PROJECT ACHIEVEMENTS (1)

- Improved understanding of floodplain fisheries dynamics - sound biological basis for adaptive management – based on research fishing and project's monitoring of markets and setting up of catch recording system
- Identification of, and obtaining support for, numerous research initiatives involving training of government scientists
- Thorough groundwork in Namibia for community management based on conservancy principles
- Namibia-Zambia Joint Commission fisheries sub-committee established and supported by project; good communication with DoF Zambia

PROJECT ACHIEVEMENTS (2)

- Excellent relations with Namibia conservancy and fishing committees
- Fish Protection Areas in Namibia proposed by fishing communities, approved by Traditional Authority and Regional Council, management plans developed, submitted to MFMR for gazetting
- Good communication and cooperation with tourist angling lodges
- Funding obtained for conservancies to manage Fish Protection Areas, from both donor organisations and local angling organisations and lodges
- Recommendations for modification to Namibia Inland Fisheries legislation (but still needs further input to remove excessive gear restrictions and harmonise with new Zambian Fisheries Act)

MAJOR ISSUES TO BE ADDRESSED IN MANAGING ZAMBEZI / CHOBE FISHERIES (and other African inland fisheries!)

Major problem in vast majority of African fisheries has been influx of outsiders without ties to local community or interest in long term sustainability.

Leads to uncontrolled overfishing and depletion of stocks, particularly of larger, slow-maturing species.

Restricting fishing to local community members enables effective control.

Effective control also allows restrictions on fishing methods, provided agreement is reached by consensus.

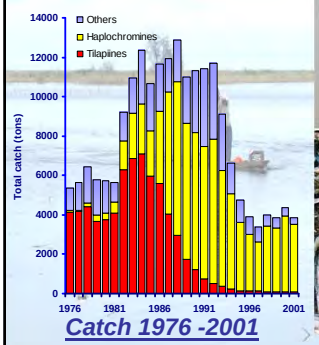
RESTRICTIONS ON MESH SIZES AND FISHING METHODS (Example of Lake Liambezi Fishery in Caprivi)

Recommendation is for 3.5" minimum mesh size for gillnets, not the current legal 3" mesh.
Is 3.5" the right choice of minimum mesh? Do we have enough data to verify that this will give higher yields than 3" mesh?

Available evidence from other African freshwater fisheries based on tilapias indicates that mesh size regulations that protect tilapias from capture until they reach maturity result in optimum catches.

Examples can be given from fisheries in Malawi, one of which is briefly discussed here.

LAKE MALOMBE : TILAPIA FISHERY COLLAPSE



Catch 1976 -2001

LESSONS FOR LAKE LIAMBEZI

ECONOMIC VALUE:
Lake Malombe example shows benefits of fishery focussed on tilapias. Current situation on Lake Liambezi (see photo on right) suggests similar scenario.

MANAGEMENT PRIORITIES:
Protect tilapias until maturity :–

- **No gillnet meshes between 2" and 3.5": these target immature fishes when growing at fastest rate in their life cycle, having survived heavy natural mortality experienced by fry and small juveniles.**
- **No seines (dragnets): 'nkacha' nets on Lake Malombe, destroyed economic value of fishery.**

NEW RESEARCH RESULTS AND RECOMMENDATIONS

Results of recent research unequivocally demonstrate need to increase minimum mesh size for gillnets to at least 90mm (3.5") (but preferably even larger – 95 mm (4"))

Same recommendation for Upper Zambezi, Kavango, Chobe and Kwando Rivers and also Lake Liambezi.

Research findings also promote increased number of Fish Protection Areas to create networks of such areas to benefit all areas of the fisheries.

SCALE AND VALUE OF THE CAPRIVI FISHERIES

Project sponsors and assists data collection on Caprivi fisheries.

Results show value much greater than earlier estimated:

Summary of catch and value for the fisheries of the Caprivi Floodplains and Lake Liambezi for the year 2011.

Area	Annual catch	Value (N$)
Caprivi floodplain, Namibia	2,900 tonnes	58 million
Caprivi Floodplain, Total	5,000 tonnes	100 million
Lake Liambezi	1,700 tonnes	34 million
Total	**6,700 tonnes**	**134 million**

CURRENT PROJECT ACTIVITIES

In Namibia:

- Continue to assist conservancies/committees to establish and develop management plans for fish protection areas (FPAs).
- Ensure revised regulations are gazetted in parliament to ban most destructive fishing gears.
- Guide communities to establish their own rules for their particular water bodies.
- Assist MFMR in extension and environmental education to ensure communities understand and agree their roles in managing the resources.
- Assist MFMR in developing capacity for management – currently several research projects linking MFMR with SAIAB and UNAM.

CURRENT AND PROPOSED ACTIVITIES

In Zambia:

- Agree harmonised regulations between Zambia and Namibia, particularly on destructive gears.
- Promote communication/joint operations between fisheries departments in Zambia and Namibia.
- Cooperate with Fisheries Department in Sesheke and with Western Province regional officer in Mongu.
- Assist Fisheries Department in strengthening communication with fishing communities.
- Explore role of Royal Establishment in assisting with strengthening community participation in management
- Explore potential role of existing natural resource committees (set up for wildlife) in managing fisheries resources also.

THE FUTURE

EUROPEAN COMMISSION NETWORKING PROJECT:

Project Title: Community-based management of river and floodplain fisheries in Namibia, Zambia, and Botswana, contributing to environmental conservation and to improve socio-economic benefits and food security, especially for women, children and the rural poor through capacity building and the development of regional and International networking platforms

Project Area: Rivers and floodplains in the Upper Zambezi, Chobe and Okavango catchments in Namibia, Zambia and Botswana

EUROPEAN COMMISSION NETWORKING PROJECT:

Partners

Namibia Nature Foundation
Government Fisheries Department, Zambia
Okavango Research Institute
University of Namibia

Associates

Kavango-Zambezi Transfrontier Conservation Area (KAZA)
University of Hull International Fisheries Institute (Professor I.G. Cowx)
South African Institute for Aquatic Biodiversity
Government Fisheries Department (Botswana, Namibia, Angola)
African Wildlife Foundation
World Wildlife Fund

SASSCAL Research Project

Topic:
Improved knowledge of aquatic ecosystems supporting fisheries, development of integrated strategies for sustainable fisheries and improved fisheries management

Project leaders:
Namibia Nature Foundation
Ministry of Fisheries and Marine Resources (and neighbouring country fisheries departments)
University of Namibia
SAIAB (NRF)
SAREP
WWF (Namibia and Zambia)
Potential collaboration with SADC NEPAD programme and other identified partners in Germany e.g. University of Hannover, University of Trier

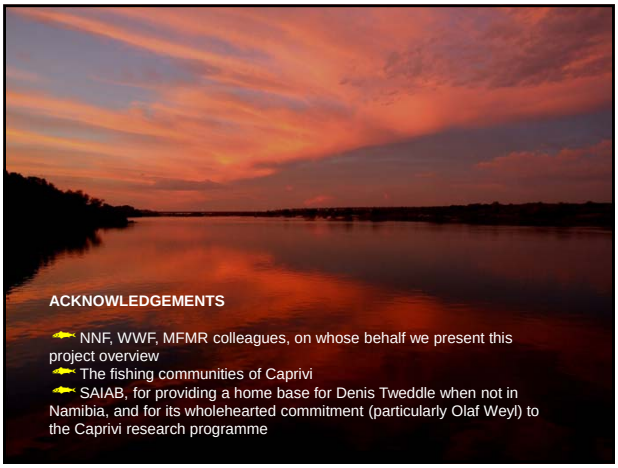
Other Research Projects and Activities

Go Green Fund – completed project and new proposal, NNF with SAIAB

NRF funded collaborative research - SAIAB and UNAM, with MFMR staff also

SAREP collaboration – mainly Kavango system

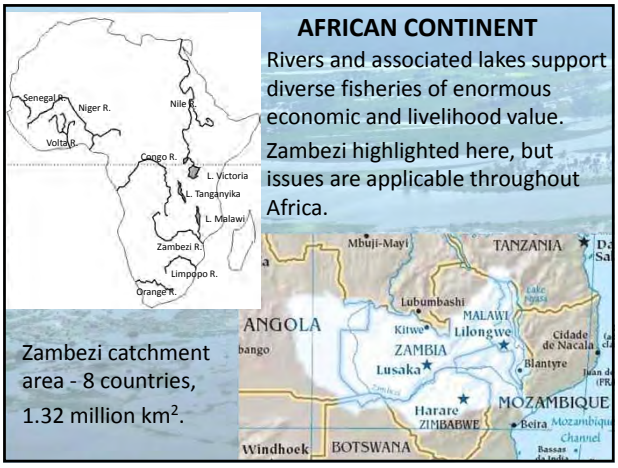
ICEMA Project – NNF with SAIAB



Challenges in Fisheries Assessment and Management in the Great Rivers of Africa, with particular emphasis on the Zambezi River System

D. Tweddle[1,2], I.G. Cowx[3] & O.L.F. Weyl[1]

[1] South African Institute for Aquatic Biodiversity
[2] Integrated Co-management of the Zambezi/Chobe River Fisheries Resources Project
[3] University of Hull International Fisheries Institute



AFRICAN CONTINENT

Rivers and associated lakes support diverse fisheries of enormous economic and livelihood value.

Zambezi highlighted here, but issues are applicable throughout Africa.

Zambezi catchment area - 8 countries, 1.32 million km^2.

SUMMARY OF ZAMBEZI FISHERIES

- Upper Zambezi - floodplains - subsistence and semi-commercial fisheries.
- Middle Zambezi – subsistence, commercial in lakes Kariba, Cahorra Bassa.
- Kafue tributary - floodplain and man-made lake.
- Lower Zambezi River and delta - subsistence, marine fisheries offshore on sediment fans.
- Lake Malawi - major commercial and subsistence.

CATCH DATA of variable quality, e.g. Malawi: good commercial data from 1946, whereas floodplain fisheries under-recorded and unappreciated.

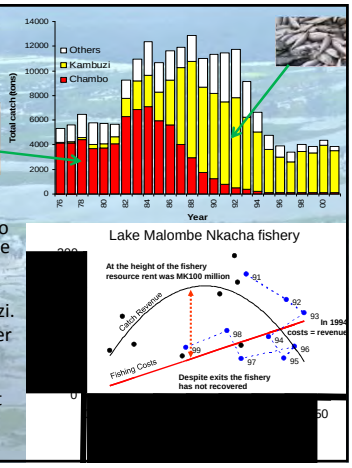
CONSEQUENCES OF INADEQUATE DATA

- True value of fisheries not recognised,
- Fisheries Departments poorly-funded - high staff turnover, and
- **Government priorities can be seriously misguided!**

RESULT - FISHERIES COLLAPSES

- Governmental failure to deal with open-access fisheries and impoverished communities;
- Failure to optimally manage fisheries; e.g. collapse of valuable tilapiine fisheries in Malawi.

LAKE MALOMBE, TO SOUTH OF LAKE MALAWI



- Collapsed stocks *fait accompli!*
- Kambuzi fishery - inability to manage impact on high-value chambo fishery.
- Baselines shifted, fishery "managed" for small kambuzi.
- Uncontrolled effort - further collapse.
- Replacement of 4000t chambo fishery with <4000t kambuzi fishery worth <10% of original fishery.

SOUTHERN LAKE MALAWI

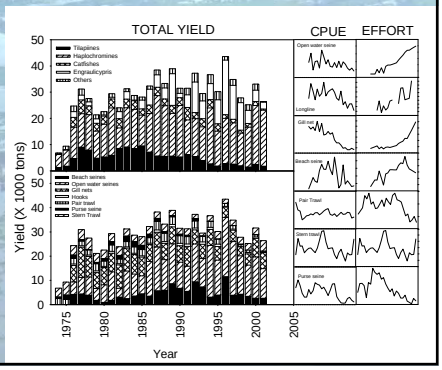
Fairly stable yield

BUT

Clear overfishing,

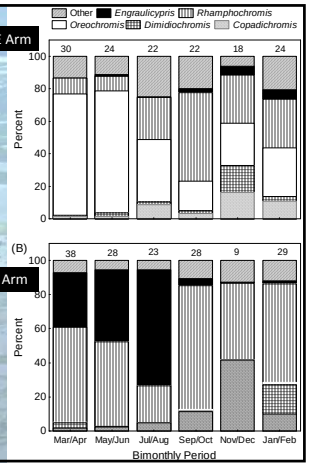
i.e.

- Loss of most valuable spp
- Increase in effort
- Declining catch rates



LAKE MALAWI UNEXPLOITED STOCKS?

- Perceptions of unexploited stocks often based on poor data.
- pelagic "ncheni", large proportion of "usipa" and "utaka" light attraction fishery in Lake Malawi; current catch ≈ calculated yield for whole lake.

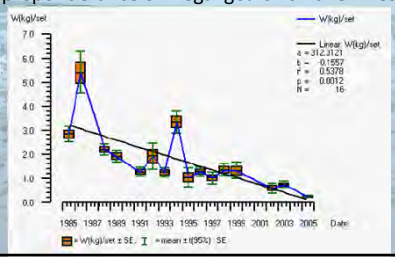


PROBLEMS IN KAFUE RIVER FISHERY

Consistent trends: falling CPUE and fish maximum size.

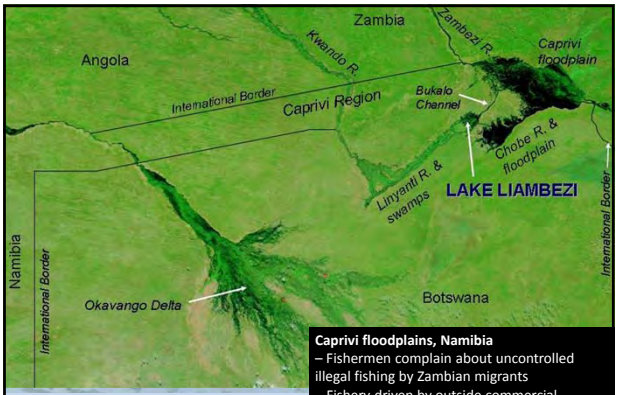
"Fishing down" process, i.e.

- loss of larger individuals, especially higher value cichlid species.
- change in species composition and size of fish.
- shifts to, preponderance of illegal gears - smaller mesh sizes.



PROBLEMS COMMON TO MAJORITY OF AFRICAN FRESHWATER FISHERIES

- Unemployment, hardship, associated with population growth.
- Mobility – Migrating fishers devastating fisheries.
- Population growth = competition for fishery resources = high fishing pressure, declining catches, disappearance of large valuable fishes.
- Illegal unsound fishing practices threaten rich, diverse fish communities.



Major rivers in region, note complex inter-relationships between rivers and floodplains

Caprivi floodplains, Namibia
– Fishermen complain about uncontrolled illegal fishing by Zambian migrants
– Fishery driven by outside commercial interests
– Result of recent improved road communications in area.

Barotse floodplain, April, 2004.
In addition to clearly defined floodplain, ~240 km long, enormous area to north and west of floodplain was under water.

Barotse floodplain, Zambia
– Complaints from floodplain communities about loss of traditional control over lagoons after floods recede
– Inability to exclude migrants with no interest in long-term sustainability.

COMPLEXITY OF RIVER/FLOODPLAIN FISHERIES

- Floodplain fisheries remarkably resilient.
- Pioneering species adapted to fluctuating environment.
- Exploit intensively when present.

OPTIMAL MANAGEMENT SCENARIOS

- Pioneering species only one component of river/ floodplain fisheries.
- FAO Technical Paper **"Management, co-management or no management? Major dilemmas in southern African freshwater fisheries" –** case studies generally well-balanced, but Abstract ignores complexities – looks only at yields.
- Need alternative exploitation scenarios for more valuable species.
- **Not** MSY based on "balanced exploitation" of entire fish population.
- Larger species economically valuable - food fisheries and recreational angling tourism.
- Optimise economic benefits for fishing communities.

LAKE LIAMBEZI FISHERY DEVELOPMENT

Fishery in 2009 dominated by clariid catfishes with few cichlids

Fishery in late-2010 dominated by tilapiine cichlids

LAKE LIAMBEZI, NAMIBIA

Fishing communities assumed management responsibility, supported by MFMR and Fisheries Project.

- Managed as tilapia fishery, fishermen register, mesh size limits, ban on active gears.
- Catch ~ 1700 t in 2011 after being dry from 1980s until 2009.
- Agreed rules more suited to fishery than government regulations.

RECREATIONAL ANGLING TOURISM

- Major tournaments, e.g. Zambezi Classic in Caprivi.
- Inject money into local economy.
- Tourist lodges source of employment.
- Lodge employees as much part of fishing economy as fishermen.
- Conservancies recognise value of tourism,
- entering partnerships with lodges / clubs,
- creating reserves to protect fish stocks earns revenue from catch & release angling.

Caprivi FPAs

Sikunga Channel protected area

Kasaya Channel protected area

COMMUNITIES NEED MANAGEMENT SUPPORT AND GUIDANCE

- Communities capable of managing fishery resources.
- Legislation recognises need for co-management.
- Inertia by government ministries must be overcome.
- Fisheries Departments (financial & human resources) to support communities in management.
- Quality of data collection must be improved.

BALANCED ECOSYSTEM APPROACH TO MANAGEMENT OF ZAMBEZI FISHERIES

- Ecosystem includes legitimate human aspiration towards improved livelihoods.
- Maximising yields through **"No Management"** at expense of optimum economic returns seriously misguided.
- Balance intensive exploitation for food against high economic value (food, tourism) of larger fishes.
- Establish protected area networks for breeding stocks - fee-paying catch & release angling.

Example of Caprivi floodplains

- Improved data collection & management, information dissemination.
- New conservancies focus for management for benefit of all stakeholders.
- Conservancies readily accept ideas for improving livelihoods.
- Conservancies potential to restore pre-colonial local fishing rights.
- Lessons learned applicable throughout Africa.

Competing interests for water usage

- Fisheries low on priority list.
- Proposed irrigation schemes threaten floodplain fisheries, Victoria Falls flow rate (hence tourism), hydroelectricity generation, and elephants.
- Mozambique fortunately vetoed proposal to dredge Lower Zambezi channel.

BALANCED ECOSYSTEM APPROACH

- Recognise vital role of fisheries in rural livelihoods.
- Recognise livelihoods include all dependent on fish stocks, e.g. tourism sector.
- Recognise full value of inland fisheries

- move away from food basket policy to maximise social gains. i.e. employment, livelihoods, wealth and well being rather than poverty alleviation and food security.

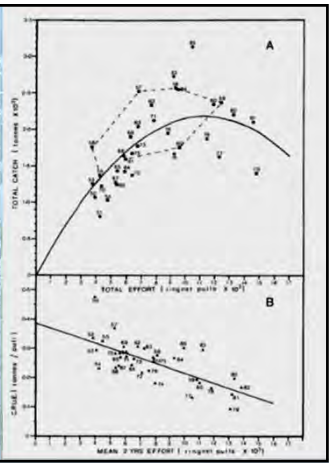
IN CONCLUSION::

- Proper quantification of the value of freshwater fisheries to local economies and food security throughout the Zambezi Basin (and the rest of Africa) will demonstrate their high value.
- Fisheries should be given highest priority in planning allocation of scarce water resources.

SOUTH EAST ARM OF LAKE MALAWI

From 1940s, SE Arm chambo fishery supported 5000 tonnes pa fishery shared between (A) commercial scale open water ringnetting and midwater trawling, and (B) artisanal gillnet fishery with 3.75" minimum mesh gillnet regulation.

Catch data from beginning of commercial fishery showed excellent relationships between catches and total effort, and also influence of changing environmental conditions.



WorldFish Center in the SADC Region:- A Scientific Partner for Sustainable Fisheries Development

Tabeth Matiza Chiuta
WorldFish Center – Africa Regional Director

A presentation made at the Zambezi Basin Fisheries Stakeholder Workshop 27-30th August, 2012, Kasane, Botswana

WHO ARE WE?

- **International Research Organizations** - One of the 15 CGIAR Centres [the only one working on fish]
- **Our Mission**

  To reduce poverty and hunger by improving fisheries and aquaculture.
- **Our Vision**

  To be the science partner of choice for delivering fisheries and aquaculture solutions for developing countries.
- **Focus of Work** – Research in Development for improved small scale fisheries and aquaculture in under developed regions – [including Zambezi River Basin]

Our Research Focus

Reduce poverty and vulnerability through fisheries and aquaculture.

Sustainably increase food and nutrition security through fisheries and aquaculture.

Focal Area	Key research question
Climate Change Vulnerability and Adaptation	How will climate change affect fisheries and aquaculture in developing countries and how can adaptive capacity be built?
Improved value chains	How can we improve input and output value chains to increase the development impact of aquaculture and fisheries?
Nutrition and health	How can investments in fisheries and aquaculture best improved human nutrition and health?
Gender and equity	How can strengthening the rights of marginalized fish dependent people reduce inequality and poverty?
Sustainable aquaculture technologies	How do we increase productivity, ecological resilience and development impact of aquaculture?
Policies and practice for resilience	What policy and management investments will increase the resilience of small-scale fisheries and increase their contribution to reducing poverty and hunger?

3

WorldFish Center- Engagement in the SADC Region

- **Operating in the region for more than a decade**
- **Engagement in Malawi**
  - resilient small-scale fisheries management
  - productive IAA systems
  - development of SME aquaculture sub-sector
- **Engagement in Mozambique**
  - productive IAA systems in Angonia District for improved livelihoods
- **Engagement in DRC**
  - Inland fisheries of Congo River Basin focusing on livelihoods and management]

WorldFish Center- Engagement in the SADC Region

- **Engagement in Zambia**
  - Fisheries & HIV/AIDs
  - Fish & nutrition security
  - Policy
  - fisheries management
  - sustainable aquaculture production
- **Regional Engagement**
  - AU/NEPAD – involved in the establishment of PAF
  - COMESA – Fish trade and Climate Change
  - FARA (ASARECA) – Aquaculture production
  - SADC – governance/policy; Sustainable aquaculture production

Current Project Portfolio

Managing for Resilience: Strengthening Co-Management and Value Chains of Shared Fisheries Resources in the Zambezi Basin

Lake Chilwa Basin Climate Adaptation Programme [Royal Norwegian Embassy]

- Goal: To secure the livelihoods of 1.5 million people in the Lake Chilwa Basin and enhance resilience of the natural resource base

Partners - LEAD Southern and Eastern Africa, Forestry Research Institute of Malawi; Local Communities Dept. of Forestry of Malawi

Current Project Portfolio

BMZ-GTZ - Enhancing adaptive capacity to climate change impacts through well-managed water use for aquaculture integrated with small-scale irrigation in the Chinyanja Triangle in Africa (Malawi, Mozambique and Zambia).

Partners - International Water Management Institute (IWMI), University of Osnabrück's Institute of Environmental Systems Research (USF), & National agencies from Malawi, Mozambique and Zambia

Current Project Portfolio

Strengthening aquatic resource governance: Institutional innovation to build livelihood security and reduce conflict in the Lake Victoria, Lake Kariba, and Tonle Sap/Lower Mekong ecoregions [BMZ]

- **Objective:** to strengthen the capacity for collaboration among producer organizations and other civil society groups, governments, and private sector actors to address the sources of resource competition, and develop governance arrangements that manage future resource competition equitably.

Partners:

Adelphi Research, Lake Victoria Fisheries Organization, Uganda Makerere Institute for Social Research, Uganda ; Department of Fisheries, Zambia; Center for Applied Social Science, University of Zimbabwe; Fisheries Administration, Cambodia

Cambodia Development Resource Institute

WorldFish Center - Core Competencies

- Facilitating partnership research
- Stock assessment
- Databases for management of aquatic resources
- Watershed approach to aquatic resources management
- Institutional analysis for governance of aquatic resources
- Development and evaluation of small holder focused aquaculture technologies
- Aquaculture & fish genetic improvements
- Methods for developing improved fish strains;
- Socioeconomic research including institutional and governance analysis of the fisheries sector in developing countries

New Focus of Our Work

- **Harnessing the development potential of aquatic agricultural systems for the poor and vulnerable – with a bias on freshwater ecosystems [& small scale coastal fisheries] – [AAS CRP]**
- More Meat, Milk and Fish by and for the Poor – focus on small scale and large scale commercial aquaculture production to increase the supply of fish [CRP 3.7]

Harnessing the development potential of aquatic agricultural systems for the poor and vulnerable

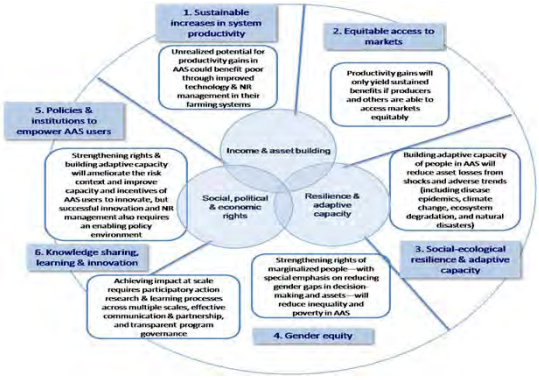
AAS CRP

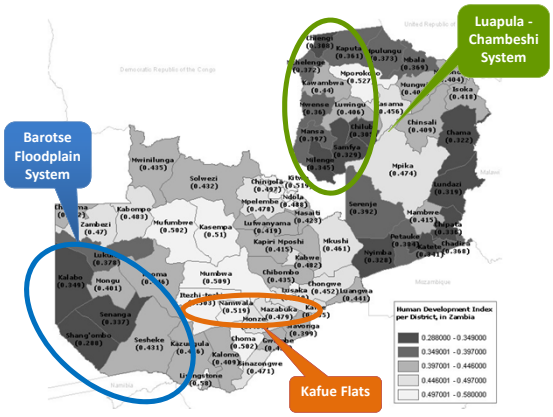
WorldFish Bioversity CGIAR CIAT IWMI

What is an aquatic agriculture system?

- those farming, fishing and herding systems where the annual production dynamics of natural freshwater and/or coastal ecosystems contribute significantly to household livelihood, including income and food security.
- These include major wetlands, floodplains and deltas, and most coastal systems.
- **Zambezi River basin** – target basin for the programme
- **Zambia** – Pilot Country

Key Research Themes





AAS CRP

System	Characteristics	Development Context
Barotse Floodplain	Floodplain fisheries with seasonal transhumance between floodplain and uplands. Cattle on seasonal pasture. Crops: rice, maize, sorghum, millet and cassava. There are forestry resources and some horticulture.	83% below poverty line. 53% stunted children <5 yrs. 15% HIV prevalence. Gender inequities.
Kafue Flats	Floodplain fisheries, aquaculture and cattle on communal pastures. Irrigated commercial crop production with out-grower schemes. Maize is the main food crop with horticulture close to main towns.	73% below poverty line. 18% HIV prevalence. Gender inequities.
Luapula-Chambeshi	An area of extensive swamps and wetlands (10,000km^2) with lake, river and wetland fisheries. There is small livestock production. Cassava, millet, maize and groundnuts are the main food crops.	79% below poverty line. 56% stunted children <5 yrs. 16% HIV prevalence. Gender inequities.

AAS CRP - Barotse

Working in Partnership

Media

PPS BRE PACO

ZFA

ZAAIL WP

CONCERN worldwide

UNZA

CGIAR

GART

CRS

SNV

WorldFish CENTER

AAS Roll Out

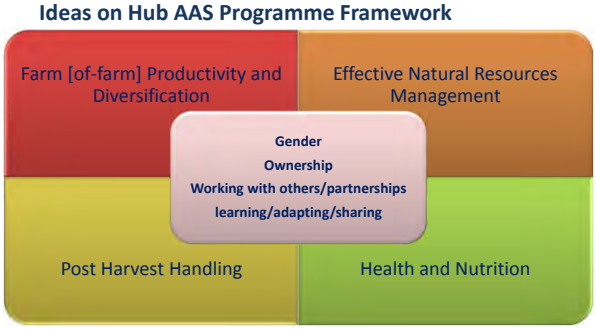
Stakeholder Consultation

What it captures:

To make effective use of the seasonal flooding and natural resources in the Barotse floodplain system	⇨	The main opportunity we want to harness.
through		
more productive and diversified aquatic agricultural management practices and technologies	⇨	The kind of interventions we expect to undertake.
that		
improve the lives and livelihoods of the poor.	⇨	The difference we want to make.

AAS Roll Out in Zambia

Ideas on Hub AAS Programme Framework



THANK YOU

ZAMCOM

Zambezi Watercourse Commission

Co-management of the Shared Zambezi Fisheries Resource : SADC Regional Workshop

Mowana Cresta Lodge, Kasane, Botswana

27 August, 2012

"ZAMCOM Process Overview"

INTERIM ZAMCOM SECRETARIAT (IZS)

"win-win cooperation / cooperacao, ganhas tu, ganho eu"

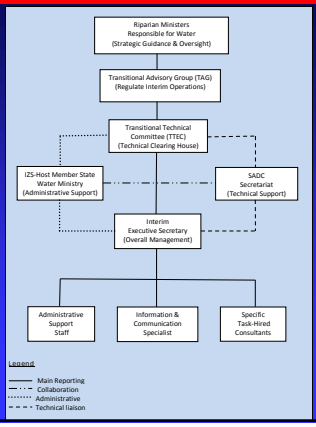
Outline

- Key Cooperation Landmarks
- Transitional Governance
- Permanent Arrangement
- Stakeholder Consultations
- Key Messages

Key Cooperation Landmarks

- Jun 1999, ZAMCOM Agreement Negotiations Begun within the Framework of the SADC Shared Watercourse Systems Protocol
- Jul 2004, ZAMCOM Agreement signed majority riparian States
- Mar 2008, Decision reach: for the continuation of the ZAMCOM process beyond the life of ZACPRO 6.2 Project (after June 2008)
- Nov 2008, Botswana selected Host- Interim ZAMCOM Secretariat
- Jul 2009, Transitional ZAMCOM Governance Structure approved:
  - Riparian Water Ministers (Strategic Guidance and Oversight);
  - Transitional Advisory Group –TAG (Regulate Interim Operations);
  - Transitional Technical Committee – TTEC (Technical Clearing House);
  - Interim ZAMCOM Secretariat - IZS (Overall Management);
  - SADC Secretariat (IZS - Technical Support); and
  - Host (IZS - Administrative support)

Transitional Governance



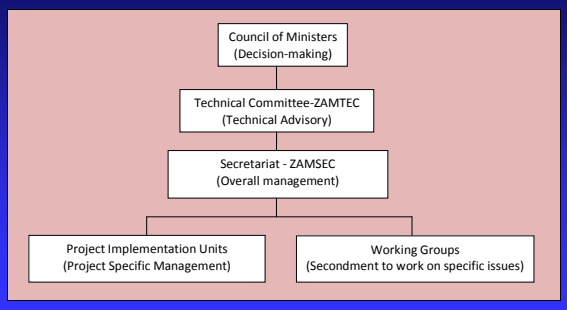
Interim Secretariat todate

- IZS Fully Established -1 May 2011, Hosted by Govt of Botswana
- Key Interim ZAMCOM Secretariat Progress
  - Convened the first formal Zambezi International Cooperating Partners Partnership meeting (Gaborone Oct 2011);
  - Hosted the Zambezi basin pre-national consultation meeting for WMO / USAID Flood Forecasting & Early Warning (Gaborone Early August 2011)
  - Hosted the Zambezi basin post-national consultation meeting for WMO / USAID Flood Forecasting & Early warning (Gaborone Late August 2011)
  - Development of the ZAMCOM Information & Communication Strategy in progress
  - Preparation of ZAMCOM Newsletter in progress
  - Development of the ZAMCOM Website in progress
  - Preparation of internal communication tools (bus. Cards, etc)
  - Production of a limited amount of promotional tools
  - Facilitation of the establishment of National Stakeholders Coordination Committees (NASCs) in progress

Permanent Arrangement

- Objective of the Commission:
  - promote the equitable and reasonable utilization of the water resources of the Zambezi Watercourse as well as the efficient management and sustainable development thereof
- ZAMCOM envisioned:
  - water management organization for the entire Zambezi River Basin, as stipulated in the ZAMCOM Agreement and drawn in line with the revised SADC Protocol on Shared Watercourses
  - Riparian States: Republic of Angola, Republic of Botswana, Republic of Malawi, Republic of Mozambique, Republic of Namibia, United Republic of Tanzania, Republic of Zambia and Republic of Zimbabwe
- ZAMCOM Operationalisation
  - June 2011, 6 Riparian States ratified Agreement (attainment of 2/3rd Majority minimum) came into force
- ZAMCOM ORGANS:
  - Council of Ministers (Decision Making);
  - Technical Committee - ZAMTEC (Technical advisory);
  - Secretariat - ZAMSEC (Overall permanent Management);
  - Project Implementation Units (Project - specific Management);
  - Working Groups (Dealing on specific Issues, accommodating NASCs/BASC input)

ZAMCOM Governance



Stakeholder Consultations...

- Key approach is to ensure active stakeholder participation in its deeds
- Fosters the associated spirit of ownership and the commitment
- National Consultative Forums (NCFs)
- Annual Basin-wide consultative Forums (BCFs)
- ZAMCOM needs to be a broad based interaction vehicle
- NASC's BASC input envisaged through Working group window
- NASC's essence:
  - important tool to operationalise the stakeholder participation ideal
  - vital way to effective dissemination of ZAMCOM decisions /values
  - to play role of being a stakeholder outreach medium at country level & representation to the Basin-wide Consultative Forums (BCFs)
  - constitute representatives of major stakeholder institutions
  - manage the National Consultative Forums (NCFs)
  - expected to convene at least quarterly in a year

...Stakeholder Consultations.

- BASC essence:
  - furtherance of the stakeholder participation principle at basin level
  - Support effective dissemination of national level decisions/values
  - play the role of being a stakeholder outreach medium at basin-level and representation to the NCFs wherever possible
  - manage the Basin-wide Consultative Forums (BCFs)
  - mainly to constitute representatives from the Riparian States' NASCs and other strategic regionally established stakeholders
  - expected to convene once in a year
- Information and Communication Strategy
  - guide the interaction between the ZAMSEC and the Stakeholders
  - Strategy formulation consultations in progress
- ZAMSTRAT dedication to Fisheries
  - Promote Sustainable Fisheries Management
  - Zambezi Water Information System (ZAMWIS)

Key Message 1: Consultations' Value

Broad Stakeholders Consultations, Regardless of Class, is Fundamental to Mitigating Potential Conflicts Over Shared River Basin Waters!

Key Message 2: Cooperation Ethics

ZAMCOM

"Regional Cooperation is not an optional extra; it is a matter of survival"

..SADC-ELMS (1993)

Key Tenets

- Food Security & Poverty & Alleviation
- Regional Cooperation & Prosperity
- Basin-Wide Benefit Sharing
- African Heritage
- Environmental
- Inclusivity
- Fragility

Thank you!

Michael Mutale

Managing for Resilience:

Strengthening Co-Management and Value Chains of Shared Fisheries Resources in the Zambezi Basin

Presentation Outline

- ❑Background to the RTP
- ❑Resource Mobilization Efforts and Challenges
- ❑Restructuring the RTP
- ❑Proposed Components
- ❑Next Steps

Background to the RTP

- 2004 International Conference on Zambezi Fisheries:
  - ➢ technical recommendations for a basin-wide initiative
- 2007 Zambezi Stakeholder Forum [ZACPRO 6]:
  - ➢ Technical Working Group on Zambezi Fisheries and Aquaculture established with link to SADC Fisheries Technical Committee
- 2009 Fisheries Technical Committee Meeting:
  - ➢ Prioritize development of a new program on Zambezi fisheries within Protocol Implementation Plan;
- March 2010 Fisheries Technical Committee Meeting :
  - ➢ Draft Program Proposal discussed and endorsed;
- 16th July 2010:
  - ➢ SADC Ministers of Environment and Natural Resources approve Proposal as new SADC Program

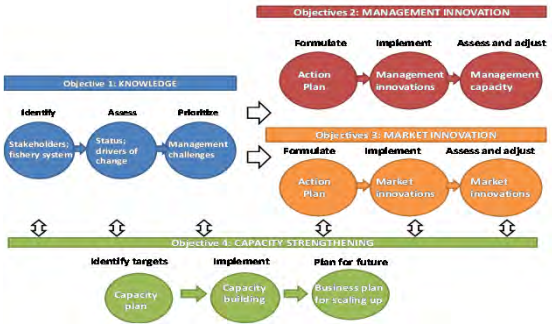
RTP as an Instrument for Implementing the SADC Protocol on Fisheries

- **Key Priorities addressed include**:
  - – Improved strategies for management of shared fisheries
  - – Enhanced links with private sector and civil society
  - – Determine capacity building targets and develop programs to attain the targets
  - – **Develop strategies to determine better understanding of stocks/resources and to manage such resources**
  - – Identification of critical habitats
  - – **Establish real base-line economic contribution of fisheries to the national economy**
  - – Establishment of a comprehensive mechanism of dissemination of information and common planning process

RTP Goal

- ❑ **Overall Goal: Enhance regional food security and rural economic growth through sustainable, productive and resilient fisheries in the Zambezi basin**
- ❑ **Four programme sites**
- ❑ **Budget envelop**: US$28 615 716
  - – Regional coordination budget line
  - – Project sites budget lines – organized by objectives & other operational inputs
  - – Target Cooperating Partner - Norway
- ❑ **Brings together experiences from**
  - – co-management
  - – ecosystem-based management
  - – value chain approaches

Programme Structure



Resource Mobilization Efforts & Challenges

- ❑RTP – submitted to NORAD
- ❑WFC/SADC Mission to Oslo
- ❑Targeting the CGIAR traditional donors
- ❑Dialogue with:
  - World Bank
  - African Development Bank
  - Foundations

Main response: budget envelop is enormous

Restructuring the RTP for Effective Resource Mobilization

- ❑Discussions with SADC FANR on resource mobilization challenges
- ❑Proposal to restructure the RTP within the context of the approved programme
- ❑Zambezi Fisheries meeting: 25th – 27th January 2012, Victoria Falls [Malawi, Zambia & Zimbabwe]
- ❑Proposal to split the RTP into two projects, i.e.
  - Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin
  - Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin

- ❑Key Development Challenge
  - o widespread food insecurity and poverty
- ❑Key Areas of Concern
  - o Weak/poor governance, in terms of rights, policies, enforcement [MCS], institutions [poor stakeholder participation]
  - o Unsustainable Exploitation: arising mainly from weak stock assessment; management and mitigation; destructive fishing methods; weak monitoring and control; open access system; IUU Fishing; and poor price determination

Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin

- ❑Key Areas of Concern
  - o Habitat destruction and loss due to uncoordinated development [dam construction - influencing productivity]; pollution; changes in land use; invasive species and fish disease
  - o Climate Change/Variability, resulting in poorly predicted flooding and drought; changes in breeding patterns; changes in species and food chains; shrinking and varied livelihood patterns; and reduced productivity.

Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin

- ❑Project Goal
  - To enhance the contribution of fisheries to the regional food security and rural economic growth in the Zambezi basin
- ❑Project Purpose
  - To establish productive and resilient fisheries in the ZB
- ❑Tentative Budget: +/_ US$9 million over 6 years

Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin

- ❑Expected Results
  - o Co-management tools and approaches for sustainable exploitation of the fisheries resources in the ZB developed and disseminated
  - o Capacity and active participation of stakeholders in the management of fisheries resources of the ZB strengthened
  - o Co-management tools and approaches applied by key stakeholders in selected sites
  - o Regulatory and institutional frameworks for the shared ZB fisheries harmonized
  - o Climate change mainstreamed in the management of the fisheries resources in ZB *[fisheries mainstreamed into other sectors CC & adaptation strategies]*

Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

❑ **Key Development Challenge**

- o widespread poverty ; and Low to negligible contribution of Zambezi Basin fish to wealth generation

❑ **Key Areas of Concern**

- Limited access to markets
- High post harvest losses [quality and safety]
- Limited capacity to add value
- Limited policy environment for intra-regional trade
- Fishing not viewed as a business – limited investment in fisheries

Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

❑ **Key Areas of Concern**

- Limited knowledge and information - *little information on the scale of fish trade, its economic value, and the wider role that it plays in the rural and urban economies of the basin*.
- Limited capacity to carry out research on value chain analysis and fish contribution to GDP-regional and national economies, wealth creation
- Poor marketing systems – quality issues and packaging [Sanitary and phytosanitary]
- Lack of organised bulking systems

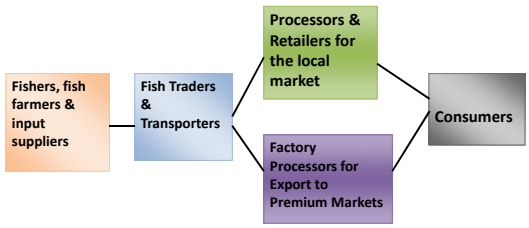
Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

❑ Fish Value Chains in the Basin have not been fully developed, mapped & studied in terms of:

- – Supply channels, volumes, price structure, seasonality, spatial distribution
- – Actors and employment profiles (disaggregated by nationality/gender/age)
- – Financial performance / gross margins / value added and distribution of profits

Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

Generic Fish Value Chain



Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

❑ **Project Goal**

- o "**to enhance value chain gains on the fisheries resources in Zambezi Basin for wealth generation**".

❑ **Project Purpose**

- o to improve business development by strengthen market linkages and competitiveness of the fish value chains in the Zambezi River Basin

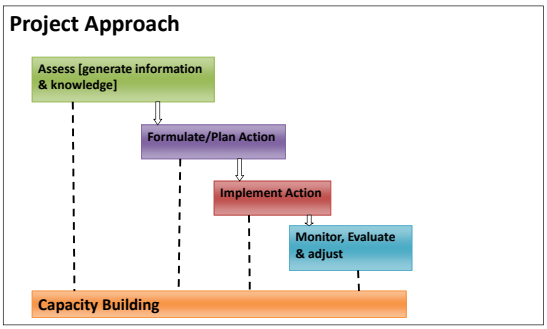
❑ **Tentative Budget: +/_ US$7.8 million over 6 years**

Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi Basin

❑ **Expected Results**

- Information and knowledge base on the fish and fishery products in the Zambezi basin generated and made available to relevant stakeholders.
- More effective and appropriate policy environment supporting enhanced fish trade in the basin [trade barriers]
- Large scale and MSE fish business enterprises engaged in the fish value chains and supplying a diversified and improved range of products that are competitive at the regional and global fish market
- Operational marketing linkages for fish and fish products in the Basin

Proposed Project Approach



NEXT STEPS

- ❑Finalise the revised components
- ❑Dialogue with SADC on marketing and resource mobilization for the components
- ❑Use WFC networks & linkages to the AAS CRP
- ❑Etc.

THANK YOU

SAREP

Southern African Regional Environment Program

Monitoring & Evaluation Specialist

Belda Mosepele

USAID | SOUTHERN AFRICA OKACOM

SAREP

SADC/EU-ACP Fish II Regional Fisheries Co-Management Workshop
"Information & Knowledge"

Kasane, August 27th –30th, 2012

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SAREP

USAID – SADC Agreement

- Original agreement between SADC & USAID
- Support for watershed management:
  - focus on Okavango River Basin – support to OKACOM
- Integrated River Basin Management (IRBM) project supported creation of OKACOM Secretariat (2004-2008/9)
- IRBM project completed in early 2009.

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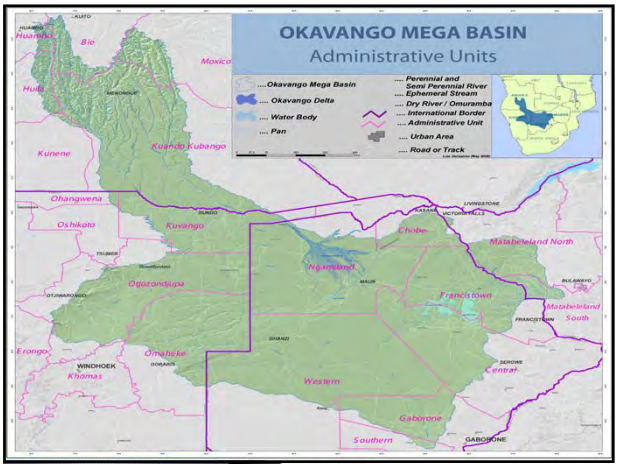

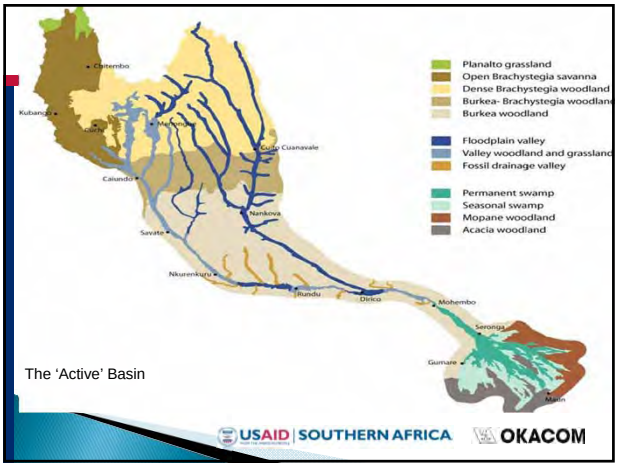

The 'Active' Basin

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SAREP Regional Objectives

- **Build Capacity for Water Governance**
  - Strengthen cooperation and capacity of regional institutions
  - Promote public participation in IWRM and SD
- **Support Basin-level Plans and Priorities**:
  - OKACOM ⟷ Community level
- **Integrate Transboundary Infrastructure and Land Use Planning**:
  - Strengthen district and local level governance processes to develop PILUMPs
  - Support and facilitate improvement of the design, implementation, operation and sustainable maintenance of water supply and sanitation services (WSS).

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SAREP Programmatic Objectives

- **Protect Biodiversity and Ecosystem Services.**
  - Biodiversity conservation to address threats to biodiversity in biologically significant areas
- **Increase Access to Water Supply and Sanitation.**
  - Increase access to safe drinking water and sanitation
  - better quality of services and/or hygiene promotion

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SAREP Programmatic Objectives

- **Address Global Climate Change**
  - Activities will seek climate change related outcomes
  - Monitor impacts using one or more Global Climate Change (GCC) indicators.
  - Activities to support adaptation to address vulnerabilities identified in GCC assessments.
- **Integrate HIV/AIDS prevention and treatment**
- Support regional HIV/AIDS program results and indicators
- Note: HIV/AIDS information and support is limited or unavailable in some of the trans-frontier areas where SAREP will focus.

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Key Result Areas (KRA's)

KRA 1 – Cooperative management of targeted shared river basins improved

KRA 2 – Biodiversity and ecosystem services monitored and protected

KRA 3 – Access to safe water supply and sanitation increased

KRA 4 – Targeted river basins resources managed in the Context of Global Climate Change (GCC)

KRA 5 –Regional, national, and local development planning capacities around river basins (for land and water use, biodiversity conservation) strengthened

Namibia Buy-In

SAREP Performance Indicators

- Total of 20 indicators
- # of hectares (area) under improved natural resources management
- # of hectares of "biologically important areas" under improved management
- # of people with access to improved drinking water supply
- # of people with access to improved sanitation services
- # of people with increased adaptive capacity to cope with climate variability*
- # of people with information and access for HIV/AIDS prevention and treatment*
- # of people trained in direct support of program objectives

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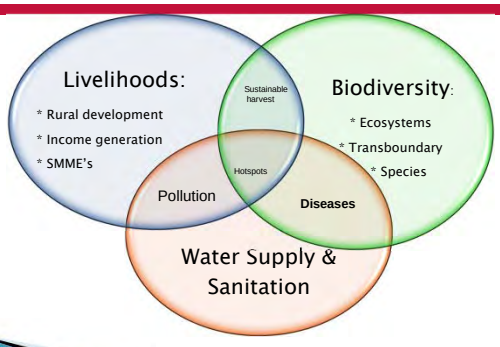
Summary: 3 pillars



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Fisheries Co-Management

- Partners
- Cross-cutting – related to BD conservation
- Transboundary Fisheries:
  - Harmonization of methodologies / Policies – shared resources
  - Fish reserves
  - Capacity building: Institutional & # of people
  - Shared experiences & lessons learned in co-management
  - Opportunity for collaboration and leveraging funds
  - OKACOM, working groups, task forces
  - Joint commission (Namibia & Botswana) – Mgt Plan

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Contact us

Prime Contractor
- Chemonics International Inc.

Client
- USAID Southern Africa
  - Other stakeholders (OKACOM, etc)

Project Name
- Southern Africa Regional Environmental Program (SAREP)

Duration
- Base Period: June 2010–June 2013
- Option Period: July 2013–June 2015

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SAREP

Thank You!

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WATER TODAY TOMORROW

The SADC Regional Zambezi Basin Workshop on the ;

Adaptive co-management of shared fisheries resources in the Zambezi Basin

By Eng. M. C. Munodawafa
Chief Executive
Zambezi River Authority

1

WATER TODAY TOMORROW

Scope of Presentation

- Introduction
- ZRA Mandate
- Strategic Functional Objectives
- Management of the Zambezi Water Resources
  - Environmental
  - Hydrological
- Conclusion

Introduction

- The Zambezi River Authority established as a body corporate on 1st October, 1987
- Through Parallel legislation in parliaments of Zambia and Zimbabwe (Acts No. 17 and 19 of 1987, respectively)
- Zambezi River Authority(ZRA) replaced Central African Power Corporation (CAPCO)

3

Mandate

To obtain for the economic, industrial and social development of the Republics of Zambia & Zimbabwe, the greatest possible benefit from the natural advantages offered by the waters of the Zambezi River and improve and intensify the utilisation of the waters for the production of energy and for any other purpose beneficial to the two countries.

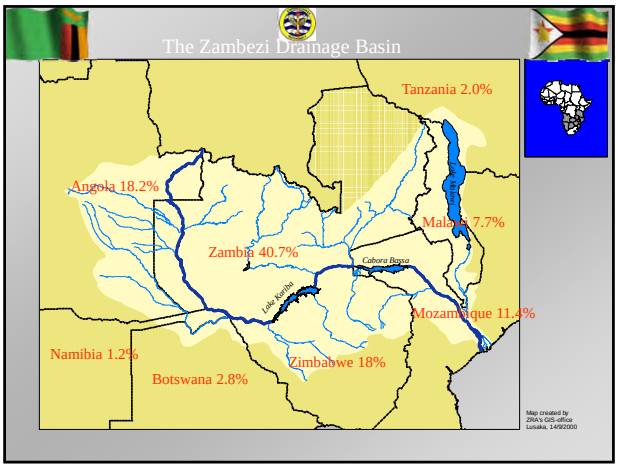
4

Strategic Functional Objectives

- Operate monitor and maintain Kariba and any future dams on the Zambezi River
- Develop New Hydroelectric Schemes
- Collect, accumulate and process hydrological and environmental data of the Zambezi
- Manage Kariba reservoir for hydropower generation taking cognisance of effects of operations downstream

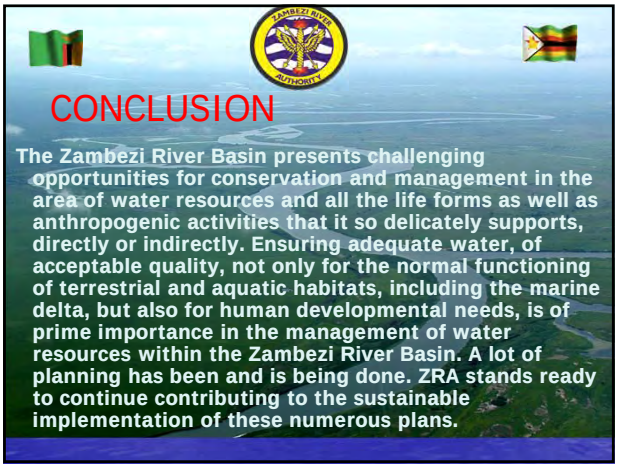
Management of the Zambezi Water Resources

Barotse Plain in Zambia provides natural flow attenuation and sediment deposition


The Zambezi Drainage Basin
Tanzania 2.0%
Angola 18.2%
Malawi 7.7%
Zambia 40.7%
Cabora Bassa
Lake Kariba
Mozambique 11.4%
Namibia 1.2%
Botswana 2.8%
Zimbabwe 18%
Map created by ZRA's GIS office Lusaka, 14/9/2000

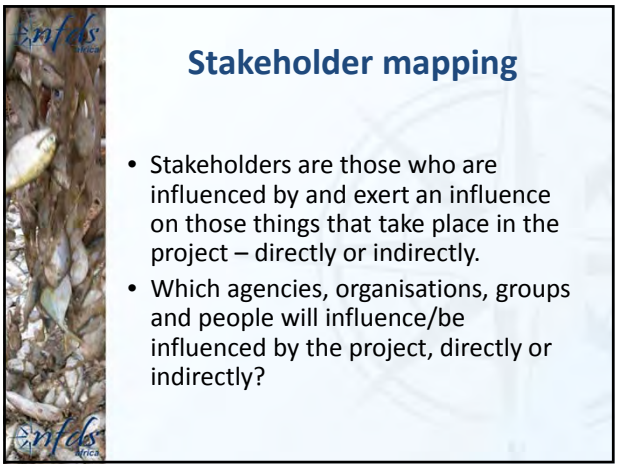

Environmental Monitoring
– Water quality monitoring covers
✓Physical parameters
✓Chemical Parameters
✓Bacteriological parameters
– Invasive weed monitoring and Control
✓Water hyacinth – biological control
✓Other weeds – chemical control (when necessary)
– Environmental Impact Assessment Studies
8

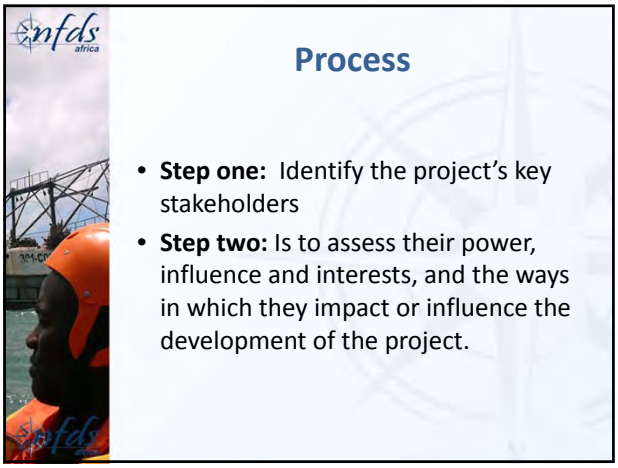

Hydrology and Reservoir Operations
– Measurement of river flows
– Flood forecasting
– Flood control
– Water allocations for power generation
– Generation Water flow measurement
9

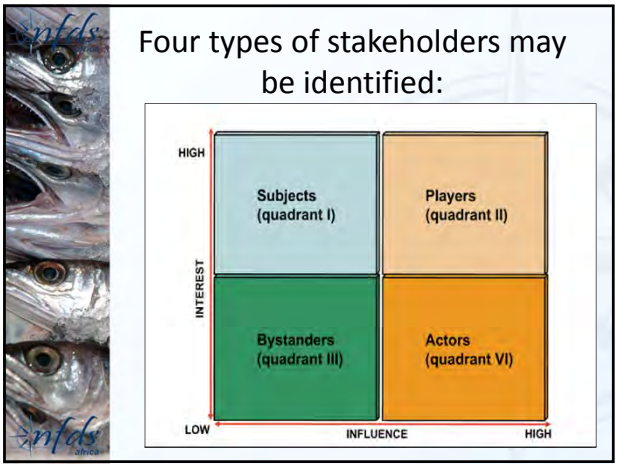

CONCLUSION
The Zambezi River Basin presents challenging opportunities for conservation and management in the area of water resources and all the life forms as well as anthropogenic activities that it so delicately supports, directly or indirectly. Ensuring adequate water, of acceptable quality, not only for the normal functioning of terrestrial and aquatic habitats, including the marine delta, but also for human developmental needs, is of prime importance in the management of water resources within the Zambezi River Basin. A lot of planning has been and is being done. ZRA stands ready to continue contributing to the sustainable implementation of these numerous plans.


Thank You


ACP Fish II
nfds africa
Stakeholder mapping


Stakeholder mapping
• Stakeholders are those who are influenced by and exert an influence on those things that take place in the project – directly or indirectly.
• Which agencies, organisations, groups and people will influence/be influenced by the project, directly or indirectly?


Process
• Step one: Identify the project's key stakeholders
• Step two: Is to assess their power, influence and interests, and the ways in which they impact or influence the development of the project.


Four types of stakeholders may be identified:
HIGH
Subjects (quadrant I)
Players (quadrant II)
INTEREST
Bystanders (quadrant III)
Actors (quadrant VI)
LOW
INFLUENCE
HIGH


Thank You!

Risks and assumptions

Risk Analysis and Risk Management

- Identify, analyse and assess different factors, which, in different ways, affect the possibilities available to the project to achieve its objectives.
- An analysis of possible critical external and internal factors /risks gives us an opportunity to assess the conditions that the project is working under.
- Look at each result and determining the risks of not achieving the result.

Process

- Internal factors/risks: These are risks of the type that are possible for the project to exercise control over. They can be practical matters such as delays in deliveries, personnel turnover etc.
- External factors/risks: These are risks that exist outside the framework of the project (for example political developments, natural disasters, corruption etc.) It is most often the case that the project group cannot exert an influence on these risks.
- It is common to then turn these into assumptions – e.g. Political will to implement shared management and to add something in the activities to make it more likely e.g. *Sensitisation of decision makers through interviews and policy briefs*.

Assumptions

- Assumptions - factors important for goal fulfilment, but outside the project's scope
- A project does not exist in a social, economic and political vacuum. For it to succeed it is dependent on norms, laws, ordinances, policies, political will and commitment, allocation of funds, etc. This is what is normally referred to as the institutional situation.
- It is not always possible for the project group to exert an influence on this situation and it creates assumptions for the project, which can be favourable or not so favourable.

Assumptions

- If an assumption is found to be a risk, i.e. that nobody else will deal with this factor, but it is a very important factor in order to achieve the results, then consider including activities dealing with this risk in the plan of activities. E.g. Sensitise decision-makers.....
- The assumptions are set with regard to the resources and the mandate the project group has, and with regard to what the project group knows that others are handling. The assumptions have to be realistic, otherwise they are considered to be risks

6.12 Photos from workshop

All photos courtesy of NFDS Africa

	Workshop participants holding discussions in breakout groups, August 2012, Kasane, Botswana
	Photo 3 Workshop participants in break out groups, August 2012, Kasane, Botswana
	Participants discussing the LFA, August 2012, Kasane, Botswana

Participants discussing the stakeholder mapping analysis August 2012, Kasane, Botswana

Participants discussing the stakeholder mapping analysis August 2012, Kasane, Botswana

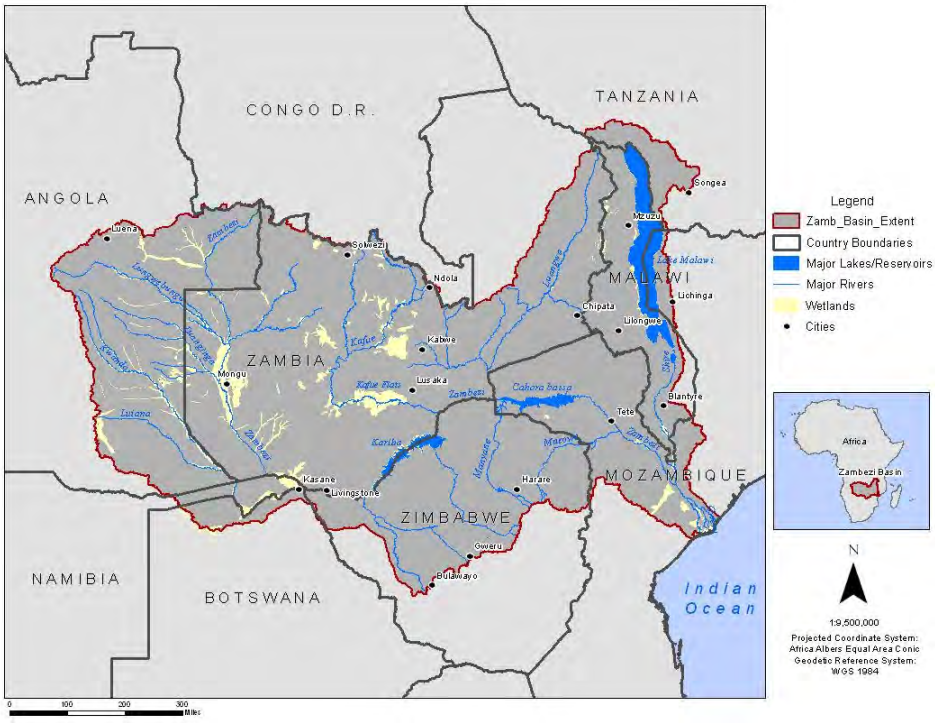
Workshop participants relaxing after Day 1 of the workshop, August 2012, Kasane

Group photo of most workshop participants, August 2012, Kasane, Botswana

6.14 Project concept note – English

Concept Note

For a project to strengthening co-management of the shared fisheries resources in the Zambezi River Basin



October 2012

Final

I Table of content

II List of acronyms

Acronym	Full name
ACP	African, Caribbean and Pacific
CAADP	Comprehensive African Agricultural Development Plan
CS	Civil Society
EU	European Union
FANR	Food, Agriculture and Natural Resources
FAO	Food Agriculture Organization
GDP	Gross Domestic Product
GEF	Global Environment Facility
IGO	Inter-Governmental Organizations
IUU	Illegal, Unreported and Unregulated
LVBC	Lake Victoria Basin Community
LVFO	Lake Victoria Fisheries Organisation
MCS	Monitoring, Control and Surveillance
MT	Metric tonnes
NEPAD	The New Partnership for Africa's Development
NGO	Non-government organizations
NPOA IUU	National Plan of Action IUU
PAF	Partnership for African Fisheries
SADC	Southern African Development Community
SWOT	Strength, Weakness, Opportunity and Threat
TA	Technical Assistance

1 Background and rationale for the project

The Zambezi Basin covers eight countries: Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe with an area of 1.39 million km^2. It is home to about 40 million people and comprises some of Southern Africa's most important inland fishery resources, providing food, income and livelihoods to many people of the region.

The entire fishery system – from production to trade – is vulnerable to a range of changes derived from both man-induced and natural sources: these changes threaten the benefits provided by the fishery resources. In response to this, the eight riparian countries are increasing their individual and joint efforts to safeguard the future of fisheries. Aware of the challenges in maintaining and strengthening the benefits from fisheries resources the countries of the Basin have developed a SADC Regional Technical Programme (RTP)to – *strengthen co-management and value chains of shared fisheries resources in the Zambezi basin*. The programme will also act as an instrument to aid the implementation of the SADC *Protocol on Fisheries.* The Programme was approved at the Ministerial Meeting on Natural Resources and Environment held on 16 July 2010 in Victoria Falls, Zimbabwe. The initial RTP was later restructured to enable more efficient resource mobilization in January 2012 and later developed into this Project concept note at a workshop held in Kasane, Botswana from the 27-30 August 2012 with funding support from the European Union.

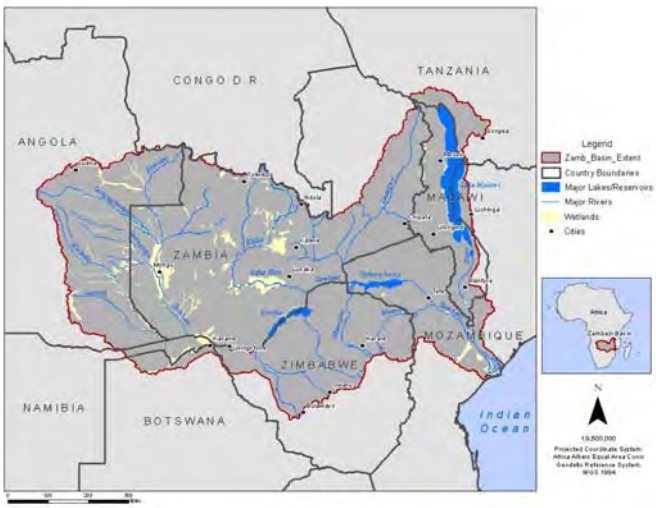
The overall goal of the RTP is to support the objectives and the SADC and specifically to support the implementation of the SADC Protocol on Fisheries through enhancing regional food security and rural economic growth, through two linked projects:

1. Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin
2. Enhancing Value Chain Gains of the Shared Fisheries Resources in the Zambezi River Basin

This project concept describes the first of these; strengthening co-management of shared fisheries resources in the Zambezi River Basin.

The Zambezi Basin comprises some of Southern Africa's most important fresh water and inland fishery resources. Total fish production of the Zambezi system is estimated at over 500,000 metric tons (MT) annually, many of which is unrecorded, and more than 500,000 people are directly dependent on fisheries for their livelihoods.

Figure 1: The Zambezi River Flood plain[1]



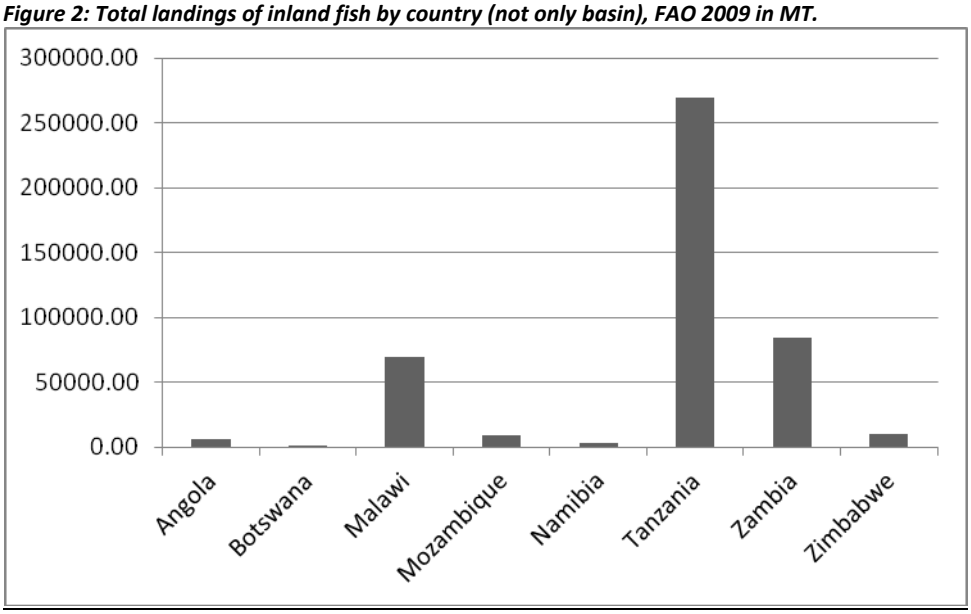
[1]http://waterbalance.org/wp-content/uploads/2011/09/ZambeziMap1.jpg

The Zambezi River, on its journey through eight countries passes through a range of ecological areas from where it rises in the Kalene hills in northwestern Zambia. It then flows northwards for about 30km, before turning to run about 280km through Angola and back into Zambia where it flows southwards through marshy plains. In the south-west of Zambia the river becomes the border between Zambia and the eastern Caprivi Strip of Namibia for about 130km. The Chobe tributary originates in Angola, crosses the Caprivi Strip, then forms the border between Namibia and Botswana and enters Botswana to flow southwards for about 75km until it meets the Selinda spillway along which spillage from the Okavango occurs in high flood years. It then turns east, again forming the border between Namibia and Botswana as it flows through a swampy area and flows into the Zambezi River at the border point between Namibia, Botswana, Zimbabwe and Zambia. The River then forms the border between Zambia and Zimbabwe and reaches its greatest width, over 1.3kmbefore the water plunge over the Victoria Falls. It continues to form the border between Zambia and Zimbabwe where the man-made Lake Kariba sits before entering Mozambique another man-made Lake – the Cahora Bassa. At its mouth, the Zambezi River splits into a wide, flat and marshy delta before running into the Indian Ocean.

Table1: Summary of catches and area by country[2]

COUNTRY	Total inland fish landings (mt) (2009)[3]	Total area of the country (km^2)	Area of the country within the basin (km^2)	As % of total area of the basin (%)	As % of total area of the country (%)
Zambezi Basin	-	-	135, 1365	-	-
Angola	5, 848	1,246,700	235,423	17.4	18.9
Botswana	86	581, 730	12, 401	0.9	2.1
Malawi	69,325	118,480	108,360	8.0	91.5
Mozambique	9,546	801,590	162,004	12	20.2
Namibia	2,800	824,900	17,426	1.3	2.1
Tanzania	269,402	945,090	27,840	2.1	2.9
Zambia	84,716	752,610	574,875	42.5	76.4
Zimbabwe	10,500	390,760	213,036	15.8	54.5

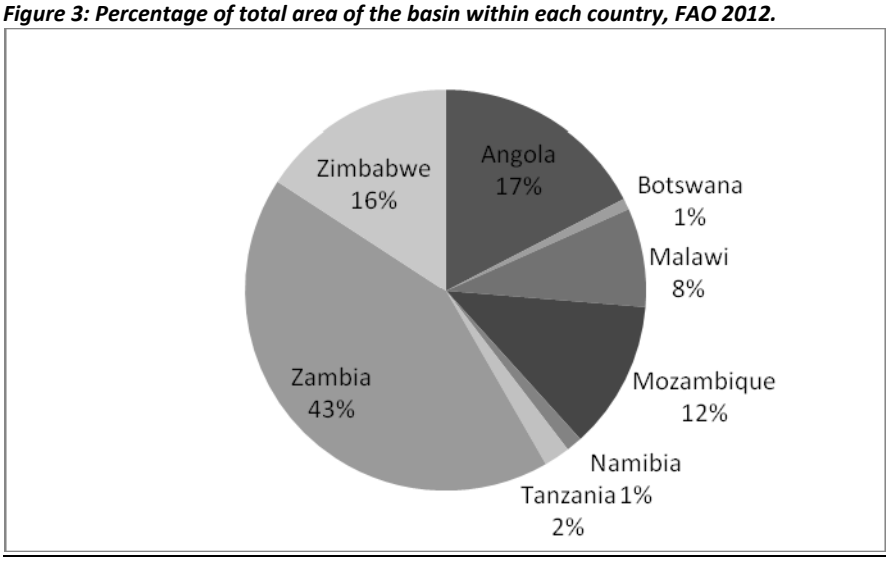
Figure 2: Total landings of inland fish by country (not only basin), FAO 2009 in MT.



[2]FAO The Zambezi River page- http://www.fao.org/docrep/W4347E/w4347e0o.htm

[3]Review of the state of the World Fishery Resources: Inland Fisheries. FAO Fisheries and Aquaculture Circular No. 942, Rev. 2. Rome, FAO, 2011

Figure 3: Percentage of total area of the basin within each country, FAO 2012.



2 The SADC Regional Technical Programme

As noted above in 2010 the SADC Ministers of Natural Resources and Environment approved a programme to strengthen co-management and value chains of shared fisheries resources in the Zambezi basin. The overall goal of the RTP is to *'Enhance regional food security and rural economic growth through sustainable, productive and resilient fisheries in the Zambezi basin'*.

The shared nature of the fisheries resources in the Basin requires collaborative management between countries and amongst relevant stakeholder groups. Co-management approaches empowering fishing communities to participate more formally in the management of fisheries resources have been applied in several countries with varying success, in order to strengthen the successes a more strategic and effective engagement with relevant stakeholder groups is required. These include, for example, stakeholders in fish trade and marketing and in the wider value chain, private sector investors in fisheries and aquaculture, stakeholders in the water, energy and irrigation sectors, as well as national climate change adaptation and basin-wide investment planning processes. It is believed by some that the future of fisheries in the Zambezi Basin will to a large extent depend on how well the sector's requirements and potentials are defined in relation to these stakeholder groups and processes within and outside the fisheries sector.

2.1 What is meant by co-management

Co-management involves sharing authority and responsibility between government and stakeholders. The benefits that can come with including stakeholders in fisheries management include greater effectiveness, reduced conflict and empowerment of communities[4]. However, policies and projects that incorporate the principles of co-management can vary broadly to the degree that stakeholders are actually involved. Three types of co-management are often distinguished[5]:

[4]Béné, C., E. Belal, M. A. Baba, S. Ovie, A. Raji, I. Malasha, F. Njaya, M. Andi, and A. Russel. (2009). Power struggle, dispute and alliance over local resources: Analysing 'democratic' decentralisation of natural resources through the lenses of Africa inland fisheries. World Development. 37(12):1935–1950.

[5]Halls, A.S., Arthur, R., Bartley, D., Felsing, M., Grainger, R., Hartmann, W., Lamberts,D., Purvis, J; Sultana, P., Thompson, P., Walmsley, S. 2005.Guidelines for Designing Data Collection and Sharing Systems for Co-Managed Fisheries. Part I: A Practical Guide. FAO Fisheries Technical Paper.No.494/1. Rome, FAO.

- ***consultative***, where decisions are made by the government in conjunction with non-binding community consultation;

- ***cooperative***, where government and fishers are equal partners in decisions and implementation; and

- ***delegated*****,** where authority is devolved entirely to the user level, with government being informed of decisions.

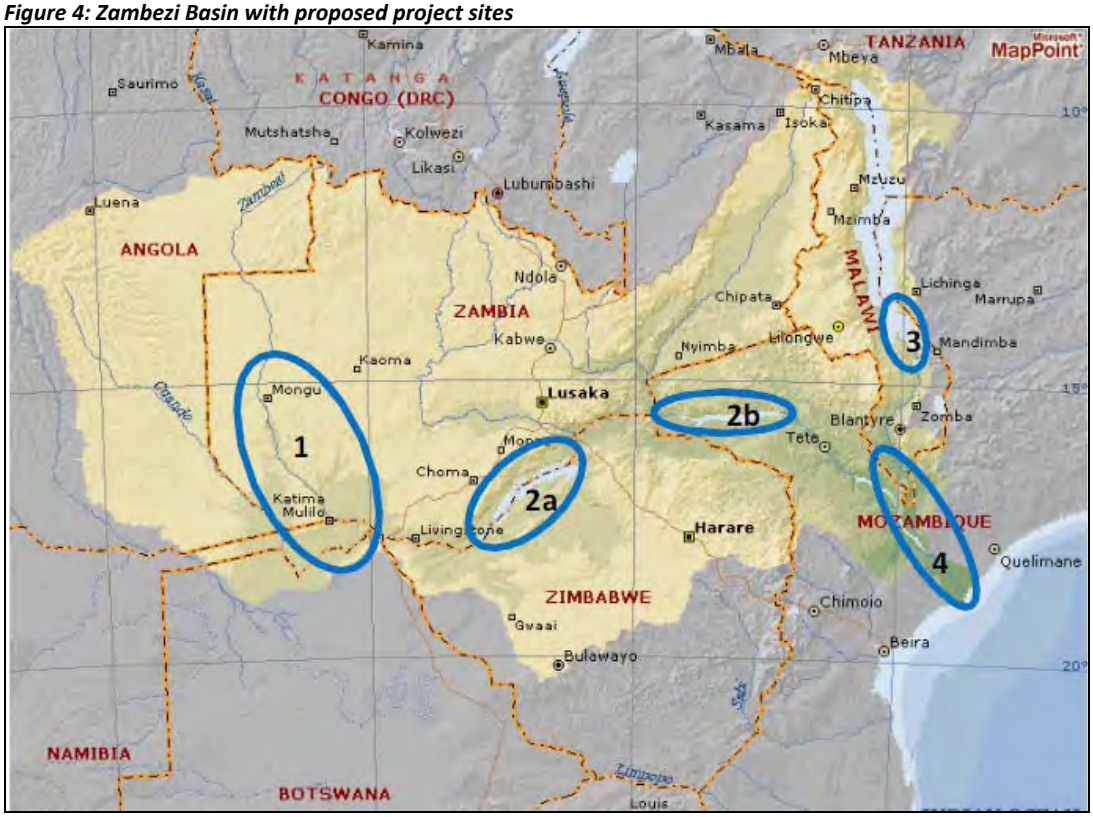
2.2 An overview of the Programme approach

The Project *Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin,* has been developed to address the key challenge of widespread food insecurity and poverty along with its sister Project focusing on enhancing value chains. It is intended that the Programme will be implemented through regional and site-specific or pilot components that will reflect shared development challenges. Pilot sites will provide empirical testing and assessment for implementing new management and market tools and approaches. This information will be up-scaled and out-scaled to share lesson learning and experience through a combination of basin-wide assessments, synthesis and dissemination, supported by capacity building to ensure participation and uptake.

The proposed locations for site-specific activities are geographically represented in Figure 4 and are:

- 1 Upper Zambezi –(4) seasonal floodplain and river fishery
- 2a Lake Kariba – (2) and 2b CahoraBassa – (1) reservoir fisheries
- 3 South East Arm Lake Malawi/Niassa and Lake Malombe–(2) lake fishery
- 4 Lower Zambezi/Shire and Delta –(2) river fisheries, seasonal/ regulated, floodplains and delta

Figure 4: Zambezi Basin with proposed project sites



3 Context analysis and Project description

3.1 Challenges

Some of the key issues and challenges that the Project has been developed to address within the Zambezi Basin include issues important to policy and management challenges for fishery development in the Zambezi basin have been noted in previous work[6]and have been validated in the process of developing this project[7], they include:

- the need to elaborate and implement adequate national and regional policy frameworks that are coherent across sectors and countries;
- developing adequately robust legal frameworks to support the policy objectives at national levels;
- developing and implementing practical and inclusive strategic and operational plans;
- coordinating and including the complex group of resources users into the consultations and plan;
- finding solutions that sustain production within the context of increases in population and demand and high poverty levels;
- challenges of shared or co-management;
- the complexities of a multi species fishery;
- the need to balance between national and regional priorities and differences in national levels of competence and readiness for cooperating on fisheries sector issues;
- limited access to knowledge about suitable method or gear or access to the actual gear;
- limited knowledge of the resource base or the habit;
- consideration of the need to lengthen the value chain in fisheries, through more post-harvest activities in order to increase economic growth;
- no good economic valuation of the resources; and
- the need for defining management objectives, that reflect the complexity of the issues and system – e.g. the open access state of fisheries resources, HIV/AIDS prevalence, lack of education in relation to sustainable use of resources, inability to adequately disseminate extension concepts/ ideas to communities.

3.2 Strengths, opportunities, weakness and threats

To update the current situation in the Zambezi Basin fisheries, and to highlight factors which may have an impact on strengthening co-management; a strengths, weaknesses, opportunities and threats (SWOT) analysis has been developed. This tool was used to access the Project context by the regional stakeholders at the onset of the Project design and it will guide future implementers in highlighting areas which can be maximised to benefit the outcomes of the project and, highlights areas which need to be addressed and improved to avoid manageable limitations to the project. The SWOT is presented in Figure 5 (Key: L = local level attribute, N = national level attribute, R = regional level attribute):

[6] e.g. Zambezi workshop 2004

[7] Specifically at the SADC Kasane, Botswana workshop held in August 2012.

Figure 5: SWOT analysis of Strengthening Co-Management of Shared Fisheries Resources in the Zambezi River Basin

	HELPFUL				HARMFUL			
	STRENGTHS	**L**	**N**	**R**	**WEAKNESSES**	**L**	**N**	**R**
INTERNAL	Existing research results and experiences on various co-management initiatives in the basin				Inadequate capacity- research, human resources in the fisheries			
	Critical mass on co-management skills in the basin and region				Poor/insufficient data collection and analysis			
	Shared Culture and language				Political interference in the fisheries sector is an issue- big problem. Motivation dependent on political gain			
	Political will				Law enforcements officer- overstretched and unable to enforce law on river system			
	Community co-management organisations (BMV, BMU, VMC's, etc.)				Conflicting legal policy between neighbouring states			
	National legislation which enables co-management				Illiteracy- communities don't understand law and regulations			
	Basin wide/trans-boundary programmes, initiatives and organisations				Poor stakeholder participation and cooperation- those affected aren't always involved or informed, even though they are important. Left out.			
	International policy and agreements which support sound fisheries management				Uneven distribution of wealth- those who are richer have more influence on the poor			
					Inherent power struggle- conflict within traditional leaders, and between TL and government			
					Land ownership - can be unstable			
					Uncontrolled migration of fishers- no stake of the resources, so care less about sustainable management			
					Bad and uncoordinated land use practices (Tragedy of the commons)			
					Unbalanced gender engagement- poor implementation of gender policies. Benefits are very much skewed towards men			
					Poverty			
EXTERNAL	**OPPORTUNITIES**	**L**	**N**	**R**	**THREATS**	**L**	**N**	**R**
	Existing policies				Conflicting priorities (communities/sectorial/national)			
	Interest from donors (in this region specifically)				Political interference at implementation level			
	Political will				Corruption			
	Interest from communities				Increased population and poverty levels leading to unsustainable resource use			
	Existing international frameworks				Natural disasters (includes Climate Change)			
	Shared experiences from past collaboration (positive spirit for collaboration)				Lack of capacity (Human & financial)			
	Natural resources available				Increased IUU Fishing			
	Economic and employment opportunities (poverty reduction)				Unsustainable land use practices (removal of riparian vegetation, pollution, etc.)			
	Existing skills in the basin (SADC region)				Commercialization of the fishery (legal and illegal)			
	Research on existing co-management models and existing co-management structures				Open access			
	Awareness of the environment and climate change (driver for sustainable management)				Increased fishing effort			
	Existence of enabling legislation				Introduction of invasive alien species (fish and Hyacinth)			
	Regional trade- opportunity for expanding co-management				Uncontrolled development (increased tourism mining, etc.)			
	Increasing tourism opportunities				HIV/AIDS			
	KAZA- Transboundary organization				Traditional structures			

3.3 Project description

From the above analysis and earlier work the Project has been designed to address the challenges and build on the opportunities while being mindful of the threats. The original and overarching Programme the same goal has been kept for the Project goal, which is the anticipated final outcome that the Project and Programme will contribute towards; it is the broad motivation and reason for establishing the Project. The goal of this project is:

To enhance the contribution of fisheries to the regional food security and rural economic growth in the Zambezi basin

The purpose is the intended system wide effect of the project, and specifically in this case, on the fisheries system of the Zambezi Basin. Therefore, results and activities will be directed on addressing the purpose, while keeping in mind an outlook of the overall goal of the project. The purpose of this Project is:

To establish productive and resilient fisheries in the Zambezi Basin

The results are the specific outputs the project is designed to achieve; they are directed at sub-system level. The results associated with this project are:

1. *Co-management tools and approaches for sustainable exploitation of the fisheries resources in the ZB developed, disseminated and applied by the key stakeholders in selected sites*
2. *Capacity and active participation of stakeholders in the management of fisheries resources of the ZB strengthened*
3. *Regulatory and institutional frameworks for the shared ZB fisheries harmonised*
4. *Climate change in the management of the fisheries resources in ZB mainstreamed*

3.4 Stakeholders and partners

Stakeholders are those that exert influence on, or are influenced by the activities and results of the project. It is necessary to have an idea of all the stakeholders who are connected by the project in order to benefit from the combined knowledge and experience of the associated stakeholders and to identify relationships of stakeholders towards the project. They can incorporate those who may benefit or support the project, or those who may lose out or be against the project, and can be individuals, groups or organisations.

In relation to the SADC Protocol on Fisheries and its implementation plan, Article 7.7 notes that *'State Parties shall endeavour to ensure that all stakeholders participate, at the appropriate level, in decision-making processes that affect the management of shared resources*.' While in Article 12.6 on artisanal, subsistence fisheries and small-scale commercial fisheries it refers to the obligation of State Parties to *'facilitate broad based and equitable participatory processes to involve artisanal and subsistence fisheries in the control and management of their fishing related activities'*. In 2001, when the SADC Protocol on Fisheries was signed, discussions and practices of empowering participation in policy and operational processes and decision making had not been as widely developed as they have today, but still, the above calls for both participation and shared stewardship to be implemented.

Linkages with other SADC programmes in the Zambezi Basin the water, energy, agriculture, and conservation sectors will be important and will require careful elaboration together with the

respective SADC divisions and basin organizations before the start of the Project. As will links to issues of climate change vulnerability and adaptation in order to consider how the Project activities will relate to the threat of climate change and the vulnerability of the fisheries systems (including the human dimensions) to expected impacts resulting from both gradual warming and associated physical changes as well as from frequency, intensity and location of extreme events. In addition to climate change related considerations the overall Poverty Reduction Strategy Papers, the UN Development Assistance Frameworks (UNDAFs) and the Comprehensive Africa Agriculture Development Programme (CAADP[8]) national compacts have also been considered in order to improve synergies in the development of this Project.

In each Pilot site, national institutions will identify partnerships and linkages with recent or on-going projects. This can entail information exchange, application of lessons and technologies as well as sharing capacities and operational linkages as appropriate. These arrangements will be identified and specific roles agreed during start-up meetings for stakeholders which will take place in each Pilot site.Stakeholders of the Zambezi Basin fisheries are categorised into four groups: subjects, players, bystanders and actors according to how influential and important they were according to each of the four expected results.

Figure 6: Stakeholders of the Zambezi Basin by category

Result	Subjects	Players
1. Co-management tools and approaches disseminated and	Academic and research units, Conservancies, Fish consumers, Fish processors, Ministry for tourism, NGO's and Tour operators.	Departments of fisheries, Fish traders, Fishers, Local authorities, Regional councils and Traditional authorities.
2. Capacity and active participation of stakeholders in the management	Consumers Researchers, Traders and Women.	Fish farmers, Fishing communities, Fisheries managers, Sport fishers and Tour operators.
3. Regulatory and institutional frameworks harmonised	Local authorities, Politicians and Traditional leaders.	Basin level organisations, Developers, Donors, Financial institutions, Government, NGO's, Politicians Private sector, Regional/international programmes, Regional bodies, Research institutions and Traditional leaders.
4. Climate change mainstreamed	CITES, FAP, Research and universities, Tourism sector, IUCN and UNCC.	Co-management groups, Fish processors, Fishers, Fisheries authorities, Member states Research, SADC and WWF.

[8] http://www.nepad-caadp.net/

Result	Bystanders	Actors
1. Co-management tools and approaches disseminated and	Dam operators Ministry for energy, Ministry for mines and minerals, Ministry for forestry, Ministry for water, Ministry for natural resources, Para-statal for water development, Tourism board, Waters users associations/organisations and Wildlife authorities/resorts.	Civil society organisations
2. Capacity and active participation of stakeholders in the management	Department of irrigation, Farmers, Ministry of agriculture, Power utilities and Water utilities	Fish traders, Forestry departments, Governments Maritime administrators, Police, SADC, Traditional authorities, ZAMCOM and ZRA/ARA.
3. Regulatory and institutional frameworks harmonised	Communities at large, Environmentalists, Human rights groups and International lobby and pressure groups.	Dam operators.
4. Climate change mainstreamed	Local community members and Mining and other polluting industries.	

3.5 Results and activities

The activities are the actions carried out in order to achieve the results of the project. They are the means through which the final goal of the project is achieved. The activities associated with the projects results are:

Figure 7: Project results and activities

Result	Activities
Result 1 *Co-management tools and approaches for sustainable exploitation of the fisheries resources in the ZB developed, disseminated*	i. Generate Information on fisheries status ii. Review, document and disseminate the existing Co-management tools and approaches to key stakeholders iii. Establish Co-management structures
Result 2 *Capacity and active participation of stakeholders in the management of fisheries resources of the ZB strengthened*	i. Mobilise constituencies around prioritised management challenges ii. Key stakeholders trained
Result 3 *Regulatory and institutional frameworks for the shared ZB fisheries harmonised*	i. Harmonization of policy and legislation
Result 4 *Climate change in the management of the fisheries resources in ZB mainstreamed*	i. Review all available literature on potential impacts of climate change on the ZB aquatic ecosystem ii. Conduct a vulnerability assessment of the key fisheries in the basin. iii. Develop mechanisms for adaptation and mitigation. iv. Integrate multi-sectorial approaches in the fisheries sector. v. Pilot the adaptation and mitigation mechanisms in selected sites. vi. Share lessons and successes with stakeholders.

3.6 Risks and assumptions

The following are the identified risks for the project that have all been categorised as low risk.

Figure 8: Project risks and mitigating factors

Risk	Rank	Mitigation factor
Lack of political will or change in political landscape – both National and local level	LOW	SADC commitments at a Ministerial level to cooperate, and for member States to benefit through the SADC framework through a SADC implemented project (activities under result 3)
Lack of technical knowledge at grass roots level	LOW	Information and knowledge sharing is an integrated component in both projects of the RTP. This has also been accounted for under the activities of Result 1, specifically, *Review, document and disseminate the existing Co-management tools and approaches to key stakeholders.*
Loss of skilled human resource brain drain– after being trained or migration of trained fishers	LOW	Region wide directed project- large coverage of training.
Lack of ownership or willingness to participate	LOW	Integration of all stakeholders will be carried out through the activities of the Project.
HIV/AIDS	LOW	Promotion of wealth through increased productivity of the fisheries will increase access to ARV's. General health and wellbeing of local populations will also be promoted by the increased nutritional gain as a result of more productive and resilient fisheries.

3.7 Logical framework

The following logical framework (logframe) has been developed for the Project.

Goal	Indicators	Means of verification	Assumptions
To enhance the contribution of fisheries to the regional food security and rural economic growth in the Zambezi basin.			
Purpose	**Indicators**	**Means of verification**	**Assumptions**
To establish productive and resilient fisheries in the Zambezi.	Knowledge of fishery resource potential integrated into national planning. Catches of fish are within biological sustainable levels. Those reliant on fisheries for a livelihood have coping mechanisms for change.	Project reports National Statistics	Fisheries co-management advice implemented in cross-sectorial approaches to basin management.
Expected Result	**Indicators**	**Means of verification**	**Assumptions**
1. Co-management tools and approaches for sustainable exploitation of the fisheries resources in the ZB developed, disseminated and applied by the key stakeholders in selected sites.	Number of strategies, tools and guidelines developed. At least five case study/pilot projects developed for co-management. Dissemination of case study lessons learnt to wider audience.	Programme progress reports	Already existing body of knowledge is available and utilised.
2. Capacity and active participation of stakeholders in the management of fisheries resources of the ZB strengthened.	Active engagement of at least five different stakeholder groups in the co-management centres of the basin. At least three issues raised by groups in co-management processes become internalised and result in a change in practice by resource users.	Project reports. Project website. National reports.	Stakeholders' willingness to work together and to accept project. High staff retention.
3. Regulatory and institutional frameworks for the shared ZB fisheries harmonised.	National and local legislation harmonised to introduce or enhance co-management that incorporates regional cooperation, where applicable.	National reports/legislation.	Acceptance within wider national legislative frameworks to accept changes.
4. Climate change in the management of the fisheries resources in ZB is mainstreamed.	Climate change is incorporated into fisheries frameworks at regional, national and local levels.	National frameworks for fisheires.	Limited political interference Natural disasters

Activities	Indicators	Means of verification	Assumptions
1.1 Generate Information on fisheries status 1.1.1 Assess the fish resource status (Frame Surveys, Stock Assessment and review previous studies). 1.1.2 Assess Aquatic Ecosystem health of the basin (pollution and diseases). 1.1.3 Establish knowledge management and sharing mechanisms.	Comprehensive reviews of main bio-physical and socio-economic aspects of fisheries published. Basin-wide status report of Zambezi fisheries published.	Publications, including scientific papers, maps, policy briefs. Publications, website. Technical reports, website, reports from training events.	Data can be accessed in member states and relevant technical agencies. Enough capacity within member states to do assessment (research).
1.2 Review, document and disseminate the existing Co-management tools and approaches to key stakeholders 1.2.1 Gather and review existing literature and experiences on co-management approaches in ZB 1.2.2 Generate stakeholder distribution list 1.2.3 Conduct stakeholder workshops 1.2.4 Develop and operationalise website on ZB	Number of stakeholders having access to the tools and approaches.	Survey. Progress report.	Data can be accessed in member states and relevant technical agencies. Member states will contribute information for website updates. Commitment by SADC to administer the website.
1.3 Establish co-management structures 1.3.1 Identify and define pilot sites and participating groups (fisherfolk) 1.3.2 Mobilise resource users into committees and associations 1.3.3 Develop co-management framework structures 1.3.4 Train committees and trainers on co-management tools and approaches 1.3.5 Implement Management tools and innovations 1.3.6 Develop action plan 1.3.7 Implement the action plans in the pilot sites 1.3.8 Monitor and assess implementation of the action plans 1.3.9 Review the co-management action plan	Number of stakeholders applying the tools. Number of best practices sites. Number of action plans developed. Number of action plans implemented.	Progress reports.	Relevant institutions at all levels make staff available for training.
2.1 Mobilise constituencies around prioritised management challenges 2.1.1 Conduct stakeholder analysis 2.1.2 Generate directory of stakeholders 2.1.3 Identify and prioritise management challenges 2.1.4 Assess capacity to address the challenges 2.1.5 Develop and implement capacity building plan 2.1.6 Strengthen existing co-management centres and/or establish new co-management centres 2.1.7 Monitor and evaluate performance of the co-management centres	Co-management resource centres established and operational in at least four pilot areas. Resource user groups established and active.	Survey reports. Progress reports. Website.	Political will at local and national level maintains engaged even with changes. Willingness to participate by potential members.

Activities	Indicators	Means of verification	Assumptions
2.2 Key stakeholders trained 2.2.1 Carry out needs assessment survey 2.2.2 Develop training materials to meet the needs 2.2.3 Conduct training 2.2.4 Identify conditions under which co-management can work	Number of stakeholders trained. Capacity strengthening plan in place and implemented.	Training report. Progress report. Survey report.	Availability of trainers. Enabling environment of cross boarder collaboration.
3.1 Harmonization of policy and legislation 3.1.1 Identify conditions under which co-management can work 3.1.2 Appraise existing co-management policies and legislation and identify and harmonise elements that should be standardized 3.1.3 Conduct sub-basin workshops for harmonisation of legislation for shared fisheries resources of the Zambezi basin 3.1.4 Adapt the harmonised policy and regulations at country level 3.1.5 Implement the harmonised policies and regulations in project pilot sites 3.1.6 Monitor and evaluate performance and impact in pilot sites on co-management 3.1.7 Share knowledge and lessons with stakeholders in the Zambezi basin 3.1.8 Replicate successes to wider basin	Gap analysis report publically available and agreed. Policy briefs available. Publications available. Recommendations documented.	National annual reports. ZAMCOM reports.	Political buy-in maintained. Acceptance of the revised fishing legislation by fishers. Availability of fish is maintained.
4.1 Review all available literature on potential impacts of climate change on the ZB aquatic ecosystem.	Report available on impacts	Progress report and website.	No large gaps information.
4.2 Conduct a vulnerability assessment of the key fisheries in the basin.	Vulnerability report available.	Progress report and website.	Access granted for physical survey
4.3 Develop mechanisms for adaptation and mitigation.	Methodologies available and published in suitable languages.	Progress report and website.	
4.4 Integrate multi-sectoral approaches in the fisheries sector.	Approaches documented and integrated.	Progress report and website.	Buy-in of fishery
4.5 Pilot the adaptation and mitigation mechanisms in selected sites.	At least five pilot communities adopt integrated approaches.	Progress report and website.	
4.6 Share lessons and successes with stakeholders.	Lesson learning shared through at least two multi-user events and dissemination material available.	Progress report and website.	

3.8 Work plan

The workplan illustrates the expected timeframe for the activities of each result. It plans out the order in which activities will be carried out, and how long they will be planned for. This step of planning will also assist in the next step of assigning a budget to each activity, as it gives an idea of the scope of each activity. The indicative time is 6 years with an indicative budget of around USD 9 million.

Expected Result 1: Co-management tools and approaches for sustainable exploitation of the fisheries resources in the ZB developed, disseminated and applied by the key stakeholders in selected sites

Activities	Year 1				Year 2				Year 3	Year 4	Year 5	Year 6
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
1.1 Generate Information on fisheries status												
1.1.1 Establish knowledge management and sharing mechanisms												
1.1.2 Assess the fish resource status (Frame Surveys, Stock Assessment and review previous studies)												
1.1.3 Assess Aquatic Ecosystem health of the basin (pollution and diseases.)												
1.2 Review, document and disseminate the existing Co-management tools and approaches to key stakeholders												
1.2.1 Gather and review existing literature and experiences on co-management approaches in ZB												
1.2.2 Generate stakeholder distribution list												
1.2.3 Conduct stakeholder workshops												
1.2.4 Develop and operationalize website on ZB												
1.3 Establish co-management structures												
1.3.1 Identify and define pilot sites and participating groups (fisherfolk)												
1.3.2 Mobilise resource users into committees and associations												
1.3.3 Develop co-management framework structures												
1.3.4 Train committees on co-management tools and approaches												
1.3.5 Implement Management tools and innovations												
1.3.6 Develop action plan												
1.3.7 Implement the action plans in the pilot sites												
1.3.8 Monitor and assess implementation of the action plans												
1.3.9 Review the co-management action plan												

Expected Result 2: Capacity and active participation of stakeholders in the management of fisheries resources of the ZB strengthened

Activities	Year 1				Year 2				Year 3	Year 4	Year 5	Year 6
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
2.1 Mobilise constituencies around prioritised management challenges												
2.1.1. Conduct stakeholder analysis												
2.1.2 Generate directory of stakeholders												
2.1.3 Identify and prioritise management challenges												
2.1.4 Assess capacity to address the challenges												
2.1.5 Develop and implement capacity building plan												
2.1.6 Strengthen existing co-management structures and / or establish new co-management structures												
2.1.7 Monitor and evaluate performance of the co-management structures												
2.2 **Key stakeholders trained**												
2.1.1 Carry out needs assessment survey												
2.1.2 Develop training materials to meet the needs												
2.1.3 Conduct training												
2.1.4 Identify conditions under which co-management can work												

Expected Result 3: Regulatory and institutional frameworks for the shared ZB fisheries harmonised

Activities	Year 1				Year 2				Year 3	Year 4	Year 5	Year 6
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
3.1 **Harmonization of policy and legislation**												
3.1.1 Identify conditions under which co-management can work												
3.1.2 Appraise existing co-management policies and legislation and identify and harmonise elements that should be standardized												
3.1.3 Conduct sub-basin workshops for harmonisation of legislation for shared fisheries resources of the Zambezi basin												
3.1.4 Adapt the harmonised policy and regulations at country level												
3.1.5 Implement the harmonised policies and regulations in project pilot sites												
3.1.6 Monitor and evaluate performance and impact in pilot sites on co-management												
3.1.7 Share knowledge and lessons with stakeholders in the Zambezi basin												
3.1.8 Replicate successes to wider basin												

Expected Result 4: Climate change in the management of the fisheries resources in ZB mainstreamed

Activities	Year 1				Year 2				Year 3	Year 4	Year 5	Year 6
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
4.1 **Review all available literature on potential impacts of climate change on the ZB aquatic ecosystem**												
4.2 **Conduct a vulnerability assessment of the key fisheries in the basin**												
4.3 **Develop mechanisms for adaptation and mitigation**												
4.4 **Integrate multi-sectorial approaches in the fisheries sector**												
4.5 **Pilot the adaptation and mitigation mechanisms in selected sites**												
4.6 **Share lessons and successes with stakeholders**												

4 Annexes

4.1 Annex 1 – Programmes, projects and initiatives with potential links and synergies to the Project

Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved
The Food Safety Capacity Building on Residue Control (FSCBRC)	SADC	2007 - 2011	• Harmonization of legislation, accreditation system, communication between local authorities. • Promoting trade and increased food security. • Reduce spread of disease, increase food safety.	All
ACP Fish II programme	Regional Facilitation Unit (RFU)	2009-2013 (9th European Development Fund)	The programme is primarily designed to improve fisheries management in ACP countries and to reinforce regional cooperation for the management of shared stocks. The expected results of the Programme, which coincide with the Programme components, are – 1. Improved fisheries policies and management plans at regional and national levels 2. Reinforced control and enforcement capabilities 3. Reinforced national and regional research strategies and initiatives 4. Developed business supportive regulatory frameworks and private sector investment 5. Increased knowledge sharing on fisheries management and trade at regional level	All except Zimbabwe
Aquatic biosecurity framework	FAO and OIE	2009 - ongoing	Network in the region to fight and limit spread of disease in aquatic environment. To safeguard aquatic resources for future food security through biological safety. Support for sustainable development	All
Cabo Delgado and Northern Nampula Artisanal Fishing Project (PPANCD)	African Development Bank (ADB); Government of Mozambique	2003 - 2011	Provision of credit, development of community infrastructure; institutional support	Mozambique
Cahora Bassa Research, Monitoring and Fisheries Development Project	Government of Mozambique; ICEIDA	2007 - 2010	Capacity strengthening for research (IIP delegation) Training (MSc and PhD), research and monitoring of the semi-industrial and artisanal fisheries Development of fisheries strategies and management plans.	Mozambique

Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved
Dam Synchronisation and Flood Release in the Zambezi River Basin	Part of the Transboundary Water Management programme in SADC	2011-Ongoing	The dams of the Zambezi basin are operated by different organisations. Communication and information sharing between dam managers is limited. This has caused unnecessary floods downstream of the reservoirs, reduction of energy productivity and an unnatural runoff regime with negative impacts on the rich eco-systems within the Zambezi. The Southern African Development Community (SADC) has initiated a project, to recommend improved operations of the reservoirs in the Zambezi river basin. In particular the focus of the recommendations has been on feasibility of forecasting of floods, added value of synchronized operation, environmental flow releases and potential of new infrastructure. This project has been performed by a joint venture, consisting of SSI (South-Africa), WRNA (South Africa), SEED (Mozambique), Rankin Engineering (Zambia) and Deltares. The project has been financed by the Gesellschaft für Technische Zusammenarbeit (GTZ).	All
Economic value of the Zambezi basin wetlands	IUCN	Completed	Valuation for resources to support planning and decision making. Tool for planning, sections on agriculture, fisheries, vegetation and wildlife. Sensitivity and opportunity described by area.	All except Malawi
Integrated Management Of Zambezi /Chobe River System - Transboundary Fishery Resource	WWF Norway, WWF Namibia, Namibia Nature Foundation	Phase I: 2006 - 2009 Phase II: 2010 - 2012	Understanding of the impact of the new Inland Fisheries Resource Act (Namibia) on the fisher folk and on the resource Achieve transboundary collaboration on fisheries management Support the emergence of local level community fishery groups to manage the fishery resource Facilitate development of appropriate fish farming projects in conjunction with MFMR and projects utilising existing water bodies and local fish species Implement monitoring programmes.	Namibia, Zambia, Botswana, Angola, Zimbabwe
Integrated Development Plan (IDP) for the Angola component of	Angola	Completed in 2011	The IDP will guide the further development of the Angolan component of the KAZA TFCA. It will involve the declaration of the Luiana Partial Reserve as a formal Protected	Angola

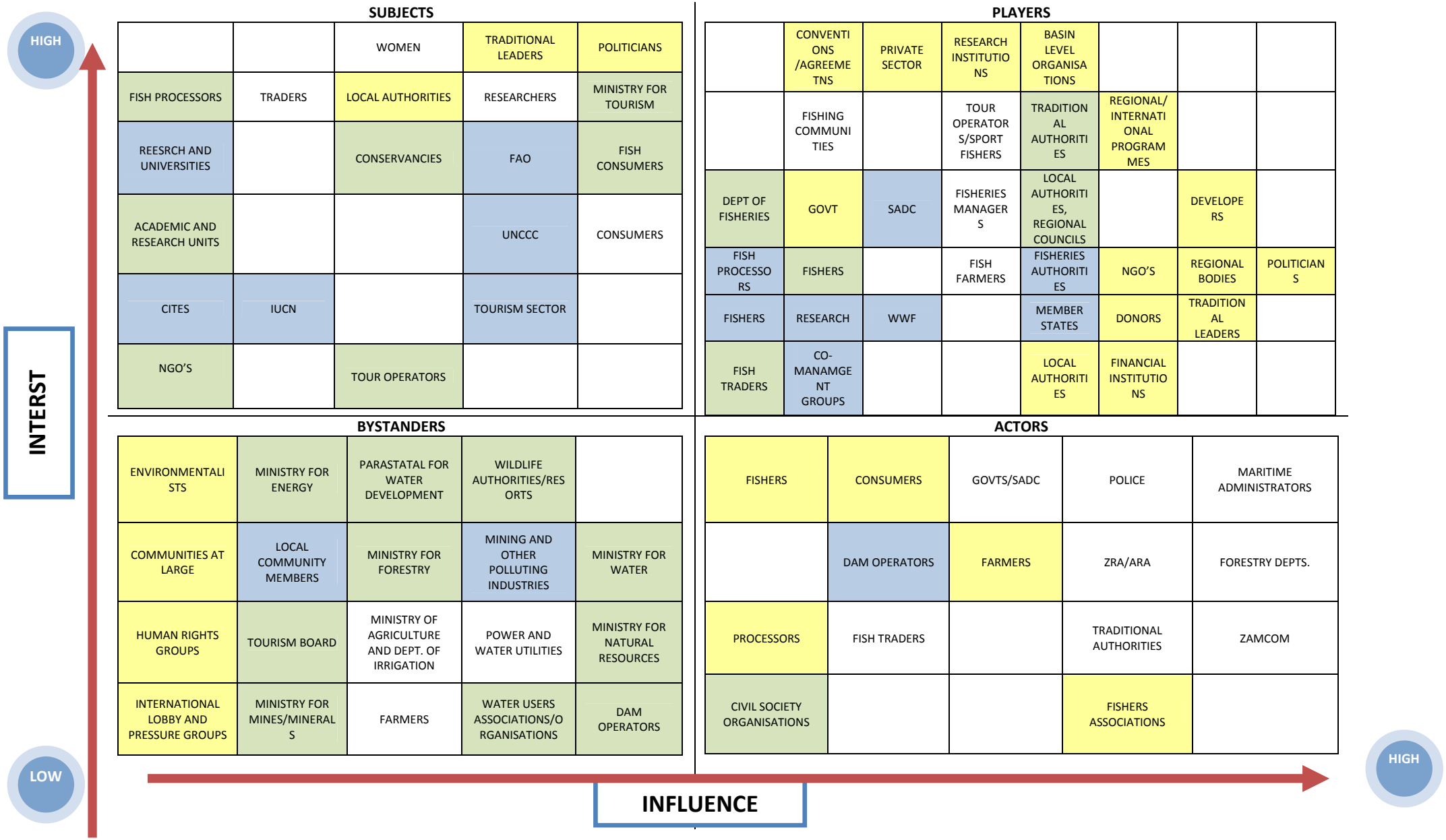
Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved
the KAZA TFCA			Area and the establishment of various community-based natural resources management programmes	
Integrated Development Plan (IDP) for the Botswana component of the KAZA TFCA	Botswana Government	Ready for review by stakeholders before government approval	Roadmap on how the Botswana component of the KAZA TFCA will be developed in line with the overall KAZA TFCA vision, mission and objectives	Botswana
International Training Programme on IWRM	SIDA, ZAMCOM, Zambezi River authority	First quarter 2006- Fourth quarter 2010		All
Joint Zambezi River Basin Environmental Flows Programme (EF ZRB)	WWF	Inception phase, 2009-2010	To meet human development needs the river has been heavily modified, as evidenced by the construction of huge dams in the main stem and some of the tributaries of the Zambezi basin to meet the energy demand of Southern Africa. These changes have severely distorted the Zambezi River's natural flood regime and as a consequence, biodiversity values have greatly declined with a knock on effect for local communities dependent on natural resources. WWF proposes the use of environmental flows to set out water requirements in the Zambezi River Basin. The objective is to improve the River Zambezi ecosystem and the lives of the communities which depend on the river. This will be achieved through improving dam operation of major dams in Zambia & Mozambique and river basin management plans (including floodplain protection and management) to permit environmental flows in main stem and tributaries of the Zambezi River.	All
KAZA	SADC, DBSA, RETOSA	2003 - ongoing	**KAZA TFCA**, is potentially the world's largest conservation area, spanning five southern African countries; Angola, Botswana, Namibia, Zambia and Zimbabwe, centred around the Caprivi-Chobe-Victoria Falls area. The goal of the KAZA TFCA is "To sustainably manage the Kavango Zambezi ecosystem, its heritage and cultural resources based on best conservation and tourism models for the socio-economic wellbeing of the communities and other stakeholders in and around the eco-region through harmonization of policies, strategies and practices." KAZA TCFA will develop an extensive	Angola, Namibia, Botswana, Zambia, Zimbabwe

Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved
			network of parks to increase opportunities of development and increased infrastructure in rural areas. This will incorporate the development of tourism and will contribute to the provision of employment and revenue whileafeguard of natural vales and wildlife.	
Lake Malawi/Niassa/ Nyasa Conservation and Development Project	World Bank, ACP Fish II		The main objectives are: 1. improving the livelihood of people living around the Lake 2. to improve natural resource management	Malawi
River Basin Dialogue (RBD)	SADC	2066-2011	Develop multi-stakeholder participation strategies and implementation mechanism to facilitate consensus building between user groups Develop and apply improved decision-making and coordinating mechanism for the application of environmental and social standards in water infrastructure development Improve professional capacity to adapt integrated water resources management regimes in SWCI under conditions of climate change adaptation and increasing water scarcity Policy Dialogue on Transboundary Water Governance in Africa to promote enabling environment for intersectoral cooperation and regional benefit sharing	All
Sofala Bank Artisanal Fishing Project (PPABAS)	Government of Mozambique; IFAD, Norway, Belgium Survival Fund (BSF)	2002 - 2011	• fishing development (research, fishing gear, processing), • development of social infrastructures (education, health, water, markets), • development of economic infrastructures (access routes), • strengthening of financial services, • community development (fisheries associations, co management) and institutional • support, policy formulation and legislation;	Mozambique
Southern Africa Regional Environmental Program	USAID, OKACOM, SADC, ACP Fish II	2010 – 2015	SAREP's regional objectives are to build capacity for water governance, support basin-level plans and priorities and integrate	All except Tanzania

Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved
(SAREP)			transboundary infrastructure and land use planning. The project's programmatic objectives are to protect biodiversity and ecosystem services, increase access to water supply and sanitation, address global climate change and integrate HIV/AIDS prevention and treatment.	
Special Programme for Aquaculture Development in Africa - SPADA	FAO, NEPAD	2007-Ongoing	SPADAs Objective is to improve economic and rural development by enhancing fish supply and distribution as well as benefiting nutrition through increased aquaculture production; this goal achieved by promoting sustainable aqua-businesses at national level including the necessary public and private support services. SPADAs Scope & Strategy will cover all African countries; taking place at national, sub-regional and regional levels. At national level the programme will work with public and private institutions, service providers, NGOs/CSOs and the private sector to establish sustainable and responsible aqua-businesses which will, in turn, increase employment, fish supply and investment opportunities.	All
Zambezi Commission (ZAMCOM)	A programme of the SADC through agreement with all countries	2004 - ongoing	The objective of the Commission: "is to promote the equitable and reasonable utilization of the water resources of the Zambezi Watercourse as well as the efficient management and sustainable development thereof." This is done through: • Collection and dissemination of data on water utilization, advise in policy, legislation, planning and management. • Promotion of sustainable development and efficient management. • Equitable and reasonable use of the water resources of the Zambezi river basin.	All
Zambezi Has Its People' (ZHIP)	SIDA, SADC, Kalahari Conservation Society (KCS)	5 year project	A co-coordinated and effective regional coalition of NGOs, Communities and other Zambezi stakeholders. ZHIP works to: • increase understanding of the state and use of natural resources in the basin • better links between Government and stakeholders • develop a regional model for a participatory process associated with the management of a shared river basin	All

Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved
Zambezi River Basin Initiative (ZRBI)	Red Cross and Red Crescent Societies	2009 - 2017	The project focuses on building communities capacities and resilience to cope with the challenges related to flooding and general poverty in the Districts along the Zambezi River. This projects looks at capacity building for the local Red Cross Branches to facilitate their work and support to communities. Consequently communities are also supported in a variety of activities to improve livelihoods in the sectors of Water supply and sanitation, Health and Agriculture.	All except Malawi
Zambezi River Authority	-	Longterm, on-going organisation	The ZRA is the primary organ for managing the water of the Zambezi river and harnessing hydro power through dam operations.	All, but primarily operates in Zambia and Zimbabwe
Zambia Pilot Program for Climate Resilience - Phase I	World Bank	2010 - ongoing	• Water, sanitation and flood protection (34%) • Agriculture, fishing, and forestry (33%) • Transportation (33%)	Zambia

4.2 Annex 2 – Stakeholder mapping by workshop in Kasane – August 2012



Stakeholder mapping key:

	Result	Colour
1	Co-management tools and approaches for sustainable exploitation of the fisheries resources in the ZB developed, disseminated and applied by the key stakeholders in selected sites	
2	Capacity and active participation of stakeholders in the management of fisheries resources of the ZB strengthened	
3	Regulatory and institutional frameworks for the shared ZB fisheries harmonised	
4	Climate change in the management of the fisheries resources in ZB mainstreamed	

6.15 Project concept note – Portuguese

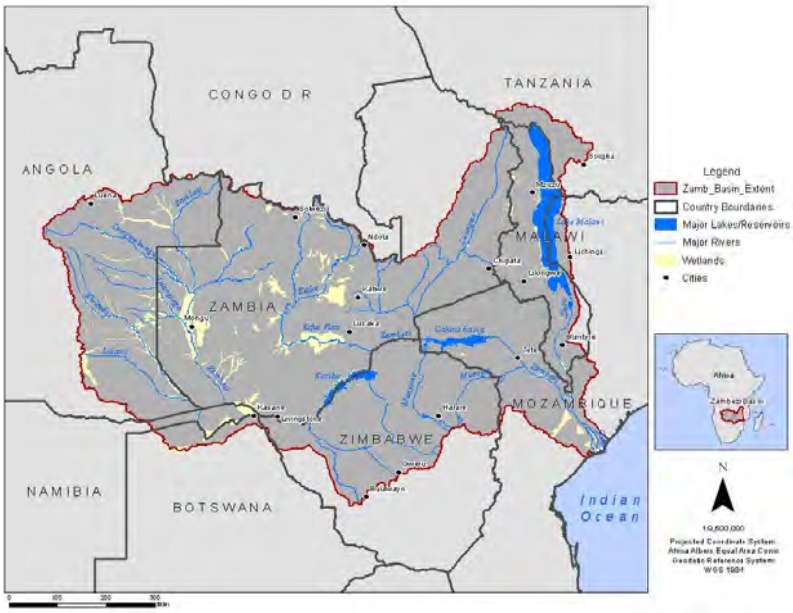
6.16 Briefing paper for workshop

Background information prepared and compiled as supporting material for the:

SADC workshop to elaborate a workplan for the start-up phase of the SADC regional technical programme to strengthen co-management and value chains of shared fisheries resources in the Zambezi basin - component one

Improving the information and knowledge base for adaptive co-management of shared fisheries resources in the Zambezi basin

— Sharing information and knowledge for resilient fisheries and fishers —



http://waterbalance.org/wp-content/uploads/2011/09/ZambeziMap1.jpg

August 2012

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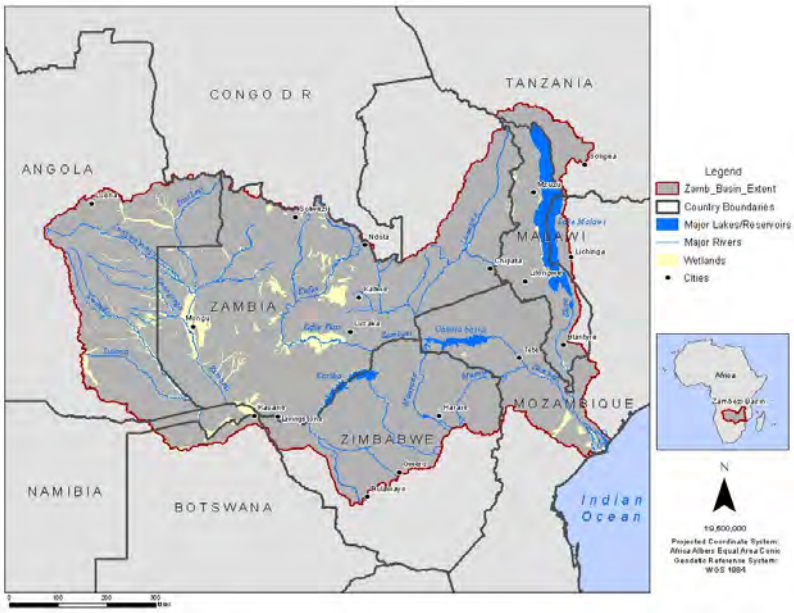
1 Background

The Zambezi River system is the largest in Southern Africa and one of the most important on the African continent. The Zambezi Basin covers eight countries: Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe with an area of 1.39 million km^2 and it provides multiple benefits ranging from water for domestic, irrigation, and hydropower uses, to fisheries and a wide diversity of wildlife products, the river plays a central role in the lives of 40 million people in the riparian states. Amongst the many wild natural resources that the basin provides the fisheries are especially important. They play a crucial role in providing high quality nutrition for the people of the basin while also sustaining a diversity of livelihood strategies ranging from those who catch the fish to those who process and trade the catch.

Aware of the challenges in maintaining and strengthening the benefits from fisheries resources the countries of the Basin have developed a SADC Regional Technical Programme (RTP), particularly to strengthen co-management and value chains of shared fisheries resources in the Zambezi basin. The RTP is designed for six years and is structured around four objectives. The Programme was approved at the Ministerial Meeting on Natural Resources and Environment held on 16 July 2010 in Victoria Falls, Zimbabwe. Funds for its implementation are not yet fully secured; SADC is still in the process of submitting the proposal to donors for funding.

The ACP Fish II project of the European Union (EU) is funding a project to develop a work plan for implementing objective one of the RTP - *to improve the information and knowledge base for adaptive co-management of shared fisheries resources in the Zambezi basin.* The work plan should include: identification of objectives, priorities, key actions and timings and identify a group of stakeholders to be involved in the RTP management. In order to support this a workshop is being arranged to take place in Kasane, Botswana from 27 to 30 August 2012 to engage with countries and other stakeholders to provide input and to assist in designing this work plan and to consider changes since the project was approved in 2010. This work is being supported by NFDS Africa (Sandy Davies and Ulrika Egner, with support from Sinead Sheridan and James Abbot). This briefing paper provides some initial information for workshop participants and to encourage discussions and updates in the workshop.

Figure 1: The Zambezi River Flood plain[1]



[1] http://waterbalance.org/wp-content/uploads/2011/09/ZambeziMap1.jpg

2 Introduction to the Zambezi basin

The Zambezi Basin comprises some of Southern Africa's most important fresh water and inland fishery resources. Total fish production of the Zambezi system is estimated at over 500,000 metric tons (mt) annually, many of which is unrecorded, and more than 500,000 people are directly dependent on fisheries for their livelihoods. The Zambezi River rises in the Kalene hills in north-western Zambia and flows northwards for about 30km, before turning to run about 280km through Angola and back into Zambia where it flows southwards through marshy plains. In the south-west of Zambia the river becomes the border between Zambia and the eastern Caprivi Strip of Namibia for about 130km. The Chobe tributary originates in Angola, crosses the Caprivi Strip, then forms the border between Namibia and Botswana and enters Botswana to flow southwards for about 75km until it meets the Selinda spillway along which spillage from the Okavango occurs in high flood years. It then turns east, again forming the border between Namibia and Botswana as it flows through a swampy area and flows into the Zambezi River at the border point between Namibia, Botswana, Zimbabwe and Zambia. The River then forms the border between Zambia and Zimbabwe and reaches its greatest width, over 1.3km, before its waters plunge over the Victoria Falls. It continues to form the border between Zambia and Zimbabwe until it enters Mozambique. At its mouth, the Zambezi River splits into a wide, flat and marshy delta. There are two major man-made lakes on the Zambezi River, Lake Kariba on the border between Zambia and Zimbabwe and Lake Cahora Bassa in Mozambique.

Country profiles are provided later in the document, with more detail on the situation in each country.

Table 1: Summary of catches and areas by country[2]

COUNTRY	Total inland fish landings (mt) (2009)[3]	Total area of the country (km²)	Area of the country within the basin (km²)	As % of total area of the basin (%)	As % of total area of the country (%)
Zambezi Basin	-	-	135,1365	-	-
Angola	5,848	1,246,700	235,423	17.4	18.9
Botswana	86	581,730	12,401	0.9	2.1
Malawi	69,325	118,480	108,360	8.0	91.5
Mozambique	9,546	801,590	162,004	12	20.2
Namibia	2,800	824,900	17,426	1.3	2.1
Tanzania	269,402	945,090	27,840	2.1	2.9
Zambia	84,716	752,610	574,875	42.5	76.4
Zimbabwe	10,500	390,760	213,036	15.8	54.5

[2] FAO The Zambezi River page- http://www.fao.org/docrep/W4347E/w4347e0o.htm

[3] Review of the state of the World Fishery Resources: Inland Fisheries. FAO Fisheries and Aquaculture Circular No. 942, Rev. 2. Rome, FAO, 2011

Figure 2: Total landings of inland fish by country (not only basin), FAO 2009 in mt

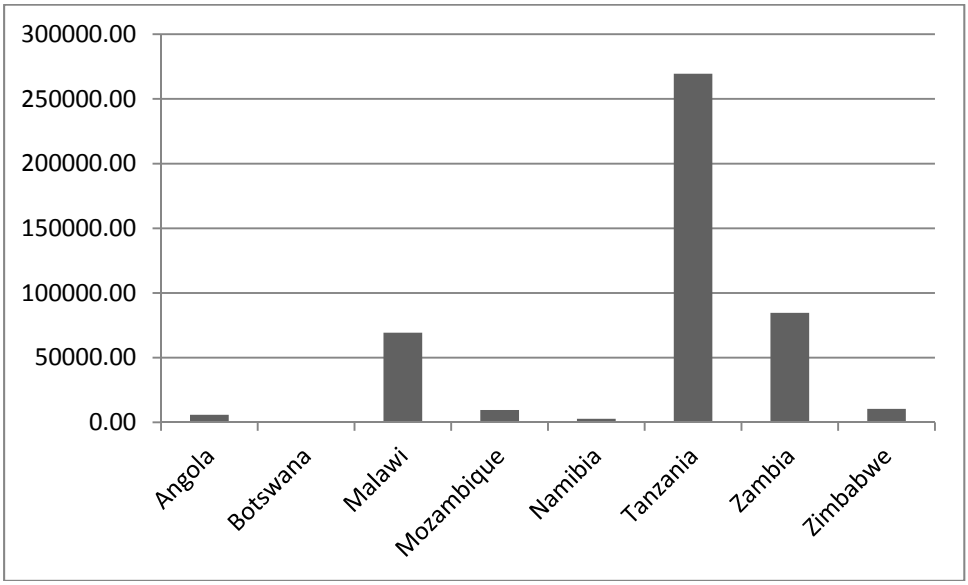
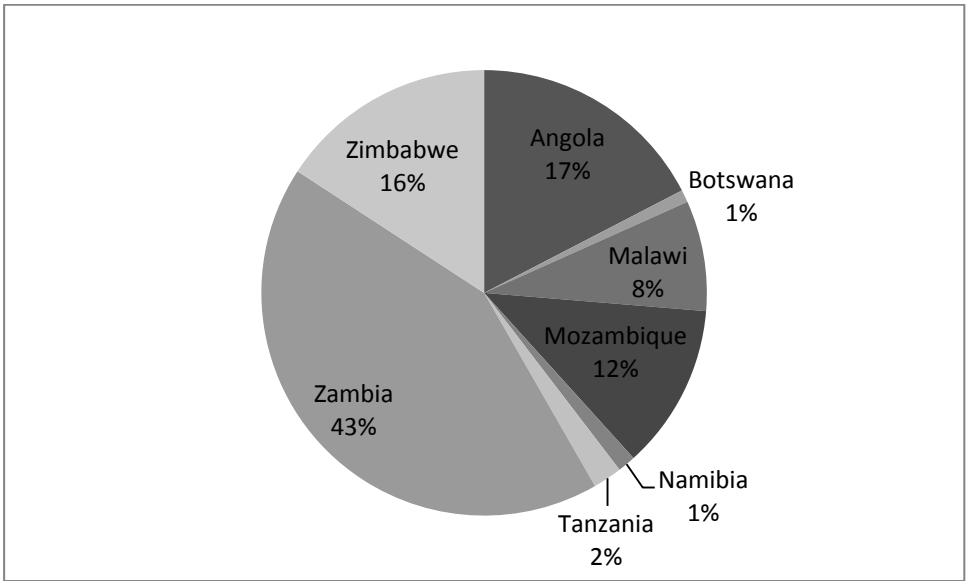


Figure 3: Percentage of total area of the basin within each country, FAO 2012



3 The SADC regional technical programme

As noted above in 2010 the SADC Ministers of Natural Resources and Environment approved a programme to strengthen co-management and value chains of shared fisheries resources in the Zambezi basin. The outline of this proposal in respect to component one is given below.

3.1 The rationale

The shared nature of the fisheries resources in the Basin supports the need for collaborative management that strengthens cooperation between countries and amongst relevant stakeholder groups. Co-management approaches empowering fishing communities to participate more formally in the management of fisheries resources have been applied in several countries with varying success. In order to strengthen its impact, a more strategic and effective engagement with relevant stakeholder groups throughout the basin and with national policy and management processes is required. These include, for example, stakeholders in fish trade and marketing and in the wider value chain, private sector investors in fisheries and aquaculture, stakeholders in the water, energy and irrigation sectors, as well as national climate change adaptation and basin-wide investment planning processes.

The future of fisheries in the Zambezi Basin will to a large extent depend on how well the sector's requirements and potentials are defined in relation to these stakeholder groups and processes within and outside the fisheries sector. The trade of fish from the Zambezi system is a major source of regional food security and economic opportunity for small-scale entrepreneurs many of whom are women. Fish traders, processors, retailers and ultimately consumers are key stakeholders in the adaptive co-management of the shared fisheries resources in the Basin. They are increasing their investments in the post-harvest sector and are having a direct impact on the level and pattern of exploitation of fisheries resources. Trade and market forces have the capacity to either undermine or strengthen the resilience of these shared fisheries resources.

At the same time, the trade and market mechanisms are themselves vulnerable to multiple drivers of change, (e.g., volatile food and fuel prices, rising demand from urbanized populations, competition for ecosystem services) and require particular interventions to make them more resilient to these trends. In spite of the important role these small-scale entrepreneurs play, they are currently largely excluded from fisheries management institutions and processes, and their needs for support and the scope for economic growth within this sector remain largely unrecognized.

Issues highlighted in the proposal that need addressing include; post-harvest losses that continue to exceed 20%; food quality and safety concerns; fishing communities and small-scale traders seem not to benefit from rising fish prices in regional markets; and public revenue from regional fish trade remains marginal. In order to secure a sustainable future for this trade, small and medium scale enterprises require business development support to stay competitive and to be able to adapt to changing economic, technological, environmental and policy conditions. Likewise, the capacity of their associations and organizations needs to be strengthened to facilitate more effective access to business and social services and technologies as well as enable participation in fisheries management and relevant policy processes.

3.2 An overview of the programme

The RTP, with an estimated overall budget of US$ 28 million, is designed for 6 years and is structured around four specific objectives:

1. To improve the knowledge and information base for adaptive co-management of shared fisheries resources in the Zambezi basin

2. To identify and implement effective tools and approaches for addressing key management challenges for these resources
3. To enhance the market and value chains of the Zambezi fisheries through business-based innovations
4. To strengthen human, institutional and technical capacity among key stakeholder groups for adaptive co-management of shared fisheries resources and their market and value chains

The Programme is proposed to start with an assessment and knowledge building phase to identify stakeholders and assess the fishery system and key drivers of change. Stakeholders will formulate and prioritize key management challenges arising from these assessments the Programme can address (Objective 1). In each Programme site, stakeholders will then develop and implement detailed action plans for priority intervention over a five year period to improve resource management and enhance market chains (Objectives 2 and 3). These three objectives are supported by targeted human, institutional, and technical capacity development throughout the duration of the Programme (Objective 4).

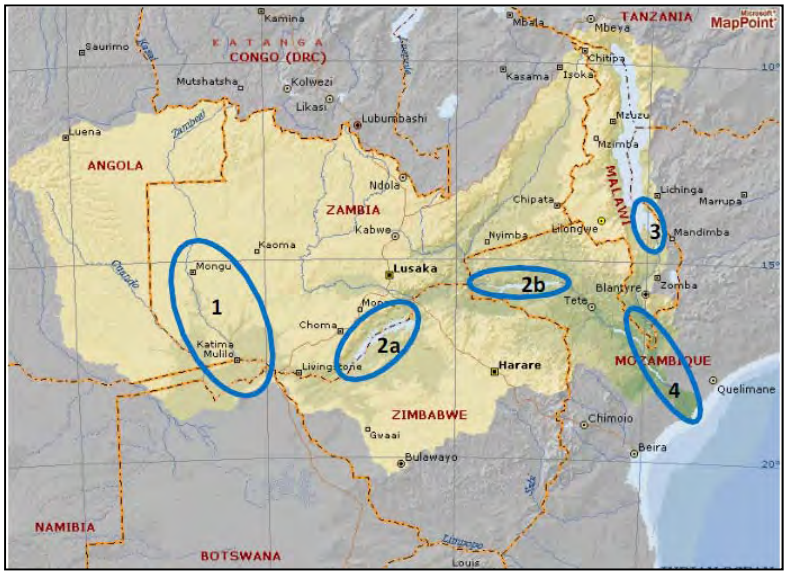
3.2.1 Pilot sites

It is intended that the programme will be implemented through regional and site-specific or pilot components that will reflect shared development challenges. Pilot sites will provide empirical testing and assessment for implementing new management and market tools and approaches. This information will be up-scaled and out-scaled to share lesson learning and experience through a combination of basin-wide assessments, synthesis and dissemination, supported by capacity building to ensure participation and uptake.

The proposed locations for site-specific activities are geographically represented in Figure 4 and are:

- 1 Upper Zambezi – (4) seasonal floodplain and river fishery
- 2a Lake Kariba – (2) and 2b Cahora Bassa – (1) reservoir fisheries
- 3 South East Arm Lake Malawi/Niassa and Lake Malombe – (2) lake fishery
- 4 Lower Zambezi/Shire and Delta – (2) river fisheries, seasonal/ regulated, floodplains and delta

Figure 4: Zambezi Basin with proposed project sites



4 Objective one of the SADC RTP - information and knowledge

Objective one is planned for two years and aims to improve the information and knowledge base for adaptive co-management of shared fisheries resources. The current information and knowledge base is estimated as weak for key bio-physical and socio-economic fisheries indicators, impacts of external and internal drivers of change and opportunities for institutional development both at the basin-wide and for specific fisheries. Ideally up-to-date understanding of status, trends and drivers at local and regional levels and an in-depth knowledge of institutional and policy options would be available.

Suggestions for the Programme are that it will consolidate and strengthen this knowledge and information base through an assessment phase of about twelve months, to combine proven methods of participatory fisheries resource assessments with local knowledge and datasets from related programmes in the water, environment and demographic sectors.

4.1 Proposed activities

The main proposed activities under Objective 1 are:

4.1.1 Activity 1.1 – Identification

The proposal for activity one has so far been elaborated to include identifying and appraising key stakeholders and their current mandates, strengths and weaknesses; and defining the fishery system at basin level and subsystems at management level with a focus on Programme sites;

Activities will be carried out at basin-level and in each Programme site and will involve relevant stakeholder groups, including management authorities, non-governmental organizations, private entities, and community groups from each of the riparian states. Trans-boundary and regional coordinating bodies will also be engaged where possible. These stakeholders will participate in generating, analyzing, storing and disseminating knowledge and information.

In particular, information points will be identified. These will consist of organizations and networks with the capacity for managing fisheries data and knowledge, who will have these capacities strengthened so that they function as focal points for fisheries research and information throughout and beyond the duration of this programme.

Further, identifying key leaders, stakeholders and change agents is a necessary step in resilience approaches to fisheries management. These can be individuals (traditional leaders), groups (civil society groups) or organizations (private or local government authorities). The roles of the different stakeholders, inter alia traditional leaders, will be critically reviewed. Their roles are to be identified, critically reviewed and supported throughout this phase.

This step identifies the focal system and outlines systems one scale above and below the focal fishery. Identifying multiple scales is widely advocated from resilience perspectives. Defining the focal system is essential to target the appropriate level of management intervention. It is also important for recognizing cross-scale linkages. Methods and guidelines are available for doing this.

Consideration for workshop *- are these still the most relevant and suitable pilot sites? Who are the key players in each site and at basin level? Are the system boundaries clearly identified?*

4.1.2 Activity 1.2 – Assessment

The proposal for activity one has so far been elaborated to include assessing the current status of the fisheries in their main aspects (bio-physical as well as socio-economic) and appraising the most important current and future drivers of change and their likely impacts.

To understand what is necessary and what is possible in terms of management, an understanding of the current fishery context is needed. Despite the importance of the Zambezi's fisheries there is little good current information on the scale of the catch, its economic value, and the wider role that it plays in the rural and urban economies of the basin.

Further, new interventions will not occur in a vacuum - institutions already exist, historical processes have left their legacy, and power relations are already in play. These need to be understood before they can be adjusted and strengthened. As trans-boundary fisheries, both the national and cross-scale dynamics of these systems needs to be understood.

Different aspects of the trade dynamics of the Zambezi Basin fisheries also need to be understood. Network analysis, based on document analysis and strategic field research, will identify trade networks from the focal shared fisheries systems in this Programme.

Socio-economic analysis will determine the status, value and trends of these trade networks. Particular attention will be paid to the high-volume 'informal' cross-border and domestic trade and marketing within the focal countries in this Programme, which are currently poorly understood.

It is proposed to conduct an assessment of the current status, value, and development importance of focal shared fisheries and fish-value chain in the Zambezi Basin. Collaborative ecological, socio-economic and institutional analysis will be employed in each focal fishery.

The knowledge generated will be distilled in the form of information briefs to build awareness of the basin's fisheries and the shared nature of the resource, and will be used to inform management processes and decisions at relevant levels.

This step will also identify key drivers of change within the fisheries sector and those impinging on the sector and will assess their present and likely future impact on production, food security benefits, and environmental sustainability. Global, regional, trans-boundary and local drivers will need to be identified. Current drivers and their impacts can be identified relatively easily through focus groups, multi-stakeholder discussion, and review of available literature and data. In this respect it is important to consider drivers from both within and outside the fishery, considering the ecological, human and institutional dimensions of the focal systems a range of tools are available for this[4].

Scenario-development can then be employed to project future drivers of change and to present and communicate the implications of different development and investment pathways, this can occur in collaborative fora at different scales, building on global information from the Millennium Ecosystem Assessment, Fish Supply and Demand to 2020, and IPCC (2000) climate change scenarios. The scenarios will elaborate on projected changes within the basin that will impact on the future ability of the focal fisheries to support livelihoods, contribute to food security and continue to generate

[4] Decision-support tools E.g. Diagnosis Radar developed by the WorldFish Center or Problem Trees widely used in collaborative decision-making could be used. For the trade component identification of i) the key drivers of change affecting these primary market and value chains (e.g. growth in markets, competition from other sources and products, business development constraints, social vulnerabilities (gender, HIV/AIDS), ii) degree of access to critical inputs and services, and iii) important bottlenecks including post-harvest losses and food quality and safety. Social vulnerabilities, in particular, gender roles and the issue of HIV/AIDS, and their association with market and value chains is particularly important in fisheries and will be a critical concern.

economic growth opportunities. This will include scenario building based on assessments of key economic development trends, infrastructure development, hydropower development, population migration, and water resource demand. Involvement of representative stakeholders from these different sectors in each SADC member state bordering the focal fisheries will be ensured. It will also include a focus on climate change impacts. Climate change is projected to have wide-reaching impacts in the Zambezi Basin. The Programme will use regional climate change predictive models and existing Zambezi Basin hydrological models to inform collaborative scenario development.

Consideration for workshop *- Are these assessments still the most relevant? Is there any work / processes underway that they can link to? What are the main actions required to do this?*

4.1.3 Activity 1.3 – Prioritization

The proposal for activity one has so far been elaborated to include identifying and prioritizing the key management challenges that arise from these conditions.

Identifying drivers of change will potentially highlight a large number of issues and it will not be possible to manage all these aspects of the shared fisheries resources in the Zambezi. However, the critical drivers and priorities for management need to be identified. While different bordering nations and different stakeholder groups may emphasize particular issues, consensus on management priorities is necessary. Decision-support tools for ranking, for example analytical hierarchy processes (AHP), used alongside widespread dissemination and communication of the analyses and scenario development, above, can direct or guide these, more political, processes.

On this basis, the Programme will identify key investment opportunities and critical institutional linkages that are needed to address the threats faced by the Basin's fisheries, including the fish value chain. With the involvement of public, private and civil society stakeholders, at local, national and trans-national level, the WorldFish Center will facilitate the development of costed strategies for pilot implementation of adaptive co-management. These strategies will include explicit monitoring and evaluation phases (that undertake intermediate diagnosis) and targeted capacity building. Drivers of change, access issues and development bottlenecks on the resilience of the market and value chains will be discussed in the multi-stakeholder decision-making arenas identified and put in order of priority.

Note, diagnosis is used here as a research tool to design and initiate appropriate Programme interventions. However, it is also an invaluable tool for adaptive management and should be used throughout the fisheries management process within and beyond the scope of this Programme. In order to enable relevant institutions to utilize and apply information outputs under this Objective, the Programme will support member states to develop business plans for strengthening their information management capacity. This will comprise an assessment of current capacities and the need for up-dating these with a view of a regionally networked information system. It is envisaged that resources for implementing these plans will come from national budgets and additional regional programmes.

Consideration for workshop *- Who should be involved? Can this link into other networks and cooperation already in place in the basin?*

4.2 Proposed outputs

The proposal lists the following definitive outputs associated to the three activities of objective or component one:

1. Publication of guidelines for diagnosis methodologies
2. A basin-wide status report on the Zambezi fisheries published
3. A comprehensive diagnosis of shared fisheries systems in the Zambezi basin.
4. Information briefs that summarize the current ecological, socio-economic and institutional status of shared fisheries systems
5. Identification and support of information points
6. Prioritization and agreement on critical management and market challenges.
7. Viable scenarios for Programme sites and at basin-level developed and widely disseminated.
8. Capacity development of key stakeholder groups

Consideration for workshop

It may be valuable to discuss these outputs or deliverables in detail to gain agreement on what they mean, their scope, what is required to achieve them and how this is achieved and consider if the list is complete.

These outputs are not directly linked to the activities above and this is an area for the workshop to consider and to possibly use this list and add to it and relate in the new log frame that will be developed in the workshop.

Is any of this underway already? Can we build on this? Best practice for up scaling?

4.3 Proposed outcomes and impacts

The following outputs, outcomes and impacts are proposed in the Programme proposal:

Output areas	Outcomes	Impacts
Diagnosis of current status of fisheries widely disseminated	Improved information base and information system	Policies and investment planning better informed to support sustainable fisheries
Future scenarios generated and widely disseminated	Improved understanding of possible future scenarios	Policies and investment planning better informed to support sustainable fisheries
Capacity strengthened and networked in key stakeholder groups and institutions for assessments, monitoring and scenario building	Improved capacity in the region to deliver research and monitoring functions	Improved information generation and dissemination by regional stakeholders
Tools and methodologies adapted and widely disseminated	Enhanced set of research and monitoring tools available to trained stakeholders	Improved information generation and dissemination by regional stakeholders

Consideration for workshop
These outputs can be used in the new detailed logframe and they can be linked to activities and outputs above.

4.4 Proposed timescale

The proposal provides an overview of timing of proposed activities and for objective one this is given as:

Proposed activity	Year 1	Year 2
1.1 Identification of stakeholders and definition of fishery systems		
1.2 Assessment of status of the fisheries in their main aspects		
1.3 Assessment of drivers of change and their likely impacts		
1.4 Prioritization of key management and market challenges		

Consideration for workshop
This step has taken the initial three activities and subdivided the second into two (1.2 and 1.3 above), the workshop can consider if these four activities [possibly to be called outputs in a new logframe] are adequate for objective one of the RTP.

These activities [outputs] can be used in the new detailed logframe and they can be linked to activities and outputs above.

4.5 Proposed indicative budget

The overall budget is given at 28,615,716 USD.

For objective one an indicative budget of USD 763,500 is provided for site specific work while it is assumed that other funds from the general pot for workshops, personnel, operational costs etc. will also apply.

4.6 Proposed log frame

The proposal includes a logframe and the applicable section for objective one: To improve the knowledge and information base for adaptive co-management of shared fisheries resources is extracted below:

Activities	Indicators	Means of verification	Risks/assumptions
1.1 Identification of stakeholders and definition of fishery systems	• Stakeholders participate actively in Programme design at Programme site and regional levels • Fishery systems and sub-systems identified and multi-sector linkages defined	• Reports from stakeholder meetings • Authorship of technical reports reflect stakeholder ownership • Technical reports • Publications	• Government departments communities, private sector, and research institutions willing and able to participate • Cross-border cooperation supported by riparian states
1.2 Assessment of status of the fisheries in their main aspects	• Comprehensive reviews of main biophysical and socio-economic aspects of fisheries published • Basin-wide status report of Zambezi fisheries published • Assessment tools and methodologies disseminated and key stakeholders trained in their use	• Publications, including scientific papers, maps, policy briefs • Publication; website • Technical reports; website; reports from training events	• Data can be accessed in member states and relevant technical agencies • Relevant institutions at all levels make staff available for training
1.3 Assessment of drivers of change and their likely impacts	• Technical papers on drivers of change produced at programme site and basin levels • Likely future scenarios established on impacts from these drivers at Programme site and basin levels • Assessment tools and methodologies disseminated and key stakeholders trained in their use	• Publications • Publications; website • Technical reports; website; reports from training events	• Data can be accessed in member states and relevant technical agencies • Relevant institutions at all levels make staff available for training
1.4 Prioritization of key management and market challenges	• Priority list of management and market challenges produced for each Programme site and for the entire basin	• Technical reports	• Stakeholders engaged in dialogue and agree on priorities

Consideration for workshop

The workshop may now update and validate this logframe and then add the next level of activites with deliverables that is required to prepare the action plan.

It may be useful to consider some of the issues highlighted in this paper and also by workshop participants in day one to feed into this process.

5 Stakeholders, linkages and implementing partners

The proposal notes that linkages with SADC programmes in the Zambezi basin the water, energy, agriculture, and conservation sectors will be important and goes on to note that these linkages will be further elaborated together with the respective SADC divisions and basin organizations and will be operationalized before the start of this Programme.

In each Programme [pilot] site, national institutions will identify partnerships and linkages with recent or on-going projects. This can entail information exchange, application of lessons and technologies as well as sharing capacities and operational linkages as appropriate. These arrangements will be identified and specific roles agreed during start-up meetings for stakeholders which will take place in each Programme site.

The proposal also talks of the SADC Protocol on Fisheries and the SADC Statement of Commitment on IUU fishing and the need to ensure that these are being implemented through the RRP.

In relation to the SADC Protocol on Fisheries and its implementation plan, Article 7.7 notes that *'State Parties shall endeavour to ensure that all stakeholders participate, at the appropriate level, in decision-making processes that affect the management of shared resources*.' While in Article 12.6 on artisanal, subsistence fisheries and small-scale commercial fisheries it refers to the obligation of State Parties to *'facilitate broad based and equitable participatory processes to involve artisanal and subsistence fisheries in the control and management of their fishing related activities'*. In 2001, when the SADC Protocol on Fisheries was signed, discussions and practices of empowering participation in policy and operational processes and decision making had not been as widely developed as they have today, but still, the above guidance on these issues - in respect to both participation and shared stewardship will be followed.

Consideration for workshop
The workshop is a good opportunity to prepare update this list and to identify who is doing what across the basin and in each pilot site and the roles they may play in the future project. A table will be developed for national stakeholders, stakeholders by pilot site and also basin level players, projects, initiatives etc. It will be useful to consider these in respect to:

Programme / initiative	Main organisation implementing or involved	Status	Technical focus	Countries from the basin involved	Relevance to pilot sites	Main reason for linkage / engagement	Overall importance to the RTP

6 International processes

The purpose of this chapter is to update on new areas of development that may impact on the action plan, it will be supplemented by additional information in the workshop by participants and allow for consideration of linkages, synergies or new options for the future project.

6.1 Climate change adaptation and

The links between fisheries systems and climate change vulnerability and adaptation have been brought out in many fora including the recent Rio+20 forum. It will be important to consider how the proposed activities of the workplan will relate to the threat of climate change and the vulnerability of the fisheries systems (including the human dimensions) to expected impacts resulting from both gradual warming and associated physical changes as well as from frequency, intensity and location of extreme events. Understanding vulnerabilities to change is an aspect of 'climate-proofing' or increasing resilience of fishery systems that is highly inter-related to other drivers of change.

Towards this a brief overview of two main national framework climate change documents has been made for each country the National Adaptation Programmes of Action (NAPAs[5]) and the National Communications[6], these documents link the country frameworks to the international panel on climate change. The relative relevance of inland fisheries to each of these was scored as indicated below on a scale of none, low, medium and high. In the workshop a more complete extraction of the challenges provided within these documents will be provided.

In addition to climate change related documents we also considered the Poverty Reduction Strategy Papers, the UN Development Assistance Frameworks (UNDAFs) and the Comprehensive Africa Agriculture Development Programme (CAADP[7]) national compacts were also considered in the same manner.

Country	NAPA	National Communication	PRS	UNDAF	CAADP National Compacts
Angola					
Botswana					
Malawi					
Mozambique					
Namibia					
Tanzania					
Zambia					
Zimbabwe					

Key: Relative level of relevance of inland fisheries within the policy document

High Relevance	Medium Relevance	Low Relevance	No Relevance	Document not available

[5] http://unfccc.int/national_reports/napa/items/2719.php
[6] http://unfccc.int/national_reports/non-annex_i_natcom/items/2716.php
[7] http://www.nepad-caadp.net/

6.2 Draft international guidelines for securing small scale fisheries and EAF

The action plan and associated logframe will need to be coherent with the Conduct for Responsible Fisheries (CCRF) and the Ecosystem Approach to Fisheries[8] (EAF) as specified in various SADC policies. The EAF concept, although quite general and wide does promote a holistic approach to fisheries management and, for its effective implementation, it requires; taking into account the interactions between fisheries and ecosystems, as well as the effects of natural long-term variability and other, non-fishery uses; broader and improved stakeholder involvement; and in the face of uncertainty – precaution and adaptation.

The most appropriate integration of this is the FAO process of developing the *Guidelines on Securing Sustainable Small-scale Fisheries.* Following recommendations by the FAO Committee on Fisheries (COFI) the FAO have been supporting a process to develop guidelines for small scale fisheries, including national and regional consultations in Africa. In February 2012, FAO organized an *Expert Workshop on International Guidelines on Securing Sustainable Small-scale Fisheries*[9] in Rome. The FAO prepared a zero draft of the Guidelines based on the outcomes of the various consultation processes including the workshop. The purpose of the zero draft is to inform the additional consultative process and to feed into the formal negotiation process[10]. The Africa Group at COFI in July 2012, where the draft zero was discussed made the following statement:

Statement for Agenda item 10: Update on the development of International Guidelines for Securing Sustainable Small-scale Fisheries

Chair, we would like to stress the great significance of small scale fisheries in Africa, especially to the most vulnerable in our societies – in particular the women and children. Small scale fisheries are our largest fisheries sector contributing significantly to social and community well being including important food and nutritional requirements. We are aware of the need to work with our fishing communities to safeguard the fisheries systems and wider ecosystems that support them, as well as to promote greater safety for those working in the sector. We therefore welcome the progress in the voluntary guidelines for securing sustainable small-scale fisheries and the efforts of the FAO in this regard.

However, we would like to draw the attention of FAO to the need to ensure that items of the guidelines are relevant for practical translation into national policy, strategic and legislative frameworks. Additionally, we encourage the FAO to work closely with countries and local fisheries organizations to shorten the consultation process and also to enhance the relevance and effectiveness of the guidelines. We therefore encourage and support the continuation of this process and greatly welcome the on-going participation of the Civil Society Organisations in this process. It is paramount that the voice of all those involved in the fisheries sector is heard and thus accommodated and coordinated within the process of developing the guidelines.

From the draft zero guidelines themselves the following are of particular relevance to this workshop:

Section 12 - RESEARCH, INFORMATION AND CAPACITY DEVELOPMENT

This section looks into the interrelated aspects of access to information and capacity development. It discusses the general lack of information and research on small-scale fisheries and the need for capacity development at all levels and scales.

[8] The **purpose** of EAF is: to plan, develop and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystem. The **definition** of EAF is as follows: An ecosystem approach to fisheries strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries.

[9] http://www.fao.org/docrep/015/i2719e/i2719e00.pdf

[10] Regarding the latter, the FAO Secretariat has tentatively scheduled an intergovernmental technical consultation for the period 20-24 May 2013

12.1. These SSF Guidelines recognise the need for a wide range of information for decision-making, including bio-ecological, social, cultural and economic data, in order to apply EAF and integrated development approaches. They promote the use of a combination of scientific data and local, traditional or indigenous knowledge, and research for enhancing the understanding of small-scale fisheries governance and development needs and opportunities. The SSF Guidelines acknowledge that access to information is essential for human dignity, equity and justice. Lack of access to knowledge tends to disproportionally affect the poor, women and other vulnerable and marginalised groups. Information often equals power and the withholding of information can skew decision-making. In order to utilise information, capacity is needed. Capacity development is a key building block for creating knowledge, empowerment and enablement for effective participation in decision-making.

12.2. States should ensure that transparency and availability of and access to information are priority considerations. This is important for ensuring accountability and for enabling meaningful participation of all stakeholders.

12.3. All parties should recognise small-scale fishing communities as holders, providers and receivers of knowledge; there are information needs about, from and to them. It is particularly important to understand the need for access to appropriate information by small-scale fishing communities and their organisations in order to facilitate their coping with existing problems and empowering them to improve their livelihoods. These information needs depend on current issues facing communities and span across biological, legal, economic, social and cultural aspects of fisheries and livelihoods.

12.4. All parties should support the collection, compilation and analysis of disaggregated data allowing for an improved understanding of the importance of small-scale fisheries and its different components, including gender roles. The value of local and traditional ecological knowledge systems and resource governance mechanisms should be appreciated. Information systems that are low on data requirements should be developed for data poor situations.

12.5. All parties should promote the availability, flow and exchange of information through the establishment or use of appropriate existing platforms and networks at community, national, sub-regional and regional levels, including both horizontal and vertical two-way information flows (among communities or countries; between communities and national and regional structures). Appropriate approaches, tools and media should be used conveying messages and for capacity building for small-scale fishing communities (e.g., radio, audio tools, ICT).

12.6. States should ensure that funds are available for small-scale fisheries research and academic and research institutions should be encouraged to carry out relevant data collection, analyses and research. This should include – but not be limited to - aspects related to climate change, e.g. vulnerability analysis, improving the understanding of attitudes to risk, and analysing the gender-specific impacts of globalization on local fishing communities, e.g. assessments of trade-offs between new opportunities for some groups of men and/or women and threats to the livelihoods of others. Guidance to academic research should be provided to include small-scale fisheries concerns and better use of existing research should be encouraged.

12.7. States should encourage research and academic institutions, the private sector and NGOs to engage in and support the development of appropriate technologies and practices for responsible fisheries, and of effective technologies and participatory practices for enforcing existing management regulations.

12.8. All parties should recognise the importance of capacity development, including human capacity and organizational development, in small-scale fishing communities. Human development-building initiatives should be demand based, use bottom-up approaches and be participatory in their needs-

assessment, design, implementation and monitoring. They should build on existing knowledge and skills and be a two-way process of knowledge transfer, providing for flexible and suitable learning pathways to meet the needs of individuals, including both men and women and vulnerable and marginalised groups. The enhancement of people's self-determination capacity and their right of choice should be given particular attention.

12.9. All parties should recognise that organisational and institutional development need to be adequately tailored to the needs of small-scale fishing communities and involve different groups, including both men and women, and cover different spheres of concerns and interests. More emphasis on social, economic and livelihoods analysis skills may be required in organizations and they should take the overall societal/political context in which they operate into consideration.

12.10. Accordingly, States should provide support to capacity development and to fisher and fish worker organisations to ensure their representation in professional and sector institutions and decision-making processes. Men and women in professional organisations should be empowered to engage in political debates and support to leadership skills should be provided, especially for women. Organizational development and support to community networks and organizations that encourage good governance and sustainable development in small-scale fisheries should also be promoted. Moreover, capacity development should include building the resilience and adaptive capacity of small-scale fishing communities in relation to DRM and CCA.

12.11. States should also ensure that government authorities and agencies at all levels have adequate knowledge and skills to support small-scale fisheries governance and development. Particular attention should be given to decentralized and local government structures directly involved in governance and development processes together with small-scale fishing communities but also in, for example, the area of research. Moreover, adequate extension and advisory services for supporting small-scale fisheries governance and development should be provided.

12.12. Small-scale fisheries actors should engage in information sharing processes and capacity development, recognizing their role in governance and development and the needs for information and capacities that it entails. They should share their local and traditional knowledge and encourage policy and decision-makers to learn more about their professions and livelihoods.

6.3 The Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the context of National Food Security

A further important development has been made in the successful conclusion of the negotiations of the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the context of National Food Security (VG-Tenure)[11] by the open-ended working group of the Committee on World Food Security (CFS) in March 2012 and their formal approval by a special session of CFS in May 2012. The VG-Tenure represents an important international consensus as the livelihoods of many, particularly the rural poor, are based on secure and equitable access to and control over these resources including fisheries resources. They are the source of food and shelter; the basis for social, cultural and religious practices; and a central factor in economic growth.

Of relevance to this workshop is:

Part 5: Administration of tenure - Records of tenure rights

1. *States should provide systems (such as registration, cadastre and licensing systems) to record individual and collective tenure rights in order to improve security of tenure rights, including those held by the State and public sector, private sector, and indigenous peoples and other*

[11] http://www.fao.org/nr/tenure/voluntary-guidelines/en/

communities with customary tenure systems; and for the functioning of local societies and of markets. Such systems should record, maintain and publicize tenure rights and duties, including who holds those rights and duties, and the parcels or holdings of land, fisheries or forests to which the rights and duties relate.

2. *States should provide recording systems appropriate for their particular circumstances, including the available human and financial resources. Socio-culturally appropriate ways of recording rights of indigenous peoples and other communities with customary tenure systems should be developed and used. In order to enhance transparency and compatibility with other sources of information for spatial planning and other purposes, each State should strive to develop an integrated framework that includes existing recording systems and other spatial information systems. In each jurisdiction, records of tenure rights of the State and public sector, private sector, and indigenous peoples and other communities with customary tenure systems should be kept within the integrated recording system. Whenever it is not possible to record tenure rights of indigenous peoples and other communities with customary tenure systems, or occupations in informal settlements, particular care should be taken to prevent the registration of competing rights in those areas.*
3. *States should strive to ensure that everyone is able to record their tenure rights and obtain information without discrimination on any basis. Where appropriate, implementing agencies, such as land registries, should establish service centres or mobile offices, having regard to accessibility by women, the poor and vulnerable groups. States should consider using locally-based professionals, such as lawyers, notaries, surveyors and social scientists to deliver information on tenure rights to the public.*
4. *Implementing agencies should adopt simplified procedures and locally suitable technology to reduce the costs and time required for delivering services. The spatial accuracy for parcels and other spatial units should be sufficient for their identification to meet local needs, with increased spatial accuracy being provided if required over time. To facilitate the use of records of tenure rights, implementing agencies should link information on the rights, the holders of those rights, and the spatial units related to those rights. Records should be indexed by spatial units as well as by holders to allow competing or overlapping rights to be identified. As part of broader public information sharing, records of tenure rights should be available to State agencies and local governments to improve their services. Information should be shared in accordance with national standards, and include disaggregated data on tenure rights.*
5. *States should ensure that information on tenure rights is easily available to all, subject to privacy restrictions. Such restrictions should not unnecessarily prevent public scrutiny to identify corrupt and illegal transactions. States and non-state actors should further endeavour to prevent corruption in the recording of tenure rights by widely publicizing processes, requirements, fees and any exemptions, and deadlines for responses to service requests.*

7 Some considerations for improved information and knowledge

Below some considerations and issues are presented to both provide some background for participants and also to possibly lead into some discussions to clarify the project and workplan.

7.1 What is meant by information and knowledge

The terms data, information, and knowledge are often used loosely and as though they are interchangeable and it may be useful to clarify these for the purpose of the project. Taking the definition from FAO (2009)[12] these can broadly be described as:

Data is single facts or numbers.

Information is more meaningful concepts that contain facts in a given context.

Knowledge is concepts that comprise reasoning and can be research-based or traditional (and allows new information to be generated).

The cycle of information includes:

- production;
- dissemination;
- discovery;
- sharing;
- use; and
- flow of information between stakeholder groups.

Information is transformed to knowledge when combined with experience, context, interpretation, and reflection. The relationship between information and knowledge has been summarized:

	Information	**Knowledge**
Multiplicity	Piecemeal Fragmented Particular	Structured Coherent Universal
Spatial	Flows across spaces	Specifically located
Expansive	Temporal Timely Transitory Sometimes ephemeral	Enduring Expansive

Unlike information, knowledge cannot be encapsulated in the form of messages. It is what individuals and communities make of the information they receive and how they themselves process it. Individuals or communities do not acquire knowledge as something ready-made and packaged; they build it within their culture and through the cultural exchanges and interactions in which they participate.

Of interest to this is that communication is also not about messages but about the processes of dialogue. Often confused with information dissemination, communication is a two way process while dissemination is one way. It requires sender and receiver to make an effort to ensure that the content is understood by both parties. Communication provides a way of participating in the decision making process.

[12] FAO Information and knowledge sharing. FAO fisheries and technical guidelines for responsible fisheries - No 12, Rome FAO 2009 97p

7.2 Challenges in relation to information and knowledge

7.2.1 Limited data in a changing environment

Useful management decisions are impossible without accurate, consistent and contemporary data. Collecting fisheries data is an expensive, time consuming exercise. The environmental and human characteristics of the fisheries of the Zambezi Basin make data collection all the more challenging. Indeed, the effect of limited data for the Zambezi has been a recurrent theme in workshops, conferences and policy documents for at least a decade (Box 1).

Box 1: Selected excerpts highlighting data issues in the management of the Zambezi Basin.

- "…there is urgent need for collaboration and liaison in order to improve fisheries management and abate environmental degradation…" (SADC, 2002)
- "… the available data are often sparse, incomplete or span a very short period of time." (Turton et al., 2003)
- "Data collection networks are declining, rather than increasing, in almost all basin states." (Euroconsult Mott MacDonald, 2007)
- "Poor information sharing and exchange. Though this has been improving lately, it has been hampered by lack of protocols for data sharing (what data can be shared, cost of data, levels of access); lack of common standards for data processing and storage." (Euroconsult Mott MacDonald, 2007; p. 88)
- "Sustainable water resource management is also impeded by poor data collection, management, and dissemination systems, inadequate training, and weak stakeholder participation." (Kirchoff and Bulkely, 2008)
- "Many areas in the southern Africa region are still not well surveyed such that the available information on freshwater species is insufficient for environmental and development planning." (Darwall et al., 2009; p. 117)
- "Catch and effort data are patchy and in many cases unreliable even for the larger fisheries." (Tweddle, 2010; p. 231)
- "Data collection networks are declining, rather than increasing, in almost all Riparian States." (sic) (ZAMCOM, 2011; p. 5)
- "Information sharing and exchange has been improving lately, but it is being hampered by, amongst others, lack of protocols for data sharing (i.e. what data can be shared, cost of data, levels of access); and lack of common standards for data processing and storage." (sic) (ZAMCOM, 2011)

The need for good fisheries data is also apparent in the light of future changes in the Zambezi Basin (Table 2). The effect of some changes are relatively easy to quantify, such as hydroelectric and irrigation projects (e.g., World Bank, 2010). Other effects are more difficult to predict, such as climate (Gaughan and Waylen, 2012; Beck and Bernauer, 2011) and aquaculture (e.g.,Choongo et al., 2009).

Table 2: Data demands of basin-level environmental and social factors in the Zambezi River Basin.

Ability to Quantify	Factor	Potential Effects
Less Difficult	Hydroelectric Dams	• Disruption of flood cycle • Change from fast to slow flowing river habitat
	Irrigation/Water Abstraction/Industry	• Lower water levels • Agricultural
More difficult	Aquaculture	• Invasive species • Disease
	Climate Change	• Disruption of flood cycle • Habitat change

7.2.2 From identifying objectives to applying actions

The need to address data gaps for the Zambezi River Basin has been emphasized in several venues. Suggestions made in two recent reports do provide convincing, tangible ways forward to not only improve data quantity, quality and availability, but also how to use it to inform management decisions (Table 3). Yet it is unclear to what degree any of these suggestions have been acted upon. There are several examples of one-off research surveys or management initiatives (Box 2), however, these underline, rather than address, the data gap issues mentioned earlier.

Why have efforts to improve the production and availability of fisheries data had limited success to date? There are several enabling instruments at the international and regional levels that not only encourage coordinated data collection, analysis and sharing, but also provide guidelines to do so. Several funding sources support efforts to improve understanding of the Zambezi River Basin. However, as pointed out in a recent report concerning integrated water resource management "*Recent years have seen the development of sophisticated water policies and plans in many parts of the world…these achievements also need to be balanced, however, by a recognition that policy changes at the national level have often only been imperfectly followed through to effective implementation."* (UNESCO, 2006; p.57).

Therefore, it may be worth exploring if the enabling institutional environment and the funding initiatives are actually contributing to a coordinated, long term and sustainable effort to address data gaps or not.

At the same time, it is important to note that policy implementation should rarely occur quickly for its own sake. The Okavango River Commission (OKACOM) has documented the gradual emergence over ten years of a comprehensive policy around data collection, storage and sharing (OKACOM, 2012). Despite OKACOM's advanced level of policy and activity development, challenges still remain:

"*While research exposes pockets of usually very narrowly defined data, government shoulders the burden of ongoing collection of environmental and social data year after year – data that OKACOM needs for big picture planning. Under-resourcing and lack of good communications tools often isolate and discourage the collectors of this data, and often breed mistrust and reluctance to share it…Existing work towards an Okavango Basin information System (OBIS) can also be used to encourage governments at all levels to make their data available: the technology is there, but the challenge is to develop information preservation and access policies that satisfy potential participants and build trust*." (OKACOM, 2012; p.19, emphasis added)

Table 3: Recommendations and objectives, grouped by theme, coming from two consultations relating to management of aquatic resources of the Zambezi River Basin

	Proceedings of the International Workshop on the Fisheries of the Zambezi Basin, 2007	**Euroconsult Mott MacDonald Integrated Water Resources Management Strategy & Implementation Plan for the Zambezi River Basin 2008**
Data Collection and Management	• A knowledge management system for the Zambezi basin is required including: baseline information & managing data collection, quality control, harmonization, storage & dissemination.	• Formulate & implement a data & information sharing protocol for further operationalization of the Zambezi Water Information System (ZAMWIS) • Harmonize data measurement & storage methods in basin
Research	• Information required for development of an integrated basin management plan including study of the effect of natural environmental variability on fishing stock versus fishing patterns & other human impacts (including upstream/downstream impacts of dams, pollution) on fisheries is needed	• Prepare a comprehensive & spatially explicit map of ecosystems services & delineate high priority conservation areas such as headwaters, recharge zones & flood plains & implement l& use plans for these areas • Start international cooperation on linking areas with high significance for biodiversity – coming to Protected Area Networks • Prepare & implement strategic environmental plans & procedures including the development of area networks

Box 2: Examples of recent initiatives related to management of Zambezi River Basin's aquatic resources

- **Zambezi Water Information System** (ZAMWIS), set up in 2007. Described in ZAMCOM (2011) as "a strategic central interface for all data and information relating to the Zambezi River Basin" (p.5). As of July 2012, ZAMWIS appears to be hosted by a Russian internet server, and the page addresses give error messages.
- **Baseline fish surveys funded by the African Wildlife Foundation** (AWF) at five representative sites along Upper Zambezi River. Project included the development of a shared GIS database to archive the survey data and analyses (AWF, 2005). However, no online evidence of the database could be found.
- **Zambezi River Basin included as part of IUCN analysis of status and distribution** of freshwater species in southern Africa and recommended conservation measures (Darwall et al., 2009)
- **Joint Zambezi Environmental Flows Program**, a WWF project to adapt flow patterns from reservoirs to promote healthy ecosystems. Installation of water level and flow monitors in Zambian, Zimbabwean and Mozambican stretches of Zambezi River as part of the WWF E-Flows project (WWF, 2011)
- **World Bank evaluation of environmental and economic effects** of different river modification scenarios according to the degree of modification and the degree of coordination amongst users.
- **African Water Resource Database** (circa 2007): A free, G.I.S.-linked database of natural and human features of the continent. Databases include cross-reference to FISHBASE as well as the South African Institute for Aquatic Biodiversity. Can be modified for specific fisheries management applications and data entry (FAO, 2007).

UNESCO's 2006 report titled *Water, A Shared Responsibility* discusses other factors that may hinder the implementation of integrated water resource management policy, namely:

- lack of capabilities in or resources available to government departments
- resistance by sceptical officials
- pressure by interest groups

The point is not to speculate which, if any, of the above factors play a role in limiting the implementation of policies that encourage data collection and sharing. Rather, it is a starting point to consider how to define achievable goals within a definitive timeline. As stated by Halls et al. (2005a) "Key stages in designing an effective and efficient data collection and sharing system are therefore identifying and maximizing the overlap between shared interests, and reaching agreement on who should collect and share data to generate this information based upon their capacity and motivation." This requires stakeholders to be honest about: (a) their confidence in the feasibility and utility of an activity; (b) their capacity to participate towards its success and (c) what they are willing to provide, in terms of succinct time commitments and outputs.

7.2.3 Common information needs of small-scale fishing communities

Fishing communities in the basin are often located in remote areas with little access to basic infrastructure and means of communication and therefore lack access to appropriate information. This severely constrains their ability to influence decision-making processes, to advocate for their rights, to improve their incomes and livelihoods, and ultimately constrains their ability to contribute to improved management of fisheries resources. The availability of appropriate information to small-scale fisheries communities is critical. The types of information that they often request include (FAO 2009 - adjusted):

- Contribution of small-scale fisheries and aquaculture to the economy and within that the contribution made by women;
- Demographic and socio-economic data on fishing and fish farming communities;
- Provincial, national and international legislation relevant to fisheries and fishworkers, particularly provisions supportive of small-scale fisheries;
- Pros and cons of fisheries management options, such as input and output control measures, and experiences of their implementation in various countries;
- Environmental impact of trawling, pushnets and other fishing gear;
- Trade, ecolabelling, markets and barriers to market access, multilateral and bilateral trade agreements, the role of companies in fish processing and export, impact of economic globalization on fisheries;
- Appropriate fish processing and packaging technologies for small-scale fish processors and traders;
- Safety, disaster preparedness, working conditions and labour rights;
- Impact of industrial and other pollution, coastal management policies, and the link between fisheries and area management;
- Environmental and social impact of intensive aquaculture and the legal framework regulating aquaculture.

7.3 What is meant by co-management

Co-management involves sharing some degree of authority and responsibility between government and stakeholders. The apparent benefits that can come with including stakeholders in fisheries management include greater effectiveness, reduced conflict and empowerment of communities[13]. However, as with other terms such as *participation*, *community* and *sustainability,* co-management is rarely an objective definition. Policies and projects that incorporate the principles of co-

[13] Béné, C., E. Belal, M. A. Baba, S. Ovie, A. Raji, I. Malasha, F. Njaya, M. Andi, and A. Russel. (2009). Power struggle, dispute and alliance over local resources: Analysing 'democratic' decentralisation of natural resources through the lenses of Africa inland fisheries. World Development. 37(12):1935–1950.

management can vary broadly to the degree that stakeholders are actually involved. Halls et al. (2005)[14] therefore distinguish between three types of co-management:

- ***consultative***, where decisions are made by the government in conjunction with non-binding community consultation;

- ***cooperative***, where government and fishers are equal partners in decisions and implementation; and

- ***delegated*****,** where authority is devolved entirely to the user level, with government being informed of decisions.

Many authors have suggested that participation by those who have the most to gain or lose in fisheries management is small in proportion to other groups active in policy planning and implementation, such as governments and funders. There are several reasons why 'true' co-management rarely, if ever, occurs. One reason is sheer practicality: As Béné et al. (2009) point out: "*involvement of every single fisherfolk (fishers, traders, fish processors, etc.) in the decision-making process (i.e., direct democracy) is not possible as it would increase ad infinitum the transaction costs of the political process*" (p. 1944).

Eagerness to apply co-management principles and see them in place may, paradoxically, also hamper participation. As argued by Chuenpagdee and Jentoft (2007): "*Although not necessarily advantageous, the top-down process is sometimes a lot faster than the bottom-up. Enthusiastic sponsors of co-management may therefore be tempted to initially skip the slow and cumbersome democratic process of stakeholder participation*." (p.664). Similarly, institutional reform often lags behind the development paradigms that they promote. In many situations, both government and non-governmental organizations are understandably hesitant to yield authority or fiscal control to another group. Béné et al. (2009) suggest that this has led to most initiatives being "instrumentally participatory programs", where prior to any community participation, the goals and objectives are predefined by the government or donors, instead of first arising from the concerns of communities who have the most to gain or lose in fisheries management.

7.3.1 Avoiding the trap of 'the perfect being the enemy of the good'

Examples of co-management, despite the best intents, not achieving its principles in practice, are common. However this does not mean that it should not be strived for, because the potential benefits are many, and the choice is not between co-management or no co-management. Rather, it is important that the routine exercise of listing goals and objectives be taken seriously and revisited often throughout the planning stages of any co-management initiative. This means stepping beyond a blueprint idea of what co-management is. This concept often referred to as reflexive or adaptive co-management, is often discussed in the context of a management policy that is already in place. However, it is also important to constantly reflect on goals and objectives in the planning process (e.g., are they valid? are they feasible?). Moreover, instead of thinking about what should be done, participants in the planning process could first think about what represents success in fisheries management and how they would know it had been achieved, and to what degree. The next section examines the best practices for planning co-management and creating indicators of success.

[14] Halls, A.S., Arthur, R., Bartley, D., Felsing, M., Grainger, R., Hartmann, W., Lamberts,D., Purvis, J; Sultana, P., Thompson, P., Walmsley, S. 2005.Guidelines for Designing Data Collection and Sharing Systems for Co-Managed Fisheries. Part I: A Practical Guide. FAO Fisheries Technical Paper.No. 494/1. Rome, FAO.

7.4 Some issues and challenges for the Zambezi fisheries sector

Some of the key issues and challenges in the Zambezi importance to consider when designing a workplan in respect to the policy and management challenges for fishery development in the Zambezi basin have been noted in previous work (e.g. Zambezi workshop 2004) include:

- the need to elaborate and implement adequate national and regional policy frameworks that are coherent across sectors and countries;
- developing adequately robust legal frameworks to support the policy objectives at national levels;
- developing and implementing practical and inclusive strategic and operational plans;
- coordinating and including the complex group of resources users into the consultations and plan;
- finding solutions that sustain production within the context of increases in population and demand and high poverty levels;
- challenges of shared or co-management;
- the complexities of a multi species fishery;
- the need to balance between national and regional priorities and differences in national levels of competence and readiness for cooperating on fisheries sector issues;
- limited access to knowledge about suitable method or gear or access to the actual gear;
- limited knowledge of the resource base or the habit;
- consideration of the need to lengthen the value chain in fisheries, through more post-harvest activities in order to increase economic growth;
- no good economic valuation of the resources; and
- the need for defining management objectives, that reflect the complexity of the issues and system – e.g. the open access state of fisheries resources, HIV/AIDS prevalence, lack of education in relation to sustainable use of resources, inability to adequately disseminate extension concepts/ ideas to communities.

While some of the key development processes, both resulting in positive and negative impacts on the fishery sector, include:

- Infrastructure development such as hydropower and storage dams resulting in e.g. obstruction of fish migration; changes in fish production; changes in species composition / biodiversity loss and reduced quality; changes in downstream flow regimes; and increased use of land for agriculture; and roads resulting in e.g. increased access and to fish markets and migration; environmental damage; and flood changes.
- Agriculture development can have a high impact on fisheries including from irrigation schemes, deforestation and overgrazing resulting in impacts such as encroachment into

wetlands and destruction of breeding areas, siltation due to soil erosion leasing to destruction of breeding sites, and use of pesticides resulting in weed proliferation.

- Aquaculture potentially has a high impact on capture fisheries in the basin with potential introduction of alien species and the resultant impact on diversity, hybridisation, and fish disease, while on the positive side aquaculture can increase production and thus generate food, jobs and livelihoods.

- Population increase potentially has a high impact on the fisheries due to; increasing pressures on fisheries; increasing demand for fish; increase in conflict (e.g. among fishing communities); and migration of communities or fishers.

- HIV/AIDS infection rate is high in the region and this has an impact on fishing communities through; increasing fishing pressure (especially from the most vulnerable); disruption of organisational structure and operations; loss of expertise; destruction of social structures and control mechanisms; and loss of investment.

7.5 Some suggestions for consideration in the project

Identify and make use of existing datasets:
Keeping in mind the limitations identified by Tweddle (2011) in his review of the state of knowledge of the Zambezi Basin fisheries, it is important to make use of the archival data that already exists. One of the most apparent sources is the results of the numerous surveys carried out on behalf of the African Wildlife Society.

Use available data sharing platforms, instead of investing time and resources in replicating them:
Even simple databases are expensive to design and implement. Fortunately, free databases suited to the input, analysis and sharing of fisheries data already exist. Two examples are: (i) the PASGEAR program, a DOS-based package designed by the Norwegian Institute of Marine Research that allows for efficient fisheries database construction and data entry; (ii) The African Water Research Database, which provides a G.I.S.-linked database (described earlier in Box 2).

Pilot Projects:
The pilot projects could build on objectives for managing a resource at the basin level while incorporating vertical co-management approaches by following this approach:

1) Address basin-scale issues, such as climate change, water abstraction, invasive species and epidemics
2) Sensitive to local-scale characteristics, both environmental and social, which benefit from engagement with stakeholders in designing, implementing and learning from projects
3) Data collected using uniform methods and being entered on a shared database
4) Approaches that can be modified, replicated and scaled up to other areas of the Zambezi River Basin

7.5.1 Enabling conditions for fisheries co-management

Identifying best practices for co-management in fisheries beyond general themes (e.g., transparency, efficiency, equity) is challenged by the fact that so much depends on the environmental and social contexts in each individual case. A lack of common variables determining success or failure in management, argues Berkes (2009), means that analysis should instead be driven by 'diagnostic questions' that vary according to each case. Recent analyses of over twenty years of experience in co-management in a variety of settings has attempted to draw out some of the enabling conditions that are more likely to present in successful fisheries co-management. Very few enabling conditions

are associated with the biological or economic characteristics of the fishery itself. Rather, the properties most associated with effective, sustainable fisheries co-management most often deal with power and influence.

Enabling Condition #1: Downward accountability - or to improve information in co-management we can pilot improving downward information flow

Accountability is the obligation to communicate and justify policies and actions, as well as report if and how objectives are/aren't being met, to a specified group. The most common form is *upward accountability*, where reporting is largely unidirectional and according to hierarchy. Due to legal and financial requirements, government and donors understandably insist on accountability from practitioners and beneficiaries and are invested with some way of sanctioning what they perceive as poor results (such as fines or withholding funds).

Downward accountability, by contrast, obliges that co-management beneficiaries (in this case fishers) be informed on performance and, to some degree, have sanctioning ability. Many authors (e.g., Guiterrez et al., 2011; Béné et al. 2009; Berkes, 2009; Chuenpagdee and Jentoft, 2007) argue that downward accountability is vital in order to achieve the principal aspects of co-management (e.g., participation, transparency, project sustainability, efficiency and effectiveness). However, downward accountability rarely occurs in practice, due in part to the hesitancy of government and donor agencies to yield control. This reluctance is understandable in highly dynamic situations such as fisheries, where success is rarely guaranteed and linkages between cause and effect are rarely clear. The myriad of stakeholders and interconnected dimensions of power inherent in most fisheries makes the exercise of defining beneficiaries of co-management difficult as well. Lack of downward accountability can also be inadvertent. In the Beach Village Committee (BVC) co-management initiative in Malawi, fishers reported feeling inadequately represented, as BVC members were elected by the entire community, rather than just their stakeholder group (Hara, 2007).

In spite of these limitations, any co-management effort should have the requirement of regular reporting back to communities (beyond stakeholders) regarding the implementation process. This, ironically, does require a certain degree of upward accountability, as government and donor stakeholders must also ensure that this takes place, and consider sanctions if it doesn't.

Enabling Condition #2: Presence of individuals at the local scale with strong leadership qualities

This condition, identified foremost by Guiterrez et al. (2011), as having "*entrepreneurial skills, highly motivated, respected as a local leader and making a personal commitment to the co-management implementation process*" (p. 387) seems at first glance contrary to other norms associated with co-management, such as community and participation. Leaders, by definition, establish a hierarchy and limit participation through decision making. Moreover, emphasizing leadership carries the risk of devolving management to the local level leading to 'elite capture' (Béné et al., 2009) of power and material benefits. Similarly, legitimizing and enabling the leadership qualities of one individual may cause conflict if existing leaders (e.g., traditional authorities or local administrators) perceive their power is threatened (e.g., Russell and Dobson, 2011). Hence, it is important to constantly assess whether the leadership qualities first identified as suitable for local engagement are actually achieving the identified goals of co-management.

7.5.2 Measuring Success in co-management

Definitions are important, as what qualifies as a 'success' will vary according to the observer. As a result, most analyses of fisheries co-management performance have developed several indicators of success such as improved fish yields, household income, or reduced conflict (e.g., Miliao et al., 2009). Some analyses also distinguish between process and outcome indicators of success (Table 4).

Table 4: Indicators used for performance of fisheries co-management used by Evans et al. (2011).

Process Indicators	Outcome Indicators
• Participation • Influence • Rule Compliance • Control over Resources • Conflict	• Access to Resources • Resource Well-Being • Fishery Yield • Household Well-Being • Household Income

What should be evident is that there are no 'must have' indicators, as objectives and stakeholders of fisheries co-management project are inherently fluid. Indicators are likely to change over time as more is understood about the resource the users, and the landscapes of power occupied by different stakeholder groups (Béné et al., 2009).

These will be relevant for inclusion in the logframe for the component. However, it is important that the listing of indicators and their linking to objectives not simply be a mechanical exercise. Planning should include explicit, detailed rationales of the reasoning process behind the choice of indicators and how they are measured. The purpose of such detail is to create a transparent iterative process that can inform later stages of the co-management implementation, as well as applications elsewhere.

8 Zambezi basin country overviews

8.1 Angola

The Upper Zambezi River is found in Angola, it runs for about 30km from Zambia before turning west and entering Angola, where it runs about 280km through the country and reenters Zambia. The Chobe tributary originates in Angola, crosses the Caprivi Strip, then forms the border between Namibia and Botswana and enters Botswana to flow southwards for about 75km. It then turns east, again forming the border between Namibia and Botswana as it flows through a swampy area and flows into the Zambezi River at the border point between Namibia, Botswana, Zimbabwe and Zambia.[15]

Angola has no big lakes but the rivers flowing through its territory contain several freshwater species of high value in the local market. It is estimated that more than 255 freshwater fish species exist in Angola's waters (2005)[16]. Tilapia is the most important and abundant freshwater fish. Other species include catfish and freshwater prawn.

Inland fishing is very important in terms of poverty alleviation because the sector is a large contributor to employment in rural areas. This fishery involves about 7,000 full time fishers, mainly involved in subsistence fishing.

Aquaculture production in Angola is to a large extent small scale and focused mainly on inland freshwater both by rural communities and private sector. Lack of investment, knowledge and the impacts of the civil war have however limited the development of these activities. Currently, the development of aquaculture in Angola is driven by a strategy adopted by the Ministry of Fishery, with the objective to reduce poverty.[17] Rural fish farming with native species has been developed in some provinces of Angola, while commercial private sector aquaculture started in 2002 on the Bengo River in Kifangondo, Luanda province using the Nile Tilapia introduced from Brazil. Currently the monthly production is 40mt which is marketed locally.

The fishing industry contributes significantly to food security in the country. Presently, around half of the population is dependent on the fishing industry for their livelihood, especially in the artisanal fishery, but this includes marine fisheries. Therefore the Angolan fisheries are viewed as a significant economic tool to alleviate poverty and marginalization of poor people.

Angola adopted a new Law on Aquatic Biological Resources (Law 6-A/04) in October 2004, which replaced the previous legislation on fisheries (Law 20/92). The new legal framework aims at establishing 'regulatory measures that seek to guarantee the sustainable conservation and utilization of the aquatic biological resources existing in the waters under the sovereignty of the Angolan State, as well as general bases for the exercise of activities related to them, particularly fishing and aquaculture activities'. The legislation covers territorial waters, the Exclusive Economic Zone, tidal waters, estuaries and inland waters.[18]

Angola is a member of the Joint Permanent Technical Commission of the Cunene River (PJTC) with Namibia, the Zambezi Watercourse Commission (ZAMCOM), and the Standing Committee of the Okavango River Basin (OKACOM).[19]

[15] FAO The Zambezi River page- http://www.fao.org/docrep/W4347E/w4347e0o.htm
[16] www.fishbase.org
[17] http://acpfish2-eu.org/index.php?page=angola&hl=pt
[18] FAO Angola Country profile- ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_AO.pdf
[19] FAO Aquastat Angola country profile- http://www.fao.org/nr/water/aquastat/countries_regions/angola/indexfra.stm

8.2 Botswana

Botswana is linked to the Zambezi basin through the Cuando River. The Cuando (also known as the Linyati and the Chobe) flows from Angola to the Caprivi strip in Namibia before entering Botswana. It continues southeast where it meets the Zambezi river in Kazangula, on the border with Zambia. The Kariba river floodplain also extends into Botswana's north western territory. In total, 2% of the Zambezi basin is found in Botswana.[20]

Fish production and consumption in Botswana is small, originating entirely from harvest fisheries. The Okavango Delta is the most important source of fish accounting for 80% of production. The balance originates from the Linyati/Chobe and Limpopo systems, and manmade reservoirs in different parts of the country.

Aquaculture in Botswana is still in development stages, with no commercial aquaculture production, although the government has recently constructed a tilapia/ catfish hatchery on the Letsibogo Dam near Mmadinare, to promote aquaculture development and the College of Agriculture runs a small demonstration facility at the Botswana College of Agriculture at Sebele outside Gaborone. The Fisheries Division stocks these ponds periodically with fingerlings from other established dams.[21]

All fishing activity in Botswana occurs in rivers, lakes and waterways. Fisheries resources are exploited by three principal fisher groups: artisanal or subsistence fishers, commercial, and recreational fishers. During the early 1980s, the government provided grants and credit schemes such as the Agricultural Extension Small Projects Programme (AE10), later replaced by the Financial Assistance Policy (FAP), to encourage fishermen and fisher groups/syndicates to finance their projects and operations. In Chobe National Park where any form of fishing is prohibited, most fishing is done across the border in Namibia and then brought to Botswana (to Kasane) for sale.[22]

In the early 1980s the market for dry and salted fish collapsed and with the assistance of the Department of Wildlife and National Parks (DWNP) Fisheries Division and funding from the Financial Assistance Policy (FAP), the fishers procured freezing equipment and switched from a dry/salted product to frozen products. The market for frozen product continues to this day with three syndicates currently using freezer facilities to assist in the marketing and distribution of their products. The 2005 frame survey reported that there were 85 commercial fishers in the Delta. In the Panhandle, over 80% of the artisanal fisher households provide at least half of their subsistence, and about 15% feed themselves completely with fish. Furthermore in terms of income generation, fish provide a means of bartering and accessing goods and services in the informal sector. The artisanal fishery is a multi-species fishery with a large number of target species.

The Maun office of the Department of Wildlife and National Parks (DWPN): Fisheries Division is a regional fisheries office that is responsible for the Districts in the North West of the country. The Maun office is responsible for supervising the operations at the Shakawe office, collating the fisheries data that is collected from the fishers and the monthly fish resource monitoring programme. Section 11 of the Fish Protection Regulations (2008) stipulates that the open season for fishing is between 1st March and 31st December, and that the fisheries are closed for the months of January and February.

Botswana is a net importer of fish with 2,800t worth P19million imported in 2003 (DWNP website). The disparity between the national fish yield and the quantity imported thus poses a challenge in meeting the domestic fish demand as Botswana seeks to be self-sufficient in food production. The Botswana government has identified both aquaculture and fisheries as means of promoting local fish

[20] FAO Aquastat country profile- http://www.fao.org/nr/water/aquastat/countries_regions/botswana/index.stm
[21] FAO Botswana country profile- ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_BW.pdf
[22] FAO Botswana country profile- ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_BW.pdf

production and creating economic growth. The challenge is thus to determine to what extent local fisheries and aquaculture can meet the demand, and what interventions would be required to achieve the regional production potential.

In 2011 an Aquaculture Development Strategy for Botswana (ADSB) and the outline of a Fisheries Management Plan of the Okavango Delta (FMPOD) were developed with support from the EU.

A complementary policy context is that of 'resource use', which is strongly development orientated, promoting community based natural resource management to contribute to sustainable livelihood creation and poverty eradication. In this context, fisheries and aquaculture are not only potential providers of food but could provide employment opportunities in the service industries associated with tourism (through recreational angling) and the associated value chains.

8.3 Malawi

20% of Malawi's surface area is aquatic. At least 50,000 people derive their livelihood directly from fisheries and recent estimates gauge total fishing industry participation at more than 230,000 persons. The main capture fishery areas of Malawi are the four lakes: Malawi, Malombe, Chilwa and Chiuta and the upper and lower Shire River.[23] The riverine system includes Songwe, South Rukuru, North Rukuru, Dwangwa, Bua, Linthipe and Shire; all except Shire River are inflows of Lake Malawi. The Shire River is the main outflow of Lake Malawi and flows approximately 410km from the lake to Mozambique, where it drains into the Zambezi River. Its reach can be divided into the upper, middle and lower sections. The Riverine system sustains important fisheries in Malawi.[24]

In terms of fish production in 2003, the Upper Shire River contributed less than 1%, and the Lower Shire River about 4.2%.[25] The large-scale fishing operations in Malawi are formal industries that represent considerable financial and technological investments and employ specialised labour. The small- scale sector contributes some 87% to the total fish landings, and is a multi-gear fishery.[26]

Fish production has fluctuated between 2,000 and 11,000mt per annum. Catches dropped to 2,000mt in 1992 from 11,000mt in 1989, and have remained more or less the same. The decline is attributed to overfishing caused by increased effort and drought that started in 1991. The use of illegal gears such as mosquito nets has compounded the situation. Apart from overfishing and use of unsustainable fishing methods, threats to the fisheries include upstream anthropomorphic activities which are increasing pollution and sediment loads.[27]

It is estimated that more than 11,650 km^2 of land in Malawi is used or has potential for aquaculture; this is about 15% of the land available. There are about 4000 fish farmers owning about 7000 fish ponds that are scattered throughout the country, producing about 650mt of fish per year (2002). The pond sizes range from 50 to 500 m^2. In addition, there are over 800 smaller water bodies that can be used by communities to produce fish. Currently, the Department of Fisheries is promoting the integration of aquaculture with agriculture, i.e. Integrated Aquaculture-Agriculture (IAA).[28]

About 90% of the fish from capture fisheries in Malawi is preserved by means of smoking or roasting (40%), and sun-drying (50%) and the rest is in fresh, chilled and frozen forms. Fish processing and

[23] SIF website country profile- http://www.stopillegalfishing.com/malawi.php
[24] The WorldFish Centre. 2007. Proceedings of the international workshop on the fisheries of the Zambezi Basin, 31 May- 2 June 2004, Livingstone, Zambia. The WorldFish Centre Proceedings 75, 83pp. The WorldFish Centre, Penang, Malaysia.
[25] FAO country profile- http://www.fao.org/fishery/countrysector/FI-CP_MW/en
[26] SIF website country profile- http://www.stopillegalfishing.com/malawi.php
[27] The WorldFish Centre. 2007. Proceedings of the international workshop on the fisheries of the Zambezi Basin, 31 May- 2 June 2004, Livingstone, Zambia. The WorldFish Centre Proceedings 75, 83pp. The WorldFish Centre, Penang, Malaysia.
[28] FAO Malawi country profile- http://www.fao.org/fishery/countrysector/FI-CP_MW/en

trading is a major occupation among many fishing communities including women since most of the fish sold to distant markets is in dry form for easy transport and storage. In 2002, fish had a beach value of about US$ 21 million and contributed about 4% to GDP (2005)[29]. The fish industry supports nearly 1.6 million people in lakeshore communities and is the second largest employer, second to agriculture. The population growth in Malawi of 2% per annum will make it impossible to maintain or improve on the current per capita fish supply of around 5kg without increasing yields from the offshore sectors of the lake, additional aquaculture production, and increased fish imports.[30]

Fisheries management falls under the Fisheries and Conservation Act. This has clear provisions for the conservation and management of fisheries through taking necessary protective measures, monitoring compliance and taking enforcement measures and issuance of permits and licenses to regulate fishing. However, the riverine fisheries are not managed effectively. This is largely due to the state based fishery management system that is still operational in riverine fisheries. Compliance with management regulations (i.e. mesh size and type, minimum landing size and closed seasons), is low due to enforcement problems. For effective development of the fisheries, the Department of Fisheries has put in place a framework that advocates co-management; a more consultative and participatory approach to fisheries resource management. The Policy and legislation have been revised to accommodate this concept. The main challenge however is to translate the national priorities and targets in action plans and programmes in order to promote effective participation of all stakeholders. The research action plan for Department of Fisheries is also undergoing review to incorporate long-term research on riverine fisheries that will address most of the research gaps. [31]

8.4 Mozambique

Mozambique contains 11% of the 1,385 million km^2 surface area of the Zambezi river system and is the most downstream country of the system. It flows for some 850km before it empties through a delta of about 8,000km^2 into the Indian Ocean. As the most downstream country it also bears the effects of upstream activities and developments, such as farming, impoundments, irrigation, introduction of alien species, siltation, water shortage and floods; with all the associated effects on the fisheries.

Three major objectives are highlighted in the fisheries sector Master Plan, as milestones of the fisheries policy for Mozambique: to improve fish protein supply in order to cover part of the food shortage; to increase net foreign exchange earning to the national income produced by the fishery sector; to improve life standards of the fishing communities (absolute poverty alleviation). These policies raise a challenge as to how to achieve these objectives while ensuring a sustainable utilization of aquatic resources. As far as inland fishery is concerned, no fishery regulation exists.

The Mozambique section of the Zambezi basin comprises part of the Middle Zambezi that starts from the Victoria Falls and ends at the Cahora Bassa rapids, and the Lower Zambezi that runs from the rapids to the river mouth. It was the damming of the Cahora Bassa rapids that produced the Cahora Bassa reservoir, the second largest on the Zambezi and second largest freshwater lake in Mozambique (Lake Niassa being the largest). At 326m above sea level, the lake is 246km long and 39.8km wide. The lake is East West oriented and is divided into 7 basins: Zumbo, Messenguezi, Mágue, Chicoa, Carinde Macanha and Garganta. There are more than 70 seasonal rivers and streams that enter the reservoir. The Zambezi and the Luangwa are the main affluents entering the lake and these rivers are responsible for most of the water input to the lake. Other perennial rivers drain into the lake- the Messenguezi and Hunyani on the south shore and the Mucanha and Metamboa on the North.

[29] FAO Malawi country profile- http://www.fao.org/fishery/countrysector/FI-CP_MW/en
[30] SIF website country profile- http://www.stopillegalfishing.com/malawi.php
[31] The WorldFish Centre. 2007. Proceedings of the international workshop on the fisheries of the Zambezi Basin, 31 May- 2 June 2004, Livingstone, Zambia. The WorldFish Centre Proceedings 75, 83pp. The WorldFish Centre, Penang, Malaysia.

Three fisheries are presently operating in the reservoir: artisanal, kapenta and recreational fisheries. The artisanal fishery, which operates mainly surface gill nets, captures a variety of fish species. Some 13 in total, of which 6 are commercially important namely Tiger fish (*Hydrocinus vittatus*), Kurper bream (*Oreochromis mossambicus*) and Nchenga (*Distochodus nchenga*). The current annual catches are around 12,000mt (Mafuca, 2002). Current annual catches for the artisanal fishery as estimated by Barnes *et al*. (2002)[32] are about 7,600mt. Given all the discrepancies above, further and detailed studies are required to come up more realistic figures on the yields for Cahora Bassa reservoir.

8.5 Namibia

All perennial rivers in Namibia are shared with neighbouring countries. The Zambezi basin is found in the north east of the country in the Caprivi Strip and the fishery system plays a very important role in the livelihood of a large number of households in those regions. As a result, a regional co-operative approach is of high importance in Namibia to support sustainable and fair management of the fisheries resources of the Zambezi Basin. A regional approach was initiated in November 2000 when four countries, Botswana, Zambia, Zimbabwe and Namibia came together to discuss the issue of collaboration on all shared river systems. An aquatic resources working group was established from this and two projects were developed, one on the fish biodiversity of the Upper Zambezi River and one on the standardization of the research methodology.

The Inland Fisheries Resource Act and Inland Fisheries Regulations (2003) were developed with close consultations with a wide base of stakeholders utilising the fishery. These instruments promote several principals including: sustainable utilization of the resource, protection of biodiversity, subsistence over the commercialization of the fish resource, stakeholder involvement in control measures and the management of the resource and a need for regional co-operation on all shared river basins. It is the policy of the Ministry to involve all stakeholders in the decision making process and in the management of the resources.

Information is presently available on species diversity (Diversity Index), the Index of Relative Importance, gill net selectivity of important species, catch per unit effort for gill nets and species, catches of fishing gear, body length distributions, maturation lengths for selected species and species diversity and catch per unit effort for different habitats and different water levels.

The fish market in Katima Mulilo is surveyed once a week for information on the demographics of the vendors, the supply to the market, species composition and size and fish prices and how this varies with season and the flood cycle. Two frame surveys along the Zambezi River were conducted to record data on village characteristics, fisher characteristics, fishing methods and gears used, the fishing crafts and traditional fishing management systems. Further ward meetings were held at the villages to document all informal (traditional) and formal (government) management systems.

One of the major challenges is the continued availability of funds and human resources (experienced in fisheries science) to address these challenges. Also an improved understanding of the biology of important fish species is needed. Outcomes of discussions from the *'International Workshop on the Fisheries of the Zambezi Basin'* suggest that there is a lack of a harmonized policy, a lack of standardized research methodologies and a lack of baseline data for the region. Therefore a standardized monitoring programme for the resource and the fisheries should be developed. Furthermore knowledge of present traditional management systems must also be documented.

[32] Barnes J.I., Meisfjord, J., Dugan P.J. & D.M. Jamu. (2002). Inland fisheries in Mozambique: Importance and Potential. Final report. *World Fish Center*. 58 pp.

8.6 United Republic of Tanzania

Tanzania is connected to the Zambezi basin through Lake Malawi; 18% of which is found in Tanzania. Lake Malawi is part of the River Shire drainage basin, which feeds into the Zambezi River which ultimately flows out into the Indian Ocean through Mozambique.[33] As with other freshwater lakes in Tanzania, important fish stocks include tilapia, Nile perch and sardines. These inland freshwater fisheries are all utilised by artisanal fishers (approximately 150,000 are employed) using small (between 7-11m) motorised boats. They predominantly use gill nets with varying mesh sizes. Results from a National Fisheries Frame Survey (2006) indicate that there are 39,881 fishing vessels in the fresh water sub-sector nationwide (Fisheries Division, 2006).

Overall fish contributes 27% to the total animal protein consumption. Fish are processed in the typical methods seen in the region, including: sun-drying, salt-drying and smoking. Nile perch are unique; they are filleted for export to the EU and Asian markets. Other fish products are sold domestically and to other countries in the region. Domestically, demand for fish is very high in rural and urban areas.

Small-scale fish farmers practice both extensive and semi-intensive fish farming. Small fishponds of an average size of $100m^2$ are integrated with other agricultural activities such as gardening, animal/birds keeping on small pieces of land. Today Tanzania is estimated to have a total of 14,750 freshwater fishponds (for *Tilapia* and *Oncorynchus sp*). Two species are farmed: *Kappaphycus cottonii* and *Eucheuma spinosum. Kappaphycus cottonii* is believed to be indigenous while *E. spinosum* was imported from the Philippines. There is also a potential for other seaweed species farming such as G*racilaria,* etc. In terms of employment, aquaculture offers employment to about 18,000 people; 14,750 are involved in freshwater fish farming.

The general legal framework which governs the freshwater fishery include: Fisheries Act No. 22 of 2003 – which is an Amendment of the Fisheries Act No. 6 of 1970; Principal Fisheries Regulations (2005) - is an Amendment of the Fisheries Principal Regulations of 1989 [34].

8.7 Zimbabwe

The major economic activities in the Zambezi Valley are based on the exploitation of the natural resources especially terrestrial wildlife and fisheries and tourism. The seasonal nature of rainfall has resulted in the construction of numerous reservoirs for agricultural purposes and the supply of potable water, especially in urban settlements, while Kariba dam was constructed mainly for hydroelectric power supply. The development of fisheries in these reservoirs has been a secondary activity. Zimbabwe has no natural lakes: there are over 10,700 reservoirs ranging in surface area. Aquaculture has never been a primary activity on these smaller bodies of water. Recently, large mining projects are also competing for access to land and through mining activities are affecting the water bodies and rivers.

132 fish species were recorded in Zimbabwean waters; 122 indigenous species and 10 exotic species. Lake Kariba produces 90% of Zimbabwe's fish production. The fishery on Lake Kariba is largely commercial with an artisanal (nearshore/littoral) fishery and a Kapenta (offshore/pelagic) fishery. Recreational fishing is also carried out here. The artisanal fishery is a multi-species fishery and is based on the exploitation of the indigenous riverine fishes that were able to establish in the Lake. The breams (Family *Cichlidae*) constitute the bulk of the catch. The fishing gear used is the gill-net, and entry into the fishery is regulated. The pelagic fishery is a single species fishery based on the introduced freshwater sardine (*Limnothrissa miodon*), known locally as Kapenta. The major by-catch species is tigerfish (*Hydrocynus vittatus*). A lot of research has been conducted in both fisheries,

[33] FAO Aquastat Country profile- http://www.fao.org/nr/water/aquastat/countries_regions/tanzania/index.stm
[34] FAO country profile, Tanzania, ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_TZ.pdf

both at national level and jointly with Zambia. The research has been either short-term (focused studies) or long-term (resource-monitoring). Fish production from the waters of the Zambezi River outside Lake Kariba and the Limpopo River is minimal.

Management of the fishery resource falls under the Zimbabwe Parks and Wildlife Management Authority (ZPWMA) a department of the Ministry of Environment and Tourism; they function from several fisheries research stations in different administrative provinces. There is a fisheries unit in the Ministry of Agriculture and Rural Resettlement with the main function of fisheries extension in communities living around Small Water Bodies (SWB). The principal act governing fisheries management is the Parks and Wildlife Act of 1996. The Zimbabwe National Water Authority (ZINWA) has the mandate of regulating water usage, including abstraction. The Zambezi River Authority regulates the flow regime at Kariba dam. Management of the fisheries on water bodies outside the Parks Estate has been minimal. Historically, fisheries management interventions have been based primarily on biological considerations. In recent years, there has been an increased appreciation and awareness of the role of socio-economic factors in the dynamics of any exploited fishery. Fisheries managers have acknowledged the need for a fisheries policy for both capture fisheries and aquaculture. Very little work has been done on the Limpopo River, and it is therefore necessary to initiate programmes to develop joint research and management of the Limpopo among the riparian states. Currently, there are several institutions that are carrying out research on the fisheries of the Zambezi. There is no institutional mechanism for coordinating this research.

Efforts have been made to introduce co-management, mainly in the artisanal fishery. A lot of lessons have been learnt in the process. It is therefore necessary to review the applicability of co-management, also drawing upon experiences from within the region. A major challenge is to develop management structures/mechanisms that will adequately cover the smaller water bodies in the Zimbabwe portion of the Basin.

8.8 Zambia

The Zambezi Basin catchment area is the largest water area in the country, covering 76.4% of Zambia's land surface area, 574,875km^2. This includes the Zambezi River and three major tributaries: the Kabompo (found in the west, near Angola), Kafue (runs through the centre of Zambia) and Luanwa (found in the east near Tanzania). The River Zambezi flows in and out of Zambia, across the borders of Angola and Namibia. As a result the Zambezi river is split into the Super Upper Zambezi, the Upper Zambezi and Middle Zambezi (Lake Kariba) in Zambia.

Commercial aquaculture is a major activity in Zambia. Most large-scale fish farms are based around the Kafue basin in the south east near the Zimbabwe boarder and many smaller fish farms around Super Upper Zambezi and the Luangwa Basin in eastern Zambia. Zambia, is of course, also the location of the source of the Zambezi. The Kafue Basin supports three major commercial fishing areas- Lukanga Swamps, Lake Itezhi-Tezhi and the Kafue Flats. The catch estimates for these fishing areas is 9,600 (2000). Annual fish production from fish farms is estimated at about 5,000mt (2005). The artisanal fishery relies heavily on the resources of the Zambezi. Similarly to the industrialised commercial fishery, the main species exploited is Kapenta. Gillnets are used mostly.

Co-management of the fisheries occurs in areas such as Lake Kariba and Lake Mweru-Luapula. A forum for dialogue between the resource users has been created facilitating more involvement for traditional leaders in the management of Lake Kariba. Currently the Department of Fisheries is also sensitising the fisher communities with the view to involving fisher communities in the management of the fisheries in the Kafue River.

Main challenges facing the fishery are thought to include the rapid and unregulated development of commercial fish farming activities in cages. In addition, over recent years, the number of fishers

exploiting the resource has also increased in an unmeasured and unregulated fashion, and with this there has been a rise in destructive fishing methods. The use of hydropower has also been considered a threat to the fishery, as it disrupts the downstream flows of the basin. However, it is also felt that with effective management, these threats can be mitigated.

The Department of Fisheries is the custodian of the fisheries in Zambia (Fisheries Act 1974). They licence fishermen and enforce Fisheries Regulations. From 1993 the Department of Fisheries began to involve the fishing communities in the management of the fisheries resources. Arrangements for community participation in fisheries management were created in fishery areas such as Lake Kariba and Lake Mweru-Luapula. In these fishery areas the lakes were zoned, into a stretch of shoreline with a designated number of fishing villages. The fishing villages in the zone have a management committee; these institutions (Zonal Committees and Village Management Committees) lacked legal support because the Fisheries Act of 1974 had no provisions for the formation of such committees or for community participation in the management of the fisheries resources. The Fisheries Act has therefore been revised to include the institutions for community participation in the management of the fisheries resources. Among the benefits to communities in the revised draft bill is that the communities through the above established institutions will receive 60% of the fish licence fees and 60% of the monies collected by the Local Authorities (District Councils) in the form of fish levies. A forum for dialogue between the resource users has been created facilitating more involvement for traditional leaders in the management of Lake Kariba.[35]

[35] The WorldFish Centre. 2007. Proceedings of the international workshop on the fisheries of the Zambezi Basin, 31 May- 2 June 2004, Livingstone, Zambia. The WorldFish Centre Proceedings 75, 83pp. The WorldFish Centre, Penang, Malaysia.

9 Documents consulted or referenced

The following lists the documents that have been consulted and may be useful to workshop participants. These will be available in the workshop in electronic copies and also provided at the end of the workshop to participants.

9.1 SADC publications

1. Climate Change Adaptation in SADC- A strategy for the Water Sector
2. Climate Change Adaptation in SADC- A strategy for the Water Sector- Factsheet
3. Protocol on Shared watercourse systems in the SADC Region
4. Regional Programme for Food Security (RPFS) in member countries of the SADC, May 2002
5. Regional Strategic Action Plan on Integrated Water Resources Development and Management (2011-2015) (RASP III)
6. Regional Water Infrastructure Programme, 2010
7. SADC Regional Fisheries Monitoring, Control and Surveillance Coordination Centre, Draft, April 2011
8. Support by International Cooperating Partners (ICPs) to the Transboundary (Regional) SADC Water sector, Technical report. P. Ramoeli and Dr. H. Vogel, April 2011

9.2 Stakeholders and Organisations

1. Baseline Fish Biodiversity Surveys- Experiences from the Zambezi River, Southern Africa. African Wildlife Foundation, July 2005
2. Biodiversity of the Zambezi Basin wetlands: Review and preliminary assessment of available information, Phase 1. Final report. The Zambezi Society, J. Timberlake. February 1998
3. River Basin Dialogue (RBD). A capacity building programme to enhance transboundary water resources management in Africa, 2008-2011, Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ)
4. Special Programme for Aquaculture Development in Africa (SPADA) factsheets
5. FAO- NEPAD seminar of the Permanent Secretaries or Equivalent in the Ministries in charge of Inland Fisheries and Aquaculture in CIFFA Member States on the: 'Review of the CIFFA', A prospectus, March 2012

9.3 River Zambezi Basin and inland fisheries Reports and Documents

1. Abell, R., M. Thieme, E. Dinerstein, and D. Olson. 2002. A Sourcebook for Conducting Biological Assessments and Developing Biodiversity Visions for Ecoregion Conservation. Volume II: Freshwater Ecoregions.World Wildlife Fund,Washington, DC, USA.
2. Chiwaula L., and Witt R. 2010. Technical Guidelines for the Economic Valuation of inland smallscale fisheries in developing countries, with input from Béné C., Ngoma P., Turpie J. and H. Waibel. Report for the project "Food security and poverty alleviation through improved valuation and governance of river fisheries in Africa" (WorldFish Center, Penang, Malaysia, 40 p.
3. Food security and poverty alleviation through improved valuation and governance of river fisheries in Africa, Policy analysis: Lake Chad Basin and River Zambezi Basin Synthesis Report, Dr. C. Bene, WorldFish Centre, February 2008
4. Implementation of SADC Protocol on shared Watercourses presentation, ZAMCOM Establishment experiences lessons learnt, ZAMCOM, June 2012
5. Inland Fisheries in Africa. Key Issues and Future Investment Opportunities for Sustainable Development, Technical Review Paper- Inland Fisheries, NEPAD- Fish for All Summit, August 2005
6. Integrated water resources management strategy and implementations plan for the Zambezi River Basin, SADC-WD/Zambezi River authority, Euroconsult Mott MacDonald, April 2008

7. Jenness, J.; Dooley, J.; Aguilar-Manjarrez, J.; Riva, C. African Water Resource Database. GIS-based tools for inland aquatic resource management. 1. Concepts and application case studies CIFA Technical Paper. No. 33, Part 1. Rome, FAO. 2007. 167p.
8. The WorldFish Centre. 2007. Proceedings of the international workshop on the fisheries of the Zambezi Basin, 31 Mat- 2 June 2004, Livingstone, Zambia. The WorldFish Centre Conference Proceedings 75, 83pp. The WorldFish Centre, Penang, Malaysia
9. Zambezi Flood Forecasting and Early warning System (ZFEWS) Meeting. 'Zambezi Watercourse Commission Governance Brief (Background Paper)'. ZAMCOM, November 2011

9.4 Inland Fisheries Reports and Documents

1. Best practices and approaches for promoting shared river basin management, Lessons learned from methodologies used by the 'Every River has its people Project for the Okavango River Basin', 2000-2004
2. Elaboration of a management plan for the Kafue Fishery: final Technical Report, ACP Fish II, May 2011
3. Support for Devising the Aquaculture Development Strategy for Botswana and the Development of outlines for the Fisheries Management Plan of the Okavango Delta: Final Technical Report, ACP Fish II, May 2011

9.5 Referenced material

AWF. 2005. Baseline Fish Biodiversity Surveys – Experiences from the Zambezi River, Southern Africa. AWF Conservation in Practice Papers.African Wildlife Foundation.

Beck, L. and Bernauer, T. 2011. How will combined changes in water demand and climate affect water availability in the Zambezi river basin? Global Environmental Change. 21 1061–1072

Béné, C., E. Belal, M. A. Baba, S. Ovie, A. Raji, I. Malasha, F. Njaya, M. Andi, and A. Russel. (2009). Power struggle, dispute and alliance over local resources: Analysing 'democratic' decentralisation of natural resources through the lenses of Africa inland fisheries. World Development. 37(12):1935–1950.

Berkes, F. (2009). Evolution of co-management: Role of knowledge generation, bridging organizations and social learning. Journal of Environmental Management.90: 1692–1702.

Chuenpagdee, R., Jentoft, S.(2007). Step zero for fisheries co-management: what precedes implementation. Marine Policy. 31:657-668.

Darwall, W.R.T., Smith, K.G., Tweddle, D. and Skelton, P. (eds) 2009. The Status and Distribution of Freshwater Biodiversity in Southern Africa. Gland, Switzerland: IUCN and Grahamstown, South Africa: SAIAB.

Euroconsult Mott MacDonald. 2008. Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin-Summary.

Euroconsult Mott MacDonald. 2007.Integrated Water Resources Management Strategy for the Zambezi River Basin. Rapid Assessment-Final Report.

Gaughan, A. Waylen, P. 2012. Spatial and temporal precipitation variability in the Okavango-Kwando-Zambezi catchment, southern Africa.Journal of Arid Environments. 82:19-30.

Guiterrez, N., Hilborn, R. and Defeo, O. (2011) Leadership, social capital and incentives promote successful fisheries. Nature. 470: 386-389.

Halls, A.S., Arthur, R., Bartley, D., Felsing, M., Grainger, R., Hartmann, W., Lamberts,D., Purvis, J; Sultana, P., Thompson, P., Walmsley, S. 2005.Guidelines for Designing Data Collection and Sharing Systems for Co-Managed Fisheries. Part I: A Practical Guide. FAO Fisheries Technical Paper.No. 494/1. Rome, FAO.

Hoggarth, D., Cowan, V., Halls, A., Aeron-Thomas, M., McGregor, J., Garaway, C., Payne, A., and Welcomme, R. 1999. Management guidelines for Asian floodplain river fisheries.Part 1.A spatial, hierarchical and integrated strategy for adaptive co-management.FAO Fisheries Technical Paper.No. 384/1. Rome, FAO.

Miliao, R., Pomeroy, R. and Turingan, R. (2009) Performance of community-based coastal resource management (CBCRM) Programs in the Philippines: Ameta-analysis. Marine Policy.33: 818–825.

Russell, A. and Dobson, T. (2011) Chiefs as Critical Partners for Decentralized Governance of Fisheries: An Analysis of Co-Management Case Studies in Malawi. Society and Natural Resources. 24:734–750.

SADC. 2002. Regional Programme for Food Security in Member Countries of the Southern African Development Community. Prepared with the collaboration of the Food and Agriculture Organization of the United Nations.

UNESCO. 2009. Introduction to the IWRM Guidelines at the River Basin Level. United Nations Educational, Scientific and Cultural Organization. Paris, France.

UNESCO. 2006. Water, A Shared Responsibility.The United Nations World Water Development Report 2.United Nations Educational, Scientific and Cultural Organization. Paris.

World Bank, 2010. The Zambezi River Basin: A Multi-Sector Investment Opportunities Analysis. The International Bank for Reconstruction and Development/The World Bank. Washington,USA.

WorldFish Centre. 2008.Food security and poverty alleviation through improved valuation and governance of river fisheries in Africa. Policy Analysis: Lake Chad Basin and River Zambesi Basin Synthesis Report February 2008.

WWF. 2011. The Joint Zambezi Basin Environmental Flows Programme. Brochure.

10 Questionnaires

The following questionnaire was distributed and available on Monkey Survey for gathering information for the workshop. At the time of preparing this only 6 replies had been received.

6.17 Challenges identified from frameworks relevant to the co-management of the Zambezi basin

The following extracts were developed to provide background information to workshop participants to enable them to easily locate the pre-identified and prioritised issues identified at a National level in respect to various policy and strategy frameworks. The intention was that they would be able to then compare these to the issues identified in the workshop and for this Project and to identify coherence between policy frameworks at a National level.

The summary is found in the Briefing Paper for the workshop, the documents that were reviewed for each country were the National Adaptation Programmes of Action (NAPAs[1]) and the National Communications[2], the Poverty Reduction Strategy Papers (PRS), the UN Development Assistance Frameworks (UNDAFs) and the Comprehensive Africa Agriculture Development Programme (CAADP[3]) national compacts. Only where a box is shaded is there any information provided below.

Country	NAPA	National Communication	PRS	UNDAF	CAADP National Compacts
Angola					
Botswana					
Malawi					
Mozambique					
Namibia					
Tanzania					
Zambia					
Zimbabwe					

Key: Relative level of relevance of inland fisheries within the policy document

High Relevance	Medium Relevance	Low Relevance	No Relevance	Document not available

[1] http://unfccc.int/national_reports/napa/items/2719.php
[2] http://unfccc.int/national_reports/non-annex_i_natcom/items/2716.php
[3] http://www.nepad-caadp.net/

6.17.1 ANGOLA

6.17.1.1 NAPA

CHALLENGES

- The rural sector, inclusive of fisheries, is the second largest contributor to GDP. Its further development is hampered by mines in the rural areas
- Fragmented small-scale farms;
  - Inefficient organisation of entrepreneurial-based holdings
  - Deficient and disorganised distribution circuits of farm and fisheries produce
- Inadequate organisation of the fisheries sector and associated activities
- Weakness of the economic and social infrastructures; Absence of rural extension structured services
- In some rural zones the inhabitants choose to live on the banks of the rivers because they want to live close to fertile soils to cultivate their food, and be close to watercourses for fishing; they know it is dangerous to live close to the river and they could lose their belongings in floods, and there is an increase in waterborne disease, their way of life is vulnerable.
- Inhabitants along the banks of the Zambezi River and the rivers in the province of Kunene report that in recent years floods have been more frequent.
- Climate change has the potential to influence the geographic location, the diversity of species and the functionality of ecosystems, which can occur so quickly that the ecosystems are not able to adapt.
- There appears to be a downward trend in the availability of fishes observed over the last 10 years, the fishing communities are concerned about this.
- Looking at the climate change study that has been done it appears like the most vulnerable sector is agriculture and fisheries

SOLUTIONS

- Following the National Strategy for food and nutritional security and its Plan of Action, climate change might be calling for increasing and diversifying agricultural, livestock and fishery production in a sustainable way to improve the standards of the populations' food supply and their living conditions;
- National adaptation priorities: Following the consultations and the analysis of vulnerabilities, a list of responses to each threat was designed, using also input from the provincial consultations where adaptation options and actions were suggested. The list of 30 options was then ranked according to its potential benefits and costs. The top 15 priority adaptation actions for Angola included fisheries and was stated as follows:
  - Study the vulnerability of fishing activities in relation to modifications of climate and currents
- Activities: Gathering information from fishermen about variations and trends in fishing
- Studying the vulnerability of the current fishing activity and if there are changes to currents or the weather.

6.17.1.2 NATIONAL COMMUNICATION

CHALLENGES

- Man-caused pressures, such as the mining industry or the changes to river itineraries, contribute to pollution and the destruction of the ecological balance in rivers and other humid zones.
- Agriculture, Forestry, Livestock, Fishing and Food Security Sector. The sector faces a set of difficulties
  - Deficient and disorganized distribution networks for agricultural and fishing products
  - Incipient organization of the fishing sector and related activities
  - Disarticulation of the rural areas, with technical assistance providing support and training

- Areas identified as vulnerable are those where vulnerabilities and serious challenges already exist, but where climate change can make these challenges even more difficult to deal with. The identified impacts include: River and lake fishing (if there are changes in hydrology or water temperature)
- The tendency to live in river banks due to their fertile soils despite the risks of floods
- It appears like the enforcement of policy, if at all it is clearly laid out, is lacking since it is not observed.
    - Over-exploration of fishing and disrespect for the established off seasons; soil and water pollution and contamination in the cities due to the absence of an adequate management of solid, liquid and gas waste
    - Industry and changes to the course of rivers, which contribute to the pollution and destruction of the ecological balance in rivers and humid zones.

SOLUTIONS

- The main recommendations for adaptation are as follows:
    - Gathering information from fishermen about variabilities and trends in fishing; Studying the vulnerability of the current fishing activity and if there are changes to currents or the weather.
    - Oral information and secondary documentation for a better understanding of climate variability and climate change in Angola.
- Research that aims to gather data that can contribute to the understanding of climate variability and possible climate change in Angola, with a focus on the central plateau and areas immediately to the south of it, including three out of four Angolan regions considered to have the greatest agricultural potential. The result will be a better understanding of climate and its variability: if there is change to climate patterns and the impact of these changes in the availability of water and the subsistence means of the communities (agriculture, wild food, livestock, fishing, potable water etc.). Another result will be a better understanding of how people adapt to change in climate patterns and what the main difficulties of doing that are.
- From 1999 to 2004, the Ecological Angolan Youth (JEA), the Environmental Nucleus of the Agostinho Neto University's Faculty of Sciences (NAFC) and the Angolan Action for Environment and Rural Development (ADRA), in partnership with the Ministry of Fishing and the Environment, and the Ministry of Education and Culture, organized the Environmental Olympics, directed at pre-university pedagogical students as well as students from Technical/Professional schools. The competition aimed to promote knowledge and interest in a diversity of environmental themes.
- The Biodiversity Strategy and Action Plan (EPANB), Resolution 42/06 of July 26th, proposes a series of measures that aim to ensure the conservation and sustainable use of components of biological diversity that would allow the just and equal sharing of the benefits from the use of biological resources.
- The National Food and Nutritional Security Strategy and its Action Plan, approved by Resolution 130/09 of December 29th, recognizes the right to food as a fundamental human right and aims to create conditions to ensure that every Angolan citizen experiences lasting food security, decreasing the level of inequality in income distributions and reducing extreme poverty.
- The 2006-2010 Fishing and Aquiculture Organization Plan, Resolution 9/06 of February 6th, contains several programs. The Ecosystem Functionality Program aims specifically to study and evaluate the incidence of disturbance factors (such as the variability of environmental and meteorological conditions due to climate change) in interactions between environment, fishing exploration and other human activities; foreseeing probable impacts of climate change and contributing to the definition of measures that avoid or mitigate its effects.
- With the intention of integrating climate change into the national sustainable development plans, in the socioeconomic sectors, and to strengthen the cooperation between the public and private sectors, four fundamental threads need to be worked on: …At the level of legislation strengthening and enforcement: Proceeding with the regulation of territorial planning,

establishment of agricultural and ecological reserves, implementation of protection zones along riverbanks, and designation of inert extraction areas;… Strengthening of inspection and legislation enforcement capacities in areas such as forestry, fishing, inert removal, environmental performance of constructions and connected activities;

- In general, there is little updated information about ground biodiversity and its state of conservation. The lack of information about possible climate change in Angola and its impact, and the lack of a vulnerabilities map, prevents the preparation of specific recommendations about adaptation strategies. Institutions that conduct systematic monitoring and investigations are, among others, the National Biodiversity and Areas of Conservation Institute, and the National Biodiversity Directive, the National Fishing Investigation Institute (INIP) These institutions, namely the ones that are also dedicated to investigation, could contribute to the generation of knowledge about Angola's baselines and, together with Civil Protection and the Ministry of the Environment, could proceed to the definition of more vulnerable zones, providing responses to the related extreme climate events. Some of these institutions could also generate climate change scenarios to determine possible impacts in the country. However, there is very little contact between the institutions and they have limited resources (human and technical) to proceed to this kind of work.

6.17.2 BOTSWANA

6.17.2.1 NATIONAL COMMUNICATION

CHALLENGE

- No study has been undertaken specifically looking at the effects of climate change on Botswana's exceptional bird and animal life, nor on the future of the important wetlands of the Okavango delta and Chobe/Linyanti Rivers.

SOLUTIONS

- There is a need to establish a National Inventory on resources such as forests, fisheries and veld products to monitor and evaluate utilization of these resources

6.17.3 MALAWI

6.17.3.1 NAPA

CHALLENGES

- droughts and floods are the major climatic hazards affecting the fisheries sector
- extensive land use including the wanton cutting down of trees in the middle and upper Shire Valleys, has resulted in severe land degradation and soil erosion
    - siltation of the Shire River and its tributaries
    - negative effect on the hydro-electric power generation, human health and fisheries
- river pollution from human and industrial waste, and agricultural chemicals
- high soil erosion, low soil fertility, over fishing
- the short term fluctuations in wind pattern that have become more variable in recent times due to climate change pose a challenge to fishers

SOLUTIONS

- fish breeding to restock the lakes
- improving knowledge and understanding on how temperature profiles in the lake disrupt fish breeding and survival
- establishing climate observations or monitoring systems on Lake Malawi
- mainstreaming climate change into fisheries strategies

- improving nutrition among rural communities
- developing small dams and other storage facilities, to mitigate flooding, to harvest water and to initiate community based fish farming and breeding
- improve community resilience to climate change through the development of sustainable livelihoods
- establishing a website for information dissemination and sharing,
- undertaking research to assess the productivity of fish under erratic rainfall and changing climatic conditions,
- establishing fish breeding and fish farming sites for restocking, food security and income generation

6.17.3.2 NATIONAL COMMUNICATION

CHALLENGES

- water resources degradation and depletion
- over-fishing
- loss of biodiversity…
- the changing water levels have significant impact on the type and number of fish catches
- decline in fish catches due to the late 1970s to early 1980s continuous and heavy rainfall events
- fish resources of Malawi are faced with increasing threats of:
    - non-compliance with "off season" regulations and inappropriate fishing methods
- climate change may indirectly affect the fisheries sector as people move to fishing as an alternative livelihood system following failure in other sectors such as farming and livestock production
- a reduction or cessation of the base water flow from Lake Malawi into the Shire River … would adversely affect hydro-power generation and the fisheries resources
- Current vulnerability of fish stocks. Starting with the studies that were conducted from the early 1930s, there has been a general recognition that some fish species are more vulnerable than others
- integrating climate change into national socio-economic and environmental policies, strategies and programmes
- consultation process with stakeholders
- few efforts have been made to specifically link climate change issues to national priority issues
- it has been noted that Malawi does not have a single central database centre where all data and information on natural resources are stored
- there is need for technical expertise in climatology, meteorology, climate change modeling, research methodology, agriculture, engineering, forestry, fisheries, wildlife, energy, water resources and participatory approaches. Hence, there is need for capacity building and training of staff

SOLUTIONS

- besides fishing in the lakes, streams and rivers, Government has also introduced fish farming in fish ponds throughout the country
- degradation of ecological niches and destruction of breeding areas
- there is need for the proper management of the lake ecosystems, to include climate change adaptations measures and strategies
- the use of the time series approach to model annual fish stock variations in Lake Malawi with climate change would be desirable for effective planning in the Fisheries Sector
- the Decentralization Policy over the last five years has created an opportunity to empower rural communities to manage their fish resources, including the enforcement of the Fisheries Act

- the vulnerability and adaptation assessments (V&As) provide a means of identifying and developing appropriate adaptation responses to the impacts of climate change
- the government should enhance efforts to promote co-management of fisheries resources, protected areas management, and promotion of aquaculture and cage aquaculture technologies
- initial regulations on the protection of fish stocks were directed at protecting Labeo mesops, especially the stock targeted by the ring-net fishing method
- changes in crop types would include: (vii) crop diversification by promoting horticulture, livestock, fisheries, and other cereal crops besides maize,
- the vulnerability of the fish stocks in the water bodies of Malawi requires that appropriate measures and strategies are put in place to address the identified problems
- the starting point is formulating implementable regulations for the most vulnerable fish stocks
    - the current thinking is that the involvement of local communities in what is termed a 'bottom-up approach' would be the most appropriate adaptation strategy
- aquaculture (pond fish farming) in Malawi has generally been on the increase, although its focus on the small-scale sector has limited its growth
- to effectively manage the available fishery resources, there is need to implement the Fisheries Act to the letter
    - the Fisheries Act should be amended to come up with a more clear statement on alien introductions as this only compounds climate change issues
    - conservation policies should be adopted through the involvement of communities to avoid past management failures that relied on "top down" approaches
- Proposed Climate Change Projects:
    - Reducing Siltation along the Shire River to Enhance Hydro-Power Generation
- Capacity building projects
    - Establishing a Global Climate Observatory Station (GCOS) on Mulanje Mountain, Mulanje District, Southern Malawi
    - Training of Professional Staff in Systems Analysis and Computer Simulation Modeling

6.17.4 MOZAMBIQUE

6.17.4.1 NAPA

CHALLENGES

- The use of fishery techniques that contribute to the destruction of sensitive ecosystems
- Floods, since they can to disrupt fisheries?

SOLUTIONS

- Inclusion of water management aspects in environment, land, mining, fisheries, forestry and wildlife laws are examples of the impact that the National Water Policy brought about.

6.17.4.2 NATIONAL COMMUNICATION

- The freshwater resources are mostly located in Lake Niassa and the Cahota Bassa reservoir. The annual registered catches are 30 000 tons yet the estimated potential is 90 000 tons
- The Southern part of the country's natural resources base experiences pressure arising from uncontrolled tourism activity
    - Tourism without proper planning
- The Vulnerability and Adaptation Assessment Report of Mozambique has identified the central region as highly vulnerable to flooding and erosion, particularly the Sofala province.
- Both economic development and impact of climate change will negatively affect water resources causing erosion, flooding and pollution of water in this region.
- These problems are exacerbated by some human-induced activities such as destruction of important ecosystem.
- Utilisation of fertilisers in agriculture in areas near the Buzi River

- there is a need to assess both climate change vulnerability and impacts of anthropogenic activities in the region and develop an integrated water resources management plan, which will consider activities to protect stressed ecosystems

SOLUTIONS

- There is an urgent need to combat developments that undermine the livelihood of communities, in terms of their dependence on fish protein, agriculture and other natural resources upon which these communities depend.
- Create alternative sources of income for the communities

6.17.4.3 PRS

CHALLENGES

- The output of the farming and fisheries sectors especially of foodstuffs on small and midsized farms and productivity are still very low
- The lack of opportunities for marketing farm and fishery products constitutes the principal disincentive for intensifying production, and limits the growth of rural family incomes.
- Increasing the coverage and quality of agricultural and fishery extension services; and promoting the development of traditional ("artisanal") fishing and aquaculture.
- Challenges of governance. The quality of the legal framework for economic activities and its effective enforcement;
- decentralization and deconcentration of functions and resources to the local level, so that local organs of government will have greater capacity to function and provide services to the citizens
- A true democratic rule of law in which all citizens and all enterprises have equal opportunities without discrimination.

SOLUTIONS

- To improve the sustainable management of natural resources; strengthen fishery and land administration
- The following priorities have been identified for promoting agricultural and fisheries production and productivity:
    - Encourage fishing activity in areas with fishery potential by providing incentives to local merchants to carry and sell fishery inputs.
    - Encourage the construction and stocking of land-based aquaculture tanks.
    - Expand access to electric energy and promote use of alternative sources, with priority for areas with agricultural and fishery potential
    - Promote and disseminate construction of local artisanal fishing and storage infrastructure
    - Government Program to Achieve the Objectives of the PARP 2011-2014 Increase fisheries production for food security: Enhance the contribution of the fisheries sector to the population's food and nutritional security.
    - Improve living conditions for small-scale fishing and aquaculture communities
    - Develop commercial fishing and aquaculture
    - Enhance the contribution of industrial fisheries and aquaculture to achieving national economic and social development objectives.
    - Enhance the contribution of fisheries to the balance of payments

6.17.5 NAMIBIA

6.17.5.1 NATIONAL COMMUNICATION

CHALLENGES

- In the Initial National Communication it is noted that the Namibian economy is highly susceptible to climate change effects because it is natural resources dependent

- The direct effects of climate change on the various economic sectors could potentially be felt in thematic areas such as water, agriculture, fisheries, ecosystems, biodiversity and tourism, health and energy.
- Namibia is a net importer of most agricultural and fisheries related products.
- The quantity of fish harvested in Namibian waters appears to be reaching a limit. The government has actively pursued value addition policies aimed at increasing onshore processing of fish products
- Lack of financing has hindered aquaculture from performing as expected. Nonetheless it is pursued to increase food security in the rural areas.
- The Namibian economy is export oriented and this exposes it to external factors like the world financial crises.
- Namibia's industrial sector remains small and little changed over the years
- Livelihoods in the eastern part of the region further depend on the interchange of the seasonal flow of water from the Zambezi, Kwando and Linyanti rivers, which causes flooding of the flood plain
- Nowadays, the region is considered vulnerable to flooding of the wetlands, as high stream flow of the Zambezi puts infrastructure that has been established in the flood plain at risk and makes economic life and access to schools, clinics and government services more difficult in times of 'flooding'
- There is a risk in that the Cuvelis wetlands are recharged by rainfall and run off from Angola, these wetlands can be negatively affected if there could be a decrease in these two recharges.
- There could be reduced productivity of flood plains and their lakes, thus disrupting breeding/growth cycles of invertebrates, fish and flora, as well as reduced ecosystem services such as water retention, flood attenuation and water purification
- In the worst case scenario large scale shifts in climate zones would reduce agricultural and fishing outputs, and the overall GDP would fall by almost 6% over 20 years
- Predicted increases in aridity and hence droughts will in turn influence agricultural production, forestry, fisheries resources, water resources, biodiversity as well as different ecosystems. These impacts will affect food availability and supply.
- In Namibia, climate change is predicted to severely influence variability of rainfall, shortening of rainy season, increases in temperature, increase potential evapotranspiration

SOLUTION

- A study by Reid et al. (2007) suggests a best case scenario where agricultural impacts would be offset by improved water distribution, with no impact on fisheries and GDP falling by only 1%
- Programme formulation with clearly set out, widely understood, and multi-stakeholder coordinated priority setting mechanisms will facilitate the implementation, monitoring and evaluation of well-thought government initiated research programmes
- A formal multi-disciplinary research programme review, evaluation, and monitoring exercise for Namibia is proposed to ensure that proper guidance is given to all research institutions,

6.17.6 TANZANIA

6.17.6.1 NAPA

CHALLENGES

- Destruction of breeding sites for fishes and other aquatic life

SOLUTIONS

- Restoration of degraded habitats e.g. vertica grass planting,
- Reduction or elimination of non-climate stress and monitoring. e.g. elimination of destructive fishing practices and over fishing, reduction of pollution and damaging extraction

6.17.6.2 PRS

CHALLENGES

- The fisheries sector regressed to 2.7% in 2009 from an earlier modest growth of 5% in 2008.

- Tanzania has an immense fisheries resource which however is exposed to IUU fishing and trafficking of fish and fish products across the borders
- This reduces the sector's capacity to contribute to growth and poverty reduction
- The use of inappropriate fishing gear by small and medium scale fisherfolk
- Limited credit resources
- Degradation
- Due to limited incentives for sustainable management (property rights etc), limited alternative livelihoods and unsustainable land management practices environmental degradation continued further to propagate the poverty cycle.
- Over utilisation of resources is driven by commercial interest, weak regulation and fragmented policy frameworks
- The economic value of revenues received from concessions and licenses from mining, forestry, fishing and wildlife commodities, was low.

SOLUTIONS

- Sound economic governance of the natural resources for poverty alleviation, both among the local communities as well as nationally, the poor significantly depend on natural resources for their livelihood
- Introducing and strengthening investments in large scale agricultural and fisheries storage facilities
- Strengthening agro-processing, fishery processing, and service sector and marketing baseline information to support agricultural and fishery growth;
- Promoting and adopting the use of science and technology in agriculture, including R&D for quality and nutritious food fishery products as well as ICT to provide information on prices, markets, and advisory services
- Developing and equitably deploying and retaining human resources especially crop livestock, forestry and fishery extension services
- Strengthening agro farmers, livestock keepers and fishers associations and cooperatives
- Strengthening fisheries resource management and utilization (including reduction of post harvest losses), value addition and marketing, protection and law enforcement;
- Promoting effective development of the aquaculture industry
- Providing adequate fisheries related infrastructure
- Order of Priority "drivers" of growth in agriculture
    - Value addition activities (agro, livestock and fish-processing, and mechanization)
- Ensuring food and nutrition security, environmental sustainability and climate change adaptation and mitigation
- Promoting increased fish production through aquaculture to complement declining capture fisheries
- Promoting grading and packaging of food products
- Increasing farmers, fishers and aqua farmers awareness on the full impacts of climate change on agriculture;
- Adequate storage capacity at strategic areas
- Implement measures that ensure sustainable harvesting of fishery resources
- Good management of revenue accruing from fisheries sector;
- Effective enforcement of fisheries legislations.

6.17.6.3 UNDAF

- While some structural changes in the Tanzanian economy are visible, these shifts have not benefited the labour-intensive sectors, such as agriculture, fishing, services all of which experienced a decline in GDP growth rates from 2007

- Programme Results Matrix: National and local levels have enhanced capacity to coordinate, enforce and monitor environment and natural resources for the implementation of an 'ecosystem approach' to fisheries, reduce illegal, unregulated and unreported (IUU) fishing
- Finalise and publish guidelines on benefit-sharing from reserves where local communities are co-managing reserves with government
- Support the development of sustainable financing mechanisms for the protected area estate of Tanzania

6.17.6.4 CAADP National Compacts

- Improving rural infrastructure and trade related capacities for improved market access. strategic intervention areas
- Increase support and incentives to artisanal fishers and aquafarmers
- Increasing food supply, reducing hunger and improving responses to food emergency crises.
- Promotion of fisheries and aquaculture development

6.17.7 ZAMBIA

6.17.7.1 NAPA

CHALLENGES

- Impacts of climate hazards
  - Drought
  - Reduced fish stocks, hence decline in fish catches
  - Floods
  - Extreme heat
- Effects of climate change will therefore render the fisheries sub-sector vulnerable based on its socio-economic significance to the country
- Commercial fish species (e.g. breams, sardines, etc.) in the drought prone agro-ecological zones 1 and 2 were particularly identified as being most vulnerable to such climatic change.
- the department has limited capacity to enforce strict licensing due to inadequate manpower and financial constraints
- The major constraints ….. include lack of legislation and legal framework to empower the committees

SOLUTIONS

- A need for integrated land management to ensure that watershed areas are not at risk to tree felling (for charcoal or firewood), that rivers and fisheries resources were protected and landscapes were preserved to support wildlife habitats
- Fish breeding to restock the lakes, rivers and dams
- Promotion of aquaculture
- Using species suitable for aquaculture in vulnerable areas
- Developing small dams, and other storage facilities, to mitigate droughts/flooding, to harvest water and to initiate community-based fish farming and breeding
- To empower small scale and rural fish farmers with relevant agricultural knowledge and skills in order to increase aquaculture production
  - started in 2006 and the current phase of the project should come to an end in 2007
- Training fish farmers through a 3-week residential course in aquaculture - This programme will improve the food security situation of the communities
- National Aquaculture Research and Development Centre (NARDC) - basic and applied research in the following areas: fish seed propagation; fish feed formulation; and pond environment.
- Rural Aquaculture Programme (RAP); to increase aquaculture production through improved extension service. - supported by American Peace Corps
- Aquaculture will contribute to the improvement of livelihoods of people.

- Increasing aquaculture and fisheries production in resource poor rural communities so as to reduce poverty
- CLIMAFISH; To assess the impact of climate changes on the ecology of Lake Tanganyika with a view to assessing the impact of current global warming on the biodiversity of the area
- There is the need to re-orient programmes of the fisheries sector so that issues on climate change either from the capture or culture fisheries are taken into account.

6.17.7.2 NATIONAL COMMUNICATION

CHALLENGES

- Effects of climate change will therefore render the fisheries sub-sector vulnerable based on its socio-economic significance to the country.
- to establish effects of temperature change on fish growth and feeding on one hand, and impacts of change in fish habitat conditions

SOLUTION

- Adaptation measures …. Strict licensing to regulate influx of fishermen to fisheries
- The new draft fisheries bill before Parliament incorporates co-management approach
- Promotion of fish farming and encourage fish conservation: aquaculture of fish farming has been incorporated in the new Act
- To develop fish research in both the natural fisheries and aquaculture

6.17.7.3 PRS

CHALLENGES

- In the last decade, environmental degradation, especially deforestation and wildlife and fish depletion, has become particularly severe and threatens sustainable economic growth
- Fish catches from the artisan sub-sector have remained static, averaging about 70,000 tons per annum. Consequently, the demand for fish outstrips supply
    - Increasing human population in fishing areas
    - Unsustainable fishing practices e.g. fishing in breeding sanctuaries and the harvesting of immature fish.
    - The sub-sector is constrained by poor storage and preservation facilities, unreliable transport services and poor infrastructure.
    - It is estimated, for example, that over 20 percent of the flood plains and swamps have been degraded as result of dam development, siltation and human settlements
    - over 50 percent of wetland fisheries resources have been considerably over-exploited

SOLUTIONS

- The fisheries sub-sector will focus on promoting community-based resource management of capture fisheries, thereby improving catches
- Concerted efforts will be made to promote aquaculture development and restocking natural water bodies with fish seed
- Better processing facilities will be promoted and the distribution network improved.
- To increase fish production and promote sustainable utilization of fisheries resources thereby contributing to the economy through the generation of employment, income and improved availability of fish
- Strategies
    - Conserve and maintain bio-diversity of aquatic resources through improved monitoring
    - Regulate and control the marketing and trading of fishing gears and fishing practices
    - Promote aquaculture development
    - Promote improved fish processing and storage

- Conduct soils, crops and fisheries research aimed at generating and adapting technologies for increased and sustainable agricultural production

NB. Solutions have been proposed taking into consideration the unique challenges of each province

- Southern Province. Programmes: Agriculture, Livestock and Fisheries Development.
- Objectives
  - To enhance growth in crop production
  - fisheries and animal husbandry
- Strategies
  - Train Extension Officers in fisheries; f) Establish fish processing plant

6.17.7.4 UNDAF

CHALLENGES

- Evidence based planning, research, implementation, programming, policy development, monitoring and evaluation, partnership, legislation and enforcement

SOLUTIONS

- Government institutions to design, implement and evaluate pro-poor responsive food security policies and programmes in accordance with global and regional agreements/ protocols/ frameworks.
- People's vulnerability reduced from the risk of climate change, natural and man-made disasters and environmental degradation by 2015
- Government implements policies and legal frameworks for sustainable community based natural resources management