

© FAO/Jim Holmes

4. Offloading the catch

© University of Rhode island

© FAO/Pietro Cenini

5. Fresh fish marketing

© FAO/Rosetta Messori

© FAO/J.Micaud

6. Processing and packaging

© Paul Siegel. WWF

© University of Rhode island

7. **Storage**

© FAO/T.Fenyes

© University of Rhode island

8. **Distribution**

© FAO/K. Dunn

© University of Rhode island

facilitators' notes

Post-harvest loss can be physical (e.g. fish that is discarded, eaten by insects or unfit for human consumption) or qualitative (e.g. relatively low price for a product because of quality deterioration). Both relate directly to loss of income and loss of fish as food.

- Time, temperature and handling influence the rate of spoilage of fresh fish.
- Improper processing methods can damage the fish and decrease its value.
- Allowing contamination from insects or predation by animals will decrease the value of the product.
- Packaging, transportation and storage can influence the quality of the product before it reaches the market.

The pictures above illustrate some situations in which losses can occur.

At aquaculture site: The photograph on the left shows how mangrove clearing for the building of aquaculture production sites reduces biodiversity and protection from potential climate change and natural disasters. The photograph on the right refers to high farming density, which can cause physical loss due to higher mortality from disease or lack of oxygen.

During fishing: If nets are not checked and cleared regularly, there is the risk of quality loss due to spoiled or rotten fish. Also, there is a risk of physical loss due to predation from other fish. If not harvested carefully, the flesh of the fish can be damaged (e.g. squeezed, ripped).

Storing fish on board: If fish is kept without ice and not gutted, it will quickly spoil, especially in high temperatures and in improper storage containers. Fish stored at the bottom of the boat can be stepped on.

Offloading the catch: Long bargaining processes and offloading times in high temperatures can spoil the product if it is not properly kept on ice. There is also a risk that fish falls out of the baskets or is stolen in the crowd.

Fresh fish marketing: A lack of ice and proper containers has a negative impact on the quality of the fish. If the fish is exposed on the ground, it risks contamination from dirt and insects.

Processing and packaging: Fish quality will suffer if the processing is done in an inappropriate environment (e.g. on the floor) and without the appropriate hygiene measures (e.g. clean water, no smoking during processing).

Storage: If storage containers are not used correctly (e.g. not properly closed), they will not protect the fish from high temperature, insects and exposure to other sources of contamination.

Distribution: transporting fresh fish in the trunk of a car or on other supports (e.g. donkey, bicycle) without ice and without proper packaging exposes it to high temperature and the risk of contamination with dirt and from insects.

Good practices to prevent losses of fish:

- Keep yourself clean as well as the working tools used and the working environment in order to prevent fish from being contaminated.
- Keep the fish cool, store it adequately, keep it clean, keep it moving (alive if possible), handle it carefully and start preserving it at harvest.

On the boat, the following are among things that can help preserve good fish quality:

- Use proper gear and fishing methods. Adapt to changing weather conditions, seasons, distance from shore (commute time) to prevent fish from becoming spoiled once it is out of the water.
- Handle fish gently.
- Use good sanitary practices. For example, wash hands and use clean gloves.
- Store in clean container with lid and ice.
- Do not let fish sit at the bottom of the boat where it can be stepped on or sloshed in fuel from the outboard motor.
- Remove heads, gills or guts when possible.
- Bleed fish if possible and place in cold brine solution (saltwater with non-contaminated ice).
- Do not store or wash with contaminated water (e.g. shore water).
- If possible, keep fish alive.

At the aquaculture farm:

- Only use approved products for feed and handling, and be careful if using antibiotics and other additives.
- Use good sanitary practices.
- Wash hands and use clean gloves.
- Store harvested animals in clean containers with lid and ice.
- Do not store or wash with contaminated water.
- If possible, keep fish alive until processing starts.

At the landing site:

- Land fish adequately, avoiding spoilage.
- Move quickly from boat to processing or sales area.
- If fish has not been cleaned on board, do so as soon as possible. Wash with clean water and remove gills and guts.
- Keep everything clean. Do not store your boxes near a latrine or other contaminated areas.
- Keep flies and other insects and animals away from fish.
- Ice or refrigerate and store in clean containers.
- Wash hands often and use clean gloves.

At processing or sale site:

- Display on ice or coolers with protection from flies and other insects.
- Put date of capture on the product. If you hold it for several days, make sure it is kept cold.
- Do not let customers or other people handle fish.
- Ensure that all processors pay attention to personal hygiene and health.
- Do not cross-contaminate pretreated/trimmed/processed fish with raw product.
- If you cook, fry, dry or use any other processing technique, make sure all tools and inputs (e.g. pans, oil and utensils) are clean.
- Wrap in clean food-grade packing material for sale.
- Processing inputs such as salt and oil should be clean and good quality.
- If dried and/or salted, make sure it is protected from flies and other insects.
- No fish or fish product should be placed on the ground or floor.
- Drying and salting racks and any other processing facility should be clean and free of debris.
- Smoking facilities should be free of insects and debris.

- Wood used to smoke needs to be safe for human consumption. For example, no painted or treated wood should be used for smoking as the ink and paint pigments and other chemicals may generate toxic smoke.
- Establish and control a “first in, first out” process for storage and pulling out of products.
- An HACCP plan should be developed and applied. If possible, seek assistance from fish inspection and/or extension services. HACCP plans can be simple and can be applied also to small operations: Identify where seafood can be contaminated, and then design and apply a plan to minimize the risk and monitor the result. An HACCP plan should also be applied at the harvesting stage. Good record-keeping is important.

Preparation and cooking techniques at home:

- Plan your purchase and manage it well.
- Buy high-quality fish.
- Fish should be stored in a refrigerator or on ice, or at the very least kept moist in the shade and cooked as soon as possible.
- Keep flies and insects away from fish and any food items.
- Do not cross-contaminate processed and raw product.
- Wash your hands before handling product.
- If there is any doubt about the fish having spoiled, dispose of the fish. Do not eat it!

Any type of fish handling, processing or marketing should not involve children in a way that is harmful to their development or interferes with schooling. Consult the JFFLS module Child Labour Prevention In Agriculture (available at www.fao.org/docrep/013/i1897e/i1897e.pdf) for more information.

THE ECONOMICS OF FISH

Maybe you have a business idea in relation to fish. However, to be successful, you need to assess whether it is worth starting a business. For example, you have to ask if all the necessary inputs are available or accessible to run your business. What will it cost to produce your final product? Setting the price at the right level is very important. Can the price you want to sell it at cover the costs without being too expensive for the final buyer? Is there a final buyer who is interested in your product? Successful businesses will matches the skills and resources of the entrepreneur or producer group with the needs of the customers. Who else produces a similar product and could be a competitor? To work well over a long period, a business will have to learn to deal with risk, including competition and changing circumstances. One way of reducing risk is by linking with others to form a group. When people come together, they bring in different skills and resources and have more options to reduce risks. A group also has a stronger voice in the market.

exercise 1:

WHAT ARE YOU GOOD AT DOING?

OBJECTIVE:

Raise awareness about basic business skills and different business options.

MATERIALS:

Pieces of paper (small and large), pens.

TIME:

1 hour.

STEPS:

1. With the group, talk about the differences between people and what they enjoy doing. Ask them to give examples for themselves (e.g. some people enjoy working with their hands; some enjoy being inside; some like outdoor activities more; some enjoy solving puzzles). Explore with the group if, when they enjoy doing something, they tend to do it better and want to learn more about it.

2. Ask each person to write down on a piece of paper two things they like to do. List all these as skills on a piece of large paper.

3. Discuss with the group: Are there are certain skills that are gender-related?

4. Invite participants to think about what skills are needed to run a business. Ask them to think about someone in their community who runs a successful business. What is the difference between a business person and a sales person?

5. Brainstorm how different skills support running a business. For example, someone who enjoys numbers could enjoy record-keeping; someone who negotiates well might be good at buying and selling fish. Ask the group: what would happen if you tried to do something you were not interested in or not very good at?

facilitators' notes

As a business person, you should see the big picture. A business person is more than just a sales person. A business person must be aware of all aspects of the business, especially the planning. You should be able to identify opportunities, access financing, recruit good workers, and obtain all the necessary information to run a successful business. Consider the following principles when engaging in a business:

- Believe in your own ability to make things happen.
- Make decisions based on careful planning.
- Understand the environment you work in – use Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis.
- Be able to accept failure as part of the learning cycle and make sure you learn from it.
- Work with a vision.
- Manage your time.
- Be realistic.

Useful business skills:

- Appear in public as an organized and focused person.
- Negotiate with skill.
- Communicate clearly.
- Good record-keeping.
- Develop marketing skills.
- Be flexible.

There are exercises below to practise some of these skills and the JFFLS module Entrepreneurship provides more background (www.fao-ilo.org/?id=20904).

exercise 2

PICK A BUSINESS

OBJECTIVE:

Evaluate the feasibility of setting up a new business.

MATERIALS:

Paper, pens.

TIME:

3 hours.

STEPS:

1. Recall that in the community survey (Exercise 1 under What types of fish products exist?) participants were able to observe what is currently sold in the local market. Now their task is to investigate what type of product is missing that people might want to buy.

2. Brainstorm with the larger group: What makes a successful business? (e.g. sell your product, make a profit, save a portion of the income to pay business expenses and reinvest in business, have enough for basic personal needs plus other expenses).

3. Break students into gender-balanced groups of 5–6 people. Ask them to pick a business idea (species, type of product and market) that appears to have a high demand. They should discuss the following questions:

   - What would they sell?
   - Where/who would they obtain it from?
   - Who would they sell to?
   - Where would they sell it?
   - How would they sell it?

4. Have them present their idea to the larger group and pick two ideas (a feasible one and one that seems less likely to work, if possible).

5. For the two cases, with the whole group, work through the following questions:

   - What are the internal strengths of the proposed business?
   - What are the weaknesses internal to the business?
   - What are the opportunities external to the business?
   - What are threats external to the business?
   - Would it make a difference if the business was run by a men or by a women?

6. Capture the results in the following table and compare results:

INTERNAL TO THE BUSINESS			
Strengths	Weaknesses	Opportunities	Threats
EXTERNAL TO THE BUSINESS			
Strengths	Weaknesses	Opportunities	Threats

7. Continue brainstorming with the group:

   - What information are we lacking?
   - Are there more strengths than weaknesses?
   - Are the threats too big to deal with?
   - Is there any gender-based discrimination
   - Is the target market influenced by global changes in markets?
   - Remember to add in climate change in this category!

8. Pick the business idea most likely to work and design a plausible supply and value chain for this business. Conclude by discussing:

   - What are the costs of doing business?
   - What price can you sell the product for?
   - Is it risky? What changes can affect it?

facilitators' notes

Planning is key for the establishment of a successful business. The new business person should understand the environment they are entering with the business. A SWOT analysis is a tool that can be used to develop the business idea, make decisions, solve problems, and develop a marketing strategy.

exercise 3

IS IT FEASIBLE?[2]

OBJECTIVE:

Assess the feasibility of a business idea.

MATERIALS:

Paper, pens.

TIME:

5 hours.

STEPS:

1. Based on the feasible case from the previous exercise, discuss with the group what else needs to be looked at for their particular business idea. The group should now really think in more detail about everything the business will need. Start a discussion by leading the group through a day in the life of the business: It is morning and you are going to the beach, aquaculture site or processing area. Where is the beach, aquaculture site or processing area and how are you going to get there? Once you are there, what will you do first (e.g. checking the fish: is it fresh?)? What do you need to transport your product? Who else will be working with you? etc.

2. The group should list all the things they talk about on a piece of paper.

3. Ask the group further questions to try to make sure nothing has been forgotten. The list of inputs needed for the business should include: raw materials (e.g. fish, salt, wood, ice), labour, skills, equipment (e.g. drying oven/racks, knives), time, buildings (e.g. processing areas), land, transport, licences and legal requirements, public services (e.g. clean water). The following questions can be helpful:

   - Where will the inputs come from? Is everything available locally?
   - Is the supply reliable? Is it reliable throughout the year or just for a part of it?
   - Is the quality of inputs good enough?
   - Who else uses the resources? Will this mean competition for the same inputs?
   - Does the entrepreneur/group have the land or buildings already? How much does it cost to rent them?
   - Are any services already there (water and electricity)? If not what would it cost to provide them?
   - How will inputs be transported? Will they need a storage place?
   - What about equipment? Where will maintenance and repairs be done? By whom?
   - If a licence is needed, where can they obtain it? How much will it cost?
   - How many people will be needed to run the business? Who are they? Is there an existing group with the necessary members or are others needed?
   - Are the necessary skills already available or can they be learned? How, where and when?
   - If designs or other technical information are needed, where will these come from?

4. With the group, estimate what everything will cost. Next to each item on the list, write down estimates of cost. Some of these costs will be fairly easily estimated based on the participant's experiences. Other things will have to be found out by asking others. The figures do not have to be exact, the idea at this stage is just to see whether the business is roughly feasible or not.

2 Adapted from the JFFLS module Entrepreneurship (available at www.fao-ilo.org/?id=20904).

- If skills have to be learned, will it cost anything to learn them?
- If extra labour is needed, what will it cost?
- How about any equipment or tools?
- How much will the day-to-day running costs be for materials, transport, etc?

5. Discuss who will keep the records and do the business accounts for this exercise. Maybe the group has somebody who already has some experience in keeping records. There might be a member who is good at numbers and would be willing to try. Once the group has put a figure next to all the things they need for the business, explain the difference between different types of cost (fixed costs and variable costs).

   - Example: Consider running a bakery. Some costs will not change whether the bakery produces a few loaves or many. Rent, electricity, transport to go to the market to sell the group's product will still be needed regardless of how many loaves have been produced. These costs are called fixed costs. Some other costs will change according to how many loaves the bakery produces. Flour, salt, yeast and other ingredients will vary according to how many loaves are made. These costs are called variable costs.

6. Ask the group to divide their list of costs into the two categories of fixed or variable. This will help the group both to monitor the business and to set the most profitable level of production.

7. Setting the price: Ask the group whether the same or similar products are already available in the area or neighbouring areas. How much do they cost? Discuss with the group how much they themselves would be willing to pay.

   - Note: While the price will depend on what people are prepared to pay for the product, the group will have to check that it at least covers their costs. If the price people are prepared to pay is less than the cost of production, increasing the price is not the answer. This may just mean that nobody will buy the product. Invite the group to look again at the costs, both fixed and variable, to see whether it is possible to reduce some of them. However, cutting costs should not result in a lower quality of the product. If this happens, fewer people will want to buy it.

8. Financing: Where will the money come from to start the business? Until something has been produced and sold, all the money goes out and none comes in. Every business needs money to be put in before any comes back. If the group wants to raise chickens, they will need to pay for the chicks, their feed, and some wire to make a chicken coop to keep them in. All this will have to be paid for before they can start selling the adult chickens. Ideally, this start-up money should come from the business entrepreneur. Let the group discuss options: Is it easier if he/she is part of a group that has its own savings. Will this be enough to cover costs until money starts to be received? If not, where else could money be found? Could the group contribute more? Could money be borrowed from relatives? Are there other sources? Perhaps some things could be borrowed to begin with instead of buying them, or smaller premises could be used.

   - Note: Regardless of how well the group plans the business, things can still go wrong. Input prices can rise unexpectedly or something might break down and need repairing. The group should keep some money aside in a reserve fund to cover these kinds of unexpected expenses. About 5–10 percent of the start-up costs of a business would be a reasonable amount for the reserve fund.
   - If an entrepreneur/group is not sure enough of their business idea to risk their own money first, they should not be thinking of borrowing money. A loan has to be repaid and should

be thought of in the same way as using own funds. Banks and other sources of finance are often not willing to lend to small entrepreneurs or groups unless the group have put some of their own resources or savings into the business.

9. Market research: Once the product has been identified, the group should address the following questions:

   - Who are the people that you hope to sell it to? Are they men, women, children, businesses, households?
   - Where do they live?
   - What do they do?
   - What are they most interested in?
   - How many customers do the group think there could be in the community? Are there enough to keep the business running? Consider also potential demand from local institutions and businesses (e.g. How many fish per week would the nearest hotel require?)
   - Are there more potential customers in nearby villages? How many? Could the product be sold there? Could the group transport the product there? Is anybody selling it there already?

10. Competition: Let the group discuss what product or service they would compete with. This does not only mean whether anyone else makes the product, but what customers would buy in its place if it were not for sale. For example, if the group were to make fresh lemonade, they would not just be competing with other lemonade sellers but with anyone selling soft drinks. Selling kerosene may be competing with selling fuelwood. Discuss this idea with the group and help them to think through who their competitors are. How easy is it to copy the business? If it is very easy, as soon as others see the group starting up the idea, they may copy it. Ask the group the following questions:

    - Are there enough customers for everyone who may want to enter into the business?
    - If not, is there anything the group could do that would give them an advantage over others? Better position in the community, better quality product, faster service, better packaging or labelling?
    - What would the group do if there were not enough customers for both them and their competitors?
    - How easily could they alter their product or service to provide something else to keep the business running?

Note: At this stage, the group should have a clear idea of everything necessary to run the business and will know whether they still want to go ahead. It may be that, although they are willing to start a group enterprise, they decide that the idea chosen is not practical or too ambitious for some reason. If so, it may be worth going back to the original list of suggestions for business ideas to choose something else. Before proceeding to the next chapter, the same feasibility study should then be done for the new idea.

facilitators' notes

Once an idea for an enterprise/business idea has been formed, it is important to assess the actual possibility of producing the particular product or service. Too many people start a new business blinded by the attractiveness of the product or by what seems to be an attractive market but fail after a short time to make a living. This happens because most small-scale entrepreneurs do not plan properly or understand all the costs related to running the business, and they do not do a market study to find out what customers want to buy and at what price.

There are several risks in fisheries production such as changes in abundance, environmental changes, bad weather and theft. Business risks can also be related to poor management of any income (money that comes into the business) and expenditure (money that goes out of the business). Production-related risk could also be due to a breakdown of equipment or damage to products. Market-related risks could be because of a change in what customers want. If there are too many sellers of the same product at one time, prices can fall. Working together with other people through an association can make the group stronger and more resilient to cope with any of these risks.

A feasibility study should show us the best ways to produce, market and sell a product. The result of a feasibility study should point to the best solution to make a profit, given your skills, the resources at hand, and the market opportunities.

exercise 4

CASE STUDIES

OBJECTIVE:

Practically apply the lessons learned from the previous exercises.

MATERIALS:

Two business case studies, one positive and one negative (ideally suitable to the local context, otherwise the samples given below).

TIME:

2 hours.

STEPS:

1. Present case study 1 to the group and together list the steps taken to set up a business.
2. Discuss which factors accounted for the results.
3. Present case study 2 and again identify the steps made to establish the business.
4. Discuss why this one failed.

CASE STUDY 1: ELIZABETH'S DRIED FISH

Elizabeth has space in front of her house near the beach she can use. Both her parents have passed away. She has one younger brother and one younger sister. For the three years since her parents died, she has been working with a local fishmonger helping to clean fish and has not made good profits.

Before she decided what kind of business to establish, she visited the market a number of times to know which types of fish products are popular (in demand) and which ones are sold for a higher price. She even travelled to a market in the next town, because the market in her village is quite small. She found out that dried sole sells at a very high price and that a lot of people want to buy it (it is in high demand), especially in hotels.

Her cousin lives in the next town, and she went to visit him, as she knew he dried sole. She interviewed him thoroughly on how the processing is done. Fortunately, through her cousin, she heard of a training workshop in a nearby village about drying fish as well as other products. Even though she had to arrange for someone to look after her younger brother and sister and to walk a very long distance, she attended the workshop.

The workshop was not like school or anything she had experienced before. It involved demonstrations, and those attending the workshop actually had to do some processing and drying. Elizabeth learned how to select the best fish, clean it, add salt, build racks and keep flies and other pests away from the finished product. She also learned about nice packaging and price setting.

Elizabeth had only 100 (local currency) so she went back to her cousin and requested a loan of 100 (currency) to add to what she already had. Then she went to the market place and looked for traders to buy the fish she was going to produce. She found some stallholders who said they would be willing to sell her fish.

She started to build drying racks on her land. She followed what she had learned from the workshop. She also recorded all the money she spent on buying the fish (production expenses). After three months, she started selling them to her buyers. She wrote down everything she sold, recording her sales. Her total sales amounted to 500 (currency). She made a profit of 200. Out of the profit, she paid back her loan of 100 to her cousin plus a little bit extra (the interest). She reinvested some of the remaining profit into her drying operation by hiring an assistant.

CASE STUDY 2: MARY'S PROJECT

Mary is 17 years old and lives with her two younger brothers. She has been thinking of ways to make some money to ensure her younger brothers can continue to go to school.

She learned from the people who often visit her village that they are looking for fish to eat at home. There are many fish landed in her village and lots of people come to buy. She asked her older sister who used to work in a processing facility how to dry fish.

She organized a loan from her cousin and invested all her savings to start the business. She selected the cheapest fish to buy and dry. For the whole season, she was able to sell only a small quantity of fish. She later learned that there are different prices depending on the quality of the fish product.

She was unable to recover all the money she had spent on the enterprise. Her cousin was becoming increasingly angry with her for not paying him back the money she had borrowed.

SELL YOUR PRODUCT

"What fish does the market want?" is a question all businesses must think about. The "how to market" question requires much thinking. You need to match up your product with the best market approach. For example, a fisher may be returning with high-quality fish. However, marketing this fish can be very competitive, with other fishers offering the same in the local market place. Marketing is about promoting your fish to make it attractive for the customer. How, where and at what price your product is offered is important and, therefore, a marketing plan is very important for your operation. There are many ideas and tools to help you design your marketing strategies, from how to approach buyers to packaging.

exercise 1

SELLING YOUR PRODUCT IN THE MARKET

OBJECTIVE:

Create an effective method to identify and reach your customers through a role play.

TIME:

1 hour.

MATERIALS:

Paper, pencils.

STEPS:

1. Form teams of three people each, considering a gender mix. Explain that they will do a little play (based on the scenarios below or similar ones), and that each of them will have a specific role: one will be the seller, one the buyer, and one an advisor to the seller.

2. Distribute the scenarios.

3. Use the questions below to support the teams in the preparation of their plays:

   - Think about what you are planning to sell and how you will promote it.
   - Plan a strategy:
     - What do you need to know about your competitors?
     - What obstacles do you see?
     - How will you present the information?
     - What questions will you ask?

4. All team members should then discuss together how to best present their roles.

5. Each team will present its scenario to the whole group.

6. Discuss with all the group the different marketing strategies, and brainstorm alternative ideas for closing the deal with the final buyer.

Scenarios

Seller: You are displaying and selling smoked catfish. You are trying to encourage customers to look at what high quality they are and buy them. You are very friendly, happy looking and smile a lot. You are trying to convince a sad-looking person who is walking past to buy some.

Buyer: You are sad because your mother is sick. You are not so interested in buying fish, although a very friendly fish seller is approaching you. Maybe the fish would cheer your mother up? However, you do not have much money.

Seller: You are selling dried fish that you made yourself. You want to show how good they are for preparing lunch. You approach a customer. He/she is worried about the quality of the fish.

Buyer: Someone is trying to sell you dried fish. You are worried that they may not be of good quality and concerned that you may fall sick.

Seller: You have developed a fried fish product, and you are selling it at the market. How can you attract customers to your stall? You must show that it is a good product and the fish is fresh. You want to show how tasty it is.

Buyer: You are hungry. There is a stall with cooked fish for sale. You are not sure whether it fresh fish or not. Also, you are not sure what other ingredients have been used to prepare it. Eventually, you taste it and like it.

Seller: You have live fresh fish for sale (one large one and two smaller ones), and they are wriggling when you lift them out of the water to show to customers. You want to sell the large fish, but the customer seems to want to buy the two smaller fish for very little money.

Buyer: You wish to buy two smaller fish for the same price as the large one. You must bargain with the seller. The seller wants to sell the large fish.

facilitators' notes

Role playing is an effective sales training method that provides a hands-on experience. The key to making it fun and memorable is to add humour and exaggeration to the mix. Students can take turns playing the role of the seller and the role of the customer.

Marketing is about understanding your customers' buying habits and persuading them to buy your products rather than those of a competitor. It involves identifying, anticipating, satisfying and even exceeding your customers' needs. Marketing includes all activities that can contribute to selling a product or service for a better price.

Marketing includes:

- Finding out what customers want.
- Producing a product that meets their needs.
- Pricing the product appropriately.
- Distributing where the customers are located.
- Promoting it through appropriate advertising.

Marketing requires creativity. However, there are marketing approaches that may affect the health and safety of the seller. For example, sometimes women exchange sexual favours in return for fish when they do not have enough money to purchase fish for trading or processing. This behaviour increases their vulnerability and can result in higher transmission rates of HIV/AIDS.

exercise 2

WHEN DO YOU NEED AN INTERMEDIARY?

OBJECTIVES:

Understand the role of an intermediary.

TIME:

1 hour.

MATERIALS:

None.

STEPS:

1. Have an initial discussion on:

   - whether participants think intermediaries and the distribution system are necessary for all products;
   - when and for what products they would be necessary;
   - when and for what products they would not be necessary.

2. Guide the discussion to highlight when intermediaries are useful:

Note: Intermediaries are important when markets are far away or when money is required quickly to meet operating expenses. Intermediaries are less necessary when small quantities are produced and likely to be consumed locally, or also when large quantities are produced and markets are not too far (provided transportation is available to reach the market in time and return at regular intervals). They are also less useful if producers are capable of accessing financial services to face operating expenses.

3. Discuss the characteristics of a good intermediary. For example:

   - a local person of good financial standing;
   - willing to hold stocks of product and equipped to do so;
   - able to create a steady demand for the product;
   - a good communicator (communicating the needs of the market to the producer and helping him/her to produce what the market needs);
   - pay fair prices to the producer and not exploit him/her.

4. Ask for examples of how good intermediaries have helped producers in the local community.

5. Discuss: Is it possible for you to find intermediaries who could help if you wanted to establish your own activity? Or is there scope for you to provide the service of an intermediary in your community?

exercise 3

REFINING YOUR MESSAGE

OBJECTIVES:

Develop simple market research techniques.

TIME:

1 hour.

MATERIALS:

None.

STEPS:

1. Ask the group what they need to know about their customers if they want to set up a business. They should consider the following:

   - Who are the customers?
   - Where are they located?
   - What are their needs?
   - How often do they buy? Are there seasonal patterns?
   - When do they buy?
   - How much are they willing to pay?
   - How will product reach them? Are there seasonal issues with transport?
   - Who are the competitors?

2. Ask them how they can obtain this information (e.g. through customer surveys, information from the media [radio, newspaper, TV] on similar products, observation of competitors, market testing with free samples).

3. Introduce the four “p”s of marketing:

   - Product: High quality, attractive, modern, and diversified.
   - Pricing: Set the right price (to produce a profit but not so high that your customers cannot afford it).
   - Place: You need to be selling at the right location. It should be clean, safe and attractive.
   - Promotion: How do you advertise? Use technology that is readily available. Sometimes word of mouth can be effective; consider the use of information and communication technology (e.g. mobile phones).

4. Value of a brand or a label: Ask students if they would buy a product from a local group rather than from someone they did not know. How could this be used to increase sales? Would their customers prefer locally produced products to imported ones? Would they be more likely to buy fish that was produced sustainably (if this were communicated properly, for example through an ecolabel)? Would they prefer fish from capture fisheries or from aquaculture?

closing activity

DREAM IT!

OBJECTIVES:

Allow students to experience the feeling of a successful business.

TIME:

1 hour.

MATERIALS:

Peaceful music, comfortable setting, pens, paper.

STEPS:

1. Have participants form a circle and sit comfortably on the floor or on comfortable chairs.
2. Tell them to close their eyes and help them visualize their life in 10 years from now – have them envision a successful business outcome.
3. How do they feel? What do they have? What can they see? Hear? Smell?
4. Have them pick a favourite scene and when they open their eyes, they should draw it on a piece of paper.
5. Have them share their vision with others.

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For more information, consult:

- www.kent.ac.uk/careers/interviews/role-play-interviews.htm
- www.salestalentinc.com/sales_situation_interview.php

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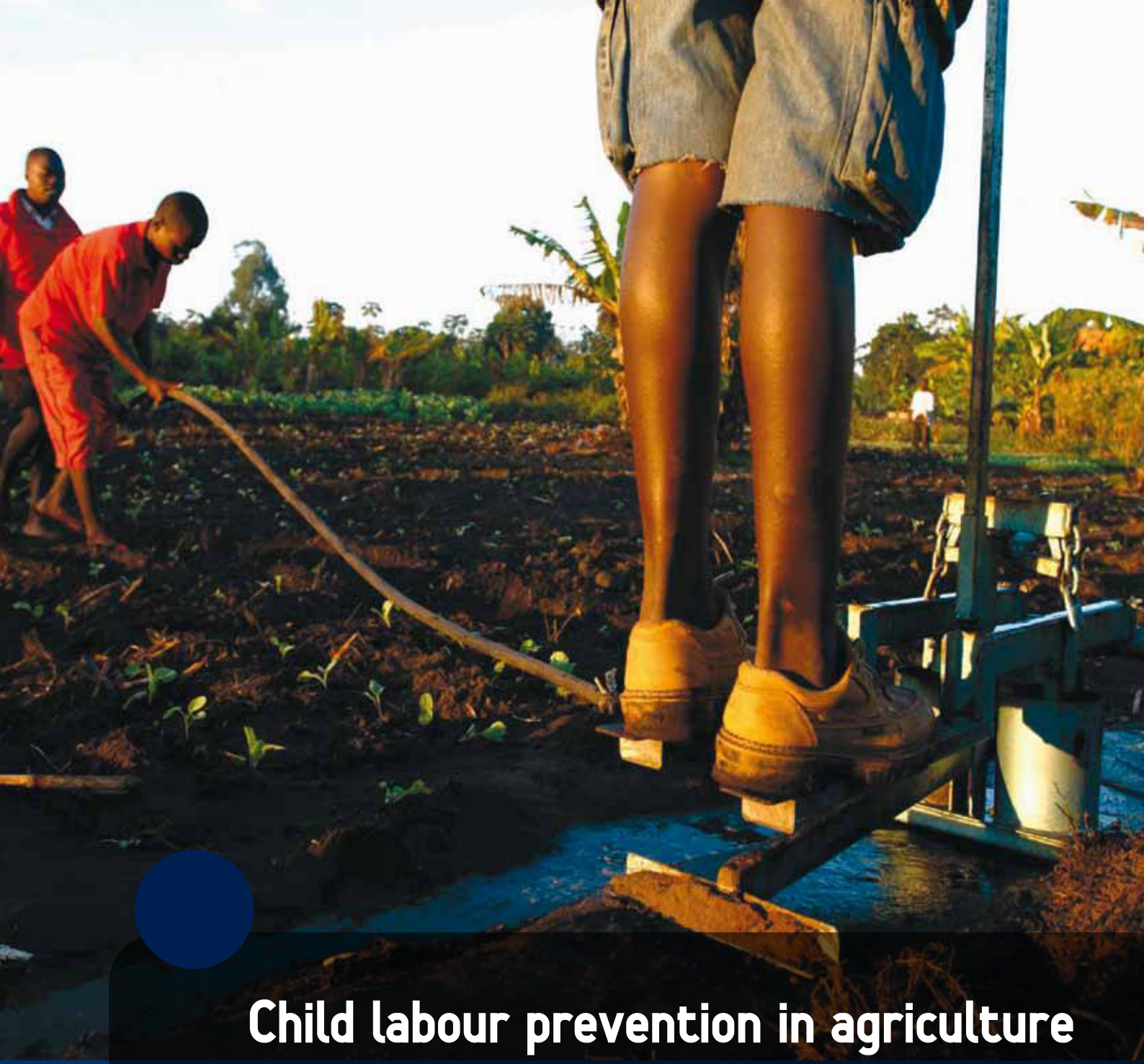

Child labour prevention in agriculture

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Child labour in agriculture

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Foreword

Children's participation in their own family farm activities helps them learn valuable skills and contribute to the generation of household income, which has a positive impact on their livelihoods. Such participation is important for children and builds their self-esteem.

Because of poverty, the breakdown of the family, the demand for cheap labour, family indebtedness, household shocks due to HIV and other reasons, many younger children end up doing work that poses a risk to their physical and psychological development or to their right to formal education. The prevention and mitigation of child labour has always been an implicit element of the JFFLS approach through its emphasis on child protection as a guiding principle and through its aim to promote decent work in agriculture for youth. Furthermore, JFFLS can reduce children's vulnerability to all farms of exploitation, through its linkages to formal school and its focus on achieving food security and by enabling better decision-making skills for participants.

The JFFLS approach so far has not included raising awareness on the harmful effects of child labour or stimulating debate about the topic among children and their communities. However, a key strategy used by the International Labour Organization (ILO) to prevent child labour is sensitization on child labour and its harmful effects on children. This Module suggests a set of exercises that can be done within the JFFLS context. Most exercises are specifically targeted at the JFFLS students, but some of the exercises have been specifically designed to involve the children's guardians.

Special attention is given to training the facilitators. Creating awareness among the JFFLS facilitators is a crucial first step in any effort to mainstream child labour concerns in the JFFLS approach. This Module contains tips for JFFLS coordinators on how to include the topic in the national facilitator's guide and in facilitators' training. It also includes special information and tips for facilitators who are introducing the topic in their JFFLS.

It will become clear that integrating child labour concerns in JFFLS takes more than raising awareness among the participants, or even among the people around them. It also entails consistent efforts to ensure that the JFFLS field activities provide a positive example of children's involvement in agriculture, which is clearly different from child labour. The possible consequences of long working hours, school dropout and work that may pose a hazard to children's health may be particularly relevant in projects where JFFLS promotes entrepreneurship among JFFLS participants or graduates.

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Introduction for the facilitators

↘ Child labour: definitions and standards

International conventions and agreements define a child as a person younger than 18 years of age.

The term "child labour" refers to:

- the engagement of children in prohibited work and activities; that is, work and activities by children that are socially and morally undesirable;
- work that harms children's health or development; stops them from attending school; does not allow them to participate in vocational or training programmes; or limits their capacity to benefit from instruction received.

The "worst forms of child labour" is an appalling category of child labour which has been defined to include all forms of slavery, child trafficking, child soldiers, commercial sexual exploitation, hazardous child labour and using children in illicit activities. Eliminating these worst forms of child labour should receive the most urgent attention, according to the 171 countries who have ratified ILO Convention 182.[1]

Not all children who work in agriculture work in "child labour". Nonetheless, child labour in agriculture is very common. Sixty instead of seventy percent of all children found in different types of child labour are found in agriculture. The number of child labourers working in agriculture is nearly ten times that of children involved in factory work such as garment manufacturing, carpet-weaving, or soccer-ball stitching. The numbers, of course, vary from country to country.

Child labour in agriculture is not confined to developing countries; it is also a serious problem in industrialized countries. All over the world, agriculture can be one of the three most dangerous sectors in which to work in terms of the numbers of work-related deaths, non-fatal accidents and cases of occupational diseases and ill health.

In order to avoid work in agriculture that can be classified as child labour, we must look to what governments internationally have negotiated and agreed about eliminating child labour.

Children under the minimum age for work in their country (14, 15 or 16 years of age depending on the country) are not allowed to work full time in agriculture or any other sector. Children under the minimum age for work should be in school being properly educated.
However, many countries allow children who are aged 12-14 (or sometimes 13-15 depending on the country) to carry out "light work", such as helping around the farm before and after school, on weekends and on school holidays. Light work is defined as work that:[2]

- does not harm children's health or development;
- does not stop children from attending school;
- does not stop children from participating in vocational or training programmes approved by the national authority;
- does not limit children's capacity to benefit from the instruction received.

Once children have attained the minimum legal age for work – 14, 15 or 16 depending on the country – they can be encouraged to enter into agricultural work and be employed full time. However, they must receive proper training, work under safe and healthy conditions and be properly supervised. Table 1 summarizes these minimum ages.

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1 http://www.un.org/children/conflict/keydocuments/english/iloconvention1828.html
2 ILO Convention No. 138 Minimum Age for Employment, Article 7.

Young people (under 18 but over the minimum legal age for work) must not carry out work that is harmful to their health, safety, development and well-being (i.e. hazardous child labour). If the workplace is too dangerous, they are automatically classed as child labourers. In such circumstances, their employment would be illegal, because no child under 18 must carry out hazardous work. They would have to be withdrawn from this work and put into vocational training or alternative employment. The ideal situation, however, would be to keep those children in the workplace and improve their levels of health and safety protection and general working conditions.

Table 1: Minimum age for employment[3]

	Minimum age for admission to employment or work In general	Minimum age for admission to employment or work Developing countries
General	15 years	14 years
Light work	13 years	12 years
Hazardous work	18 years	

3 ILO Convention 138

↘ Aims of this JFFLS Module

The exercises in this Module provide JFFLS facilitators with an opportunity to discuss the topic of children working in agriculture and provide information that could help children and their guardians avoid work that could be described as child labour. The topic of child labour should not be approached in the JFFLS without sensitizing the guardians of the JFFLS students and other members of the community.

This Module helps the JFFLS students and guardians recognize what could qualify as "child labour" and distinguish between agricultural work that helps them learn valuable skills and work that could be described as child labour. Through a serious of discussions, physical exercises, role-playing exercises and case studies, various aspects of child labour are highlighted. On the other hand, appropriate agricultural work under safe and healthy conditions is encouraged and promoted throughout the Module.

The Module focuses on child labour in agriculture, not on other forms of child labour such as in the manufacturing sector, or mining and quarrying. The topic of domestic child labour is touched upon because domestic work often links with agricultural work, particularly for the girl child. However, when using this Module, bear in mind that JFFLS participants can also be recruited to work in mining, quarrying or other hazardous sectors.

The exercises can be undertaken at different points in the JFFLS cycle, although "child labour" should be included preferably in the curriculum as a special life topic. Child labour prevention can also be linked to topics such as "the importance of education", "child protection" or "children's rights".

The exercises in this Module are developed for facilitators. After making any necessary adaptations and after adding the national-specific information, the JFFLS coordinators (or the people in charge of the national facilitator's guide) should include the exercises and the facilitators' notes in the national JFFLS guide. Tips and ideas for the JFFLS coordinators to prepare the Module for JFFLS facilitators are provided in the next section. Ideas on how JFFLS facilitators should prepare themselves before using the Modules are also provided. Sets of facilitators' notes on child labour are included.

↘ Important information for the JFFLS National Coordinator

Preparation is required before you can integrate child labour prevention in your JFFLS programme!

It is important for facilitators to have a clear understanding of the concept of child labour before they start facilitating the topic. Facilitators' notes on child labour are included in the Module; however, the JFFLS coordinator must prepare some national-specific background information on child labour to include in the facilitator training or special "refresher" training. The JFFLS coordinator can use specific exercises in this Module to sensitize the facilitators on the topic and provide them with ideas for their sessions with the JFFLS participants and guardians. Exercises 2, 5, 11 and 12 are useful for sensitizing facilitators.

Country-specific information on laws and national policies should be included in the national facilitator's guide and discussed during the facilitator training. A list of essential information to have at hand about national laws and policies on child labour is provided below. Specifically, the JFFLS coordinator should research answers to the following questions and share them with the facilitators:

- Is there national legislation on child labour? Is there an article in the constitution that prohibits labour that is considered injurious to the health, education or development of children?
- Is there an act or legislation that specifies at what age children and young people can or cannot work? What is the compulsory age for school attendance?
- Has your country passed its own child labour laws that address the issue of child labour and list which child labour practices are considered "hazardous"?
- Is there is a national list of hazardous work and if so, does this list specify certain agricultural practices as hazardous?
- Is there a National Action Plan on child labour?
- Has your country signed key international conventions that ban certain practices of child labour? Key international conventions include the Convention on the Rights of the Child,[4] ILO Conventions No. 138 (Minimum Age Convention), ILO Convention No. 1825 (Convention on the Worst Forms of Child Labour) and ILO Convention No. 184 (Safety and Health in Agriculture Convention).
- What social policies in support of vulnerable children or orphans are being implemented in the districts selected for the JFFLS? Examples could be cash transfer programmes or school bursary programmes.
- What reporting systems are in place for reporting on child abuse? Are there particular confidential "telephone" numbers that can be used to report abuse?

In order to obtain this information, the JFFLS coordinator can contact the relevant authorities (such as legislatures, the government office that deals with employment or labour issues, the International Labour Office or the UNICEF office). It might be possible to invite a colleague (e.g. from the child labour programme of the ILO, an officer from the national child labour unit in the ministry of labour or ministry that deals with children's affairs or individuals who work in non-governmental organizations (NGOs) that focus on child labour or children's rights) to provide input at some facilitator training sessions.

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4 http://www2.ohchr.org/english/law/crc.htm
5 http://www.ilo.org/ilolex/cgi-lex/convde.pl?C182

↘ Important information for JFFLS Facilitators

Preparation is required before you can integrate child labour prevention in your JFFLS!

Ensure that you have received information on your country's child labour laws and policies from your JFFLS national coordinator or master trainer. As a JFFLS facilitator, you can also do your own research with others in the community before you introduce the topic of child labour prevention.

For example:

- Read through this Module to understand what child labour is and what it is not. Background information on child labour is included and scattered throughout the exercises. Remind your coordinator to provide you with country-specific information on laws and policies if you have not already received that information. Think carefully about the positive aspects of agriculture and how to approach the child labour topic without putting people off from agriculture as a livelihood option.
- Local NGOs working on child protection issues might also be able to provide some background information. Ask around to find out who would know about these issues.
- Ask colleagues and agricultural experts to help you make a list of the types of child labour found locally in agriculture. Make a list of the types of agricultural undertakings where children work (e.g. family farms, corporate-run farms, plantations and agro-industrial complexes) and the type of work they do (e.g. scaring or eliminating pests, weeding, working with draught animals, working with agricultural inputs such as fertilizers and pesticides). This will be useful background information when using the exercises in this Module.
- Ask local agricultural officers whether programmes aimed at accelerating agricultural production recognize the issue of child labour. Find out if there are any local provisions that describe how to deal with child labour in agriculture.
- Find out if there are any programmes in your area that aim to promote youth employment in agriculture. Where are the nearest and most accessible vocational agricultural courses? What are the entrance requirements for vocational agricultural courses in agriculture?
- Try to find out who is responsible for responding to cases of child labour in your locality and who can be contacted if child labour is suspected (e.g. district/community social welfare worker).

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↘ Points to consider when tackling child labour issues in a JFFLS

- While focusing on child labour, it is important to ensure that you still encourage the JFFLS participants to consider future employment in agriculture which provides good health, safety and working conditions.
- Make sure that you set a good example about preventing child labour by ensuring that all JFFLS field activities are safe, light and in line with the age of the children who are carrying them out. Always keep the size of the learning field smaller than 1 000 m^2 and involve adults whenever there are heavier tasks to do, such as clearing land or digging holes. The information in this Module will help you distinguish between safe work and potentially hazardous tasks that should only be carried out by adults.
- Involve caretakers and, if possible, teachers and community leaders in raising awareness about child labour. Adults (especially parents and caretakers) often assign work to children and have authority over them; therefore, they must be aware of child labour issues.
- Many of the participants attending the JFFLS may be engaged in child labour. It is important to treat this topic sensitively.
- Your country will have a minimum age for employment for young workers. Know this age and constantly refer to it.
- Always be clear that child labour refers to children under the minimum age allowed to work (i.e. 14, 15 or 16 depending on the country) or young workers under 18 who are involved in hazardous work.
- Highlight that not all work that young children undertake in agriculture is bad for them or would qualify as work to be eliminated. Age-appropriate tasks that are of lower risk and that do not interfere with a child's health, schooling and right to leisure time are a normal part of growing up in rural areas. Children's participation in "light" family farm activities helps them learn valuable skills, build self-esteem and contribute to household livelihoods.
- Acknowledge that there often is increasing pressure for children to be allowed to work to cover living costs and pay school fees. This may affect participants in your JFFLS. You may try to assist the children involved in child labour, and their parents/guardians, by looking for alternative solutions to their financial or social problems. Support might be possible from relatives, NGOs or district authorities.
- Always stress that children are at greater risk than adults in terms of health and safety hazards in the workplace, including in agriculture. The reasons for this are summarized below and are outlined in more detail in Facilitator Notes 2 and 4:
- Agriculture work is considered hazardous for children if the work hours are extremely long and the work is physically demanding (e.g. work under extreme temperatures).
- Cutting tools are frequently used, hazardous substances may be involved and children are exposed to high levels of organic dust.
- Children can be injured by animals as well as machinery and agricultural equipment designed for adults and not for children.
- Working (often barefoot) in fields or around livestock exposes children to cuts, thorn injuries, skin disorders, bites or animal and water-borne diseases.
- A lack of clean drinking water and washing facilities in agricultural fields is another concern.

Sensitizing on child labour issues in agriculture programmes6

Raising awareness about child labour begins with a clear message about the difference between child labour and acceptable work for children. Understanding the distinction between the two is often difficult at first. Parents, guardians and families of working children often think that working on farms from a young age is the only way to transfer farming skills to children and prepare them to eventually take over the management of the farms; however, they are ignorant of the harmful effects of child labour on the physical and emotional development of children. A key message to portray is that education is one of the best ways to break the poverty cycle in families.

- Using drama to raise awareness is highly effective. Dramatic scenes and narratives can connect with the everyday reality faced by parents and guardians.
- Using role models (i.e. former child labourers who once worked on farms but have advanced within their communities through education) appeals to both child labourers and their parents/guardians.
- Sensitizing should focus on the community as a whole, rather than solely on JFFLS participants or their guardians.
- Involve important people in the community such as religious authorities, leaders and legislators. These people must be on board for others to follow and may also be able to influence others.
- If children's guardians see school as a threat to the income-generating activities of child labourers, it may be necessary to integrate income-earning activities in the JFFLS. This allows schools to help particular families and to provide incentives in the form of food or school uniforms.

6 COMAGRI Project Synthesis Paper on Good Practices (ILO-IPEC) Unpublished July 2005

↘ Overview of the exercises

None of the exercises contained in this Module require the participants to be able to read or write. You can adapt all exercises to the local situation, using local agricultural practices and local knowledge.

Exercises for children and their guardians:

- In **Exercise 1,** role play is used to introduce child labour. Four different child labour scenarios are presented for the JFFLS participants to act out, with or in front of their guardians.
- **Exercise 2** gets the participants to brainstorm about when a child is no longer a child and what child labour is and what it is not.
- **Exercise 5** (see below)

Exercises for children:

- **Exercise 3** allows the participants to pretend that they are reporters identifying and filming local situations of child labour in agriculture.
- **Exercise 4** presents a short story about a boy who collapses from having carried 40 kilos; this story can be used for discussion with the participants.
- In **Exercise 5,** we try to draw parallels between the special care that children require with what is already known about caring for animals and plants. This exercise is especially relevant for guardians, but can also be undertaken with the JFFLS participants.
- **Exercise 6** uses three short stories to allow the JFFLS participants to appreciate that situations and opportunities for children are very different and often depend on chance and opportunity.
- A visitor (either an ex-child labourer or an activist working to stop child labour) is invited to talk to the JFFLS participants in **Exercise 7**. The participants are encouraged to prepare questions in advance of the visit.
- In **Exercise 8**, JFFLS participants are encouraged to create a caption for a picture of a child working.
- **Exercise 9** involves using the imagination to document what a typical day would be like for a girl child labourer and a boy child labourer. The focus is on domestic work linked to agricultural work. Gender-related differences can be highlighted during this exercise.
- **Exercise 10** allows the JFFLS participants to mould themselves into "statutes" that illustrate hazardous activities and the injuries to which they may lead.

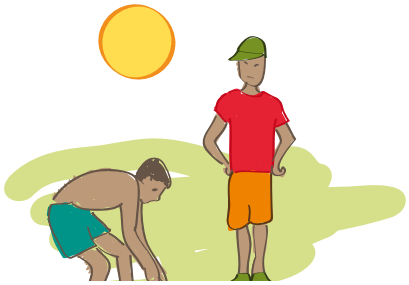
Exercises for facilitators and guardians:

- In a very physical way, **Exercise 11** allows participants to demonstrate whether they agree or disagree with certain statements about children working.
- **Exercise 12** allows facilitators and/or guardians to exchange ideas and information on what can be done to address concrete cases of child labour among their JFFLS participants and/or how to promote children's interest in agriculture as a decent future work option.

Exercises

exercise 1

Role Play



THE OBJECTIVE:
This exercise aims to build awareness among those in the community about the situation of children who are obliged to work instead of going to school.

THE EXERCISE:
Role play is defined as "the acting out of a particular role". More specifically, a role-playing game is a game in which players take on the roles of imaginary characters.[7] In role plays, the participants use their own experience to act out real life situations. Role play is used in this exercise as a learning method to understand the situation and context of child labour. By acting out child labour situations, JFFLS participants have to enter into the characters, understand them and try to reproduce their feelings. Without directly discussing the children's own situations, which can be too confrontational, children can use their own experiences with the topic. The role plays in this exercise can be done for the JFFLS children and in front of the wider community including guardians.

PREPARATION:[8]
Develop some scenarios that can be acted out by two or three participants that relate to a child engaged in child labour. Four examples are provided in boxes on the following pages. These should be **changed or adapted** to suit the local context. Alternatively, ask children to make up their own scenarios.

Remember the following important points:

- Try to avoid only portraying a negative image of work in agriculture or confirming that agriculture is only for school dropouts.
- Make sure that the messages in the role play are in line with local values about children's roles and responsibilities, such as conveying a positive perception of children helping parents.
- A thorough debriefing must follow a role play. This will provide an opportunity for the facilitator and participants to raise new issues. Always follow the role plays with a discussion or debate with the spectators.

Other ways of preparing and introducing the topic of child labour include bringing pictures of children working and asking people to describe what is happening in the picture or introducing poems or songs that deal with the issue of child labour.

7 ILO-IPEC (2002) SCREAM Stop Child Labour Module entitled "Role play" (Author: Nick Grisewood)

8 ILO-IPEC (2005) Training resource pack on the elimination of hazardous child labour in agriculture. Guidebook 2: Overview of child labour in agriculture (Author: Peter Hurst)

Case 1: Dembe and his "uncle"
(two main role players)

Dembe is "loaned" by his parents to live and work on a relative's farm in another part of the country.

The relatives collected him and brought him far away. He heard some discussions between his father and his "uncle" about money owed but he did not understand fully what they were saying.

Dembe does not know the relatives well, and is immediately put to work. His main task is to help prune old fronds from plantains and banana stems. He is using a small branch from a tree with a slit though it at one end, with a knife pushed through the slit at a right angle. All day long he is reaching up with the stick trying to pull downwards on the top side of the frond close to the main stem. After a few days he has pains in his back, waist and shoulders and feels so tired – this job is so tedious. He has many insect bites that itch. At certain times he also assists with cutting and carrying forage.

There is not enough water when he is out in the field. He fears the water is not so clean. He misses his home and misses going to school. He thinks often about how he would prefer to be back in school, but is afraid that he will be behind in school if he doesn't go back to school soon. Dembe decides one day to ask his "uncle" on the farm about his future……

One role player acts out Dembe working

One role player is "his uncle" who comes along to check on what Dembe is doing

Dembe then talks with his Uncle about his future

Case 2: Danso, Lumusi and their mother and father
(four main role players)

A brother (Danso) and a sister (Lumusi) are working on their parents' farm every day after school. They both enjoy the work and often swap stories about friends in school who seem to have made their farms more profitable by planting different crops and investing in different things. Danso and Lumusi often wonder how other families seem to cope. Danso and Lumusi have four younger brothers and sisters. Their parents are really busy and struggling to make ends meet. Their father is not convinced that Danso and Lumusi should both continue going to school as there is so much to do on the farm. They all argue and discuss this together.

Danso and Lumusi try to convince their father that they should continue going to school, and they try to get their mother also to convince him. But it is hard to argue with their father; there is so much to be done and help is needed. Food is scarce and apart from daily needs, the children realize they also need money for school.

One role player is Danso, another is Lumusi and they are both trying to convince their father (another role player). Another person can be the mother, who finds it hard to argue with the father.

Later, Danso is thinking of going to work on a nearby large farm to earn some cash so he does not have to ask his parents for everything he needs for school. Lumusi thinks if Danso does this he won't have time for school at all. Lumusi tries to reason with Danso……

Case 3: Pranab, his father and a foreman
(three main role players)

Pranab, a 12-year-old boy works alongside his dad as a wage labourer. Today they arrive at a large family-held farm with some full-time and part-time employees. A farm owner had come around to their village the evening before saying that he needed help on his farm. Pranab and his father were picked up in a vehicle provided by the farm owner and dropped at the farm.

This morning on the farm, pesticides are being mixed and will be applied later. Pranab is put to work weeding and driving away birds. Children are not allowed to mix the pesticides because they might spill or waste some of them. Pranab's father, who cannot read, is helping a full-time farm labourer handle and mix the pesticides. Pranab can see his father. Although Pranab has had little schooling he has heard that these pesticides can be dangerous and sees that his father is not wearing gloves. He knows someone who developed a bad rash from working on that farm last year. In fact, Pranab remembers small clouds or mists of vapour in the air that were blown towards where he was weeding. He remembers a feeling of suffocation. But Pranab's father is willing to spray.

Pranab goes over to where his father and the foreman are working. Pranab tries to talk quietly about the pesticides with his father, but the foreman overhears and is willing to dismiss them if they don't get on with their jobs……..

One role player is Pranab, weeding and driving away birds

Another role player is Pranab's father mixing the pesticides

A third role player is the foreman who is angry with Pranab's interference

Case 4: Miremba and her grandmother
(two to four main role players)

Miremba's mother died. Her daddy was a fisherman and had a lot of children. The children have not been going to school so their grandmother decided to give them to "relatives".

Miremba is only 11. She now stays with a family, with three small children. The family has a smallholding. The man of the house works somewhere in a nearby town. He makes her feel uncomfortable. His wife has a small stall. She is OK, but gives Miremba too much work to do. Every day Miremba sweeps the house, washes the dishes, does errands, does the laundry, fetches water, prepares meals and cooks. Miremba is also expected to take care of the seedlings, weed and gather snails and pests.

The household has two cows and Miremba also spends time feeding the animals, bringing them to pasture and fetching water for them. She sometimes works about 12 hours a day and never seems to have a break because there is so much to do. Sometimes when bringing the cows to pasture, she chats with a girl who lives nearby who is also a domestic worker. They often discuss the price you can get for milk in the nearby town. The girl told her about making butter from milk.

Recently, Miremba has had a constant sore head and a pain in her back and she has felt dizzy. She cut her finger by mistake with a sharp knife while preparing food and the cut hasn't healed fully yet. It hurts a lot when she lifts things and particularly when she is hoeing and weeding.

Miremba's food and lodging is her payment for all the work she does, and she knows that if she doesn't stay or if she complains, she will be out on the street.

Miremba has not been home since she arrived and she is not sure how long she has been there. Today her grandmother is coming to visit. She doesn't know what to tell her grandmother. Should she tell her about her hand? Surely her grandmother will notice. Should she tell her about the workload being so heavy? Her grandmother arrives……

One role player is Miremba, one role player is the other domestic worker and one role player is Miremba's grandmother

Act out the discussions between Miremba and the other girl

Act out the discussions between Miremba and her grandmother

You can also add in other characters such as the woman Miremba works for and the husband who makes Miremba feel uncomfortable

HOW DOES IT WORK?

1. Introduce the concept of role play. Explain that they will be expected to act out a situation that conveys a child's despair from working. Read and carefully explain the scenarios to the groups of children. Assign roles and set up the role play. To ensure that everyone takes part, develop other characters for each scenario (e.g. employer, guardians, other labourers), even if those roles are small ones.
2. Explain that they are performing the role plays for each other and for their guardians as an audience. They must speak loudly, clearly and slowly. They must apply basic dramatic techniques such as not turning their backs to the audience. They should exaggerate all movements and actions.
3. Give the groups half an hour or more to prepare a short role play based on the scenarios that you have adopted. Allow them to develop the scenarios further if they like.
4. While the groups are working, circulate among them. Sit with each group and make sure that they develop a situation that they can reproduce through role play. Help them allocate roles and develop their script. Help them generate emotions – how do they think their characters would feel about their situation? Help them shape their characters, understand how they would behave and interpret their body language. Overall, help them to enter in to the characters' being and portray them to the best of their ability.
5. Encourage individuals in the groups. Some will be very shy and self-conscious. Try to use some humour to make them feel less self-conscious.
6. When the groups are ready to perform, assemble everyone together, including guardians, into an area that could be the stage. Establish a performance running list. Ensure that all groups watch the others perform. For the first performance, set the climate so that the others know what the situation involves. Introduce the role players in their roles.
7. Each group of players should be given from five to ten minutes to perform their role play. Manage the time.
8. Signal the end of the role play and ask the children to step out of their roles. Thank all the "actors" and ask them how they felt about the role play.
9. Ask the audience for comments. Ask for ideas on what the children in the role plays could do. Ask how the situation relates to the lives of children around them.
10. Lead a discussion about what was going on in the role plays. Summarize main points that were revealed. While the audience is attentive, move on to Exercise 2 – *What is Child Labour?*

REFERENCE:

Adapted from ILO-IPEC (2002) SCREAM Stop Child Labour Module entitled "Role play" (Author: Nick Grisewood), and Activity Six Charades Game pp. 43-44, Gender equality and child labour, A participatory tool for facilitators. Amorim, A., Samouiller, S. Badrinath, S. & Murray, U. (2005) ILO/ IPEC Geneva.

exercise 2:

What is child labour?

OBJECTIVE:
This exercise helps children and guardians brainstorm on the topic of child labour to identify what is meant by the term "child labour".[9]

PREPARATION:
Read *Facilitators' Notes 1: Basic facts about child labour* (shown below) before conducting this exercise.

Locate national background information on child labour as suggested in the introductory notes section of this Module.

HOW DOES IT WORK?

1. Begin by asking the very simple question: *Who is a child*? Follow up with: *At what age do you think a person is no longer a child*?.

> **Note:** Different answers will be given (e.g. when someone passes through an initiation ceremony, reaches puberty, gets married, begins work, leaves home, becomes orphaned, finishes school). It will be necessary to link to the national legal definition of a child to avoid confusion. Usually a child is defined as an individual under the age of 18 years.

Article 1 of the United Nations Convention on the Rights of the Child states that a "child" means every human being below the age of eighteen years, unless the law applicable to the child specifies that majority is attained earlier.[10] Find out what the country's national constitution says.

2. Follow this question by asking the participants if they know of work in agriculture that children do which stops them from attending school or makes them too tired to perform well. Encourage the participants to be somewhat precise about the duration and nature of the activity (e.g. weeding every day for several hours; herding animals from dusk until dawn, scaring birds the entire day during school hours). Write the various activities on a chalkboard or flip chart.
3. Ask the participants to mention activities which are carried out by children and which make them feel very tired, weak or even sick or which can cause injuries (e.g. spraying pesticides, carrying heavy loads or weeding for long hours). List these activities separately on a flip chart or board.

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9 From ILO-IPEC (2005) Training resource pack on the elimination of hazardous child labour in agriculture. Book 2 training course activities for farmers (Author: Peter Hurst) and ILO-IPEC (2002) SCREAM Stop Child Labour Module entitled "Basic Information" (Author: Nick Grisewood)

10 http://www.unhchr.ch/html/menu3/b/k2crc.htm

4. Ask the participants to describe activities often done by children which are good for them and from which they learn important skills. Examples could be helping parents harvest or weed for a few hours in the weekend or learning activities on the JFFLS field. Also write down these activities.

5. Review the three different lists and explain that we usually use the word child labour (or the local equivalent of the term) to describe the type of work mentioned on the first two lists. You can use the information below as well as the information in *Facilitators' Notes 1*.

> **Note:** Broadly speaking, the term "child labour" refers to the engagement of children in work and activities that are socially and morally undesirable.[11]
> **For example, work could be child labour if the child is:**
>
> - working all the time instead of being in school;
> - engaged in tasks that are overwhelming for long periods;
> - working very late at night;
> - working under very bad conditions (e.g. no food or water or extreme heat);
> - working under duress (e.g. being beaten or forced to work);
> - working but pay is being given to someone else.
>
> For more detail, see *Facilitators' Notes 1: Basic Facts about Child Labour.*

6. Start a discussion with the children and their guardians. Use the following questions to stimulate the discussion:
   - When child labour is discussed locally, what age do people think about?
   - Do they think about boys or girls or both?
   - Where does child labour exist? In which parts of our country or in which districts or among which groups of people?
   - Are child labourers paid? Can they also do unpaid work?

7. Summarize and try to ensure that everyone is clear about what child labour is and what it is not.

11 ILO-IPEC (2008) Training resource pack on the elimination of hazardous child labour in agriculture. Book 1 A trainer's guide. revised edition. Author: Peter Hurst.

Notes about child labour

Children carry out many different tasks and activities. Some are chores.
Some are difficult and demanding. Some are more hazardous and morally wrong.

However, not all work done by children should be classified as child labour which is to be targeted for elimination.

Children's or teenagers' participation in work that does not affect their health and personal development or interfere with their schooling is generally regarded as being something positive. This includes activities such as:

- helping parents or guardians;
- assisting in a family business; or
- earning pocket money outside of school hours and during school holidays.

These kinds of activities contribute to children's development and to the welfare of their families. These activities provide children with skills and experience and help them prepare to be productive members of the community when they become adults.

The term **"**child labour**"** is often defined as work that deprives children of their childhood, potential and dignity and that is harmful to their physical and mental development.

Child labour refers to work that is mentally, physically, socially or morally dangerous and harmful to children and interferes with their schooling by:

- depriving them of the opportunity to attend school;
- obliging them to leave school prematurely; or
- requiring them to attempt to combine school attendance with excessively long and heavy work.

In its most extreme forms, child labour involves children being enslaved, separated from their families, exposed to serious hazards and illnesses and/or left to fend for themselves on the streets of large cities – often at a very early age.

Whether or not particular forms of work can be called "child labour" depends on:

- the child's age;
- the type and hours of work performed; and
- the conditions under which it is performed.

The answer varies among countries and among sectors within countries.[12]

12 Source of information: ILO-IPEC http://www.ilo.org/ipec/facts/lang--en/index.htm

8. Ask the groups whether they think the following would be considered child labour situations or not:

   - A 12- year-old child minds his baby sister for two hours after school. (No)
   - A 9-year-old girl moves to a relative's house. She has to help out with the housework and doesn't go to school anymore. (Yes)
   - A 10-year-old child spends all day working in the fields every day of the week. (Yes)
   - A 13-year-old boy accompanies his father on fishing trips for 2-3 days mainly during the school holidays. (No, as long as the fishing trips do not regularly interfere with his school attendance.)
   - A 15-year-old is hired to spray any type of pesticides without protective clothing and does not have nearby washing facilities. (Yes)

Facilitators' Notes 1:

Basic facts about child labour[13]

What is a child?
The term child usually applies to all persons under the age of 18.

What is child labour?
Child labour is a worldwide phenomenon. Millions of children around the world carry out work that harms their well-being and hinders their education, development and future livelihoods. Child labour is work which, by its nature and/or the way it is carried out, harms, abuses and exploits the child or deprives the child of an education.[14]
Child labour takes many different forms. It is a priority to eliminate without delay the worst forms of child labour.

What are the worst forms of child labour?
ILO Convention 182 defines the worst forms of child labour as follows:[15]

(a) all forms of slavery or practices similar to slavery, such as the sale and trafficking of children, debt bondage and serfdom and forced or compulsory labour, including forced or compulsory recruitment of children for use in armed conflict;

(b) using, procuring or offering a child for prostitution, for the production of pornography or for pornographic performances;

(c) using, procuring or offering a child for illicit activities, in particular for producing and trafficking drugs as defined in the relevant international treaties;

(d) work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children. This is often referred to as hazardous child labour.

What is hazardous child labour?
Hazardous child labour is work in dangerous or unhealthy conditions that could result in a child being killed or injured (often permanently) and/or made ill (often permanently) as a consequence of poor safety and health standards and working arrangements.[16] [17] Types and forms of hazardous work must be determined by the relevant authorities in each country. Most countries create a legally enforceable national list that identifies where hazardous work is found and create measures to prohibit or restrict such work for children.

13 ILO-IPEC (2005) Training resource pack on the elimination of hazardous child labour in agriculture. Book 1 A trainer's guide, as revised in 2009.
14 Trade Unions and Child Labour Pack, ILO ACTRAV, Geneva, 2000, Booklet No. 2: Union policies to combat child labour, p. 3
15 As defined by Article 3 of ILO Convention 182
16 Subparagraph (d) of Article 3 of ILO Convention No. 182 on the Worst Forms of Child Labour
17 A future without child labour Global Report under the follow-up to the ILO Declaration on Fundamental Principles and Rights at Work 2002 Para 26 Page 9

Hazard means anything with a potential to do harm. **Risk** refers to the likelihood of potential harm from that hazard being realized. Examples of **hazardous work** include:

- carrying heavy loads;
- performing heavy workloads (i.e. too much work for a child's age);
- working during night time;
- working with moving machinery;
- working with pesticides and other toxic substances.

Hazardous work must not be carried out by anyone under 18, with certain reservations. (Do you want to specify what those reservations are? The phrase raises a question in the reader's mind.)
The UN Convention on the Rights of the Child (CRC) provides a comprehensive overview of the rights of children as well as the actions of duty-bearers to guarantee these rights. Some of the rights for children set out in the CRC include: being protected from economic exploitation; being protected from performing any work that is likely to be hazardous or interfere with the child's education or be harmful to the child's heath and physical, spiritual, moral or social development; and having the right to education. The CRC urges state parties (those that have ratified the CRC) to take legislative, administrative, social and educational measures to ensure CRC implementation by providing for:

- a minimum age or minimum ages for admission to employment;
- appropriate regulation of the hours and conditions of employment;
- appropriate penalties or other sanctions to ensure effective enforcement.

The ILO Minimum Age Convention (No. 138) obliges states that ratify the Convention to fix the minimum age for admission into employment. Three categories for minimum age are established:

- The minimum age should not be less than the age of completing compulsory school, and in no event less than 15 years of age. Countries whose economies and education facilities are insufficiently developed may initially fix the age of admission to employment at 14.
- A higher minimum age of 18 is set for hazardous work.
- A lower minimum age for light work may be set at 13. For a country that initially sets a minimum age of 14, the minimum age for light work may be set at 12.

Many countries have a minimum age requirement for admission to employment or work; it is often fixed at 14, 15 or 16 years. "Young workers" are those below age 18 who have reached the minimum legal age for admission to employment and are therefore legally allowed to work under certain conditions.

Young workers (below 18 years but above the minimum age of 14, 15 or 16) must still not be engaged in hazardous work. If they are involved in hazardous work, they would be classed as child labourers, and not as young workers. Their employment under such hazardous conditions would be in breach of the law.

The African Charter on the Rights and Welfare of the Child outlines issues around child labour in Article 15:

1. Every child shall be protected from all forms of economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's physical, mental, spiritual, moral or social development.

2. States Parties to the present Charter take all appropriate legislative and administrative measures to ensure the full implementation of this Article which covers both the formal and informal sectors of employment and having regard to the relevant provisions of the International Labour Organization's instruments relating to children, States Parties shall in particular:

a) provide through legislation, minimum wages for admission to every employment;
b) provide for appropriate regulation of hours and conditions of employment;
c) provide for appropriate penalties or other sanctions to ensure the effective enforcement of this Article;
d) promote the dissemination of information on the hazards of child labour to all sectors of the community.

National action to stop child labour:
Many governments have agreed to design and implement programmes of action to eliminate the worst forms of child labour.[18] Various groups play different roles in eliminating child labour. These include government departments, labour inspectors, the police, the judiciary, district assemblies, community leaders, child protection committees, trade unions, NGOs, the media, parents and guardians. For child labour in agriculture, it is important that agricultural officers, agricultural extension agents and others are also involved. There is a need for improved coordination and networking among all these bodies.

What is not "child labour"?
Acceptable work for children is work that does not affect children's health and personal development or interfere with schooling. Examples include helping parents care for the home and the family, assisting in a family business or farm or earning pocket money outside school hours or during school holidays. Such work contributes to children's development and to the welfare of their families. It provides them with skills, attitudes and experience and prepares children to be useful and productive members of society later in life.

National laws or regulations may permit employing people 13 to 15 years of age (or 12 years of age in developing countries) to do light work which:

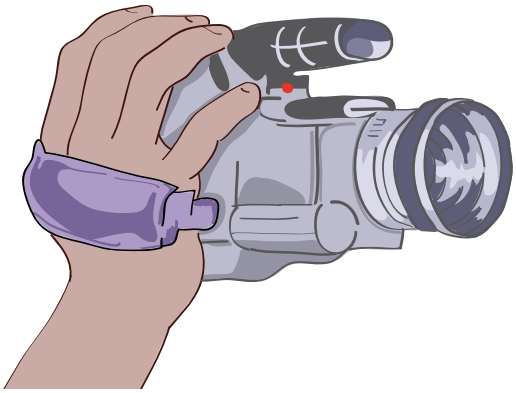
- is not likely to be harmful to their health or development; and
- is not such as to prejudice their attendance at school, their participation in approved vocational or training programmes or their capacity to benefit from the instruction received.

A thin line exists between allowable forms of work and child labour. Sometimes acceptable work can deteriorate into child labour depending on the child's age, the type of work performed, the conditions under which it is performed, the objectives of the person giving the work and whether the work is supervised by an adult or not.

18 Who have signed the Worst Forms of Child Labour Convention, (ILO Convention number 182)

exercise 3

What do children do in agriculture?



OBJECTIVE:
This exercise gets children to identify agricultural tasks that could be classified as hazardous child labour; it also tries to encourage proper, safe and potentially financially rewarding work in agriculture that will help youth earn a livelihood in the future.

THE EXERCISE:
In this exercise, the participants imagine they are reporters for a TV station.[19] Through mime and imagination, children recall and identify agricultural tasks in which children are engaged and they discuss the dangers involved.

PREPARATION:
This exercise can only be done after facilitators have gone out to see what is happening in the nearby countryside and villages. Are there children working who could be classified as child labourers? This exercise links back to other JFFLS topics (e.g. "analysing field conditions"). However, in this exercise we stress analysing those working in the field, rather than analysing what is growing. Throughout this exercise, try to encourage the children to use their own local knowledge, referring as much as possible to agricultural work that goes on locally.

HOW DOES IT WORK?
1. Ask the participants to think back on how they learned to analyse field conditions for growing crops. They will now analyse the conditions of those who are working in those fields, focusing on children.

2. Ensure that the participants are sitting comfortably and relaxed. Ask the participants to imagine that they are working as reporters for a TV station and are in the back of a four-wheel drive vehicle videoing local farming methods. Tell them that if they make a good film, with good close-ups and a lot of variety, they will get it screened and get paid lots of money. They must be careful to zoom in on different agricultural activities going on around them. Their producer is particularly interested in what children are doing in the fields.

3. Start by asking them to film the people they see working in the fields. If they can't see from the four-wheel drive vehicle, tell them to zoom in and move the camera slowly. After the participants settle down a bit, in a very quiet voice (to keep the tempo down in the classroom) pretend you are the driver of the four-wheel drive vehicle by asking some or all of the following questions

19 If you are in an area where the children have never been exposed to TV or seen a camera, adapt this exercise to "showing a visitor around the local area".

(the children do not have to answer out loud). The children must try to imagine what they see in the fields, but at this point they do not have to say anything about what they imagine.

Questions to stimulate the imagination

What is the temperature like? Is it hot or cold outside? Is it hot in the nearby field?

Are there certain times of the day when it is hotter or colder? Do people go to the fields during that time? How long do they stay in the fields?

Who is working? Is it women or men, boys or girls?
What are they wearing? Do they have footwear?

At this time of the year, what is going on in the fields (e.g. land preparation; spreading compost and manure; planting; weeding; harvesting)?

Is anyone using animal draught power? What sort of animals or carts? Are there any tractors in the location? Who is driving them?

Overall what tools are available (e.g. ploughs, ox-cultivators, row markers, planters, long- or short-handled hand hoes, axes, picks, spades, forks, pruning tools, harvesting tools, machetes, knives, scythes, sickles, rakes)?

Who uses cutting tools?

Who is manually handling, carrying, pushing, pulling and moving loads?

If it is spraying time, who is spraying?

What animals can they see?
What are these animals for?
Who is looking after these animals?
Who moves animals from one place to another?

Which “wild” animals live nearby? Are there any snakes or insects that bite?

Where are the nearby water sources (e.g. river, stream, ground water, wells, pumps, reservoirs)?
What is water used for in the fields and who collects it (e.g. irrigation, drinking, washing)?
How far does the water have to be carried and who carries it?

4. Tell the children that they must now park and report back. Ask them to think about the different tasks they filmed and what children were doing. Ask each child to give some feedback or a report.
5. What activities did they film which will help children learn valuable skills that may be helpful in the future?
6. What activities were children doing that looked like they were safe?
7. Go back to what the children said about child labour in Exercise 2. What do they think could be dangerous for children in the fields? Go around the group and ask each child to list one agricultural task that could be dangerous for children. Some children may have stories about children who were hurt. Ask them to share those stories.
8. Begin a discussion on how to avoid dangerous tasks for children.

Facilitators' Notes 2:

Health and safety problems in agriculture[20]

Children are more vulnerable than adult workers in performing agricultural work because of a combination of physical, psychological and social reasons. This section describes some of the potential risks and hazards and the effects of working in agriculture on children. See also *Facilitators' Notes 4: Why children are at greater risk than adults.*

Not all children are exposed to all the risks and hazardous outlined below. It is also true that children who do not work in what is defined as "child labour" still can be exposed to some of these risks.

It is always important to bear in mind that the consequences of some health and safety problems do not develop, show up, or become disabling until the child is an adult. This aspect of permanent long-term disability or incurable disease must be factored in when considering the long-term effects of working as a child labourer. Examples would be long-term musculoskeletal problems resulting from having carried heavy loads as a child and cancer or adverse reproductive effects resulting from exposure to pesticides, industrial chemicals or heavy metals as a child worker.

A wide range of hazards and risks
Child labourers are at risk from a wide variety of biological, physical, chemical, dust, machinery, ergonomic, welfare/hygiene and psychosocial hazards, and from long hours of work and poor living conditions. Although technological change has brought about a reduction in the physical drudgery of agricultural work in some areas, it has introduced new risks associated with the use of sophisticated machinery and the intensive use of chemicals, especially pesticides, without appropriate safety and health measures, information and training. Poorly designed tools, difficult terrain and exposure to the elements, combined with fatigue and, often, malnutrition, increase the risk of accidents. The levels of fatal and serious accidents and illnesses are high.

Climate and geography
Agricultural work is carried out mostly in the countryside. Child labour in rural settings is directly conditioned by the characteristics of local climate and geography. Most agricultural work is conducted in the open air and consequently agricultural workers are affected by changes in the weather. Agriculture work involves working in extreme temperatures and climatic conditions (conditions that can be hot and humid but also cold and damp). This can result in children working in extreme temperatures – ranging from hot sun to cold, wet conditions – without suitable clothing or protective equipment.

Children often lack suitable warm clothing or footwear. Low temperatures and a lack of warm, dry clothing can result in chilblains and hypothermia. Wet, swampy and soggy working conditions also increase the risk of respiratory infections and foot rots.

In hot conditions, children may get dizzy from dehydration because they do not have access to drinking water. Heat stress is greater in children because their sweat glands are developing. Expo-

20 From ILO-IPEC (2008) Training resource pack on the elimination of hazardous child labour in agriculture. Book 1 A trainer's guide, revised edition (Author: Peter Hurst).

sure to sun can cause burning, premature ageing and increased likelihood of skin cancers.

One of the most distinguishing characteristics of agricultural work is that it is carried out in a rural environment where there is no clear boundary between working and living conditions. Because agricultural workers and child workers live where they work, they face extra dangers such as exposure to pesticides from spray drift and pesticide-contaminated water and food.

Hours of work
Work hours can be extremely long during planting, harvesting and weeding periods. Especially during certain seasons, fieldwork can go from dawn to dusk, without even including transport time to and from the fields. The intensity of the work offers little chance for rest breaks. The length of the working day does not give children enough time for recuperation or for leisure time. Working from dawn to dusk can impact health and growth. Adolescents may need as much or more sleep than younger children (up to 9.5 hours a night). Tiredness results in poor judgement in undertaking tasks, often leading to a temptation to take dangerous shortcuts. Not having enough sleep also results in bad moods and being irritable. Even if children attend school, they will not be able to concentrate.

Children are not suited physically to long hours of strenuous and monotonous work. Children's bodies suffer the effects of tiredness because they spend energy faster than adults. Many children also suffer from malnutrition because of inadequate food intake, which lowers their resistance and makes them more vulnerable to illness.

Physically demanding work
Much agricultural work is physically demanding and strenuous; it may involve long periods of standing, stooping, bending, repetitive and forceful movements in awkward body positions and carrying heavy or awkward loads (e.g. baskets, bundles of crops, water containers), often over long distances. These types of activities can harm children's musculoskeletal development and may result in permanent disability. See *Facilitators' Notes 3: Carrying heavy loads.*

Cutting tools
Child labourers often use cutting tools – machetes, knives, scythes, sickles – to cut crops, hay, weeds and bush wood. The machete is the tool that is most commonly used by less-skilled workers on the farm or plantation. Many injuries are machete-related, ranging from minor cuts to severed body parts. Repetitive and forceful actions associated with cutting can also harm children's musculoskeletal development.

Harvesting hazards
Child labourers are often used to harvest crops, and they may fall off ladders or even out of trees while picking high-growing fruit. Fruit pods falling from trees also may injure children. Many of the crops they work with are abrasive, prickly or irritating and children can suffer skin problems such as allergies, rashes or blistering.

Fall hazards
There is a risk of falling from heights, such as working platforms, and into wells, pits or storage structures. Falls often result from climbing on or off carts or wagons or climbing trees to harvest fruit. There is also a danger of being hit by falling objects.

Transportation hazards
Child labourers can be at risk of being killed by a tractor overturning or being hit by tractors, trailers, trucks and heavy wagons used to transport farm produce from the fields. In Australia and the United States, for example, boys as young as 7-9 years old are driving tractors on farms, and by those ages many more are already riding on tractors as passengers. In other cases, child labourers may be killed or injured when they climb on or off trailers or other machines while they are still in motion and then slip or miss their footing and fall under the machine.

Machinery
In many countries, child labourers can work around, or even operate, powered machinery and equipment (e.g. power take-off shafts, grain augurs, balers, slurry tankers and other large farm machinery) and are at risk of being entangled or dragged into the machinery. Entanglement from walk-behind mowers can pull a child into the machine. Noisy machinery may also be a problem for child labourers, and excessive exposure to noise can lead to hearing problems in later life.

Tools, machines and equipment are often designed without considering that people of different heights, shapes, sizes and degrees of strength will be using them. Children using tools designed for adults run a higher risk of hurting themselves. Traditional agricultural tools and methods require high human energy input. Protective equipment does not fit children. However, designing tools for child workers would signal the recognition of children's work as legitimizing child labour.

Hazardous substances
Pesticides, chemical fertilizers, veterinary products and general commodity chemicals are all used in agriculture. Pesticides which are commonly used in agriculture in some countries are sometimes banned or severely restricted in other, more industrialized countries.

Labour-intensive crops are extensively treated with pesticides. Many child labourers also mix, load and apply pesticides which are toxic products; some of these are extremely poisonous and potentially carcinogenic and can harm female and male reproduction later in life. Children often apply chemical fertilizers with their bare hands or by using a spoon. Some children stand in the fields where pesticides are being aerially sprayed, holding flags to guide the spray planes as they swoop low over the fields. Lack of proper pesticide storage facilities or systems for disposing of empty pesticide containers can result in child poisonings or even deaths when containers are used for other purposes (e.g. to hold drinking/cooking water or for children to play with the empty, unwashed drums and bottles).

Even if children are not involved in mixing and applying pesticides, they are at risk from contamination from spray drift or from not observing pesticide re-entry intervals. Contaminated soil and water is another health and safety risk children face. Pesticides may enter the body through the skin, by inhalation and by ingestion. Child labourers can be exposed to pesticides in a variety of ways:

- opening or handling pesticide containers;
- diluting, mixing and applying the substances;
- being exposed to spray drift from being nearby when crops are sprayed;
- being contaminated when acting as field markers for aerial spraying;
- contacting residues on plant leaves or on the soil surface during weeding, pruning and harvesting (especially if working barefooted, or if they re-enter the field before the appropriate re-entry interval);
- eating and drinking in the field;
- using water that may be contaminated for drinking, bathing, cooking or washing clothes.

Exposure to pesticides can result in immediate and long-term health effects. The impact on health of pesticide exposure depends on a variety of factors. Such factors include the type of pesticide involved, its toxicity, the dose/concentration, the timing and length of exposure and the way in which exposure occurs.

Health impacts include acute poisoning (ranging from mild to severe) including skin, eye and lung irritation, breathing difficulties, nausea, vomiting, loss of consciousness, sensory perception problems and heart symptoms. In some cases, exposure may be fatal. Generally, those poisoned will recover following medical treatment.

Long-term chronic health effects include:

- reproductive problems (e.g. birth defects, spontaneous abortions, stillbirths, lower birth weights and early neonatal deaths);
- inappropriate hormonal activity (i.e. endocrine disruption). Although there are no data to demonstrate adverse effects on normal hormonal development, there are concerns that chemical exposures can alter the delicate balance of hormones during adolescence;
- an increased risk of developing cancer during one's lifetime having been exposed to carcinogens during childhood;
- a weakened immune system, particularly in growing children, which increases the risk of infectious disease and cancer.

Other health effects include skin diseases (dermatitis), tiredness, headaches, sleep disturbances, anxiety, memory problems, blood disorders and abnormalities in liver and kidney function.

Dry, chemical fertilizers (which absorb moisture) can draw moisture from the skin and cause burns and irritation of the mouth, nose and eyes. Liquid fertilizers also need to be carefully handled because they are in a highly concentrated form. Nitrogen, a basic ingredient in artificial fertilizers, results in one of the most serious water quality problems in the world. Nitrites in the body interfere with the blood's ability to carry oxygen to the body tissues. Fire is also a risk with all types of fertilizers.

Animal medicines (or veterinary products) are often in reality pesticides and require special storage to avoid children's access. Syringes and needles, dosing guns, flutter valves and tail and ear tags all require safe storage and proper training in order to minimize risks, such as needle stick injuries.

Other commodity chemicals that come in bulk containers contain caustic materials. Powerful disinfectants used in livestock production, acids for straw and silage treatment and acids and solvents for cleaning grass and machinery can release fumes while being mixed.

More studies on the effects of pesticides and fertilizers are urgently required.

A lack of clean water

A lack of clean drinking water, hand washing facilities and toilets, especially when working in the fields, pose other hazards to adult and child labourers. This increases the risk of spreading parasites, dermatitis, urinary tract infections, respiratory illness, eye disease and other illnesses. A lack of washed, clean clothing is also a problem.

Exposure to organic dust

Agricultural workers, including children, are exposed to a wide variety of animal and crop dusts, fibres, mists, fumes, gases, vapours and micro-organisms which can cause respiratory, skin or eye problems.

Allergic respiratory diseases – such as occupational asthma and hypersensitivity pneumonia – result from allergic reactions to animal or crop dusts. Child labourers often are exposed to high levels of organic dust when harvesting crops or preparing feed for farm animals. Plant material produces very fine vegetable dust. Vegetable matter may contain biological contaminants (e.g. bacteria, moulds or mites) or pesticide residues. Animal material, such as feathers or wastes, may also cause similar types of diseases as plant materials. Many allergic reactions accumulate gradually and can appear weeks or even years after exposure started; they may even result in chronic lung disease

The most common type of agriculture-related skin disease is dermatitis (i.e. irritant contact dermatitis). Skin reddens and swells, pimples or blisters may appear. A chronic form may result in thickening and hardening of the skin and severe dryness. This form of dermatitis can be caused by crop dust, vegetable and bulb plants, animal feeds, pesticides, machinery oil and grease or solvents for de-greasing.

Certain flowers produced in ornamental floriculture often cause a reaction. Exposure to certain "sensitizers" in these flowers or other vegetables can produce allergic contact dermatitis. For example, artichokes, brussel sprouts, cabbage, celery, chicory, chive, endive, garlic, horseradish, leek, lettuce, okra, onion and parsley have been reported to contain vegetable allergens and to sensitize vegetable workers. Also, chrome contained in rubber boots or gloves, veterinary antibiotics, pesticides, disinfectants and soaps cause adverse reactions in some individuals.

Animals

Children frequently herd, shepherd and/or milk farm animals. Child labourers are frequently injured by being jostled, butted, gored or trampled by farm animals, especially because many child labourers work barefoot. Children in pastoral communities may spend many months in remote, isolated areas looking after the herds and doing heavy work such as watering livestock. They often cover long distances searching for water.

Children working with animals are at risk of catching diseases (zoonoses) from farm animals, wild animals or micro-organisms (e.g. rats are commonly associated with farm yards, livestock houses/enclosures and ditches). Such diseases can be contracted through contact with animals (e.g. insects, mites, parasites) or animal carcasses or by working in or near livestock houses and stabling areas. Animal disease (e.g. bacteria, fungi, viruses, protozoa and rickettsias – a bacteria carried by ticks or parasites) can pass from animals to children from contact with animals or animal products.

Cuts, bites and diseases

Children who work barefoot in fields or around livestock are exposed to cuts, bruises, thorn injuries, skin disorders or even water-borne diseases, especially where soils are wet and sticky or deliberately flooded, as in the case of rice cultivation. In rural areas, there is also constant danger from insects, reptiles and other animals. Children are vulnerable to snake and insect bites, and in some cases, attacks by wild animals. Many children are bitten by snakes or stung by spiders, scorpions, centipedes, hornets, wasps, bees, mites and mosquitoes. Children are also exposed to bloodsucking creatures like leeches.

Bites, scratches, stings and thorn punctures also damage the skin and provide a way for disease to enter the body (e.g. tetanus).

Welfare

Accommodations for migrant agriculture workers often are extremely basic and makeshift; they may be built from pieces of plastic, wood or cardboard or may be other forms of unheated dwellings. Children in such accommodations sleep with poor ventilation; they also have poor sanitary facilities and non-potable drinking water, which increase the spread of diseases. Child care is also an issue. Parents bring their children to the fields, so young children and toddlers are exposed to the same hazards as their parents and older siblings.

Sexual harassment (i.e. unwelcome conduct of a sexual nature) and violence at work are other dangers children face. This vulnerability to sexual exploitation/harassment also exposes them to the risk of infection by HIV/AIDS and other sexually transmitted diseases.

Other hazards or risks for children

Many agricultural workers are exposed to drug addiction because of the strenuous nature of their work. Stimulants, such as "khat", contain a number of chemicals and, when chewed, alleviate tiredness and reduce the appetite. Overuse of such stimulants may result in manic behaviour and paranoid illnesses.

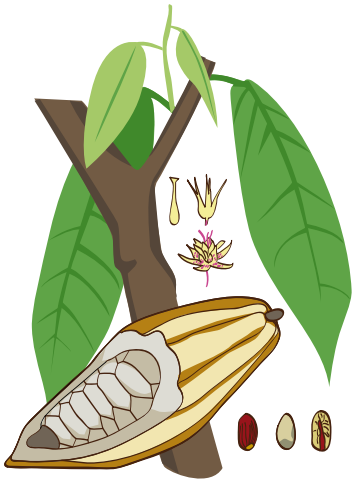
REFERENCES:

Information on the specific hazards and risks to child labourers in agriculture come from the ILO-IPEC training resource pack on the elimination of hazardous child labour in agriculture. Guide Book 3: Additional resources for trainers (Author: Peter Hurst)

Health and safety risks of children involved in cocoa farming in Ghana. ILO: IPEC West Africa cocoa agriculture project (WACAP, 2005. pp. 30-34).

exercise 4

Carrying heavy loads[21]



Story about carrying a heavy load[1]

There was a cocoa farmer named Adeniyi who had a 13-year-old son named Kolawole. Adeniyi took his son and went to farm to harvest his cocoa.. After harvesting and breaking the pods, Adeniyi loaded cocoa beans into bags weighing approximately 40 kilos each. Adeniyi carried these bags himself and also expected Kolawole to carry them. Although the cocoa was too heavy for Kolawole, he did not complain since his father carried bags himself. He also felt he should obey his father out of respect.

After some time, Kolawole collapsed one day while carrying a load a long distance. Adeniyi picked the boy up and rushed him to the clinic. The doctor examined Kolawole and found that he had sustained a spinal injury.

1 ILO-IPEC (2005) Training resource pack on the elimination of hazardous child labour in agriculture. Book 2 training course activities for farmers.

OBJECTIVE:
This exercise helps the JFFLS participants understand that carrying a heavy load might be dangerous and guides them in discussing how they can avoid harming themselves by not carrying something that is too heavy.

THE EXERCISE:
Through listening to a short story about a boy carrying a very heavy load, the participants will examine one type of work activity that should not be carried out by children.

PREPARATION:
Read through and adapt the short story below to the local context.

Read *Facilitators' Notes 3: Carrying heavy loads.*

HOW DOES IT WORK?

1. Tell the JFFLS participants you are going to read a short story. Ask them to sit back and listen to the story below. This story can be adapted to suit the local conditions.
2. Ask the JFFLS participants how heavy they think 40 kilograms is. Would Kolawole weigh more or less than 40 kgs himself?
3. Ask them why they think Kolawole collapsed.
4. Get them to discuss why they think carrying a heavy load is risky for Kolawole. You can use *Facilitators' Notes 1: Basic facts about child labour.* Guidance for governments on hazardous child labour activities includes the transport of heavy loads. [22]
5. Ask them who they think is responsible for the injury to Kolawole.
6. Do they think Adeniyi carried heavy bags when he was a child?
7. Ask them to think about how to avoid carrying loads that are too heavy. Can they find ways to make the load lighter? Can they ask help from other, older youths or adults in order to share the load?

21 ILO-IPEC 2005 and ILO-IPEC (2002) SCREAM Stop Child Labour Module entitled "The Image" (Nick Grisewood). ILO-IPEC (2005) Training resource pack on the elimination of hazardous child labour in agriculture. Book 2 training course activities for farmers.
22 Accompanying Recommendation (190) to ILO Convention No. 182.

Facilitators' Notes 3:

Carrying heavy loads

agricultural labour often involves carrying heavy loads, which puts a strain on young bodies. Carrying heavy and awkward loads, doing repetitive actions, bending, stooping and being in an uncomfortable posture can cause many musculoskeletal disorders.

Musculoskeletal disorders include a group of conditions that involve nerves, tendons, muscles and intervertebral discs. Disorders can include: strains; carpal tunnel syndrome (with numbness and muscle weakness in the hand); tenosynovitis (swelling with fluid around a tendon, resulting in pain and difficulty moving the joint); tension neck syndrome; swelling of the wrist, forearm, elbow and shoulder; low back pain; hernia (i.e. when body tissue protrudes through the muscle tissue); arthritis (i.e. damage to the joints); sciatica (i.e. pain or numbness caused by general compression and/or irritation of specific nerve roots).

Adolescents often experience rapid growth spurts during a two-year period between the ages of 10 and 20 years; about 15 to 20 percent of an individual's height is gained between these ages. During this period, adolescents are at particularly high risk of injury to ligaments and to bone growth plates.

The work that children undertake in agriculture is often invisible and unacknowledged because they assist their parents or relatives on the family farm or in "piece work" or participate in a "quota system" on larger farms or plantations, often as part of migrant worker families. In these situations, it is assumed that children work, though they are not formally hired.

In the story, Kolawole was helping Adeniyi. Kolawole could be classified as a "helper" because he was doing similar work as his father.

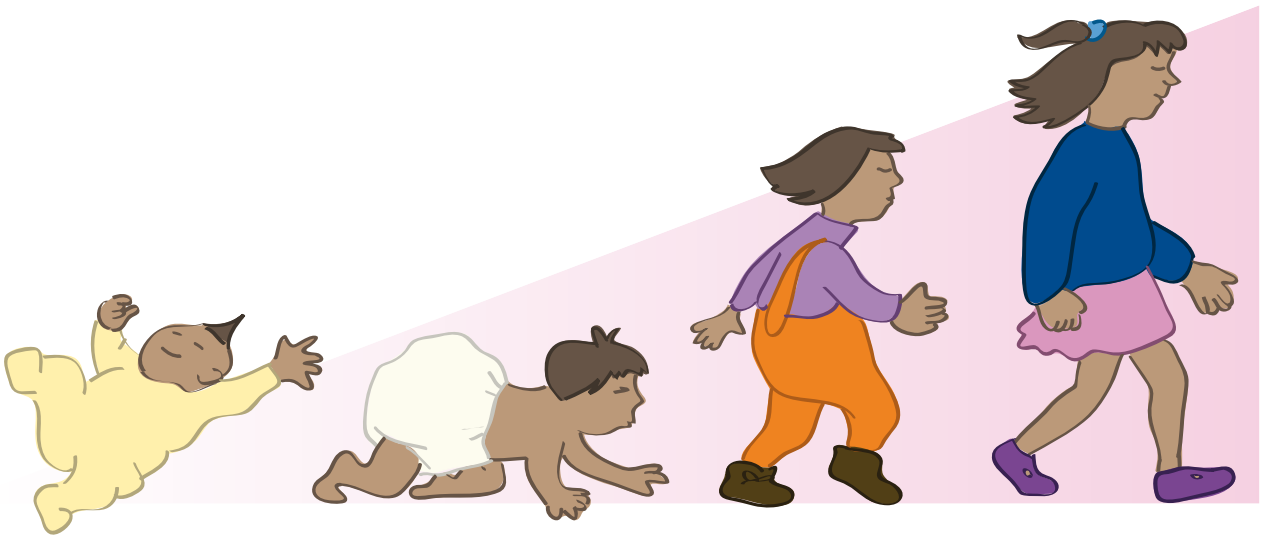
In some contexts, children may be "hired" through contractors or sub-contractors; this allows the farm and plantation owners to deny responsibility for knowing the ages of the children. Sometimes children are hired directly.

In Kolawole's case, it is clear that a 13-year-old child should not be engaged in the hazardous activity of carrying loads of 40 kilos. At 13 years of age, Kolawole should be restricted to "light work" – activities after school is over and after school work has been done. Such light work would allow Kolawole to help his father, and by being with his father he may learn some important skills and feel that he is contributing to the household in some way.

The accidents and ill health that child labourers such as Kolawole suffer at work often go unrecorded. Because certain work-related physical disabilities and health problems only develop or become fully apparent or debilitating in adult life, they go unreported and the connection with work done as a child is not made.

exercise 5

Why can agriculture be hazardous for children?



OBJECTIVE:
This exercise should ideally be done with the JFFLS participants' guardians. The objective is to discuss and draw parallels between issues around caring for crops and animals and caring for children.

THE EXERCISE:
This exercise highlights some care issues for different stages of crop and animal cycles. Drawing parallels, participants discuss that children require care to grow up healthy.

PREPARATION:
Read *Facilitators' Notes 2* and *4.*

Draw pictures on a flip chart or board of plants/crops at different stages of growth.

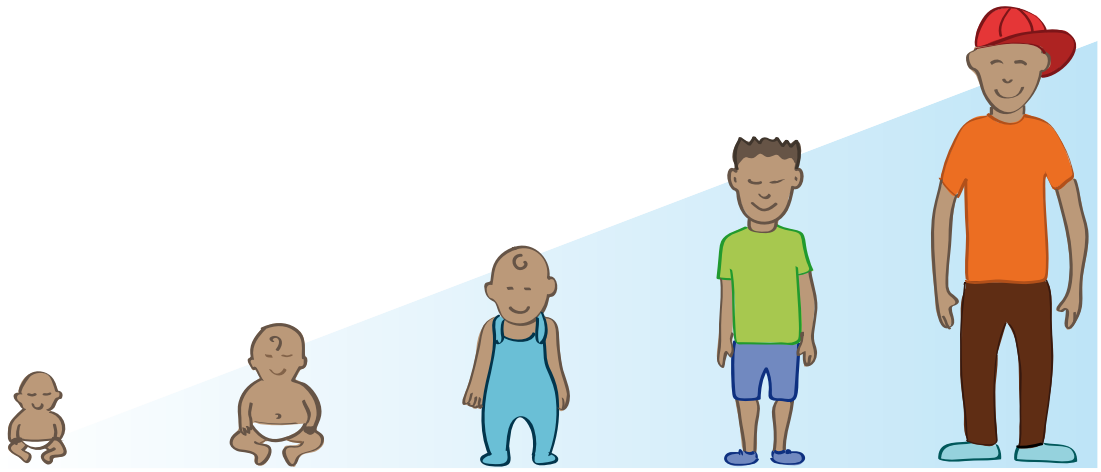
HOW DOES IT WORK?

1. Ask participants to list the different stages children go through before becoming an adult. Ask what things a child needs to grow up healthy. Write them on a large sheet of paper(s).

2. Get everyone to draw the different stages children go through before becoming an adult. Display the pictures.

3. Explain that all living things (including crops, animals and humans) go though a number of developmental stages in their life span.

4. Allow participants to shout out everything they know about the life cycles of plants, animals and humans and note what they say on a sheet of paper or chalkboard.



5. Make a chart and draw pictures to help the discussions. See the examples below.

Life cycle of Plants	**Life cycle of animals**	**Life cycle of people**
Seeds		
Vegetative phase		
Blooming		
Fruitful age (ripening period)		
Seeds again		
Death		

6. Ask why it is important to learn about the different development stages of a plant before starting to grow it. (During each stage, the crop's needs differ, and we need to be able to create the proper growing conditions; at certain stages, crops need more or less water, sunshine, protection against pests, diseases and/or weeds and special fertilization).

7. Revise the different stages of crop development. Ask participants what things a plant/crop needs to grow healthy.
   - Is there a stage when the crop needs less water?
   - Is there a stage when the crop cannot do with less water?
   - Are their stages when the crop needs special protection measures? From heat, from insects?

8. Move on to discussing livestock and what has already been covered regarding livestock.
   What are the advantages of having small livestock?
   - What are the advantages of having large livestock?
   - What can large livestock do that small livestock cannot do?
   - Why do we protect livestock?

- What do we do to protect livestock?
- When is livestock most vulnerable?
- To what is livestock vulnerable?
- What would we not do to our livestock to prevent them from being harmed?

9. Highlight again that the care animals require can be different during each stage. Summarize by stressing that it is important to understand that if crops, animals and children are to grow up healthy, they require different care at different stages of their lives.

10. Discuss the difference between children working and children working too hard. Explain that if children work too hard, they may not grow up healthy. Use the points in the *Facilitators' Notes 2* and *4*. Highlight that although working in agriculture can help children develop skills for the future, agriculture can also be dangerous for children. Stress that we must try to reduce risk for children so that they can grow up healthy and are able to work in agriculture when they are older.

Facilitators' Notes 4

Why children are at greater risk than adults

Child labourers are vulnerable to the same dangers faced by adult workers; however, children can be more strongly affected by the work hazards and risks that affect adults. Also, because children are still growing, they have special characteristics which must be considered when thinking about workplace hazards and risks.

The World Health Organization's definition of child health covers the complete physical, mental and social well being of a child (not just the absence of disease or illness). Long-term health effects also must be considered because the consequences of some health and safety problems do not develop, show up or become disabling until the child is an adult. Examples include long term musculoskeletal problems which can result from carrying heavy loads as a child or cancer or adverse reproductive effects that develop later in life from exposure as a child to pesticides, industrial chemicals or heavy metals.

The reasons for children's greater vulnerability to workplace hazards and risks are outlined below.

General
Per kilogram of body weight, children breathe more air, drink more water, eat more food and use more energy than adults. Children drink two and a half times more water and eat three to four times more food than adults per kilogram of body weight. These higher rates of intake result in greater exposure to diseases (pathogens), toxic substances and pollutants.

Children are smaller in physical size and are at additional risk when they are asked to do tasks beyond their physical strength. Because children's tissues and organs mature at different rates, it is not possible to specify precise ages of vulnerability for specific workplace hazards and risks.

Skin
A child's skin area is two and a half times greater than an adult's, per unit of body weight; this can result in greater skin absorption of toxics. Skin structure is only fully developed after puberty.

Respiratory
The respiratory system includes airways, lungs and respiratory muscles. Children have deeper and more frequent breathing and thus can breathe in more substances that are hazardous to their health.

A resting infant has twice the volume of air passing through the lungs as a resting adult (per unit of body weight) over the same time period.

Brain
Maturation can be hindered by exposure to toxic substances. Metals (e.g. lead and methyl mercury) are retained in the brain more readily in childhood and absorption is greater.

Gastrointestinal, endocrine, reproductive and enzyme systems and renal function
Some organs are not fully matured in children. Exposure to toxic substances in the workplace can hinder the process of maturation.

The gastrointestinal system (i.e. the system of organs that are involved in digesting food, extracting energy and nutrients and expelling the remaining waste), the endocrine system (which controls release of hormones), the reproductive systems and renal (kidney) function are immature at birth. These organs mature during childhood and adolescence.

The endocrine system and the hormones it generates and controls play a key role in growth and development. The endocrine system may be especially vulnerable to disruption by chemicals during childhood and adolescence.

The enzyme system (which is important to speed up or increase the rates of chemical reactions in the body) is immature in childhood. As a result, elimination of hazardous agents is less efficient in children's bodies than in adults.

Temperature
Children have increased sensitivity to heat and cold, because their sweat glands and thermo-regulatory systems are not fully developed.

Energy requirements
Children require greater energy from food because they still are growing. Without adequate energy, children can have an increased susceptibility to toxins.

Fluid requirements
Children are more likely to dehydrate because they lose more water per kilogram of body weight because of the greater passage of air through their lungs, the larger surface area of their skin and their inability to concentrate urine in their kidneys.

Sleep requirements
Children require more sleep than adults: children from 10-18 years of age require about nine and a half hours of sleep per night for development.

Physical strain/repetitive movements
Physical strain on growing bones and joints, especially combined with repetitive movements, can cause stunting, spinal injury and other life-long deformations and disabilities.

Noise
In principle, the effects of excessive noise apply to children and adults. However, it is not yet clear whether children are more vulnerable to noise than adults.

Cognitive (processes of thought) and behavioural development
A child's capacity to recognize and assess potential safety and health risks at work and make decisions about them is less mature than that of adults. For younger children this ability is particularly weak. The ability to look at a situation from a variety of perspectives, to anticipate consequences and to evaluate the credibility of information sources increases throughout adolescence. By mid-adolescence, most youngsters make decisions in similar ways as adults.

Other factors:
Other factors that increase children's levels of risk include:

- lack of work experience – children are unable to make informed judgements;
- a desire to perform well – children are willing to go the extra mile without realizing the risks;
- learning unsafe health and safety behaviours from adults;
- lack of safety or health training;
- inadequate, even harsh, supervision;
- lack of power in terms of organization and rights.

Children may be reluctant to let others know when they do not understand something. They want to show superiors and others that they are big enough, strong enough or old enough to do the job. They may fear dismissal if they fail. Children often are unfamiliar with hazards and risks and not trained to avoid them.

Reduced life expectancy

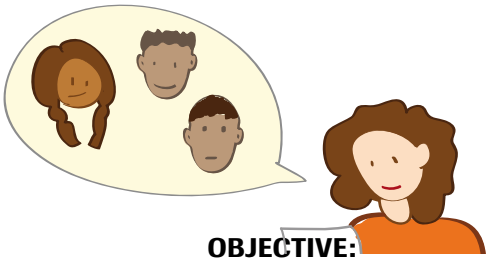
It is difficult to measure reduced life expectancy as a result of child labour; however, the earlier a person starts work, the more premature the ageing that will follow. A study based on a nationally cross-representative survey of 18-60-year-old Brazilian adults found that – after controlling for age, education, wealth, housing conditions, unemployment status and race – entry into the labour force at or below the age of nine years had a statistically significant negative effect on health in adulthood.

Disability and child labour

Little is known about what happens to child labourers who become disabled as a result of their work, or about disabled children who become child labourers. Based on sketchy evidence, it is likely that disabled child labourers will face great difficulties in finding decent work as an adult. In particular, their chances of attending school are likely to be greatly reduced. Children who lack access to education and who are unable to read, write or calculate will have only slim chances of acquiring marketable skills that will enable them to rise out of poverty. Children who have lost limbs or damaged themselves physically through work usually have poor access to orthopaedic or prosthetic services.

exercise 6

Comparing the situation of different children



OBJECTIVE:
This exercise will help participants evaluate and compare the situations of different children who are engaged in harmful child labour. They will discuss what can be done about children who find themselves in bad situations.

THE EXERCISE:
This exercise uses three stories to help participants understand and discuss the different reasons why children begin to work in agriculture and drop out of school.

PREPARATION:
Read the case stories of Awinja, Samson and Malik below. If these case stories do not fit the local context, change and adapt as appropriate.

HOW DOES IT WORK?
1. Ensure the children are sitting comfortably. Introduce the exercise by telling the participants that you will read them some stories about children working in agriculture.
2. Ask the participants to listen and tell you afterwards what was good or bad about the child's situation in each story. What happened, and what should happen to improve the situation for each child?

Case 1: Awinja

Awinja is a nine-year-old girl who used to help her mother in the fields.

Alongside her mother, Awinja used to spend a lot of time thinning and weeding groundnuts using a hand-held hoe. Awinja also had duties babysitting her younger sister when her mother went to work in the maize fields outside her village. Awinja had never attended school and could not read or write at all. Awinja says that she did not go to school because her mother would not allow her to go and, in any case, she did not have a uniform or books.

One day an organization that tries to encourage children to go to school instead of working arrived in the area where Awinja lives. After a lot of discussions with Awinja's mother, she agreed to allow her daughter to go to school instead of working alongside her in the fields. Awinja was delighted to go to school. Luckily for Awinja, the organization bought her a new uniform and gave her free stationery.

Awinja is currently in standard four and is one of the most dedicated pupils and performs well in

class.[23] She enjoys working out sums. Awinja is growing fast and is worried that she is nearly too big for her uniform. Awinja's mother has to find someone else to babysit her younger sister, or else bring the baby with her to the fields. Awinja helps out as much as she can after school.

Case 2: Samson

Samson is a 15-year-old boy working on a tobacco plantation.

Samson moved to the region near the tobacco plantation with his parents. Like his brothers and sisters, he started working on the plantation when he was nine years old, during holidays and on weekends, to pay for his school fees. Once he completed his primary education, he began to work full time.

Now Samson works 10-12 hours a day, felling trees and weeding to clear fields for cultivation; transplanting tobacco seedlings and tending the farms; and plucking and curing the leaves. Samson walks barefoot and thorns often prick him. He complains of back pain especially after carrying bags of tobacco leaves to the weighing station five kilometres away.

There is no safe drinking water on the plantation and Samson and his friends frequently suffer from diarrhoea and typhoid. The owners of the plantation deduct all medical expenses from his salary. Samson looks weak, tired and pale and has several burn scars on his hands.[24]

Case 3: Malik

Malik is 15 years old and used to work on a local farm

Even though both his parents are alive, they could not support Malik to go to school because they are very poor and do not have a favourable attitude towards education. Malik dropped out at primary school before he could even learn how to read and write properly. He joined his parents in the potato fields to supplement the family income. However, Malik heard about a training institute in the next town and went over to find out more. He found out there was a course in furniture making and he enrolled.

During the training, Malik proved to be a fast learner and had a keen interest in carpentry. He was one of the first students to learn to make simple furniture. A local businessman noticed Malik's talent during one of the open days in the institute. He offered that Malik become an apprentice in his carpentry workshop after graduation. The businessman didn't specify how much he would pay Malik, but Malik was confident that the man would treat him well. Malik and his family were fully in favour of the idea because it ensured that the skills he had obtained during the course would be developed further and may lead to a better life for Malik. He graduated and was awarded a certificate. Although Malik misses being outdoors in the open air, he started an apprenticeship in the carpentry profession with the local businessman.[25]

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23 Adapted from Chutha, Robert N. (March 2005) Good practices and lessons learned, combating child labour in commercial agricultural in Kenya.

24 Masudi *et al* (2002) Tanzania: Child labour in commercial agriculture- tobacco: a rapid appraisal.

25 Adapted from Chutha, Robert N. (March 2005) Good practices and lessons learned, combating child labour in commercial agriculture in Kenya.

3. Encourage the participants to ask questions about Awinja, Samson and Malik.
4. In groups, ask the participants to discuss:
   - What is similar about each child's situation?
   - What is different about each situation?
   - What opportunities did each child have?
   - Did the parents/guardian influence the child's situation?
   - Does the age of the child make a difference?
   - Why is it difficult to take children out of child labour?
   - What new problems may arise for each of the children?
   - Are the new situations for Malik and Awinja better than their old situations?
5. Summarize some of the main points the participants have made.

Notes for the facilitator:

Remember that the participants in the JFFLS may experience the same situations as the children in the stories. Using stories is a way of discussing child labour with children in a non-threatening way which may be better than asking children to talk about their own real situations. This is particularly important because many children are not able to influence their own situations.

Awinja's situation has improved thanks to an organization that arrived in her village. The computation skills she is learning will help her in the future, perhaps to work out profits for selling agriculture produce. However, it is important to consider how Awinja's mother will be able to afford to buy the new uniform and books that Awinja will need when she moves into standard 5 or 6. Also, Awinja's younger sister could easily end up in the same situation that Awinja was in, because her mother seems to have no option other than to bring her younger daughter to the field with her.

Samson's situation looks bleak. There does not seem to be anyone who can help him. He is most likely over the minimum age for employment (although because of his working conditions, he would still be classed as a child labourer) and too old to go back to school. He is in a dead-end job. He urgently requires medical care. Are his employers are responsible? Should they be penalized for what they are doing with their employees?

Malik was lucky to be able to enrol at a training institute. However, his future depends a lot on how well the businessman treats him when he becomes an apprentice. His situation may or may not be better in the long run. He seems to miss agriculture work and being outside. Maybe he would like to return to agricultural work, as long as it could help him earn a living.

exercise 7

Finding out more from a visitor

OBJECTIVE:
This exercise invites a visitor to explain some issues around child labour in agriculture.

THE EXERCISE:
Someone who is active in stopping child labour (e.g. from an NGO or a government agency) or a former child labourer is invited into the classroom to talk to the participants. The participants are encouraged to ask some prepared questions.

PREPARATION:
Find someone who would be willing to share with the participants his or her experience as a child labourer or in working with child labourers in agriculture. This could be someone from an NGO, a government initiative to stop child labour (such as the district child labour committee) or a former child labourer who is now adamant that children should be protected from child labour. Brief the visitor in advance, particularly if there are specific things you would like him/her to mention. Explain that you would like to highlight how the issue of child labour in agriculture is being or should be addressed. Encourage the visitor to mention positive aspects of working in agriculture or advantages of learning agricultural skills by helping parents.

If the invited person is a former child labourer, also invite someone who still works in the agricultural sector so that a negative perception of agriculture is not created.

HOW DOES IT WORK?

1. After you have chosen and briefed a suitable visitor, tell the participants who it is and what he/she does now.
2. Invite the participants to think of some questions that they could ask the visitor. Tell them not to be shy, and that the visitor is expecting questions.
3. If the visitor is a former child labourer, invite him/her to explain what s/he did to stop working as child; whether s/he did or didn't return to school and why; why s/he thinks that s/he missed out by working from an early age instead of going to school, or generally what happened in his/her life that led to where s/he is today. Types of questions that could be asked include:
    - At what age did s/he start work?
    - Did s/he earn much money as a child?
    - What tasks does s/he think are dangerous for children?
    - What is the best and worst thing about working a child and not going to school?

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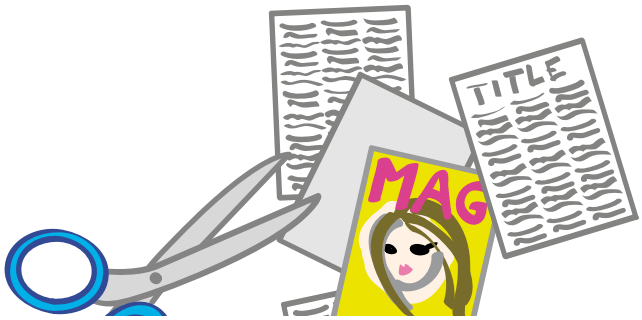
4. If the invited person is an activist working to stop child labour, encourage the person to explain what s/he or his/her organization is doing to encourage families to send their children to school instead of work. Encourage questions specifically about child labour in agriculture. Encourage questions also about employment opportunities in agriculture and what skills the visitor thinks

are useful to gain “good” employment in agriculture. Encourage the participants to ask questions such as: What encouraged you to take a stance on stopping child labour? What do you do to stop child labour? What is the biggest problem in halting child labour? Have you had any success in working on this issue?

5. Write the key questions on a chart or on the wall and try to organize and order the questions with the participants.
6. When the visitor arrives, introduce him/her and explain to participants the purpose of the visit.
7. Allow enough time for the visitor to share his/her experience with the participants in a relaxed manner.
8. Allow plenty of time for questions from the participants and write important points on the chalkboard to discuss later with participants.
9. After all questions have been exhausted (or when the time is up), thank the visitor.
10. After the visitor has left, organize an informal discussion with either guardians or children. Find out what things the visitor said that they found to be the most interesting. What was difficult to understand?
11. Summarize the discussion and refer back to points made earlier.

exercise 8

A headline for a picture



OBJECTIVE:
This exercise will make JFFLS participants think about the situation of child labourers and express their views about children working.

THE EXERCISE:
This exercise gives the participants an opportunity to make up a caption (description) for a photograph or a picture from a newspaper.[26] This exercise can be useful just before a break.

PREPARATION:
Find images of a boy child labourer and a girl child labourer working in an agriculture-related area (e.g. agriculture, forestry, fisheries). Collect some catchy headlines from local or national newspapers.[27]

HOW DOES IT WORK?
1. Read aloud some newspaper headlines you have gathered, so that all participants understand what a newspaper headline is. Show the picture with the image of the boy or girl.
2. Invite the participants in groups of three to five to examine the picture and then create its caption for a local newspaper. The caption can describe the scene or can be what one of the individuals in the picture is saying.
3. Ask every group to present its captions and write them on a large sheet of paper or chalkboard.
4. If there is sufficient time, you may include a "competition element", by asking everyone to vote for the best headline. Explain that you have to vote for a newspaper headline that is not made by your own group. Reward the group that receives the most votes with applause or a song.

26 Adapted from Pretty, J., Guijt, I., Thompson, J. Scoones, I. (1995) A trainer's guide for participatory learning and action. IIED Participatory Methodology Series. Sustainable Agriculture Programme, IIED, London. page 224.
27 http://www.stolenchildhood.net/entry/domestic-girl-workers-enslaved-and-abused-in-guinea/

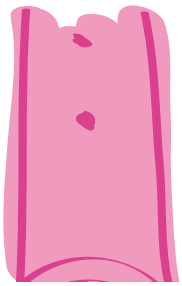
NOTES FOR THE FACILITATOR:

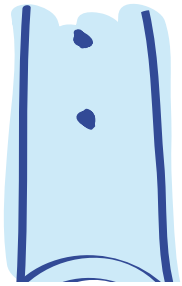
Ensure that JFFLS participants are respectful and sensitive towards the images of the child labourers. Be sure that when they are developing witty captions for the pictures, they do not poke fun at the children in the pictures.

Some examples from the ILO photo library are shown below.

exercise 9

Daily schedules for a girl and a boy[28]





THE OBJECTIVE:
This activity helps to explore differences between boys and girls in terms of how they spend their time over the course of a typical day.

THE EXERCISE:
In this exercise, there are two options for initiating discussions on what tasks boys and girls typically undertake.

In option 1, the facilitator, with the children's help, draws two clocks: one indicates a typical day for the JFFLS boys and one indicates a typical day for the JFFLS girls. This exercise is more generally about gender roles in day-to-day tasks rather than about child labour.

In option 2, two stories look at the different situations of a boy and a girl engaged in child labour. This activity helps to highlight hazardous invisible work in which boys and girls are involved.

PREPARATION:
Obtain a large sheet of paper, pencils or pens and large cut-out circles drawn on a piece of paper.

If using option 2, read the two stories, adapting them as necessary to the local context.

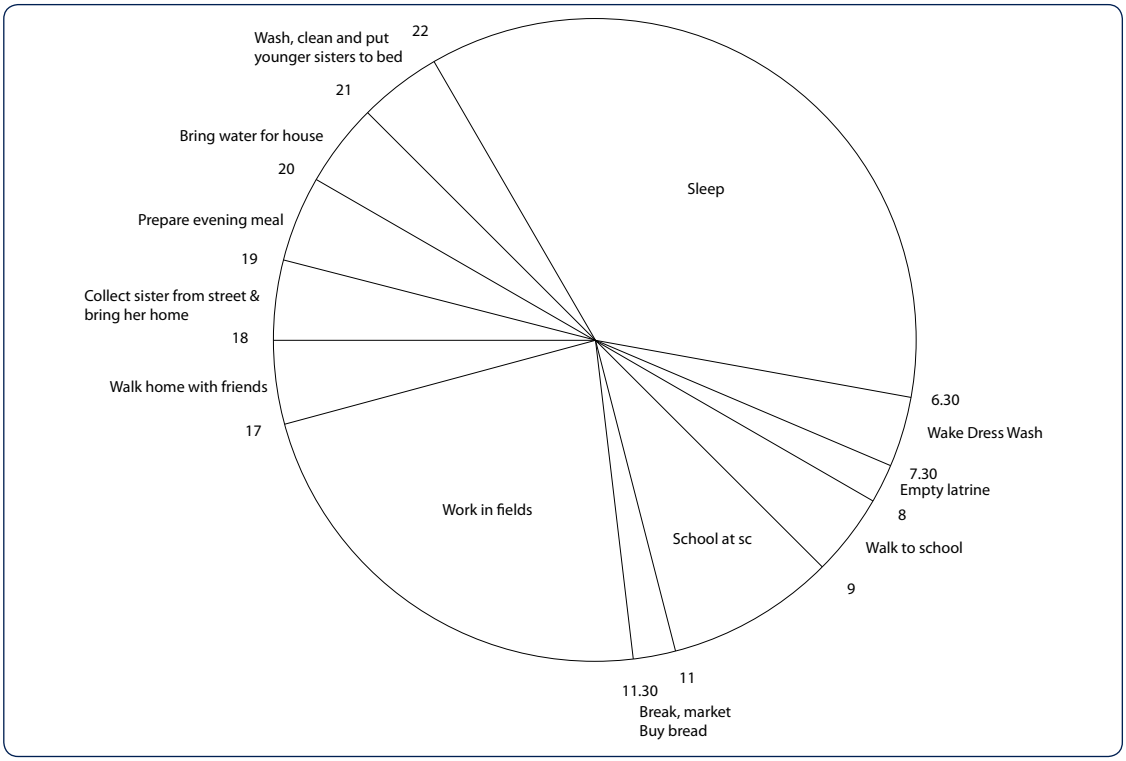
If participants are illiterate, prepare circles that are divided or segmented.

HOW DOES IT WORK?
Option 1: Develop a typical daily task clock for a child from their own community

1. Demonstrate how to draw a daily activity clock by explaining that you are going to describe how you used to spend a typical day when you were young. Start by explaining that a large circle represents a full day including dawn, day, evening and night-time. Draw a large circle and divide it into equal sections as though you were slicing the circle with a large knife. Then, draw various activities in the segments of the clock, showing the amount of time spent doing various activities over a typical day and night. The size of each section will depend on the amount of time spent on that activity. Divide the circle into chunks of time and shade in different chunks of time with the chores. The children should find this amusing and also helpful in visualizing what their own clock might look like.

28 C. Levy and N. Taher, Training materials for gender mainstreaming course, (University College of London, 2002).

Example of a facilitator's 24-hour clock:



2. Ask everyone to think about how they spend their time and what things they do every day. They should list some examples, such as going to school, spending time with friends, doing domestic chores, going to the market/shopping centre, etc. They should think about things they do every day (e.g. washing, eating), every week (e.g. visiting their relatives, playing football, participating in the JFFLS learning field) and less often (e.g. taking part in a festival, doing exams).

3. Together with the JFFLS participants, draw two clocks on the blackboard or chart: one indicating a typical day for the JFFLS boys and one of a typical day for the JFFLS girls.

4. Ask probing questions to make sure that children do not leave out any activities, such as household chores.

5. Once both clocks have been completed, encourage discussion about the clocks. The following questions can help lead the discussion:
   - How do the boys' and girls' clocks compare in terms of leisure time, responsibilities and time for study and sleep?
   - Whose day is the busiest?
   - Do you think that the clocks would change at different times of the year?
   - How do the girls' and boys' schedules affect their education? What are the potential consequences (both short- and long-term) of not going to school?
   - If there is a difference between boys and girls in terms of time spent on household or other tasks, would there be a way to reduce the workload? For example, could boys help with girls' tasks? Can all activities be done by both boys and girls?

Option 2: Develop a clock for a boy child labourer and a girl child labourer

1. Read Gyan's and Pia's case stories below.

2. Ask the children to divide into two groups. Ask each group to draw a clock for either Gyan or Pia. The clock should show what the child in the story does on a typical day.

Case 1: Gyan

Gyan is about 10 or 12 years old, he doesn't know for sure. He has been working as a domestic servant and cattle herder for the past two years. His daily work begins at 6 a.m. when he sweeps the house, fills buckets of water, cleans the veranda and floors, makes tea, helps with the cooking and makes sure the five to seven adult labourers have water and food by 7 a. m. when they set off to work. Then he herds the cattle. He does other chores until 1 p.m. and he usually has a few hours to himself in the late afternoon. In the evening, he does similar chores until around 8 p. m. when he normally finishes.

For all this work, Gyan gets paid about US$2.70 a month. He gives some of this money to his parents and spends the rest on himself. He is on call from 6 a.m. to 8 p.m. every day, seven days a week. Gyan has never been to school.[29]

Case 2: Pia

Pia stared work at the age of 11 and moved away from her family home. Her employer promised her mother she would take good care of Pia and treat her well. Living in her employer's home is more luxurious than where Pia grew up, which was a small mud hut. However, Pia has to work up to 12 hours every day and is not given sufficient time to rest.

Pia rises at 5 a.m. and goes to get water from a well before the household is up. Then she prepares breakfast for everyone. By 7 a.m. breakfast is over. Following this, the main activities Pia does every day are washing dishes, cooking/preparing other meals, cleaning the house, doing the laundry and mending clothes. She also feeds the chickens, milks the cow and weeds the vegetable garden. Cooking and preparing meals takes a lot of time and has to be done three times a day, depending on who is working and eating in the house that day.

Pia washes all the dishes and goes to the well for water at least five times a day. The well is not so far away, but the buckets she uses are heavy. Pia usually spends all afternoon in the vegetable garden before it is time to start preparing for the evening meal. She weeds and also keeps squirrels, rabbits and other pests away.

Payment is in the form of small gifts (such as clothes) and sometimes a little cash, but she does not regularly get money. Pia had to work while sick. Pia does not have time for school, but secretly would love to go to school.

29 Invisible children: Child work in Asia and the Pacific. Save the Children, Child Workers in Asia (1997)

3. Explain to the participants that they should imagine everything that this child does in a typical day and night. All the child's activities during the day first should be drawn or listed and then drawn or plotted onto the clock, in the same manner as outlined in option 1. You may prompt them with questions such as the following:
   - How much time does the boy/girl spend sleeping?
   - Does the child go to school? If so, how much time does s/he spend at school?
   - Does the child have any spare time?
   - Does the child earn money for the work you think s/he is doing?
   - What kind of tools, if any, does the child use to work (e.g. shovels to dig, needles to sew or implements to grind, crush or mix)?
   - Does the child prepare his/her own food? Does the child prepare food for others?
   - What sort of tasks does the child perform in the household? Outside the household?
   - Is the child's day split up among several different kinds of activities or concentrated on a few?
   - Do you imagine that the child is badly treated or exploited in any way? What reasons can you suggest for this ill treatment?

4. When the clocks are completed, pin them up in a central location for all to see.

NOTES FOR THE FACILITATOR:

Highlight how domestic work can link with agricultural work. Children, especially girls, often have to combine agriculture with domestic tasks. Stress how this double burden interferes with schooling. Explain again that child labour prevents children from attending school. If they do not have access to education, their chances of obtaining a better job in the future are probably bleak. If children are working and attending school, they are more likely to drop out prematurely, repeat grades or perform worse in school than their peers who are not working.[30]

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30 *Eliminating the worst forms of child labour: A practical guide to ILO Convention No. 182*, (Geneva, ILO, 2002), http://www.ilo.org/public/english/standards/ipec/publ/ipu_2002_gb_web.pdf
In 2010 and 2011, a new international labour standard on domestic work will be discussed by ILO member states.

Facilitators' Notes 5

Child domestic workers

Highlight some of the issues surrounding domestic work, such as the following:[31]

- It is a common practice to send a child (usually a daughter) to work in someone else's household. Many parents hope that their children will have a better chance in life; often such arrangements, at least theoretically, seem to offer the child access to education or instruction in a trade. This is seen as a safe option, especially if the girls are sent to the house of relatives or acquaintances. However, this often leads to abuse or exploitation of the domestic worker.
- Children's domestic work can, at times, infringe on children's rights, by leaving them open to physical, sexual and emotional abuse and often depriving them of educational opportunities.
- The majority of child domestic workers tend to be girls, although the proportion of girls and boys varies from place to place.
- Child domestic workers may get insufficient food, may have to work for long hours or during the night and may be confined to the premises of the employer.
- Girls who run away from or quit domestic work with nowhere to go or who are afraid to go home run a high risk of ending up in prostitution or other forms of commercial sexual exploitation.
- Both men and women employ child domestic labourers.
- It is often difficult to detect and combat child domestic labour because it takes place behind closed doors.
- Domestic workers often combine their household work with agriculture-related tasks.

When discussing domestic work, highlight that work is not always negative. Children's participation in light work that does not affect their health and personal development or interfere with their schooling is generally regarded as being something positive. This includes activities such as helping care for the home and family or earning pocket money outside of school. Girls tend to spend more hours in household chores than boys. As the number of hours devoted to household chores increases, the capacity of children to attend school diminishes. Differences between girls and boys – in terms of their involvement in domestic work – increases as they grow older; more girls are kept from school than boys.

31 Kane, June, Helping hands or shackled lives? Understanding child domestic labour and responses to it (Geneva, ILO-IPEC, 2004).

exercise 10

Body sculptures

OBJECTIVE:
This exercise will help the JFFLS participants understand that certain activities in agriculture may have negative consequences for the child's health in the short or longer term.

THE EXERCISE:
This interactive exercise allows the children to create a living sculpture or statue that illustrates injuries and symptoms of ill health that may or may not be related to work.

PREPARATION:
Draw an outline of the front and back of a human body. (What is the purpose of this? I don't see it used in the exercise.)

Re-read *Facilitators' Notes 2, 3* and *4*.

HOW DOES IT WORK?

1. Highlight some of the positive aspects of working in agriculture (e.g. being outside in the fresh air, contributing to food security, being able to add nutritional value to diets, a sense of achievement in growing items, being close to nature rather than living in a city, gaining knowledge about agriculture).

2. Review what child labour is and is not.

3. Clear the centre of the room or use an open space outside.

4. Ask each child to choose a partner.

5. Explain to the pairs of children that one of the partners will have to act out a certain activity in agriculture (e.g. spraying, stooping, lifting heavy loads, fishing underwater, walking long distances with animals), while his/her partner will have to act out the possible, negative consequence of this activity (for example coughing, back pain, cuts).

6. Give the pairs around ten minutes to agree on what they will act out.

7. Form a circle and ask the partners, one after another, to make their sculptures in the centre of the room for the other participants. Say "freeze" after a few minutes and let the pairs explain

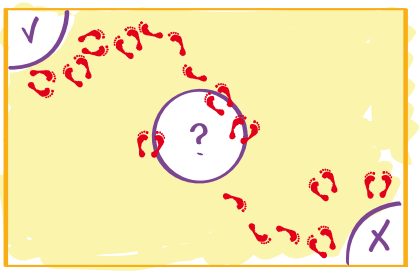
which activity and negative consequence they were acting out. Discuss if the consequence is likely to come up immediately after the activity or after a longer period of time.

8. Give the participants an opportunity to talk about symptoms of ill health and injuries. Some of the symptons of ill health may not be releated to agriculture work, but should be listed also (e.g. HIV and AIDS, malnutrition, swine flu). Elaborate on some of the injuries or mention other related injuries. Encourage a discussion of overall observations from the exercise.

9. Start a discussion on how you can reduce risk in agriculture. Refer to *Facilitators' Notes 8*.(There is no Facilitators' Notes 8.)

exercise 11

Issues for debate



OBJECTIVE:
This exercise allows guardians or facilitators to talk about and test their knowledge on child labour and clarify why child labour is or is not common in their area. It allows the facilitator to monitor the progress made by the guardians or facilitators in understanding the topic.

THE EXERCISE:
In a very active way, participants are asked to classify statements about the causes of child labour in agriculture and to decide whether they agree or disagree with a range of statements. They illustrate their opinion by physically moving from one end of the room or from one space to another.

PREPARATION:
Create a list of various causes of child labour in agriculture, some true and some not so true. See the sample list below.

Read the *Facilitators' Note 5: Why children start work*.

HOW DOES IT WORK?

1. At one end of the room or in an open space on a large piece of paper, write TRUE. ✓

   At the other end of the room or space, write FALSE . ☐

   In the central space, write I DON'T KNOW or I'M NOT SURE ?

2. Ask all the participants and/or their guardians to stand in the middle of the room or space. Read a variety of statements about the causes of child labour, one at a time (some examples are given below). Ask the participants to physically place themselves in the section of the room or space that corresponds to their opinion about whether the statement is true or false. If they are unsure, they must stay in the middle. Allow no more than a minute for this.

3. Remember that there may be no right or wrong answer for some statements; the answers may depend on an individual's point of view.

4. Allow free discussion after each statement, particularly if there is disagreement. Participants can physically move from one end of the room/space to the other if they change their minds. There are no absolute correct answers to each of these statements. The idea is to generate discussion. Individuals may come up with all sorts of answers and ideas.

5. Using the *Facilitators Note 5: Why children start work,* provide a summary at the end of this activity that pulls together reasons why children start working.

STATEMENTS TO READ ALOUD:

Warm up statements:

- Growing cabbage does not require any water.
- Goats' milk is good for you.
- Potatoes can get viruses.
- Cattle sleep standing up.

Statements related to child labour:

- Poverty is one of the main causes of child labour in agriculture. (True, but not always)
- When children work for their parents, it is never harmful. (False)
- A 15-year-old doing paid work is automatically a child labourer. (False)
- Young children have a right to work instead of going to school if they desire. (False –Every country has a compulsory age for attending school. National laws decree a minimum age for employment and compulsory schooling.)
- The reason some parents make their children work is because school is too far away. (True)
- Many parents send their children to work rather than school because the school is not very good. (True)
- Working children represent a source of cheap labour. (True)
- When children work in the field beside adults, they can learn about life and about what to do when they become adults. (True)
- Child-headed households, in which the parents have died, must do farm work to survive. (often true)
- Using more machines will decrease the use of child labour. (This may be true in some contexts, but this may force children into other forms of child labour.)
- Boy-child labourers do more work than girls. (This might be true, but it might also be false, depending on the task. Often girls have to combine household work with gardening, weeding, fetching water, taking care of poultry and animals, milking and harvesting crops.)

REFERENCES:

ILO-IPEC (2005) Tackling hazardous child labour in agriculture: Guidance on policy and practice. Understanding children's work newsletter. Issue 06, December 2008. Special feature on child labour and education.

Facilitators' Notes 6

Why do children work?

Why do children work? [32]

Child labour and poverty are linked. Even if education is supposed to be free, uniforms, books, pens and transport to school are impossible for many families. If there is no extra food available in the household, parents and children will be reluctant to attend school (and would have no snack/meal while at school). Children often work for food or for some small cash amount, or work in their own plot when there is a sick mother or an absent father or when their labour is needed. Child labour in agriculture can be seasonal and children may move between school and work.

There are also situations and values that may incline a family or community to accept or even encourage child labour. Thus, child labour in agriculture can be based on tradition. The institutional global and national levels and economic conditions also influence whether child labour flourishes or is controlled.

Causes of child labour

Limited or no cash or food stocks; Increase in basic price of basic goods	Breakdown of extended family and informal social protection systems	Low/declining national income
Family indebtedness	Uneducated parents; high fertility rates	Inequalities between nations and regions; adverse terms of trade
Household shocks, for example, death or illness of income earner, crop failure	Cultural expectations regarding children, work and education	Societal shocks, for example, war, financial and economic crises, transition, HIV/AIDS
No schools; or schools of poor quality	Discriminatory attitudes based on gender; caste; ethnicity; national origin	Insufficient financial or political commitment for education, basic services and social protection; Weak governance (or bad implementation of national laws)
Demand for cheap labour in informal micro-enterprises	Perceived poverty: desire for consumer goods and better living standards	Social exclusion of marginal groups; lack of legislation; Lack of effective enforcement of legislation
Family businesses cannot afford hired labour	Sense of obligation of children to their families	Lack of "decent work" for adults

Links between child labour and access to quality schooling

Being able to access quality schooling is a key element in whether children work or not. It is important to be aware of the main links between schooling and child labour and highlight some of these issues. For example:

32 ILO-IPEC (2008) Training resource pack on the elimination of hazardous child labour in agriculture. Book 1 A trainer's guide. revised edition. (Author: Peter Hurst).

- Parents may involve their children in work rather than school because the school is simply too far away or because it is of poor quality and therefore is not seen as being worth the investment of their children's time.
- Local schools may have inexperienced or poorly trained teachers.
- Classrooms may be overcrowded.
- The curricula may be ill-suited to the realities of rural life outside the classroom.
- It may cost money to travel to school because of the distance, and going to school may mean high out-of-pocket costs (e.g. costs to buy books, food, clothes).
- Classroom practices may exclude children with special learning needs.
- Classroom practices may violate the dignity and rights of children.
- The daily school calendar may be incompatible with family agricultural work.
- Many children are forced to work rather than attend school for survival reasons. Their families may depend on their income, no matter how small.
- Increases in world food prices may mean that child labour is a household safety mechanism to deal with the price shocks and so children are kept out of school.
- Some children may experience ethnic and religious discrimination in school.
- Traditional gender roles and attitudes often do not allow girls to continue schooling.
- There is often cultural acceptance of child labour as "normal".
- In some cultures, there may not be high awareness of the importance of education.
- Certain groups of children are the hardest to reach and often are not counted as being excluded from school.[33] These groups include: trafficked children; child victims of early marriage and other forms of slavery or bondage; child soldiers; refugees and internally-displaced children; street children; indigenous children; children working outside their own country; children affected by HIV and AIDS; child (urban) migrants; and children living in conflicted-affected states.

33 Understanding children's work newsletter. Issue 06, December 2008. Special feature on child labour and education.

exercise 12

How can we promote agriculture but avoid child labour?

THE OBJECTIVE:
This exercise will give facilitators the opportunity to reflect on what has been discussed about child labour in agriculture and to share their thoughts and knowledge with one another about what to do when they identify cases of child labour in their vicinity.

THE EXERCISE:
This activity will take the form of a role play. One person will ask for advice on how to react to or deal with cases of child labour in the community. The other person will act as an "advisor", trying to come up with some ideas.[34]

The exercise can help JFFLS facilitators exchange ideas about how they could deal with possible concrete cases of child labour in their JFFLS or community.

PREPARATION:
This activity can be done sitting on the ground or on chairs.

HOW DOES IT WORK?

1. Ask the participants to reflect on whether they have encountered cases of child labour in their communities or schools. Encourage them to think of the particular risks and hazards to which the children were exposed. Was the work harmful because it required the use of tools, chemicals or machinery or because of long working hours? Or did the work conflict with school attendance?

2. Ask the participants to think of what they see as the major problems in addressing child labour in agriculture in their communities and to choose one of those problems. The problems could include: lack of access to school; parents not being able to afford to send children to school; lack of protective clothing when working in the fields; or child-headed households.

3. Ask the participants to form two circles, one inside the other, with the same number of people in both circles. Individuals in the inner circle should sit facing out, so they are looking at someone in the outer circle. If the group is large, two circle groups should be made.

4. When everyone has been placed into one of the circles, tell them that the people in the inner ring are "advisors" who will be required to offer advice about the problems posed by those in the outer ring. Those in the outer ring will be their "clients" who are looking for advice from the advisors facing them. The advisors will have to think about what would be the best way to deal with the problem. Can anything be done to help the child? Can the problem be reported to a welfare officer or can some kind of support be arranged for the child's family? Should traditional authorities be involved? Or is it not the role of the facilitator at all to address such family issues?

34 J.N. Pretty, I Guijt, J. Thompson, I Scoones, *Participatory learning and action: A trainers guide*, (International Institute for Environment and Development, 1995) pp. 201-202.

5. Ten minutes should be allotted for each round of questions and answers, with roughly three minutes for posing the problem and seven minutes for giving the advice. The clients in the outer circle should present their first problem about child labour in agriculture to the people facing them, who are their advisors. The advisors in the inner circle should listen to their clients' question, issue or problem and suggest some solutions.

6. There should be a lot of discussion and exchange of ideas about preventing and addressing cases of child labour among JFFLS participants. Once the first round of advice is over (about ten minutes), all the participants in the outer circle should shift one position to the right, to face someone new (a new advisor) and repeat the procedure with their second problem. When two rounds of questions and answers have taken place, the advisors and clients should exchange seats. Then, the whole process should be repeated for another two rounds with the roles reversed. All participants should have had a chance to be both a client and an advisor.

7. Immediately afterwards, organize a discussion around the following questions:
   - Did they find the activity useful?
   - Did they prefer being a client or an advisor?
   - Was it difficult to be in the position of the advisor, and did they find it challenging to think of possible solutions to the problems posed by the clients?
   - Who received good ideas?
   - Ask individuals to volunteer examples of their problems and the advice they received during the activity. Write the problems and recommendations on the flip chart.
   - Were there any problems or solutions that were brought up by more than one person?

8. Finish by summarizing and listing any ideas that came up during the exercise.

Facilitators' Notes 7

Strategies to eliminate hazardous child labour

Strategies to eliminate hazardous child labour can be classified under three general headings:[35] (i) prevention of child labour; (ii) withdrawal, referral and rehabilitation of children who are classified as child labourers; and (iii) improving protection for those children of legal minimum age for employment so that they can remain at work.

Prevention

Prevention is the long-term aim. It is based on identifying children at potential risk and stopping them from starting hazardous work and from entering the workplace. Investment in the prevention of child labour is the most cost-effective approach in the long run:

- Systems of prevention need to be carefully designed by the state or non-state agencies.
- Families need income security and social benefits, such as health insurance, in order to survive short-term and long-term crises.
- Parents must be able to see investment in schooling as a viable option for their children.
- Microinsurance schemes organized by civil society groups at the local level can be linked into larger structures, such as banks and credit schemes.
- The state can help by providing start-up funds, matching workers' contributions and developing supportive laws.
- Self-help groups can provide assistance through cooperatives and mutual benefit societies which are usually financed by beneficiary contributions.
- The educational system also plays a critical role in preventive policies and actions by ensuring places in schools, adequate numbers of trained teachers and good standards of education.

Withdrawal, referral and rehabilitation

Withdrawal, referral and rehabilitation of children already carrying out hazardous work is another central strategy by:

- identifying those children in hazardous work;
- removing them from workplaces; and
- getting them into school and/or skills training.

Children in the "worst forms of child labour", such as in hazardous conditions, need urgent action for rescue and rehabilitation. Measures used to withdraw children from hazardous work include:

- persuasion, through dialogue with parents, children, employers or law enforcement authorities;
- rapid response measures (including rescue operations).

Experience shows that the most effective approaches are community-based, integrated solutions tailored to the specific needs of each target group. In addition to rapid response action to rescue victims of the worst forms child labour, a holistic approach is needed to attack underlying family

35 The International Programme on the Elimination of Child Labour at the United Nations International Labour Organizations (ILO-IPEC)

poverty through long-term solutions, including access to land, housing and economic opportunities.

There is also a need to match interventions to the age of the child. There should always be a strong link between transitional education programmes (rehabilitation programmes) and the formal education system, since basic education will ensure opportunities for further education and employment. It is important to forge close links between interventions that aim to rehabilitate existing child labourers and those that aim to prevent children from being drawn into child labour.

Educational interventions for children removed from hazardous work must be related to the approximate age of the child, his or her literacy level and psychosocial development and the age brackets defined by the child labour conventions. Experience has shown that transitional education in isolation does not necessarily ensure opportunities for further education or employment for former working children; this is why swift reintegration into formal schools or vocational training is vital.

The child labourers' jobs should be given to their adult relatives so the family as a whole does not suffer. Unemployment and underemployment in rural areas are major causes of poverty among waged agricultural workers and are regular and significant features of their lives.

Withdrawing children from work on family farms has a special meaning. While the children are withdrawn from dangerous work situations, they continue to live on the farms that are their homes.

Protection

There are two possible options for children who have reached the legal age for employment (i.e. 14-15 years and older, depending on national legislation) but who are working under hazardous conditions (and are therefore classed as child labourers):

- If health and safety standards and practices cannot be adequately improved, these children must be withdrawn from the workplace and sent for vocational training or alternative, decent employment.
- If levels of workplace health and safety protection can be sufficiently improved, they can remain employed under decent work conditions.

It is necessary to strengthen abilities to undertake a risk assessment of potential hazards in agriculture, even on family farms (see Facilitators' Notes 8 below this does not exist in this document). Protection, however, is not an option in certain sectors. For example, small-scale mining – whether surface or underground – is considered so hazardous and the general working conditions so harsh, that prevention or withdrawal are the only options for any person under 18 years of age.

↘ Further sources of information

In addition to the sources referred to in the Module, the following sources provide information on child labour in agriculture.

- http://www.fao-ilo.org includes information on the joint FAO and ILO work on child labour in agriculture and on the Declaration of Intent on Cooperation on Child Labour in Agriculture.
- SARD (Sustainable Agriculture and Rural Development) (2007) *SARD and… Child Labour*. SARD policy brief 2, FAO/ILO/IFAD 2007. http://www.fao.org/docrep/010/ai117e/ai117e00.htm
- G. Zdunnek, D. Dinkelaker, B. Kalla, G. Matthias, R. Szrama, K. Wenz (FAO, 2008). Child labour and children's economic activities in agriculture in Ghana. Rome/Berlin: FAO/ SLE (Centre for Advanced Training in Rural Development) ftp://ftp.fao.org/docrep/fao/012/al001e/al001e00.pdf

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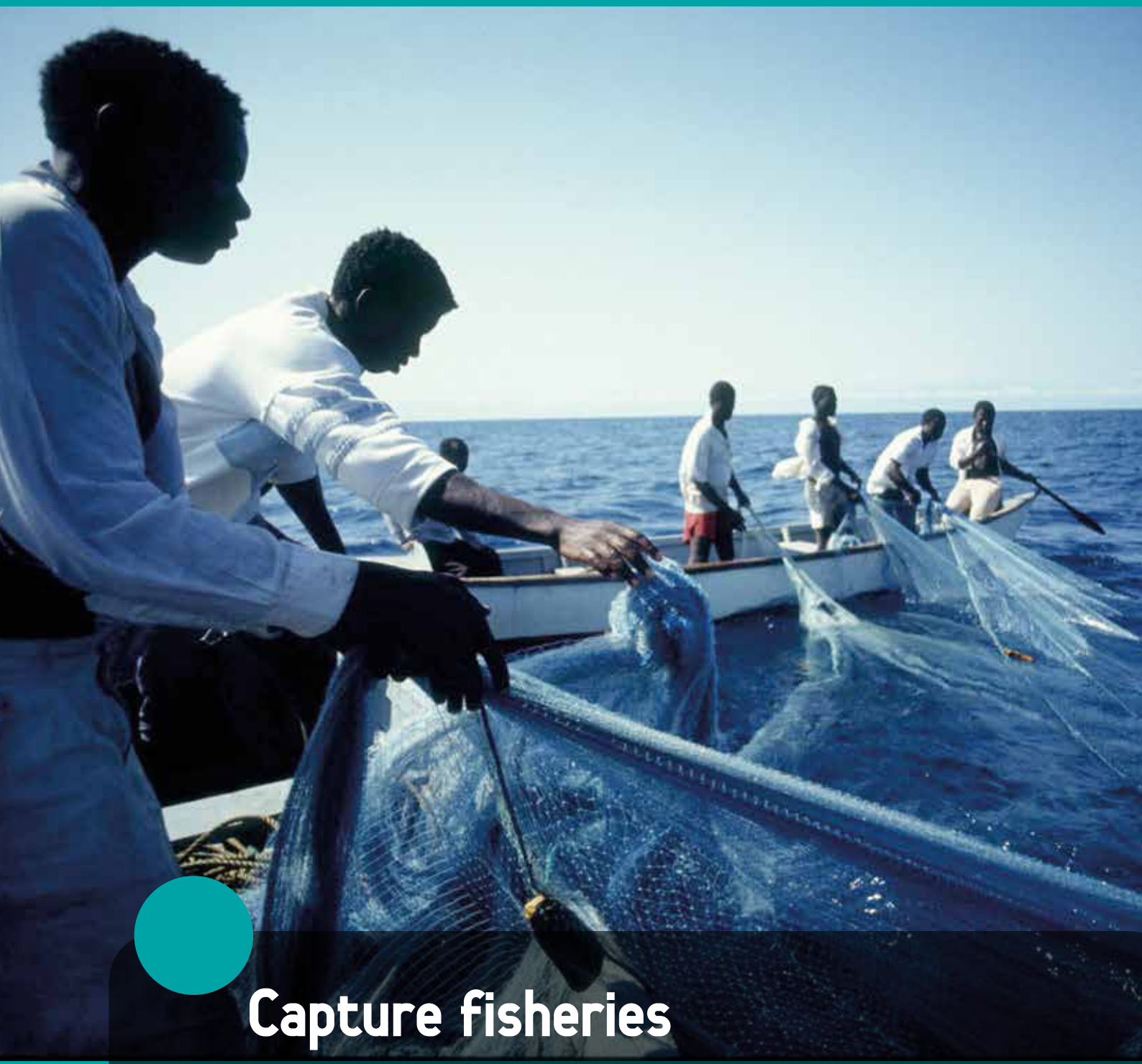

Capture fisheries

Junior Farmer Field and Life School – Facilitator's guide

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Module: Capture fisheries

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TABLE OF CONTENTS

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Module: Capture fisheries

INTRODUCTION

Systems are all around us. Systems consist of different interacting or interdependent elements that together form a whole. Ecosystems are a good example of a natural system where plants, animals and non-living things are the elements that are connected. We do not always see the connections until one thing changes and we can then watch other things change in response.

Capture fisheries is also a system. It links fish and the aquatic environment – be it the sea, a river or a lake – with humans, as fish are captured, processed, sold and eaten. This sequence of interactions in the system starts with the fish and the ecosystem and goes through many different steps until it reaches the consumer. This chain is called the fish supply chain. It is important to understand the impact of an action or change on the whole system. Each element has a value and role in the system, and the system may not work well when one element is changed or missing. As ecosystems are always changing as a result of varying conditions, they have a limited life span. Therefore, ecosystem health is closely linked to the idea of sustainability. A sustainable ecosystem is one that has all the elements living in balance that are capable of surviving, functioning and renewing themselves over time.

We have many human needs that need to be met, for example, good nutritious food and employment that provides an income. Fishing is a way to meet these needs as we fish to eat and we fish to sell. So, how do we achieve balance between saving fish for tomorrow and having enough food and income for today? This is the question being asked all over the world and solutions are not easy or short term. We need to expand our thought process to the long term. This is not an easy shift and requires changes in behaviour with respect to the environment, with respect to care for the resource, and with respect to care for oneself and others.

This module contains sample exercises for each of the learning activities, plus a number of sample energizers and cultural activities that can be used to keep the participants engaged and reinforce their learning. The provided activities should serve as samples to be modified to suit the local context and applied as appropriate. The important thing is that all the main building blocks of a typical Junior Farmer Field and Life School (JFFLS) session are included in each learning session.

By the end of this module participants should:

1. understand the elements and interdependences in a fisheries ecosystem;

2. begin to reflect on the impact of human behaviour on fisheries resources and the wider ecosystem;

3. appreciate the benefits of responsible and safe behaviour;

4. understand the benefits of collective action.

The purpose of the module is to provide guidance, making available different exercises that facilitators can use as applicable, and adapt as necessary, to the specific socio-economic and cultural contexts and needs of each target group and country in which the module will be used. This JFFLS module is complementary to other JFFLS modules, in particular with *Aquaculture and Post-harvest issues in fisheries and aquaculture*, and can be combined with them to enhance economic opportunities.

↘ OPENING ENERGIZER

OBJECTIVE:

Get to know each other, help a group of individuals become a collaborative team, and help them feel comfortable together.

TIME:

About 1 hour.

MATERIALS:

Ball, music (chairs if available).

STEPS:

1. Ask the participants to stand in a circle.

2. Explain to the participants that they will play two rounds. In the first round, the person who catches the ball will say his/her name and throw the ball to another participant, who then says his/her name. This will continue until everyone has received the ball.

3. In the second round, the participant will say his/her name and the name of a local fish that starts with the same letter as his/her name. He/she will then throw the ball to another participant until all participants have answered.

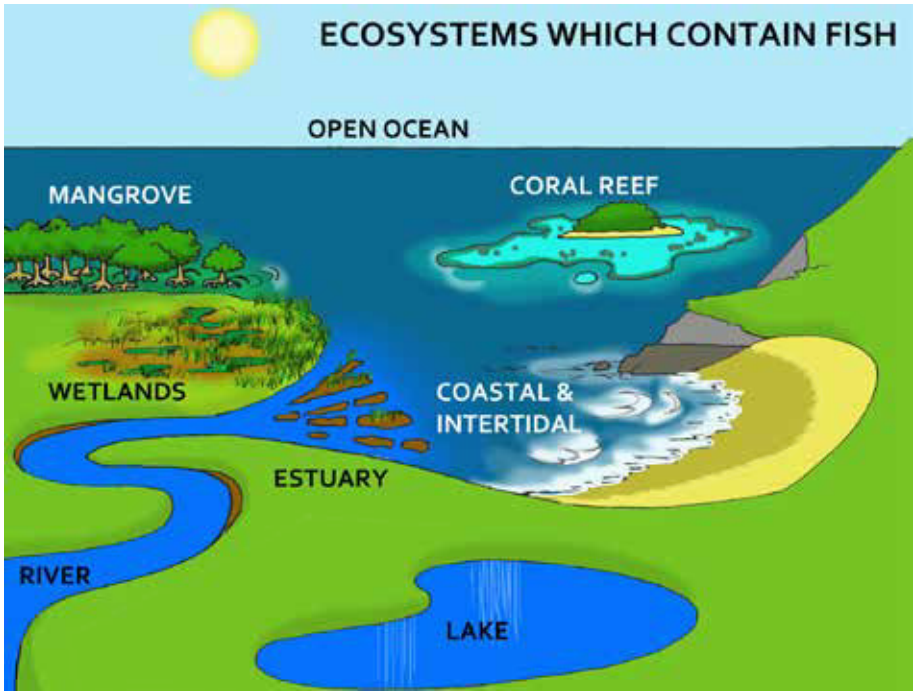
4. The game starts when the facilitator throws the first ball to a participant.

5. The game ends when every participant has received the ball twice.

Exercises

WE ARE ALL PART OF THE ECOSYSTEM

All the plants and animals around you are part of the ecosystem of your area. The weather and the landscape in your area are also important elements of the system you live in too. Just think where your fish comes from: from the sea, from a river, from a lake? Wherever it comes from, the waterbody will be connected to the land and there will be some interaction. For example, if a polluting substance from an industry is discharged into a river, a lake or the sea, it can kill the plants and fish or make them sick. Therefore, we always need to think about the changes that our behaviour will cause in the whole system. So, how many fish can we catch? Fish are born, reproduce and die. In most cases, more fish are born than are necessary to replace their parents. That means we can harvest the excess fish for our own needs if we are careful not to take too many. However, many other factors affect the ability of fish to survive over time. Weather conditions, predators, disease outbreaks, pollution and habitat destruction are some examples. If we take too many, the system will lose its balance and no longer be sustainable and we will also lose our livelihoods that depend on it.



Source: http://sciencewithme.com/learn-about-ecosystems-and-biomes/

exercise 1

LIVING SYSTEMS

OBJECTIVE:

Visually demonstrate the linkages between different elements of a system in order to show that as one thing changes, many other changes occur, which may not be obvious.

TIME

15 minutes

STEPS:

1. Ask the group to stand in a circle.
2. Ask each person to choose two people in the group (ideally one female and one male), without telling anyone else their choice.
3. Have the group start moving randomly around the space.
4. Explain that each person has to stay an equal distance from the two people they have chosen (not necessarily between them but an equal distance away).
5. Explain that participants have to keep adjusting their position based on how the other two people move.
6. Ask the group to stop when they are all approximately at an equal distance.
7. Discuss what happened to illustrate the concept of cause and effect. What happened when you tried to stay at an equal distance from the two persons you selected at the beginning? How difficult was it to keep equal spacing?
8. OPTIONAL: Ask each person to identify themselves as part of the fisheries system (for example, a fisher or a fish). Ask what happens when one part of the system changes, for example, when the fish move closer to the fishers?

exercise 2

BUILDING OUR ECOSYSTEM

OBJECTIVE:

Simulate an ecosystem, understand interdependence and the importance of biodiversity.

TIME:

2 hours.

MATERIALS:

Before the session starts, prepare pictures of fish, animals, plants of the area (at least one per participant). Paper, pens.

STEPS:

1. Ask participants to pick (or alternatively to draw) a picture of fish, animals and plants that are caught by the fishers in the village, or animals and plants that live near their home.

2. Explain that each participant represents the fish, animal or plant that he/she picked (more than one student can play the same role).

3. Ask everyone to stand on one side of the classroom/area.

4. Then ask one “plant” or “animal” to step away from the group and to sit down.

5. Ask participants if any other species depends on this plant or animal. If any other species depends on the species you have asked to sit down, those participants will have to sit as well. Continue until there are no (or very few) participants left standing.

6. Discuss the implications of the simulation with the class by asking one of the following questions:

   - What happens to the plants and animals in an area when one type of plant or animal dies out?
   - Are any species in the area where you live in trouble, and do you know why?
   - In which ways may humans and our activities affect the lives of animals, fish and plants? What about the impact of natural hazards, such as floods, drought, storms or the warming of the oceans as a result of global warming on the animals, fish and plants, including coral?

7. Ask the group to think of their family or of their village:

   - Can you give an example of how one family member depends on other family members or how one person in the village depends on other persons in the village?
   - What can you do in your house and village to help make the ecosystem sustainable and diverse? (Help the group to think by providing some examples about recycling, reusing, caring for the environment [planting, etc.], taking only the surplus of populations when fishing or hunting, reduce pollution, etc.).

exercise 3

OH FISH! (POPULATION STUDY GAME)

OBJECTIVE:

Understand the concepts of habitat, population dynamics and survival of fish species.

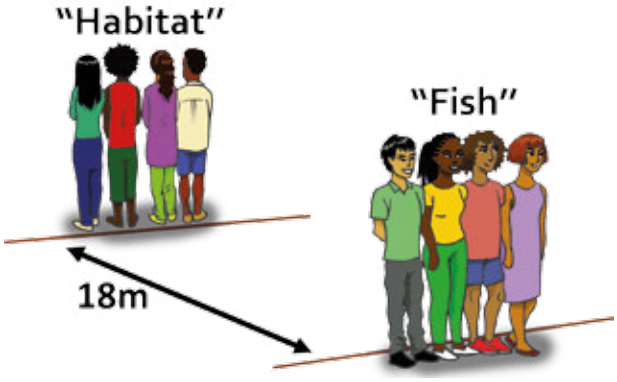
TIME:

1.5 hours.

MATERIALS:

Rope, measuring tape, paper, pencils, clipboard.

STEPS:



1. Make two horizontal lines with rope or measuring tape on the ground about 18 m apart.
2. Divide the participants into two gender-mixed groups if possible. Explain that one group represents fish, the other represents their habitat.
3. Ask the "fish" to stand behind one line and the "habitat" behind the other, with their backs to one another so that they cannot see the other group.
4. Divide the people in the "habitat" group into two subgroups: one represents "food", the other "shelter". Note down the total number of "fish", "food" and "shelter".
5. Ask the "shelter" representatives to put their hands over their head like a little roof. Ask the "food" representatives to place their hands over their stomach. [add drawing]

6. Ask the "fish" to decide if they want to look for "food" or for "shelter". They only have to think about it and are not allowed to tell their choice.
7. Slowly count to three and have everyone turn around to face one another.
8. Ask all to move around in the space between the two lines.
9. "Fish" that are looking for "shelter" link hands with "shelter" and go back behind the fish line. The same happens with "fish" looking for "food".
10. Stop the round when all "shelter" and "food" representatives have linked with a "fish".
11. If a "fish" did not find "shelter", it will perish and become habitat in the next round.
12. The person who was a "shelter" or "food" and met with a "fish" becomes a "fish" in the next round.

13. Note down the number of “fish”, “food” and “shelter” at the end of the session.

14. Repeat this exercise until you start to see a limiting habitat item start to limit fish population. Usually, this will take 10–15 rounds. Each round counts as one year.

15. At the end, lead a discussion about what the participants observed and did during the game: What does fish need to survive (e.g. food and shelter)? How do these elements work as limiting factors that affect animal survival? How do the habitat and the fish population change over time? During the game, what was the effect of competition and the stress it placed on the fish? Imagine what would happen if there were a natural disaster that changed the habitat (e.g. mangroves, seagrass beds and coral reefs will cease to exist)? Would the system be resilient, that means, would it be able to respond and to return to previous conditions?

16. OPTIONAL: The exercise can then be run again with three small groups: as before, “fish”, “habitat” (“food” and “shelter”) and, as a new group, a small number of “fishers” who can catch one fish per round.

17. Discuss the effect of fishing on the fish. What would happen if fishers were allowed to catch more than one fish per round?

facilitators’ notes

An ecosystem is the combination of physical and biological components of an environment and their interactions. A sustainable ecosystem is in balance and it is resilient. Resilience means that the system is able to cope with shocks, for example to recover from natural disasters.

Biodiversity increases the sustainability of ecosystems. Biodiversity is the variety of life on earth, e.g. the different plant and animal species. Biodiversity provides us with food and medicine and contributes to our economy. For example, we use plants and animals for food and medicine and we can harvest plants and animals and sell them to make money.

The greater the variety of species, the healthier a system is:

- more species = more links in food chains/webs = more stable
- more types of plants = more food for different animals
- more genes = better chances for survival through adaptation
- a variety of ecosystems = more habitat for different species

The natural ecosystem interacts with the human system, including, for example, through the exchange of materials (e.g. plants and animals for food) or energy (e.g. burning of wood for cooking) between these two systems. It is thus important to understand the impact of the human behaviour and actions on the natural environment.

Resilience: In ecology, resilience is the capacity of an ecosystem to respond to changes or disturbances by resisting damage and recovering quickly. Big disturbances (e.g. an earthquake, an oil spill) can profoundly affect an ecosystem and may force it into a rather different configuration of forces with a different regime of processes and structures. Human activities that hurt ecosystem resilience, such as reduction of biodiversity, overexploitation of natural resources, pollution, bad land use, and climate change caused, are more and more often causing regime shifts in ecosystems, often to less desirable and degraded conditions. For example, climate change is causing warmer water temperatures, which in turn cause coral bleaching. Corals provide important habitats for aquatic life. Once corals are lost, it is very difficult to bring them back.

exercise 4 (optional)

BUILDING AN AQUARIUM[1]

OBJECTIVE:

Better understand the complexities and interactions of an ecosystem.

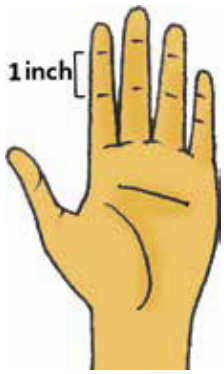
TIME:

2 hours for building the aquarium together, followed by several weeks of maintenance and observation.

MATERIALS:

- a large clean plastic container that can hold 2–3 buckets of water
- a large plastic bucket
- soil or peat moss as substrate from a local river or pond
- sand
- a few small branches of a tree
- small rocks
- freshwater (it has to be exposed to the air for at least 24 hours prior to use).
- several water plants from a local water source
- a thermometer
- one or two fish (low-oxygen-demand fish species such as catfish or tilapia)
- some snails and/or little shrimp

STEPS:



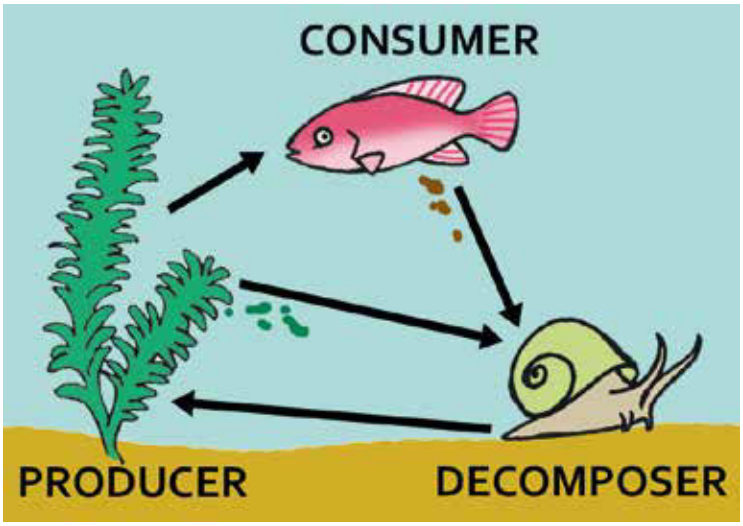
1. Ask the participants to layer the substrate on the bottom of the container, making it about 2.5 cm deep.
2. Add a thin layer of sand on top of it.
3. Let participants gently add the water so as to not make a hole in the bottom cover until the container is about half full.
4. Ask participants to add a few clean rocks, wood and plants making sure the plants are secure in the soil/gravel.
5. Then ask them to add at least two fish of different species, some snails and/or shrimp.
6. Choose a location for the tank that is away from heat and not in direct sunlight.
7. Create a note board to write or draw daily observations about what is happening in the aquarium.
8. Create teams of participants and let them chose a name for the team. Each day, one team will note down observations about what is happening in the aquarium over the coming days and weeks (e.g. water temperature, fish/shrimp/snail behaviour, plants).
9. Make sure to add water as it evaporates.
10. After a few weeks discuss the observations about the changes in the aquarium with the whole group.

[1] See JFFLS Module Aquaculture – Exercise 1: Pond in a bottle

facilitators' notes

All organisms in ecosystems, whether they are on land or in the water, are one of the following: producers, consumers or decomposers.

Producers are the plants, so named because they produce their own food and are at the base of the food web. They also produce oxygen, essential for the consumers. On land, trees, bushes and grasses are examples of plants; in the water, plants can be large (such as the ones you can see at the bottom of the sea, a river or a lake) or small (such as microalgae that you need a microscope to see clearly [phytoplankton]).



Consumers are the animals and living organisms that consume (e.g. eat) the producers (and other consumers). Consumers also contribute carbon dioxide and waste to the ecosystem. Humans are top consumers of both plants and animals.

Decomposers are the garbage cleaners of the ecosystem because they recycle the waste products. Decomposers include bacteria and worms. In a water system, snails and small shrimp are decomposers.

Producers, consumers, and decomposers must all remain in balance for the ecosystem to thrive. Too much of one of these will result in disaster. For example, if there are too many fish (consumers) and not enough plants (producers), the fish will starve or will suffocate from lack of oxygen. Therefore, it is important not to overcrowd the environment but to ensure the balance of a system.

SHARING THE FISH

Problems may arise when there is no control over how many people can fish, or how many fish they can take, or even what size of fish they should harvest. When anyone can go fishing without any regulation, it is called open access, and it can lead to overfishing. To prevent this from happening, many governments and communities control access and grant rights to fish to individuals or communities. Sometime, communities already have their own systems (often developed a long time ago) to manage access, and there are many examples of how, through cooperation, communities can successfully regulate resources and maintain their fish for everyone. Fisheries management and the sharing of fish is complex but there are many tools available. These tools include input and output controls. Input controls are restrictions put on the amount of allowed effort (e.g. the number of boats, the size of the engine, the gear mesh size, the fishing area, the fishing seasons). Output controls are limits to the amount of fish that that can be caught (e.g. by each fisher, boat or community or the size of each fish). Different situations require different solutions. It may be necessary to also engage in other economic activities such as agriculture to integrate income and food supplies in times when fishing is reduced (e.g. due to closed seasons).

exercise 1

TRAGEDY OF THE COMMONS

OBJECTIVE:

Understanding dynamics related to the use of common or shared resources.

MATERIALS:

Dried fruit, peanuts or other small nuts, forks, chopsticks / twigs, large plates, pen, paper, stop-watch or hourglass.

STEPS:

1. Tell the participants that each of them is the head of a family.

2. Explain that the aim of the exercise is to catch enough fish for their family to eat or enough fish to sell to support the family.

3. Divide the participants into groups of four.

4. Show them the area in which they fish: a small common area, in which only a limited number of fish can live. The fish are represented by dried fruit/peanuts/nuts on a large plate, which represents the lake or marine fishing areas for each group (start with the same number of "fish" per group).

5. Provide each participant with "fishing gear": the fork and the chopstick/small branches and explain that they will use this gear to catch the fish.

6. Explain that the game will be played for four rounds and that each round represents one year.

7. Tell participants that during the first three rounds they are not allowed not talk to one another.

8. Round/Year 1:

   - Ask each group to sit in a circle around their designated fishing area/lake.
   - Explain that one fishing season will last one minute and that the fork is the gear to be used.
   - The players can choose how many fish they take, but they have to know that if they only take one fish, their family will starve, while if they take more than two fish, they make a profit.
   - Explain that the fish in the lake will reproduce once a year, so the number of each remaining fish in the fishing area/lake will double (i.e. 4 remaining fish become 8).
   - Tell the players to keep the fish they catch in front of them for record-keeping, and count and note down names and numbers at the end of each round.

Fill out a table for each fishing area for each year:

Year	Team	Number of fish in area at the beginning	Number of fish in area at the end	Number of fish caught per person	Total number of fish caught per year
1					
2					
3					
4					

9. Round/Year 2:

   - Explain that, in this round, the fishing season will also last one minute. However, this time, after the first 20 seconds, players have to switch from fork to chopsticks / twigs to fish. This will likely decrease their fishing capacity, representing a fisheries management measure to reduce fishing pressure during a certain time of the year.
   - After another 20 seconds, the players are allowed to go back to using the forks.
   - The same rule for the replenishment of the fish resources as in Year 1 applies – for each fish in the water, there will be one additional new fish.

10. Round/Year 3:

    - This time, the fishing season will again last 1 minute. After 20 seconds, the players will have to stop fishing for 10 seconds. In addition, if players have caught all the fish in their area, they are allowed to move to the fishing area of another groups and continue fishing there.

11. Round/Year 4: Participants are allowed to talk to one another.

    - Ask participants to discuss the best strategy for managing their fishing to allow for maximum profit in the current year yet also taking into account maximum recruitment for the next year, based on the experiences from the past "years". Ask them to consider the management options used before (e.g. gear restriction, temporary closure of fishing area).
    - Replenishment will be allowed immediately at the end of the round with the same rule of one new fish per remaining fish to see which group managed their fishery best.

12. Lead the final discussion with the following questions:

    - Compare each group's catch: Who caught the most fish?
    - Did anyone try to take as many as possible? Why or why not?
    - Did anyone take a few as possible for the good of the community? Why or why not?
    - Did switching gear type make a difference?
    - If you moved to another fishing area after depleting your own, how did that make you feel?
    - Did you decide not to fish in another area, and why?
    - Is it possible to maximize the number of fish caught per person and the number of fish remaining in the fishing area at the same time? Why or why not?
    - Did communication/collaboration in Year 4 make a difference? Why or why not?
    - Are there any other important stakeholders who may have an interest in the sustainability of the fisheries?

facilitators' notes

Year 1 represents an open-access fishery. Year 2 includes the use of an input control in the form of a more selective gear type. Input controls are regulations directed at controlling the fishing power and effort used to harvest fish. They can be in the form of limits to the number and size of fishing vessels, to the amount of time allowed to fish, and to the types, numbers or characteristics of gear used. In this instance, the use of chopsticks/branches represents a gear modification in the form of a more restrictive gear. Year 3 uses a time closures to reduce fishing pressure on the stock. In Year 4, communication is allowed among players. Management options that players could choose are endless. Other input controls they may use include limiting the total number of players allowed to fish and then dividing the catch and restricting the gear for each player (going back to the chopsticks/branches). Output controls are direct limits on the number or size of fish harvested regardless of the inputs used. They include such measures as a limit on harvest, total allowable catch, discards, and minimum and/or maximum allowable size. Output controls they may use include limiting the total catch for each player. Discussion after each year is very important.

exercise 2

PRISONER'S DILEMMA

OBJECTIVES:

Illustrate how cooperation and competition bring different payoffs but depend on how the whole system operates.

TIME:

1 hour.

MATERIALS:

Writing support, pens.

STEPS:

1. Divide people into groups of three people each. They have to agree which two of them are fishers and who is a judge.

2. Explain the situation. The fishers have been fishing for years according to certain rules. Now they receive a new set of rules for fishing. The two fishers must choose whether to follow the new rules and to cooperate with the fellow fisher or not to follow the rules and to compete with the other fisher.

3. Ask each fisher to decide on what to do and to write down the decision without telling anyone: a cross ('x') for respecting the rules, a circle ('o') for not respecting the rules.

4. The judge then has to look at the two choices and to score accordingly:

   - If both cooperate ('x', 'x'), both receive three fish
   - If one cooperates ('x') and one competes ('o'), the competitor ('o') receives five fish and the cooperator '('x') receives none
   - If both compete ('o', 'o'), both receive one fish

5. The results from each round are told to the players before starting the next round.

6. Play at least five rounds of this game.

7. Discuss the results: Which strategy worked? Why do you think this strategy worked and why did you make the choices you made? How stable is cooperation? What can destroy cooperative ventures?

exercise 3

COOPERATE AND ORGANIZE

OBJECTIVES:

Illustrate how cooperation may work in different scenarios.

MATERIALS:

As many cards as participants with symbols for the following roles on them: half of the cards symbolizing an independent fisher and half of the cards representing a fisher in a cooperative/ association.

TIME:

2 hours.

STEPS:

1. Have a warm-up discussion by asking the participants if they or their parents are engaged in any sort of organizations. What do they think is good practice for cooperation?

2. Distribute the cards to the participants so that each participant has a role.

3. Set the stage: explain that the fishers in the village decided to form a cooperative to harvest fish 'A'. However, some fishers decided to remain independent.

4. Explain that for independent fishers the fishing season for fish "A" is from April to September. Each fisher has a preset quantity ("quota") that he/she is allowed to catch. The best fishing months are April, May and June.

5. *Fishers in a cooperative* also have a quota assigned and are allowed to fish all year until they reach their quota. The different members of a cooperative can also fish together, having a bigger quota.

6. Explain that through the game participants in the cooperative should convince those not in the cooperative to join the organizations by promoting the benefits, both to the fish stock and to themselves economically.

7. Introduce Scenario 1:

   - Explain that during the season, suddenly, one of the cooperative boats has developed a large hole and one fisher cannot fish. He/she communicates with other cooperative members to whom he/she allocates his/her quota. The other fishers catch that quota, sell the fish and give him/her a portion of the profits, although he/she did not go fishing. He/she was able to buy the repair material with the money and is now fishing again after a week.
   - At the same time, one of the independent boats has a hole and one fisher cannot fish. He/she has no money to fix the boat and he/she is still losing money because he/she is not fishing.

8. Ask the participants to discuss this scenario, from their point of view as independent fisher or as fisher of a cooperative: In these circumstances can you see the advantages of cooperation?

9. Introduce Scenario 2:

   - Explain that due to climate change, warmer water has caused a shift in the spawning

season which occurred earlier than usual. The season therefore has to end early to protect the recruitment of the stock. The independent boats are unable to catch the rest of their quota as they are not allowed to fish after the season. The cooperative boats stop fishing temporarily and restart after the spawning females leave the area.

10. Ask each team to discuss the following points and ask one representative to report to the entire group:

    - What are the challenges for cooperation?
    - How can those challenges be addressed?
    - How can youth become organized?
    - Quotas are one possible management tool, with pros and cons. For example what happens in a multispecies fishery where not only fish "A" is targeted?
    - What are good practices for cooperation?
    - Are local fishers involved in fisheries management?

11. Have a final discussion on the same points with the whole group.

facilitators' notes

Fish stocks are renewable living resources, but they cannot be harvested without limits. Through cooperation, communities can successfully regulate the use of resources. Elinor Ostrom, Nobel Prize for Economics 2009, developed some principles for successfully managing a common resource through communities:

1. Define clear group boundaries.

2. Match rules governing use of common goods to local needs and conditions.

3. Ensure that those affected by the rules can participate in modifying the rules.

4. Make sure the rule-making rights of community members are respected by outside authorities.

5. Develop a system, carried out by community members, for monitoring members' behaviour.

6. Use graduated sanctions for rule violators.

7. Provide accessible, low-cost means for dispute resolution.

8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

The government always plays a role in fisheries management but it can empower communities to take over part of the management responsibilities.

exercise 4

ROLE PLAY ON COOPERATIVES[2]

OBJECTIVES:

Develop local solutions to local problems through cooperative problem solving.

TIME:

3 hours.

MATERIALS:

Scripts for three scenarios (depending on the size of the class).

STEPS:

1. Divide the group into three equal and ideally gender-balanced groups.

2. Each group receives a separate script. This script can be modified from the one supplied or made specific to the local situation.

3. Ask the groups to:

   - read, study and rehearse their script and then perform it; explain the script if they are unable to read
   - as the scripts have an open ending ask the audience to come up with possible solutions by improvising their roles, until a real solution has been reached

4. Have a final discussion: What best practices can contribute to success? What hinders or weakens organizations and collaboration?

Example script: Organize for power (example – this should be adapted to the local situation).

Characters:

- Victor: President of the cooperative
- Anna: Treasurer of the cooperative
- Luiz: Fisher
- Julia: Fisher woman
- Captain Rodrigues: Fisheries manager

The local river has suffered a strange environmental disaster, with the unexpected dying of various kinds of fish. Close to the river, there are intense monocultures of sugar cane and coffee. There is also a diamond mine and some weaving industries. The riverside community and especially artisanal fishers of that region are severely affected by both the environmental impact of the destruction caused by the monocultures and the industries as well as the economic impact, since fishing decreased. The marketing of fish is also affected because many people do not buy fish as they are afraid to eat the fish unless the cause of the dying fish is identified.

The President of the Fishers Cooperative is Victor. He is talking to the Treasurer, Anna, about the difficulties they are experiencing. As there is no income, the cooperative does not have money to pay the bills for electricity, water and telephone. Some fishers enter the room to ask whether something is being done.

[2] Source: Kalikoski, D., Dias Neto, J., Glinfskoi Thé, A.P., Ruffino, M.L. & Marrul Filho, S. 2009. Gestão compartilhada do uso sustentável de recursos pesqueiros: refletir para agir. Brasilia, Ibama. 184 pp.

Luiz: Good morning, Anna and Victor. So what do we know about the fish disaster? Do we know who is responsible? Our wives are complaining that we have no money. It is the role of the cooperative to resolve these issues.

Julia: Really ... I heard that it was from the a farm Somewhere upstream Have you heard this Victor? Has the staff of the Forestry unit said anything?

Victor: Guys, you know how these government agencies are: they never say anything to us. But I went there right away to report the dead fish. It appears that the State Environmental Department came to collect water two months ago but the results still were not ready.

Julia: That's it, Victor? And you, Anna? And we don't do anything? Talk to a lawyer?

Anna: It is very difficult to mess with these things Julia. I have to go to the capital to talk to the prosecutor and we have no money.

Luiz: So nothing is done? Where is all the money?

Victor: What are you saying, Luiz? You think we are stealing from the cooperative? We have already paid the full year costs of the building here, mail and passage to go to the annual fishing federation meeting and money is collected only once a year from the cooperative members at the end of the year. Does anyone help out? Everyone disappears right after the election and no one comes to the meetings.

Julia: For what? The meetings do not solve anything, the problems are still here. Nobody says anything during the meeting, only Victor, and when they start talking, everyone only complains about the mess, and the meeting ends without resolving anything.

Luiz: The situation is this: The cooperative has no money, the fishers have no money, no one respects us, no one cares if we are starving!

Shortly thereafter, the phone rings and it is the Commander of Environmental Policing who wants to give news of a new ordinance for the state fishery, which had already been published five days ago in the Official Gazette.

Captain Rodrigues: Victor, how are you?

President Victor: I'm fine, captain. I am here talking with cooperative staff about the bad situation here. Have you any news, sir? Have you the seen the results of what caused the death of the fish?

Captain Rodrigues: Well, Victor I have not seen the results. It takes a lot of time because they have to send all to the laboratories, which then forward the results to the technical team who makes the report, and the board of the Institute of Waters of the State must approve the report. Only then do they publish the result of what probably happened, but it is not always possible to prove, because there is a lot of sewage in the river, industrial and domestic, there are the runoff from the farmland ... it will be difficult to find the cause.

Victor: Well, captain, but so what do we do?

Captain Rodrigues: Well, not wanting to cut you off Victor, but I'm calling to give you information about a new ordinance that has been issued. It is not for me to question the law, only to apply it. I am forwarding this law to you.

Victor: That's right, captain. We are here now. You can tell us now.

Captain Rodrigues: I'll talk, but no use questioning me because I only apply the laws. Since March 5, all fishing is prohibited in the entire stretch of the river, indefinitely.

Victor: What? But it cannot be? How is that?

Captain Rodrigues: I am forwarding the ordinance to you, Victor, so please warn all fishers, starting tomorrow, the patrol will be on the water fining anyone caught fishing in the river. Victor: Hold on, captain! But as it is ...!

Line goes dead.

Julia: What happened?

Luiz: Just tell me, what did the captain say?

Victor: There is a new ordinance from the state. The river is closed to fishing. We can no longer fish. It was already hard to sell at least we could eat, right? But now? Not so!

Anna: Ah! But we have our rights, we must receive unemployment insurance!

Julia: What do we do? Not right, no! Why are we getting punished when it wasn't our fault?

Discussion: What can be done? How could the crisis of lack of money have been avoided? What can they do now?

facilitators' notes

It is important to use local scenarios so that the participants can identify with them. There usually are many situations like the one in the example where fishers are disempowered. Another common scenario is distrust and poor performance of organizations but a need to work together when an outside threat arises. Have a brief discussion with the participants to identify potential scenarios before the exercise.

exercise 5

GOOD MANAGEMENT PRACTICES

OBJECTIVE:

Understand the basics of managing fish and fishers.

TIME:

1.5 hours.

MATERIALS:

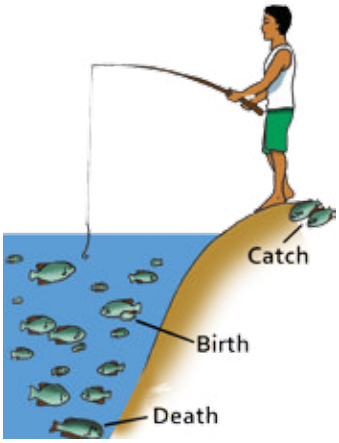
Writing support, pens.

STEPS:

1. Divide participants into two or more groups.
2. Ask each group to find a way to balance the fishing activity with a limited available amount of fish.
3. Let them brainstorm as long as they need, also using what they learned in the previous two sessions.
4. Ask the participants to present their ideas to the groups.

facilitators' notes

Fish populations will increase until they reach an environmental limit, the so-called carrying capacity. Once reached, population growth will level off. Population growth is the difference between new production (birth) and mortality (death). It is therefore important to fish when the population is between the initial small size and the limiting large size to obtain the best yield from the fish (known as maximum sustainable yield [MSY]). Fishing reduces the number of fish. If done correctly, the fishing rate will be balanced by the natural recruitment of the fish stock and not harm its survival.



If we overfish, it is possible to drive the population into low productivity mode until it can finally recover. However, if fishing does not decrease, the population will struggle to increase. If we keep fishing at high levels we will have only small fish that have limited reproductive potential. It is therefore very important to balance fishing rates with population growth rates.

There are many case studies available on best fishing practices. However the emphasis needs to be on local examples that make sense in the local context. These can include selective gear, closed seasons, closed areas, a restricted number of participants in the fishery, etc.

Natural disasters and climate change will also affect the fish growth rate. For example, changes in rainfall, wind patterns, cloud cover, currents and upwelling can influence water temperature, salinity and larval transport. As fish respond to all these factors changes in distribution and abundance are likely.

GOING TO SEA

Fish are mainly caught from boats. Sometimes people are hurt or die when they go to sea. Why is fishing so dangerous? One of the biggest challenges is working on a boat, which is a moving platform, under changing conditions such as weather and physical ocean movements (e.g. tides, currents and waves). With climate change, extreme weather events and natural hazards such as typhoons, tropical storms, heavy rainfall and tsunamis will further increase and will bring challenges. Engines can break down, especially if not maintained, and fires can break out with gasoline engines. Injuries at sea may become infected easily if not properly disinfected. On board, it is easy to become entangled in gear and to fall. If you fall overboard, remaining calm and knowing how to swim can be crucial to survive. Another risk are overloaded boats, which can become unstable. All these factors create dangerous conditions that people need to think about, prevent and prepare for to keep out of trouble. The need to know how to respond when things go wrong. Sometimes, children participate in fishing. They are even more vulnerable and should not engage in what is called “child labour”. Child labour is any activity that is mentally, physically, socially or morally dangerous and harmful for a child and interferes with schooling. A responsible fisher will be prepared to save the life of the crew, his/her own life and the boat, and will also not hire children. A life saved is worth the time spent to either learn a new skill (such as swimming and knot tying) or to remember to carry a small tool (such as a whistle) or paying attention to the signs of bad weather.

exercise 1

IDENTIFY SAFETY HAZARDS

OBJECTIVES:

Be able to identify safety hazards at sea, work as a team to minimize safety risks and learn about useful tools to maximize safety.

TIME:

1 hour.

MATERIALS:

Large writing support, blindfold, materials for a course (e.g. rope, net, wave/surf representation, rock, wind, dangerous animals representation, start and end point).

STEPS:

Set up a course with various obstacles through which two people (preferably gender-balanced) have to move together.

1. Establish pairs of participants by counting (A, B, A, B, etc.).

2. Assign one member of the pair to be crew and one to be captain.

3. Blindfold each crew member.

4. Explain the rules of the game:

   - The captain must guide the crew through the course from the beginning to the end point, using only the voice , without touching the crew
   - The rock, net, animal, waves and wind represent hazards at sea they must navigate through
   - The game ends when all pairs reach the end point safely or return back to the beginning

5. Have the captain of each pair lead the blindfolded crew through the course, one at a time.

6. When all teams have completed the exercise, ask participants to discuss the following questions:

   - How did it feel to be a captain?
   - How did it feel to be a crew member?
   - Were you afraid?
   - What hazards did you encounter during the course and what decision did you take to avoid them?
   - Are there other potential hazards to a boat you can think of?

7. Close the discussion by asking participants to list tools that may be available to help minimize hazards

facilitators' notes

Participants should learn about the following concepts with regard to safety at sea:

What are safety hazards?

- Anything that affects your ability to fish, navigate and return home safely is a hazard. Some hazards are natural, such as changing weather, and some are the result of just being on the water (e.g. risk of drowning) or a result of the activity you are doing (becoming caught in fishing gear). Sometimes they are a result of lack of planning and preparation.

Why is it important to know hazards and how to minimize their impacts/risks?

- Accidents are preventable most of the time if the captain and crew are prepared and are paying attention. Loss of life and vessels is extremely high in the fishing occupation because of the hazards.

What are causes of accidents at sea?

- A major cause of accidents at sea is human error. Some of that error is caused by lack of education, some by not planning for emergencies at sea. Another major source of accidents is a sudden change in wind and ocean current patterns – winds can change direction quickly causing boats to capsize and sink.

Importance of planning and preparation.

- If possible, check the weather forecast before leaving the shore
- Let people know you are leaving, for how long, and where you are going
- It is important to take safety items with you (first aid kit, lifejacket or personal floating device, a whistle, a mirror a torch, a bailer)
- Know what the effect of tides and wind direction are, especially in certain areas
- Be aware of dangerous animals (fish spines, poisonous animals, etc.)
- Prepare against sun exposure (always take water)
- Bring some form of communication (radio and/or mobile phone)
- Be aware of who is your closest rescuer when out at sea (in case you encounter a problem) – be aware of your surroundings
- Maintain your gear properly and always check it before heading out
- Use the right knots
- Ensure regular engine and boat maintenance (including tools and spare parts)
- Check that fuel is sufficient for the trip
- Take care of injuries right away
- Know when to cancel a trip and return to port

Tools that would help with survival at sea: rags, knife, visible stuff, dye, compass, mirror/aluminium foil, buoys, first-aid supplies, sea anchor, rope, life preservers such as life vests, radio, mobile phone, lights, food and water, whistle, flares, tide plan.

Skills that would help with survival at sea: simple navigation, GPS, swimming skills, plan for potential emergencies, simple first aid.

Children are also often involved in fisheries and are particularly vulnerable to accidents. Child labour is harmful for the development of a child and interferes with schooling. There are international standards developed by the International Labour Organization to protect children and eliminate child labour.

More information can be found in the JFFLS module Child labour prevention in agriculture (available at www.fao.org/docrep/013/i1897e/i1897e.pdf).

exercise 2

WHAT FLOATS YOUR BOAT?

OBJECTIVES:

Understand the concepts of stability and buoyancy and what makes a boat safe.

TIME:

1 hour.

MATERIALS:

Writing support, tub of water, a piece of wood, large long board of wood, a big rock, small rocks or coins, if possible a boat shaped container that can be rocked (to simulate the rolling period) and filled with water (free surface effect).

STEPS:

1. Pour water into the tub until it is about half full.

2. Ask the participants: Who thinks that wood will float? If you think wood floats, raise your hand. Who thinks that a rock will float? If you think rocks will float, raise your hand.

3. Gather the participants around the tub and first introduce the piece of wood and then the rock.

4. Ask the participants: Why do you think materials float? Do you know what buoyancy is? Discuss the concept with the class and ask them to give examples of something being buoyant.

5. Try to sink the piece of wood by pushing it down. Observe with the group what happens and let them describe it.

6. Try to make the rock float. Ask participants how this could be achieved.

7. Have participants look for other objects to test whether they sink or float.

8. Before putting the object in the water ask participants to predict whether it will sink or float.

9. Explain the simple principle of displacement-density versus buoyancy by asking these questions:

   - Are you going to float like a piece of wood or sink like a rock? Why? If you are a rock how do you become more buoyant?
   - How can you make sure that you float? Do you have the right tools?

10. Once these principles are understood, explain what changes the stability of a floating object:

    - Take the board and place it on a large rock. Have two participants of similar weight sit on each end of the board (like a see saw). Explain how the fact that the weights are equally distributed maintains the board stable. Then place two participants of different weights (or two on one side and one on the other) and talk about how this affects the board.
    - Next, take the floating boat object (something

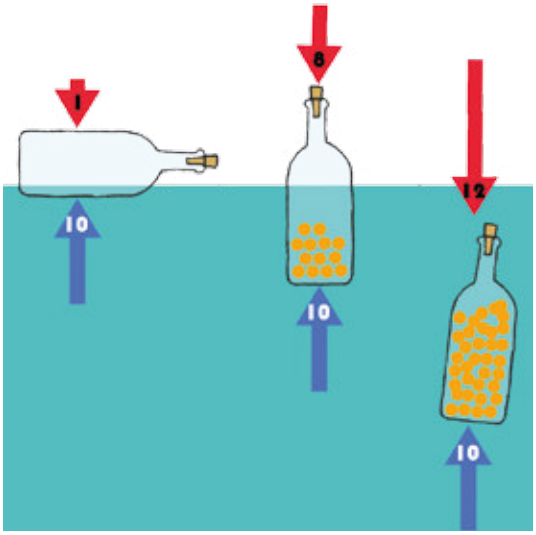
that is open and floats so you can fill it and displace the air with water) and put objects on one end until it becomes unstable. Relate it back to loading a boat with gear or catch on one side: the boat becomes unstable and can capsize. This is especially true in rough seas if a wave comes over the side of the boat.

facilitators' notes

Participants should have an understanding of these concepts with regard to buoyancy and vessel stability:

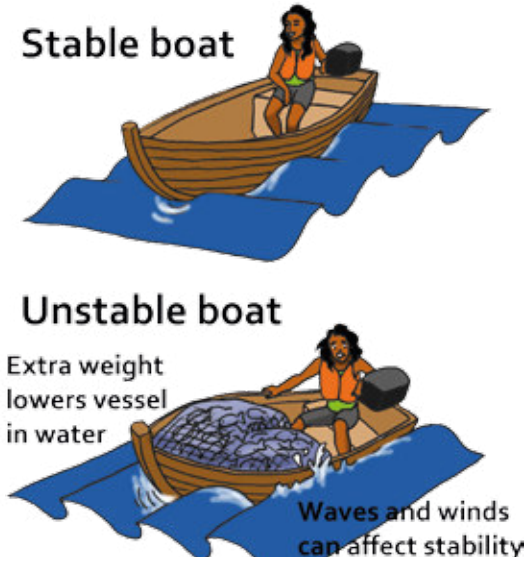
Buoyancy

- Buoyancy is a rather complex principle. It is the tendency of an object to float or to rise when submerged in a liquid. The underlying fact is that every floating object displaces its own weight of the liquid in which it floats (Archimedes principle). It helps a duck float in the water! If the object has a density that is lower than that of the fluid, it will float at a level where its weight equals the weight of the liquid it is displacing. The buoyancy provided by the underwater parts of your vessel, coupled with the combined weight of its hull, equipment, fuel, and catch, determines the stability of your vessel.



Stability

- Stability is the ability of a vessel to return to a previous position. The stability of your boat will not remain the same – it constantly changes throughout your trip. The directions of the sea and wind have a big effect on your stability. Be aware of the direction in which you steer your vessel and where the waves and wind are coming from. The centre of gravity will move in response to sea and wind and the weights you add and those you remove. It moves towards any added weights and away from weights that are removed. Loading extra fish on deck lowers the vessel in the water, limiting both its range of stability and the catch you can safely carry. It may also lift the centre of gravity dangerously. This limits the range of stability and could bring the boat much closer to a capsize condition. You should always be aware of how much extra weight you put on board your vessel.



exercise 3

KEEP IT WORKING – SIMPLE MAINTENANCE

OBJECTIVES:

Understand the different maintenance requirements of the boat, engine and gear to ensure safety at sea.

TIME:

30 minutes.

MATERIALS:

If possible, print out pictures of local boats; if not prepare simple drawings such as below (one for each group).

STEPS:

1. Divide the group into smaller, ideally gender-balanced groups.
2. Provide each group with the picture. Ask each group to discuss the following questions:
   - What is wrong with this picture?
   - Is it safe to go to sea in this vessel?
   - How could the situation be improved?

Option 2: Organize a field trip or use a picture from the local area to show the difference between a safe boat and one that needs critical maintenance.

facilitators' notes

Engine maintenance:

- After every trip, wash and flush out the engine. This does not only apply to trips in saltwater, but also to trips in freshwater.
- While the motor is being flushed, check the water pump to make sure you have good water flow.
- After flushing the engine, you should disconnect the fuel line and allow the engine to burn all the fuel in the carburettor.
- Ensure the cover of the engine is secure and not cracked or damaged.
- Check the lower unit oil and change if necessary.

Fuel:

- Check the fuel line for cracks and worn spots.
- Make sure the fuel primer bulb is not cracked and is pliable.
- Make sure the fuel line fittings seat properly and do not leak.
- Check the clamps on the fuel line for rust or corrosion.
- Check the fuel tanks for damage and corrosion.
- Check the tank vent to make sure it aspirates properly. Check for water in the fuel.

Other:

- Keep the interior of the boat free of standing water to avoid rotting.
- Keep the hull and decks of the boat clean and free of debris and trash. Dirt attracts moisture and moisture attracts rot.
- Make sure ropes on board are not frayed or weak.
- Inspect the chain and anchor to ensure that they are in good condition.
- Keep the general interior of the boat painted, varnished or oiled to repel moisture. The finish is a moisture barrier that keeps water from penetrating the wood.
- Check for scratches and thin spots in the finish and repair them to prevent the formation of holes.
- Replace any weak or loose boards or planks.

exercise 4

S.O.S. (SAVE OUR SHIP)

OBJECTIVES:

Raise awareness about the importance of reacting quickly to emergencies.

TIME:

1.5 hours.

MATERIALS:

A small boat* (one that holds at least two people) with a hole not larger than a fist below the waterline, a rag (about 1 m × 1 m), a large plastic bag, scrap fishing net, a bucket of dirt/sand, newspaper, location with at least waist-deep water (* Every fishing village is likely to have at least one old boat on the beach in need of repair. These can be used in the water or just on the beach to simulate the activity. If you use a boat in the water, make sure there are additional adult helpers to assist participants in the water and ensure no one is at risk).

STEPS:

1. Start the exercise by placing all items in the boat on shore.

2. Plug the hole with a piece of wood or other materials that can be easily removed.

3. Ask the group to move the boat into shallow water.

4. Ask for two volunteers and ask them to sit in the boat while others hold it stable.

5. Tell the group that the boat has hit a submerged rock and the two volunteers must fix the leak before they lose the boat and become stranded at sea.

6. 6.Have the rest of the group help pull the boat into waist-deep water, ensuring that no one risks drowning (see comment in the “material” part above).

7. Once in the water remove the plug from the hole and ask the two volunteers to plug the leak before the boat sinks to the bottom.

8. Once completed (the boat sinks or floats), bring everyone back to shore to discuss:

    - What items were used to plug the leak?
    - Were these items effective?
    - Could other available items have been used for better success?
    - If the leak was plugged: Did the volunteers try to empty the water that was in the boat?

- What are the implications of not plugging the leak?
- Was there time to think through all of the available options?
- Can you imagine any real-life scenarios where this exercise would be helpful?

facilitators' notes

Participants should have an understanding of the following concepts related to an emergency flooding situation at sea:

- Any breach in the hull of a vessel is dangerous, no matter how big or how small
- If a leak cannot be stopped completely it should be slowed by filling the breached area with any available materials
- All water that is in the vessel must be removed with a bailer (or container) or by hand, a flooded vessel is unstable and may capsize in rough seas

The key to saving a leaking vessel is quick thinking and ability to use available materials. A little creativity can make the difference in a dangerous situation.

exercise 5 (optional)

KNOW YOUR KNOTS

OBJECTIVES:

Demonstrate proper knot tying techniques and understand the practical uses of knots.

TIME:

1 hour.

MATERIALS:

Pieces of line at least 2 m in length, a tree or pole fixed securely in the ground.

STEPS:

1. Ask a few of the participants to tie a loop in the line that secures them to the tree.
2. Have them pull on the loop tightly. What happens?
3. Ask them what the implications are if the knot slips.
4. If the knot does not slip, what are the implications?
5. Have them pull tightly on each knot, then have them try to untie the knots.
6. Discuss if it was difficult to do. Could it be done with one hand? Could it be done quickly?
7. Explain how to tie a *bowline knot* and give each participant a chance to practise the knot. Repeat the steps above using the bowline knot.
8. Discuss the benefits of the *bowline.*
9. What every day uses does this knot have?
10. What emergency uses does this knot have?

11. Secure one of the lines to the tree using a *bowline*, hand the end of the line and an additional line to one of the participants and ask them to connect them to make one continuous line.

12. Carefully pull on the line. What happens?

13. If the knot slips, what are the implications?

14. If the knot holds, what are the implications?

15. Have them pull tightly on the knot, then have them untie it. Was it difficult to do? Could it be done with one hand? Could it be done quickly?

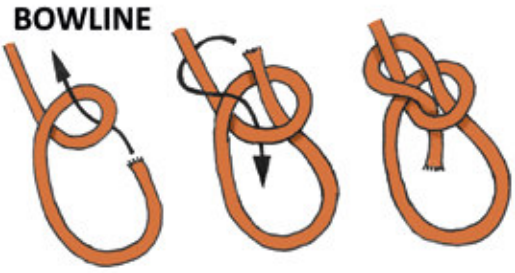
16. Explain how to tie a *square knot* and give each of the participants a chance to practice the knot. Repeat the steps above using the *square knot*.

17. Discuss the benefits of the *square knot*.

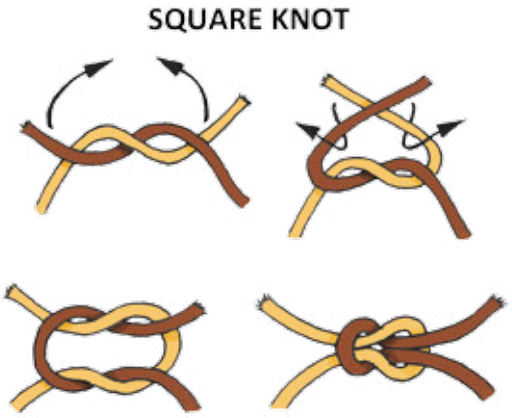
18. What every day uses does this knot have?

19. What emergency uses does this knot have?

facilitators' notes



A **bowline** can be used in any situation that a secure loop is required. It will maintain about 65 percent of the line strength with which it was tied. A bowline is easy to take apart: once tied, the knot can be flipped over and bent in half at the centre point of the knot. This will loosen the knot so that it can be easily untied. A bowline is an excellent rescue loop when put over a person's head and under the arms. This loop will not slip and suffocate the person as a standard slip knot loop would.



A **square knot** can be used any time two line ends or separate lines need to be joined together. A square knot will maintain about 45 percent of the line strength with which it was tied. This makes it a weak knot that should not be used for continuous load bearing applications. By pushing the two sides of the knot together a square knot can be easily taken apart. In an emergency situation, this knot can be used to connect short pieces of line to throw to a person in the water. Do not use this knot to lift people out of the water.

exercise 6 (optional)

LEARN TO SWIM

OBJECTIVES:

Learn two key swimming strokes through step-by-step instruction and practise treading water in water, for one minute with clothes on.

MATERIALS:

Access to shallow water.

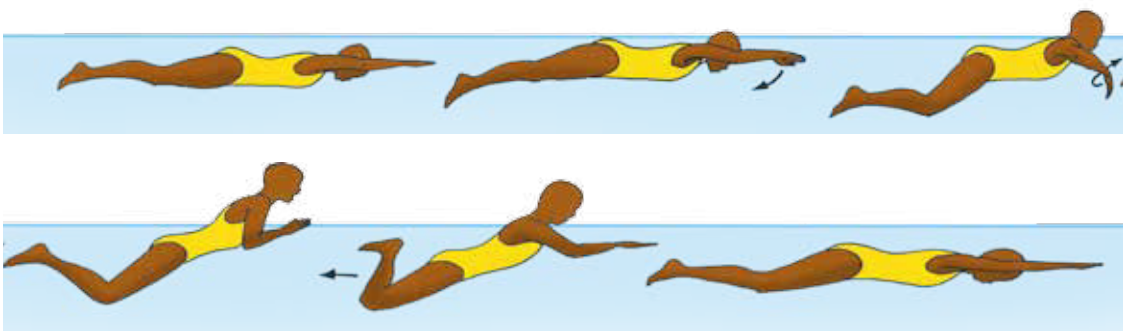
STEPS

Breaststroke

The breaststroke is performed by leaning on the chest with the arms breaking the water slightly and the legs staying under water constantly. The body should be in line with the water surface and the shoulders and hips flat in the water. The arms are moved in a long circular motion and the legs are kicked in a movement similar to a frog's kick, which is what slows the swimmer down. The one difficulty in the breaststroke is that the legs and arms are used in synchronization.

1. Explain the different movements
   - **Arm movement**: Start out by placing your arms out in front just under the surface of the water. With your palms facing outwards push both hands out and around as if drawing a full circle. Your hands finish by stretching forwards again. Your arms and legs should stay in the water all of the time and you should not splash when doing the stroke correctly.
   - **Leg movement:** From the initial position move your feet and legs together, like a frog would. Simply bend your knees and lift your feet up as far as your posterior. Turn your feet out in preparation for pushing back with the bottom of your foot. Move your feet out and in again to meet each other, and straighten your legs with your knees touching. It is a good idea to practise this movement, for example at the side of the pool, by holding onto a support rail or somewhere close to the shore where you can hold on to something with your legs stretched out behind you.
   - **Breathing**: Once you have mastered the leg and arm movements you will notice that your head starts to lift naturally at the end of the cycle. When this occurs simply lift your face out of the water and take a breath in through your mouth. Put your face back into the water breathing out through your nose and mouth, as you stretch your arms forward to begin the circle again.
   - To put the stroke together, pull your arms and breathe in while pushing your legs back and stretching out with your body level in the water.

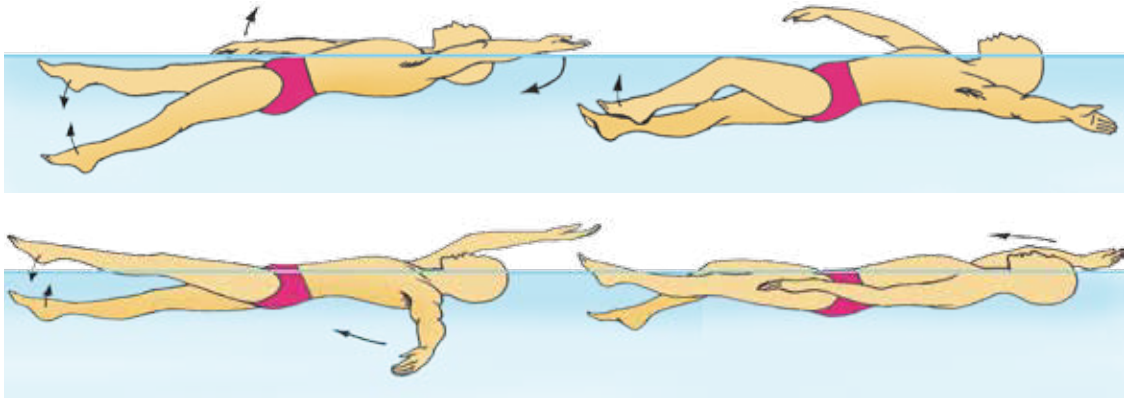
2. Without going into the water, practise the arm and leg movements with the group while sitting:
   - Sit with legs extended, turn feet up and out, brings knees in and make a kick like a frog
   - Ask participants to extend their arms out in front with their palms touching, then to bring the hands to the chest to mimic the stroke
   - If participants feel comfortable, add the head and breathing techniques



Backstroke or back crawl

The advantage of the backstroke is the ability of easy breathing but the obvious disadvantage of this stroke is not being able to see where you are going. However, in a survival situation especially when a person is out of energy and stranded out in a body of water, the best things you can do is float on your back and gently kick and use your hands to propel yourself forward. The backstroke requires the swimmer to float on the back, body straight but relaxed.

1. Explain the different movements
   - The arms reach alternately over the head, in line with the shoulder and palms outward. The arms are then thrust outward at shoulder level and swept to the sides. To move more quickly through the water, the swimmer kicks the legs in a rapid threshing movement, or flutter kick.
   - The arm movements resemble a windmill. Keep one arm straight as your raise it out of the water from your waist to a fully extended position. The other arm should be bent and pulling a cupped hand along your side in the water, entering the water little finger first. Always keep your head floating back in the water with your eyes looking up and breathe normally.
   - While floating on your back, kick your legs up and down. The legs are kept straight but not entirely rigid and toes should be pointed out. When kicking, churn the surface of the water but try not to make a big splash.



Treading water

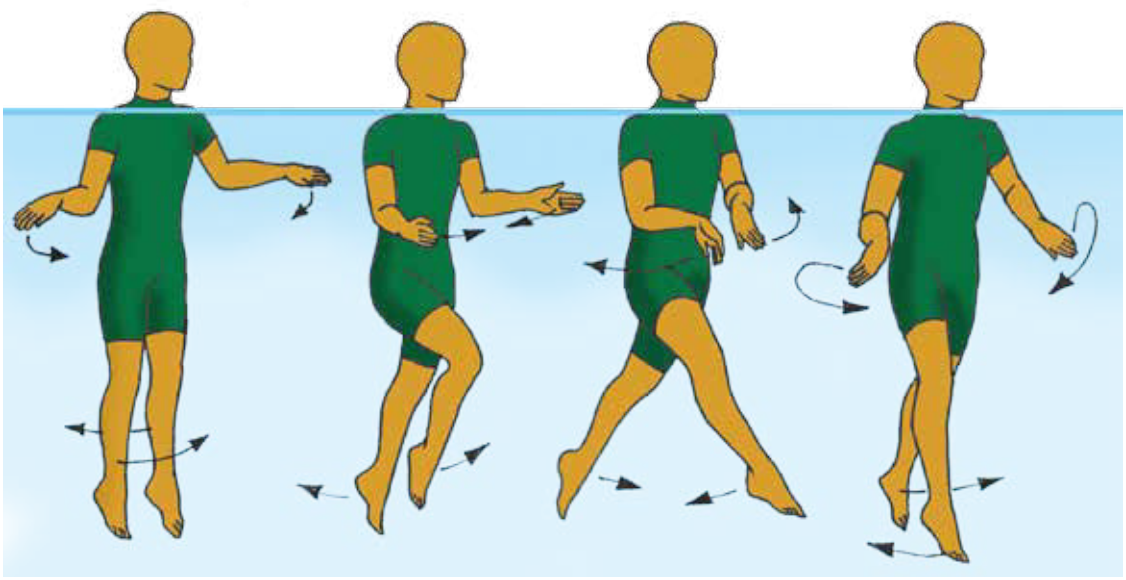
Treading water is a very important skill for water survival. It can be used while waiting for help to arrive after entering the water owing to an unforeseen event, i.e. falling overboard or ship capsizing. Treading water takes a lot of energy, so it should be used in appropriate survival situations such as heavy waves or currents that make other techniques difficult to utilize such as to back-float. Treading water can also be used to keep the body moving and warm while waiting for rescue in cold water.

STEPS

1. Describe the proper technique for treading water prior to participants entering the water:
   - Body position: keep your body upright with the head out of the water.
   - Hand and arm movements: make slow sculling movements (sculling is the term used to describe the rhythmic motion of the arms and hands to manipulate the water for upward thrust keeping the body vertically afloat) under water to maintain the vertical body position. A common sculling action is the figure eight.
   - With the fingers together and palms facing downward, draw a figure eight with each hand, pushing the water downward and outward during the motion. Keep the arms slightly bent in front of the chest. Use a minimum of effort to avoid excessive fatigue.
   - Leg movements: Make slow, continuous bicycle-like or scissor-kick type movements to support the body.

2. Have participants practise treading water: first perform the leg motion alone for 20 seconds or more, and then gradually add the arm movements.

Note that working legs and arms at the same time keeps the head well above water. Shoulders or chest may even be above water depending upon body weight, specific gravity, strength, etc. Safety tip: in an emergency, remove any heavy boots or coats that could hinder your movement, but retain the rest of your clothing to stay warm.



GETTING THE FISH

Fish can be caught in many different ways. How a fish is caught matters. It matters to the fish, the habitat, and ultimately to the processer and the consumer. The choice of fishing gear to use is a combination of factors such as materials available, type and size of boat and crew, seasons, weather conditions, distance to fishing grounds, cost of fishing, species behaviour, habitat, moon phases, and, ultimately, the traditional knowledge and skills of the fisher. The goal is to catch the size and species you want to keep while minimizing the fish you throw back ("discard"). The goal is also to reduce costs and the impact on the environment and to produce the highest-quality fish possible. It is very important to recognize that all gear types and fishing methods have some good and some bad features.

exercise 1

CATCH IT!

OBJECTIVES:

Identify local gear.

TIME:

4 hours.

MATERIALS:

Pens, writing support.

PREPARATION:

Prepare a trip to the local fishing village by talking to experienced fishers. Identify a number of fishers willing to share their knowledge and to explain the gear and fishing techniques to the group. Give them some points that they should cover when the group visits them (along the lines of the questions here below).

What other interesting things did you find out by talking to the fishers?

STEPS:

1. Ask the group what they know about fishing gear: Which gear do they know? How is it made? Which species does it catch?

2. Take the group to the local fishing village.

3. Divide the group in smaller teams, possibly ensuring gender balance.

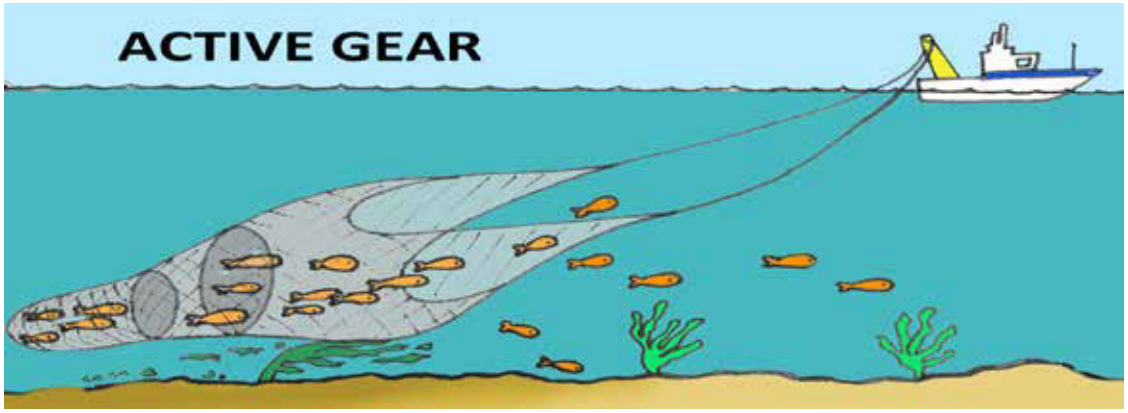
4. Ask the participants to talk to the fishers and to find out about the following questions:

   - Does the gear move or does the fish come to the gear?
   - What material is the gear made of?
   - What fish behaviour allows the animal to be caught with this gear?
   - Which species are targeted with the gear? What happens to the ones that are not targeted?
   - Name some advantages and disvantages of the gear
   - What are the chances the gear will be lost (high probability or low)?
   - How much does the gear cost?
   - What is the impact of the gear on the environment?
   - Who makes the gear? Who repairs it?

5. When back, ask each group to present what they learned.

facilitators' notes

Fishing gear is commonly divided in active gear and passive gear. In the case of active fishing gear, the fish is either swept up by gear from the sea bed or filtered from the water column [add illustration] by gear that is towed through the water or over the sea bed by a fishing vessel or a person. Passive fishing gear is usually stationary in the water or on the sea bed and only brought up on a periodic basis. Owing to the stationary nature of this gear, conflicts often arise in areas where mobile gear is prevalent.



Fishing gear is also divided into mobile gear and fixed gear. Mobile fishing gear is towed through the water or over the seabed by a fishing vessel. Fixed fishing gear is stationary in the water or on the seabed, and it is sometimes left unattended to capture fishery resources and only brought up on a periodic basis. Due to the stationary nature of this gear, conflicts often arise in areas where mobile gear is prevalent.

Fishing gear is commonly made of materials that fall into two groups, synthetic or natural. Synthetic materials take a long time to deteriorate, making them ideal for constructing gear that will last, but also causing problems related to pollution and ghost fishing when lost or discarded at sea. Synthetic materials can be made visible (polyester twine) or invisible in water (monofilament line) allowing for the construction of more efficient gear. Plastic coated wire is commonly used in the construction of pots and traps to prevent deterioration. Natural materials such as wood and cotton twine are often used as cheap or readily available alternatives to synthetic materials. Natural materials tend to degrade quickly and require more maintenance than synthetic materials. The advantage to natural materials is that they are biodegradable and will break down naturally if lost at sea.

It is important to emphasize that different species can be captured with various types of gear, while some species are gear specific. Knowing fish behaviour and habitat preference will help determine the type of gear. Fishing gear can be modified to prevent ghost fishing as well as be species selective to avoid unnecessary bycatch. Fishing gear can be constructed to accommodate the size of the fishing operation in which it will be used.

exercise 2

DON'T CATCH IT!

OBJECTIVE:

Demonstrate the selective properties of gear.

TIME:

1 hour.

MATERIALS:

Local gear – pieces of netting, several hook types and sizes, trap/pot; different types of fish with different mouth shapes and other seafood if available (e.g. crustaceans, molluscs).

STEPS:

1. Ask participants to look at the gear.

2. Ask the following questions:

   - If an object is too large, what happens?
   - If an object is small and passes through the mesh, what does this mean? Is any damage done to the fish even though it is not caught?
   - What can you do to reduce injury to fish?
   - What happens if the webbing is hung loose? Hung tight? Does it make a difference on selectivity?

3. Ask the participants to look at the fish and the hooks and the other gear.

4. Ask the following questions:

   - How can the fish become caught? Do they swallow a hook, are they hooked on their lip or on another part of their body?
   - What type of damage will be done to a fish that is caught? And to one that escapes?
   - How can you reduce injury to the fish you do not want to catch?

5. Explain hook size, treble hooks and circle hooks to the group.

facilitators' notes

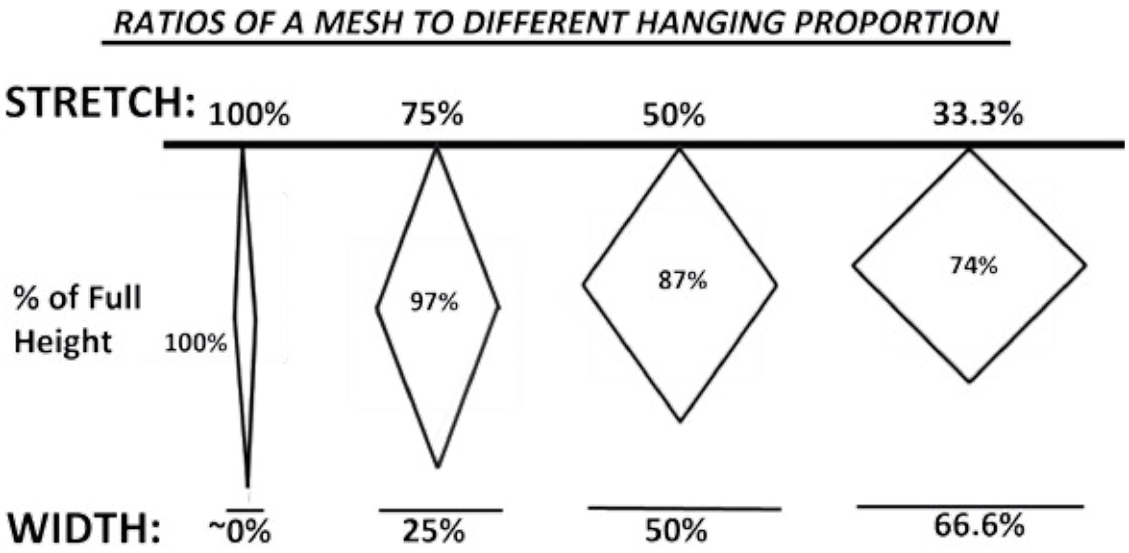
There are several approaches to reducing the amount of fish that you do not want to catch. They fall into three main categories: 1. keep fish out of gear by not catching it; 2. minimize damage to fish that are caught but will be released; and 3. help fish escape if they become caught.

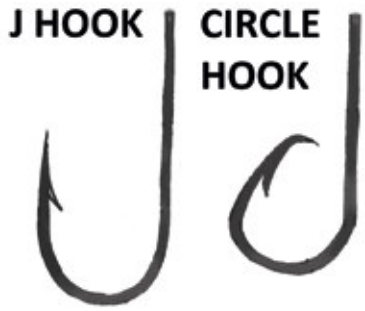
Gear selectivity refers to the property of the gear that allows the actual catch to have a different composition from the fish population in which the gear is being used. It is the fishing method's ability to target and capture organisms by size and species during the fishing operation. Selectivity can be demonstrated by trying to pass objects of different sizes through the mesh.

What makes a gear selective? Traditional fisheries management often uses a minimum fish length that can be caught legally as a way to protect species from overfishing. The established minimum length is usually based on the size of the fish at maturity – allowing a fish to reproduce at least once or twice before it becomes legal size. To avoid catching undersized fish, fisher can use gear with specific characteristics such as minimum mesh size, certain mesh shapes, minimum hook size and

appropriate shape, vent size, appropriate bar spacing and ring diameter to control the size of the fish caught.

Gillnets are considered to be one of the most selective gears available. The selectivity of a gillnet is controlled by the size of the meshes, the hanging ratio (HR) and size of the net. The shape of the meshes is controlled by the hanging ration (HR). The HR is on a scale from 0 to 1, with 0 being a mesh that has no width and 1 being a mesh that has no height. The body shape of the fish will help determine the necessary HR used to capture a particular species. Narrow bodied fish will require a smaller HR, whereas a wide bodied fish will require a larger HR. Knowing the behaviour and morphometric characteristics of the target species is also crucial in the design and type of gillnet chosen.





A circle hook is a fishing hook that has been designed with its point bent towards the shank of the hook, creating a bend that is circular or oval in shape. How does it work? Fishing with circle hooks is quite different from fishing with traditional “J” hooks. The fisher does not have to “set” the hook but just to keep tension on the line when fish bites it. The design of the hook allows it to slide out of the fishes throat and gut cavity to the point of resistance on the lip, where it hooks the fish, avoiding gut hooking which is usually fatal for the fish. Circle hooks can be used to catch any species traditionally caught using hook and line.

exercise 3

WHERE IS MY FISHING GEAR?

OBJECTIVES:

Raise awareness about the risk of ghost fishing and the importance of marking fixed gear.

TIME:

2 hours.

MATERIALS:

Large plastic bottles, foam, rice bags or similar bags, plastic bags, rocks, pieces of scrap metal, long sticks or poles, scrap netting, pieces of twine, rags, large drum of water or body of water.

STEPS:

1. Divide the participants into groups of four (can be larger or smaller depending on available supplies and the size of group – if possible try to ensure gender balance!).

2. Explain to the groups that they will be making buoys to attach to fishing gear. They are allowed to use the supplies in front of them and will have 45 minutes to complete the task.

3. Instruct the participants to collaborate with the other members of their group to come up with a buoy design that is both durable and visible.

4. Explain to the groups that their designs will be tested for buoyancy and for visibility.

5. Once the groups have completed their buoys have one participant from each group explain their design.

6. Test all buoys:

Buoyancy test

- Go to any body of water (but avoid high current area) or use a drum of water
- Place the buoys in it
- For each buoy, ask the group who prepared it: Does the buoy stay on or above the surface? If so, how far? Is the buoy resistant enough (push it under water a few times to mimic rough ocean)?
- If a flag or pole was attached: Was any ballast used to keep the pole upright?
- Are there leaks, saturation or other design flaws that may cause the buoy to sink out of sight?
- How would the buoy stand up to rough seas and heavy currents?

Visibility test

- This test can be performed in a body of water or in a field that has low bushes or small mounds. The purpose of this exercise is to mimic conditions similar to a rolling sea or a windblown body of water
- Place all buoys next to each other in a position similar to how they floated on the surface in the previous test
- Have the groups stand side by side and keep walking backwards away from the buoys until they can no longer see them
- Ask the following questions: Which buoys disappear first? Why?
- What are the advantages of the buoy that disappeared last?
- Is there a practical reason for having tall buoys with flags on top?
- Could the buoy designs be altered to make them better?
- How could you make buoys unique so as not confuse them with other fishers' buoys?
- Would one type of buoy work better for certain fishing gear?

facilitators' notes

Any product that has buoyancy can be used to construct a buoy, as long as it does not leak or become saturated with water when placed in water for long periods of time. Metal, rocks and lead can be used as ballast at the base of buoys to keep them vertical, even in rough seas. Fixed gear without proper buoys is easily lost and can contribute to ghost fishing and pollution. Lost fishing gear is lost money. Lost fishing gear also threatens the sustainability of the fisheries resources if it floats without control. When lost fishing gear (nets, traps, etc.) continues capturing and killing fish this is called "ghost fishing".

With regard to visibility, it is important to realize that changing weather patterns and increased storms caused by climate change may increase the need for visible buoys in some areas. Proper marker buoys will help prevent other boats from running over and cutting lines, which makes it difficult to find gear. In rough seas and heavy current, a surface buoy may be pulled under water, making it difficult to locate. Buoys with long poles with flags on top are visible from a much greater distance than surface buoys. Using bright paint, cloth or plastic can make it easier to see buoys and also create unique colour signatures to identify individuals' gear. Using properly tied knots can help ensure secure connections between your gear and the marker buoys.

exercise 4

WHY REPAIR MY GEAR?

OBJECTIVES:

Understand the importance of maintenance and the relationship between gear maintenance and income.

TIME:

3 hours.

MATERIALS:

Playing cards prepared based on the table below, three small square pieces of webbing/fabric, twine and mending needle.

Front	Back	Front	Back	Front	Back
Week 1		**Week 1**		**Week 1**	
Fisher 1 Day 1	New Gear Catch = 10	Fisher 2 Day 1	New Gear Catch = 10	Fisher 3 Day 1	New Gear Catch = 10
Fisher 1 Day 2	Storm Ruins Gear One Day Repair Catch = 0	Fisher 2 Day 2	Storm Ruins Gear No Repair Catch = 5	Fisher 3 Day 2	Storm Ruins Gear Waiting For New Net Catch = 0
Fisher 1 Day 3	Repaired Gear Catch = 10	Fisher 2 Day 3	Damaged Net Catch = 5	Fisher 3 Day 3	Storm Ruins Gear Setting Up New Net Catch = 0
Fisher 1 Day 4	Repaired Gear Catch = 10	Fisher 2 Day 4	Damaged Net Catch = 5	Fisher 3 Day 4	Traded Catch to Pay For New Net Catch = 0
Fisher 1 Day 5	Repaired Gear Catch = 10	Fisher 2 Day 5	Damaged Net Catch = 5	Fisher 3 Day 5	New Gear Catch = 10
Week 2 Reapired Gear Mantains Catch Efficiency		**Week 2 Damaged Net Becomes Less Efficient Over Time**		**Week 2 New Gear Maintains Catch Efficiency**	
Fisher 1 Day 6	Repaired Gear Catch = 10	Fisher 2 Day 6	Damaged Net Catch = 4	Fisher 3 Day 6	New Gear Catch = 10
Fisher 1 Day 7	Repaired Gear Catch = 10	Fisher 2 Day 7	Damaged Net Catch = 4	Fisher 3 Day 7	New Gear Catch = 10
Fisher 1 Day 8	Repaired Gear Catch = 10	Fisher 2 Day 8	Damaged Net Catch = 4	Fisher 3 Day 8	New Gear Catch = 10
Fisher 1 Day 9	Repaired Gear Catch = 10	Fisher 2 Day 9	Damaged Net Catch = 3	Fisher 3 Day 9	New Gear Catch = 10
Fisher 1 Day 10	Repaired Gear Catch = 10	Fisher 2 Day 10	Damaged Net Catch = 3	Fisher 3 Day 10	New Gear Catch = 10
Total Catch	**90**		**48**		**70**

STEPS:

1. Start a discussion about why it is important to take care of gear. How is gear repaired in the area? Who does it?

2. Choose three participants to represent fishers.

3. Give each of them a piece of webbing and label them fisher 1, fisher 2 and fisher 3.

4. Ask the fishers to walk around and to pretend to fish for 30 seconds.

5. After thirty seconds hand each fisher the appropriate card for their first day of fishing (see table above).

6. Have the fishers read the card aloud to the rest of the participants.

7. Repeat this step until the ten fishing days have passed.

8. Ask each fisher to count their total catch and to present the total to the rest of the group.

9. Ask each fisher to comment on their “week” of fishing.

10. Ask the whole group:

    - Who had the most catch? Why?
    - Is there a benefit to maintaining your gear?
    - Why not replace gear every time it is damaged?
    - If you still catch fish with a damaged net, why should you repair it and lose a day of fishing?

facilitators’ notes

Maintaining gear is an essential part of becoming a profitable fisher. Properly maintained gear will last longer and be less likely to be lost at sea where it contributes to ghost fishing and pollution. The efficiency of properly maintained gear as opposed to damaged gear is very similar to new gear. Repairing gear will help prevent incidental catch of organisms the gear is not designed for. Gear maintenance is a skill that can be passed on for generations within a fishing community and it can create employment in the local community.

EVERY FISH COUNTS

Fish is a good source of high quality protein and other important micronutrients. In many countries it is the primary source of animal protein and contributes to the health of children and adults. In the rush to catch as many fish as possible, we sometimes forget to appreciate the value that each fish has. No fish caught should be wasted. Therefore, we need to be careful we only catch the fish we want to keep. If we catch fish that are too small or the wrong type, the fish needs to be returned to the water alive so that it becomes available at some later time. Once caught, we need to do everything possible to ensure it reaches the consumer in the best condition. Once a fish dies, its body starts to spoil and loses nutritional value. There are ways we can catch fish, store it and prepare it to ensure it is healthy and safe to eat.

exercise 1

FISH IS FOOD[3]

OBJECTIVE:

Understand the concepts of a supply chain.

TIME:

1.5 hours.

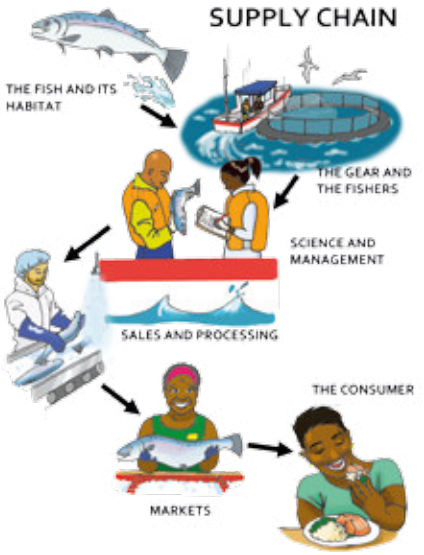
MATERIALS:

Writing support and pens.

STEPS:

1. Draw out a sample supply chain and explain the role of the key players (e.g. habitat, fish, fisher, processors, traders, scientists, managers, consumers) and steps (see example below).

2. Ask students to draw out the supply chain from the sea to the consumer for two local species. Use two species that have different supply chains, i.e. one that is sold on the beach for direct consumption and one that is processed into a new product (you can ask a fisher to come and help the participants).



3. Discuss the roles of men and women in the supply chain. Some possible questions include:

   - Who makes the boats?
   - Who owns the boats?
   - Who controls the money?
   - Are there several supply chains for the species?
   - Who buys the fish? Can they refuse to buy fish of a certain species or size?
   - Who works in processing the fish?
   - What happens to the parts of the fish that are not processed?
   - Do men and women work in all parts of the supply chain? What is the role of children?
   - What would happen to the system if a species or person or business disappeared?
   - What happens to the fish that is not sold (at the landing site, at the market)?

facilitators' notes

The supply chain includes all links from the point of production in the water to the final consumer. The supply chain for fish and fishery products can involve a large number of stakeholders between the fisher and the final consumer.

The supply of fish and fishery products is affected by a wide number of factors, such as market demand, prices, season, climatic conditions, population dynamics, economics status, fuel prices, and the policy and legal environment. The perishable nature of fish requires special attention to handling, grading and packing to avoid post harvest losses and the market price is usually dependent upon the quality of fish. Supply chains are concerned with how long it takes to present the good for sale. The main objectives of supply chain management are to reduce the number of links and to reduce friction such as bottlenecks, costs incurred, time to market, etc.

[3] This exercise is closely linked with the JFFLS module on Post-harvest issues in fisheries and aquaculture

exercise 2

HARVEST AND POST HARVEST LOSSES

OBJECTIVE:

Understand what food losses are and what causes them.

TIME:

1.5 hours.

MATERIALS:

One fresh and one spoiled fish for each small group, pans or trays to lay fish in.

STEPS:

1. Divide the participants into smaller groups of 5-6 people (indeally gender balanced!) and ask them to answer the following questions:

   - What does a fresh fish look like?
   - What does a non-fresh fish look like (e.g. eyes, gills, skin)?
   - What does a fresh fish smell like? A non-fresh fish?
   - How does a fresh fish feel? And a non-fresh fish?

2. With the whole group,encourage discussions by asking the following questions?

   - Where do harvest and post-harvest losses occur?
   - What could be done to improve the situation? In the boat? At the beach? During processing? At home?

facilitators' notes

What are harvest losses?

Fish degrade rapidly after dying. Gear that damages fish, causes struggles or leaves it dying in the water for extended periods of time contribute to this degradation process. Once deterioration starts, the quality of the fish cannot be improved. Therefore, fishers should select the gear type that minimizes these negative impacts. For example, a trap that keeps fish alive is preferable to a gillnet that causes fish to struggle and suffocate and may only be retrieved after many hours or days. Fishing methods may need to be modified during extremely hot periods as fish may spoil rapidly while still in the water. Selective gear will avoid damage to undersized fish if used correctly. If fish are thrown back (discarded) with minimum damage, they have a better chance of survival. Hook size should be large enough so gut hooking does not occur.

What are post-harvest losses?

Post-harvest loss is the loss of fish or fish quality after the fish is captured. This may start to occur in the water and will continue until it is consumed. Any loss to fish quality will result in loss. If severe, the actual whole fish will be lost and must be disposed of. As the fish begins to spoil, there is loss of protein, vitamins and nutritious value. Yield of meat will also decrease. This will also cause economic losses as less fish can be sold.

Why do these losses happen?

After the fish die, irreversible degradation starts to occur caused by biochemical processes, microbial changes and chemical changes. This varies by fish size and type (for example fatter fish spoil faster than lean fish, smaller fish spoils faster than larger one). Temperature is the main factor in spoilage rates - the higher the temperature, the faster the spoilage. Cleanliness and handling conditions also contribute to quality. Many times, fish come in contact with dangerous contaminants such as gasoline and raw sewage during handling.

exercise 3

FISH IS MONEY

OBJECTIVE:

Identify the value chain.

TIME:

2.5 hours.

MATERIALS:

Field trip to local fishing area.

STEPS:

1. Divide the group into 2-3 smaller groups with male and female participants.

2. Ask participants to discover the value chain of a local fish: they have to follow the price per unit of a fish in the local area by interviewing fishers, intermediaries, processers and consumers.

3. Each group can interview the whole supply chain for a species. Some possible questions to ask are:

   - How much did you pay and receive for your product?
   - To whom do you sell your fish?
   - Did you process the fish before selling it?
   - Do you receive more money for a higher-quality fish?
   - Would you pay more money for a better-quality fish?
   - Did you need to go to market to find processed fish?
   - Does fresh fish bought at the landing site have the same price as the same fish when it is processed, preserved, dried or canned?

4. After the field visit, discuss with the whole group:

   - Which players are involved in the different value chains?
   - Where does the fish end up? Could there be other final markets?
   - Who makes the most money for the unit of fish along the chain? Is there a difference between the income for men and women?

facilitators' notes

A value chain is a chain of activities that alter a product, increasing its value (e.g. filleted, smoked, packaged). Each market has different demands and needs, depending on food habits and consumption pattern and income levels of people in a country or region. The main objectives of value chain management are to maximize gross revenue and sustain it over time.

↘ CULTURAL ACTIVITY

STORYTELLING

OBJECTIVE:

Use storytelling to learn about how fishing has changed in the village.

TIME:

2.5 hours.

MATERIALS:

Paper bags and pens for participants to create puppets, two containers: one with slips of paper (enough for the number of groups) with a different storytelling medium listed on each one (e.g. puppets, rap song, collage, dance) and one with slips of paper with a different genre and purpose on each one (e.g. comedy to entertain, mystery to frighten, romance to invite, science fiction to question, soap opera to exaggerate, etc.), writing support.

PREPARATIONS:

Invite community members (men and women) to collaborate with the participants in this exercise (one community member per group of participants).

STEPS:

1. Ask participants to form small groups of 3-5 people each.

2. Ask the community members to join a group. The task is to work together to "Create a story about the how fishing has changed in their village". This story should include how change has affected the men, women and children in the village (e.g. has there been a decline in fishing that has reduced the amount of people that are needed on the beach?).

3. Ask each group to extract a piece of paper from each of the two containers which determine the medium and genre they should use for their story.

4. Each group will have one hour to create their story and to prepare to present it to the rest of the class. They should plan for a 5 minute presentation to the whole group.

5. Give a 3 minute warning when the time is almost up.

6. Bring the class back together and have one group at a time come to the front of the room and perform their story.

7. Ask participants about the underlying or related causes, actions, circumstances that brought about the changes in fishing in the village:
   - Did something happen in another village to change things?
   - Did the fish stop coming?
   - Did the weather change dramatically? What about the wet and dry seasons?
   - Did fuel prices go up so that the fishers could not afford to go fishing as often?
   - Did the women stop buying the fish the fishers were catching?
   - Which story would be most likely to influence someone to think about their actions and how they will affect others, nature and the environment? And how would they influence others? (e.g. scare, invite, etc.)?

8. Ask participants about the interconnectedness of actions and how they affected fishing. What type of storytelling did each group use?

↘ CULTURAL ACTIVITY 2

SING A SONG

OBJECTIVE:

Highlight gender issues in fisheries and effects of climate change.

MATERIALS:

Writing support, pens.

STEPS:

1. As a group, choose a popular children's song that is easy to modify.
2. Divide the participants into groups and assign each group part of the supply chain (refer to the section "Every Fish Counts", exercise 1).
3. Have participants create a verse to include in the song that is about four lines long, highlighting their assigned role in the supply chain (e.g. referring to gender, climate change).
4. With the whole group, have each group write their verse on a large piece of paper.
5. Order each contribution based on the sequence in the supply chain and read it aloud to the whole group.
6. As a group sing the completed song in the tune of the chosen song.

↘ CLOSING ENERGIZER: IT'S RAINING, IT'S POURING!

The group is going to make rain! Gather everyone in a circle. Explain that through an ancient series of movements, they would recreate the sounds of rain hoping for a plentiful crop and future growth. Ask the group to follow your example:

- Begin by gently rubbing your hands together back and forth to make a soft rustling sound. This is the misting/sprinkling part of the rainstorm. Gradually increase the intensity of the rubbing so that the sound grows louder
- Slowly, move to patting your hands against your lap to give the sound of drizzle. Again, you will want to increase the intensity of the sound as the storm grows
- While still patting your hands against your lap, begin to move your feet up and down to give the thunder and pouring rain
- Fade out the patting on your lap and increase the speed and loudness of your stomping to make a really big rainstorm
- Let the pouring rain subside, and let the storm drop back to a drizzle by patting your hands on your lap. As that subsides, go back to rubbing your palms together to make the sprinkling rain

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www.lessonplanet.com/search?keywords=Ecosystems&type_id[]=1&gclid=CNjGzvzJ_7gCFZCe4Aod_VQApA
www.geography4kids.com/files/land_ecosystem.html
www.teachclimatechange.org/

For more information on systems:
www.yayscienceclass.com/uploads/Pre-AP_Biology_Unit_05_-_Jar_Ecosystem_Lab.pdf
www.wizardscave.com/aquarium.html
http://freshaquarium.about.com/cs/doityourself/a/dyi.htm

For more information on vessel stability:
www.maritimenz.govt.nz
www.youtube.com/watch?v=4UZXFEkgK4U

For more information on simple maintenance:
www.fas.org/man/dod-101/navy/docs/swos/eng/62B-416.html
www.yachtsurvey.com/maintenance_1.htm

For more information on swimming and treading water:
Breaststrokes Technique: www.breaststroketechnique.com/
Encyclopaedia Britannica kids: http://kids.britannica.com/elementary/art-89726
Water-Shy Swimmer, Chapter Ten-A: Treading Water-Individual: www.thewatershyswimmer.com/Ch10a.html

.For more information on storytelling go to:
www.rcowen.com/PDFs/CTS%20Ch%201%20for%20website.pdf
www.planetesme.com/storytelling.html

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