

# Study on the effects of Climate Change in the Cuvelai Etosha Basin and possible adaptation measures

## FINAL REPORT

*Juliane Zeidler, Laudika Kandjinga and Asellah David*  
*Integrated Environmental Consultants Namibia*  
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# 1. A brief introduction to the study and consultative workshop

## Introduction and brief overview of terms

Climate change is an important issue on the development agenda and renders urgency for action. The Integrated Water Resources management project of the German Technical Cooperation (GTZ) in Namibia, a collaboration of the German Ministry for Economic Cooperation (BMZ) and the Namibian Ministry of Agriculture, Water and Forestry (MAWF), has secured initial resources from the so-called “Fast Start Finance” programme of the German Government to identify and act on immediate information needs on this important topic in the Cuvelai Etosha Basin.

The **objective** of the study is to describe possible measures to cope with the effects of climate change within the Cuvelai Etosha Basin. Firstly the document reviews and captures existing facts about climate change in Northern Namibia, highlighting the main results of current studies and documents, secondly it describes relevant climate change related impacts on the Cuvelai Basin. It then makes recommendations to stakeholders how to cope with the existing/projected phenomena of climate change. Lastly the study makes recommendations for priority activities of an information campaign that will make use the presented content. The detailed Terms of Reference for the study are included in Annex 1.

Dealing with a new hot topic brings with it a range of important fresh terms, which warrant specific introduction. Instead of including a specific glossary, key terms are briefly described in the following:

**Climate change projections (versus predictions):** “projection” is an estimate of the rate or amount of something, whilst “prediction” is a statement about what somebody thinks will happen in the future.

**Climate change risk:** The estimated extend of climate change in the future.

**Vulnerability:** The low degree of ability to react to the expected changes.

**Climate change impacts:** The effects, or impacts, of climate change may be physical, ecological, social or economic.

**Adaptation versus mitigation:** Climate change mitigation is the action to decrease the intensity of radiative forcing through e.g. emission reduction, in order to reduce the potential effects of global warming. Adaptation to climate change consists of initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change risks/effects.

**Climate risk management (CRM):** is a term is used for a large and growing body of work, bridging the climate change adaptation, disaster management and development sectors, amongst many others.

**Maladaptive:** poorly adapted, or unable to adapt well; not assisting the promotion of adaptation.

As part of the preparation of this document, a consultative meeting with stakeholders in the Cuvelai-Etosha Basin was conducted on 25 October 2010, with the following objectives:

- Review and comment on document content
- Make contributions to the picture documentation of the study
- Identify or confirm stakeholder information needs and most effective communication media
- Agree on final design of information campaign
- Brainstorm slogan for campaign

The views and inputs from the stakeholders are included in the document and the concept for a communication campaign on climate change adaptation in the Basin.

## 2. What does the science say? The projected climate change risk related to the Cuvelai Etosha Basin

### ***Who is who in the climate science context***

Climate change projections to date are very coarse and the confidence level of the simulated information is often quite low. Most of the projections<sup>1</sup> available stem from global simulation models that have been developed and agreed to by the so-called Intergovernmental Panel on Climate Change (IPCC; <http://www.ipcc.ch>), an international science policy and research committee that has been established to provide independent scientific information on climate change in a multi-lateral setting – with representatives from most of the UN countries. So far, the IPCC has produced four assessment reports and the process for drafting the fifth report has recently been initiated. The various reports are downloadable from IPCC website indicated above, and some relevant information will be presented below. Of course there are researchers from Universities, research institutions and think tanks that undertake specific climate change research, but relatively limited work is done in the area of concern.

### ***What is the difference between weather and climate and what is climate change?***

The difference between weather and climate is a measure of time. Weather is what conditions of the atmosphere are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time. When we talk about climate change, we talk about changes in long-term averages of daily weather. Today, children always hear stories from their parents and grandparents about how there used to be two distinct rainy and harvesting seasons in northern Namibia. Today in northern Namibia we mostly only experience one rainy season, and its' onset is shifting towards later period in the growing season. The changes in the growing season indicate that the climate has changed over the past decades.

### ***What climate change information is available for Namibia?***

It is important to understand that the projections presented in the reports represents the best available science, however they are produced on a global scale and provide only quite general information on a basin scale, such as for the Cuvelai Etosha Basin. Namibia has conducted what is called as the Vulnerability and Adaptation Assessment (V&A Assessment) as part of preparing the Second National Communication (SNC) to the UN Framework Convention on Climate Change (UNFCCC). The V&A Assessment conducted in 2008 includes some initial Namibia-specific analysis of long-term trends in the climate, and applies improved regional models to future climate projections. Namibia is one of few countries in the region that have undergone a specific climate change risk modelling, and some interesting more defined information on potential future climate is available. It is clearly understood that these projections are only indicative, and that the ever improving models as well as improved input data are required to model more robust future projections. However, in the absence of better data and more robust projections, current thinking and decision-making need to be based on the current knowledge – acknowledging the high degrees of uncertainty in the information used.

It needs to be said that for Angola, where a main part of the Cuvelai Etosha Basin is situated, no regional projections are available and the IPCC information is the most robust available. Few rain gauges are set up in the basin, and limited historic or longer-term climate and /or weather records are available. Angola has also not completed relevant reports under the UNFCCC, from which at least general data could be drawn. In the absence of such information it is difficult to provide a more detailed and formalised profile of past climate, and modelling of regionalised projections will also be less robust.

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<sup>1</sup> See p. 3 for a definition of the terms "projection" versus "prediction"

This said, Namibia has some good information available, which allows to better understand the potential future climate change risk and potential impacts of such changes in different sectors.

*How is Namibia's and the Cuvelai Etosha Basin's current weather normally described?*

Namibia is commonly described as the most arid country south of the Sahara, with a naturally highly variable climate. Persistent droughts, seasonal floods and generally unpredictable and variable rainfall and temperatures characterise "normal" weather conditions in Namibia (GRN, 2002). Often two rainy seasons are described, with a "small" season commencing in September and October, and the "big" rainy season mostly lasting from January through to March and sometimes up to May. The agricultural calendar has been set up in line with these "historically observed" patterns, although agro-meteorologists have differing views on this classification, mostly categorising Namibia as mono-seasonal.

*What are the future projections?*

Projections for Namibia and the southern African region suggest significant vulnerability to the impacts of climate change (IPCC<sup>2</sup>, 2001 and 2007). The IPCC in their Third Assessment report of 2001 suggested that by 2050, temperatures and rainfall over southern Africa will be 2 – 4°C higher and 10 – 20% less than the 1961-90 baselines, respectively. According to the IPCC's Fourth Assessment report of 2007 (IPCC, 2007), all of Africa is very likely to warm during this century. The annual mean warming of the African continent is likely to be larger than the global warming average. It is also expected that drier subtropical regions, such as Namibia, will warm more than the moister tropical areas. Lastly, predictions indicate that rainfall in southern Africa is likely to decrease.

Results from model projections for southern Africa (Scholes & Biggs, 2004) do indicate that for the Cuvelai Etosha basin area, including in the upper catchment areas in Angola a significant warming as well as drier climatic conditions can be expected. Records and projections from regional models applied to Namibia confirm such trends, observing a west to east gradient in increased temperature and a reverse gradient of relative increased aridity from east to west (Biggs et al., 2004; Midgley et al., 2005; GRN, 2002). No information on projected frequencies and magnitudes of extreme events such as floods and/or droughts are available at this time.

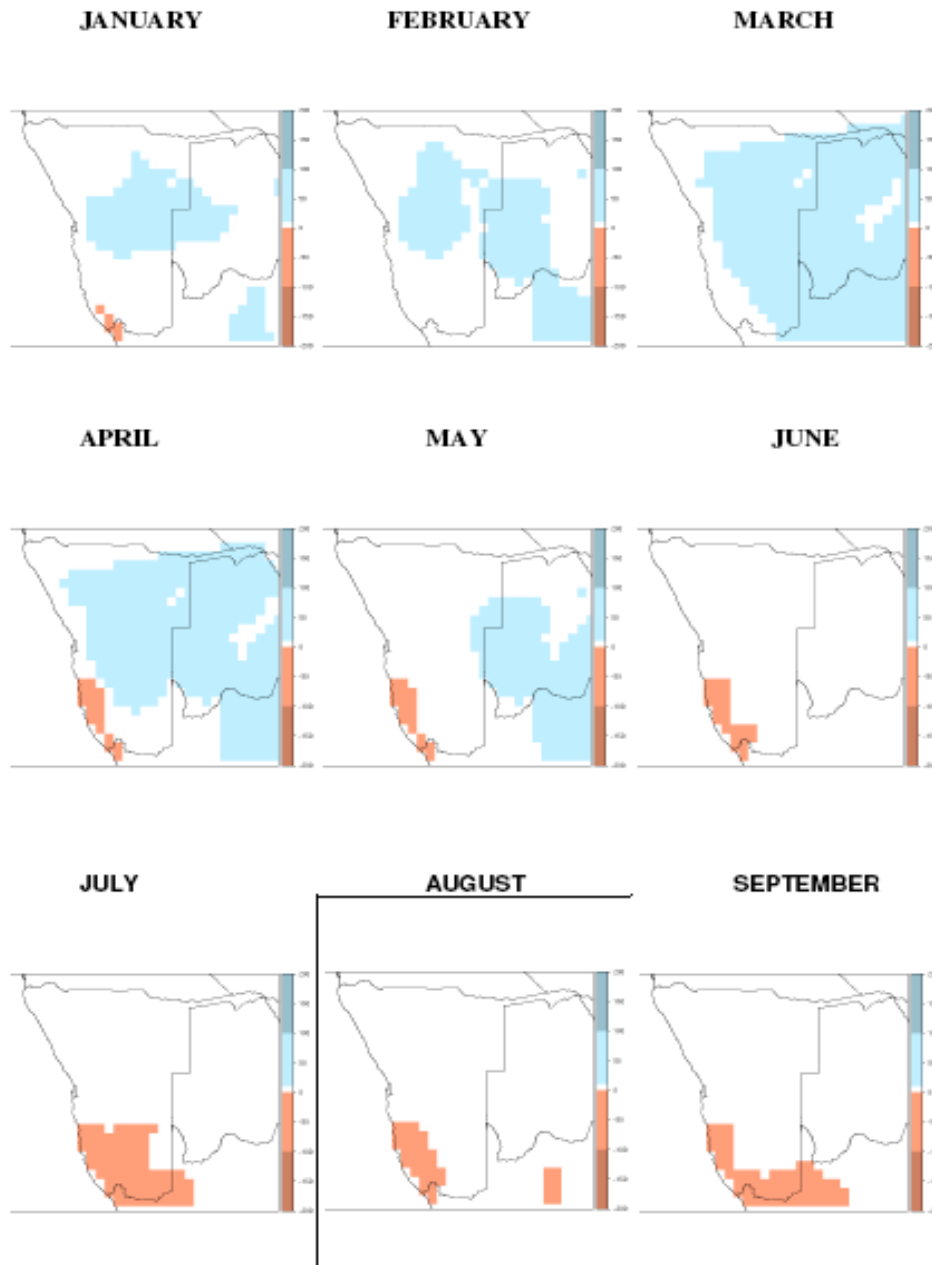
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<sup>2</sup> IPCC = Intergovernmental Panel on Climate Change

**Figure 1:** HADCM3 climate model projections of changes in temperature 9(a) and precipitation (b) for 2050 relative to mean conditions over the 1961 to 1990 period, under the IPCC SRES A2 (high emissions) scenario. Source: Scholes & Biggs (2004) in Biggs et al., 2004.

The recently completed V&A Assessment suggests that variability and expected changes vary strongly within the boundaries of Namibia (DRFN, 2008), and more differentiated statements on the expected climate change impacts are needed.

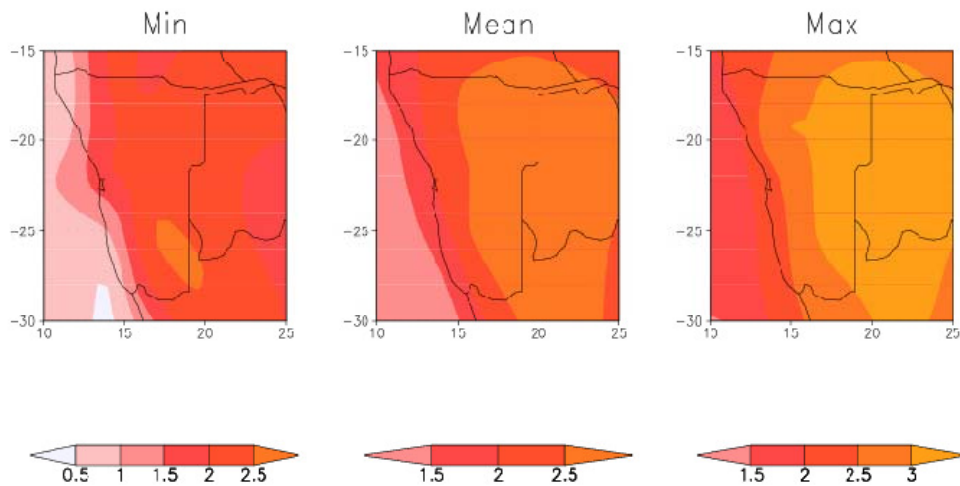
In terms of projected rainfall changes (Figure 2), downscaled regional models indicate that there are areas in Namibia, which would experience seasonal increases in monthly rainfall, with especially Namibia's central areas benefiting from additional rainfall. Namibia's winter rainfall areas in the south west and south are indicated to become overall drier, with monthly rainfall amounts subsiding. Other areas (indicated blank), will potentially not experience overall gains and losses in monthly rainfall, balanced out by evapotranspiration levels expected with projected changes in temperatures.



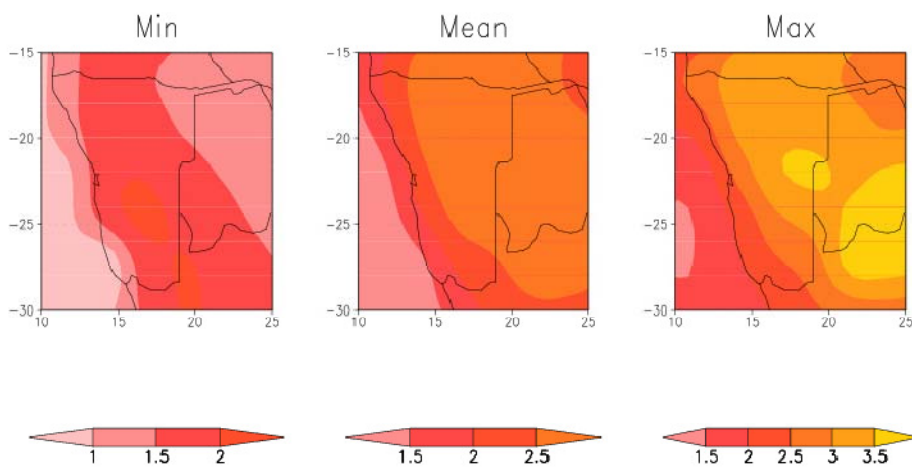
**Figure 2:** Median change in total monthly rainfall ( $\text{mm month}^{-1}$ ) from 6 statistically downscaled GCM rainfall projections. Areas in blue indicate a wetting, in red a drying and blank areas indicate areas of potentially no change. Source: DRFN, 2008.

Minimum, mean and maximum projected changes in temperature range between a warming of mean surface area of a minimum of approximately  $2^{\circ}\text{C}$  to a maximum of approximately  $3.5^{\circ}\text{C}$ . Seasonal trends are projected (Figure 3). Overall a significant warming is depicted, with the Cuvelai Etosha Basin being affected by such warming.

(a) January to March



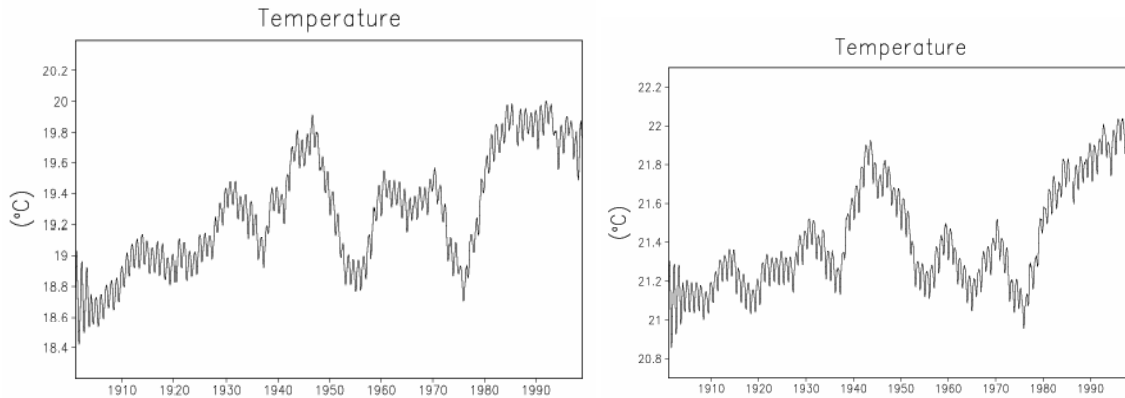
(b) July to September



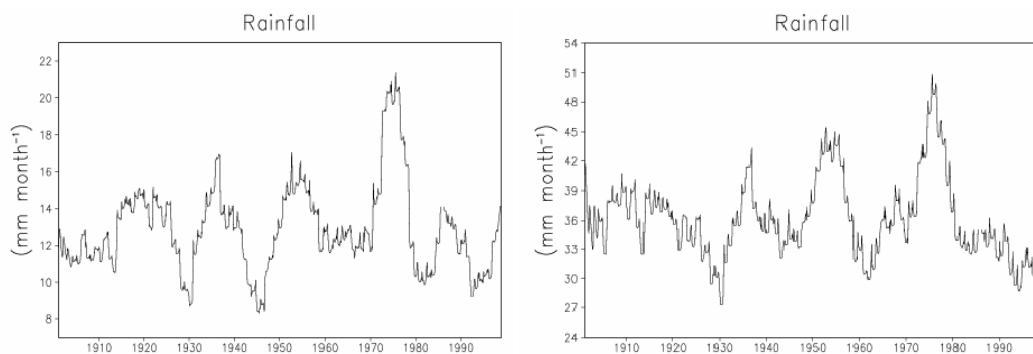
**Figure 3:** Minimum (left), mean (middle) and maximum (right) projected change in a) January-March and b) July-September mean surface air temperature ( $^{\circ}\text{C}$ ) from 13 GCMs. Source: DRFN, 2008.

Figures 4 and 5 depict long term climatic data (temperature and precipitation) for northern and southern Namibia, respectively and clearly depict the highly variable nature of Namibia's natural climatic conditions. Climate change discussions in Namibia must keep this natural variability in mind to engage in a meaningful discourse on climate change issues facing the country currently – and in the long term.





**Figure 4:** Surface monthly air temperature ( $^{\circ}\text{C}$ ) measurements 1901-2000: a) southern Namibia ( $16-20^{\circ}\text{E}$ ,  $28-24^{\circ}\text{S}$ ); b) northern Namibia ( $16-20^{\circ}\text{E}$ ,  $22-18^{\circ}\text{S}$ ). Source *Climate Research Unit (Mitchell et al. 2004)*.



**Figure 5:** Monthly mean rainfall ( $\text{mm month}^{-1}$ ) measurements 1901-2000: a) southern Namibia ( $16-20^{\circ}\text{E}$ ,  $28-24^{\circ}\text{S}$ ); b) northern Namibia ( $16-20^{\circ}\text{E}$ ,  $22-18^{\circ}\text{S}$ ). Source *Climate Research Unit (Mitchell et al. 2004)*.

### 3. What are the expected climate change impacts and vulnerabilities?

Namibia is considered to be highly vulnerable to climate change (DRFN., 2008) due our economy's high dependency on the climate sensitive sectors of rain-fed agriculture, fisheries, and eco-tourism. Most importantly, Namibia is highly vulnerable due to lack of both financial and human capacity to deal with climate change and its effects. More than half of the Namibian population lives in rural areas and directly depend on subsistence, rain-fed agriculture for their daily livelihoods. In order to safeguard the livelihoods of these people, adaptation and mitigation<sup>3</sup> measures need to be put into place.

Most key sectors of our economy will be affected by climate change, even if they are generally already highly adapted to the naturally extremely arid and highly variable climate conditions. Overall the frequency and intensity of extreme events (e.g. drought and floods) is expected to increase, affecting, for example, water availability i.e. reducing grazing distances and hydropower production, vegetation and land degradation, ecosystems and biodiversity, with negative impacts on poverty, economic development, health, and food production<sup>4</sup>. The country's poor rural population, particularly pastoralists and drylands populations, will be affected most (Reid *et al.* 2007).

<sup>3</sup> Mitigation is not the subject of this study and will not be addressed in further detail.

<sup>4</sup> University of Gothenburg. (2008). Namibia Environmental and Climate Change Policy Brief.

Some of the expected impacts directly relevant to the Cuvelai Etosha Basin are described in the following sections, giving an indication of how climate change may affect people in their daily lives. The information is mainly based on Namibia's V&A Assessment report of 2008.

### **Agriculture**

- Namibia's agriculture sector is already adapted to naturally arid and semi-arid conditions, high variability and the sporadic occurrence of prolonged droughts. Sometimes wetter periods occur, and severe flooding in major catchment areas may be observed.
- Much of the land used for agricultural purposes is already marginal in Namibia, partially also in the Cuvelai Etosha Basin. Changes in rainfall variability and quantity will affect agricultural viability in some of the basin areas.
- Climate change will affect agricultural yields directly through changes in temperature and precipitation, and indirectly through changes in soil quality, introduction of pests, and diseases.
- Increased aridity is expected to lead to an increased grazing stress and deteriorating vegetation, resulting in a reduction of livestock productivity. Animal health is affected by heat stress and reproductive rates of livestock may decline, especially of breeds that are not well adapted to the local climatic conditions.
- A reduction of crop yields is expected, resulting in temporary or even longer-term food shortages, poor nutrition and malnutrition, dependency from others. However, there might also be positive effects due to higher CO<sub>2</sub> levels, which may increase productivity especially in so-called C<sub>4</sub> plants<sup>5</sup>.
- Seasonal shifts in the rainy season are expected to lead to a shortening of the growing season, especially reducing the time for crops to ripe. This may have a significant impact on grain production, and may require an adjustment of currently prevailing agricultural calendars and practice.
- Overall, for the north-eastern agro-pastoral region of Namibia, including areas in the Cuvelai Etosha Basin, a loss of dryland crops and of rangeland capacity are predicted.
- Impacts related to disease and parasites, due to changes in the development of pathogens under changed climatic conditions are expected<sup>6</sup>.
- Higher temperatures increase the amount of moisture that evaporates from land and water, leading to water scarcity or drought in many areas.
- Increased pressure on water resources and reduction of arable land are predicted as the climate is likely to become hotter and drier, presenting a challenge for combating desertification and land degradation. Changes in land-use patterns, caused by the pressure to react to climate change impacts, may lead to land degradation and unsustainable use of resources.

### **Water and Fisheries**

- Under the likely scenario of decreased rainfall and increased evaporation, Namibia is likely to face severe water shortages (Reid *et al.* 2007). Even without climate change, Namibia faces absolute water scarcity by 2020 (Reid *et al.* 2007). Although specific information for the Cuvelai Etosha Basin is absent, from the regional projections presented above, such a

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<sup>5</sup> C<sub>4</sub> plants possess biochemical and anatomical mechanisms to raise the intercellular carbon dioxide concentration at the site of fixation, and this reduces, and sometimes eliminates, carbon losses by photorespiration. C<sub>4</sub> plants, which inhabit hot, dry environments, have very high water-use efficiency, so that there can be up to twice as much photosynthesis per gram of water as in C<sub>3</sub> plants, but C<sub>4</sub> metabolism is inefficient in shady or cool environments. Less than 1% of earth's plant species can be classified as C<sub>4</sub>.

<sup>6</sup> Newsham, A & Thomas, D. (2009). Agricultural adaptation, local knowledge and livelihoods diversification in North-Central Namibia. Working Paper 140:Tyndall Centre for Climate Change Research

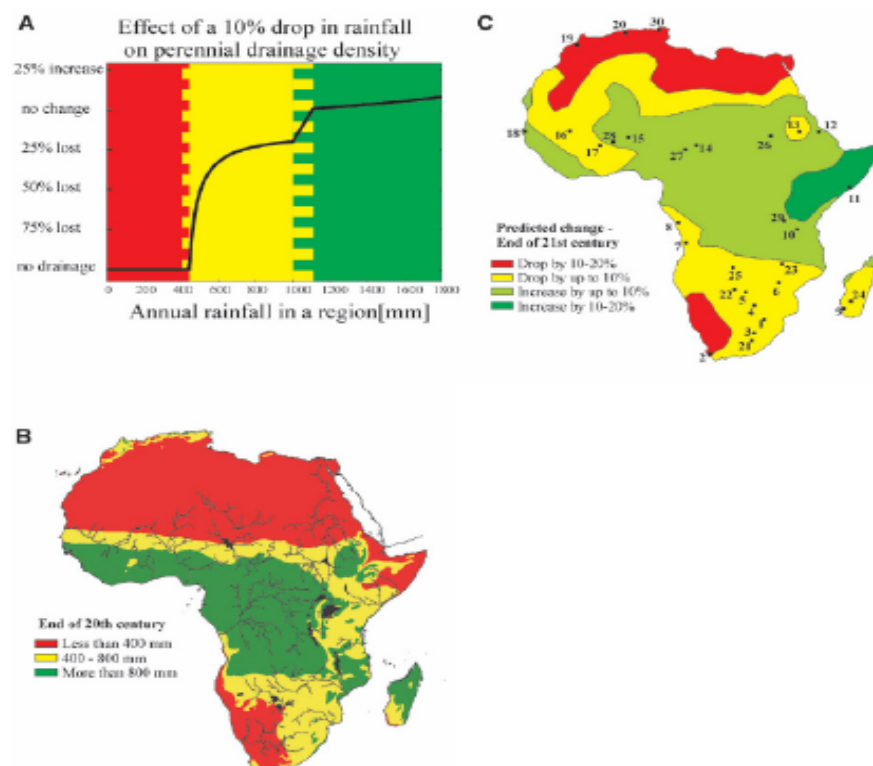
trend can be corroborated. The rivers most likely to be affected by the predicted decrease in flow from Angola are the Kunene and the Cuvelai system.

- Climate change is likely to affect water resources by increasing the demand for water, changing surface water and stream flow regimes and through possible effects on groundwater, such as depth of the water table and water quality (DRFN., 2008; Box 1).
- In Namibia, even if rainfall changes would vary little from present levels, the overall water balance is expected to become drier because of an increase in evaporation rates due to temperature increases.
- Consequently declines in water availability are expected, including in the Cuvelai Etosha Basin. Reduced water availability will impact on numerous sectors of Namibia’s economy as well as on household economics, affecting forests and other natural ecological systems as well as agriculture, power generation, infrastructure, tourism, and human health<sup>7</sup>.
- This implies that the country is likely to witness an increase in the number of people living under water stress (Bates *et al.* 2008).
- There will be increased demands for water usage, potentially reducing the ecological reserve with serious negative implications for the natural vegetation.

**Box 1: What do we know about the expected water basin related impacts**

Different climate change impacts on water basins are expected. Perennial drainage density is one important aspect of basin characteristic and with projected climate change, such drainage density will be affected. Generally, the areas in which the Cuvelai Etosha Basin is situated (including Angola) project a drop of drainage density of up to 10%.

**Figure 3.3** Effect of 10% reduction in rainfall on perennial drainage density by 2070 - 2099 for the B1-scenario (A); Rainfall regimes at the end of the 20<sup>th</sup> century (B); Map of Africa showing predicted change in precipitation (C). The numbers indicate selected locations for which the effect on perennial drainage density has been calculated.



Source: (De Wit and Stankiewicz 2006)

<sup>7</sup> Adaptation Learning Mechanism (ALM): Climate country profile: Namibia. Country pilot partnership for Integrated Sustainable Land Management (CPP) Namibia: Adapting to Climate Change through the Improvement of Traditional Crops and Livestock Farming (CPP NAM: CCA)

- Changes in air temperature and in evapotranspiration will affect the temperature of surface water. An increase of temperature may exacerbate eutrophication, a process that lead to oxygen depletion in water and allows algae and other organisms in the water to thrive, and negatively affect water quality. It may lead to or exacerbate various forms of water pollution. Native fish species may be negatively affected by such temperature and environmental changes and lead to the extinction of individual species. Positive effects could be that more food for fish might be available; however no final and conclusive information on the expected impacts is available at this time.
- Extreme events such as severe flooding with high levels of sediment from erosive action in the upper basin, may change the environmental condition for fish and other organisms to thrive. Additionally such sedimentation can lead to the siltation of the Oshanas<sup>8</sup>, a phenomenon already observed and rendering the water bodies unfit for watering livestock. Overall it is believed that the Oshana's will be inundated by floods but then dry out sooner due to increased evaporation rates.

### Human health

- Climate change related impacts in the health sector can be broadly categorized in three groups namely<sup>9</sup>:
  - i. Temperature-related health impacts and effects
  - ii. Water-borne and vector-borne diseases
  - iii. Health-related effects of food and water shortages.

All of these categories are of relevance to the people living in the Cuvelai Etosha Basin under the projected climate changes.

- First of all, unexpected flash floods as well as the unusual extent of water bodies can pose direct threats to humans and even cause death by drowning. Although not very common in northern Namibia due to the flat geographic characteristics of the Cuvelai Etosha Basin, the sudden and powerful rise of water poses a threat to human and animal lives.
- Already, in Namibia the main causes of deaths in children under five-years old are diarrhoea, under-nutrition, and malaria. All these illnesses and ultimately deaths are related to environmental circumstances, and it is asserted that they will be exacerbated by the effects of climate change. For example, increasingly hot climates weaken people and especially children. Food may go off more readily, especially if no advanced food storage options are in place, and diarrhoea can be a consequence. Because the climatic conditions are already trying, the effects of the diarrhoea can be detrimental for the already weakened child.
- During the dry season, food supply is limited, and the nutritional status, particularly of the rural population, is poor; additionally the reduced availability of clean water impacts on the health status of the people. Increased frequency and intensity of occurring droughts in the future would exacerbate these problems.
- During flood events, such as the 2008 and 2009 extreme inundations of the Oshanas, lead to the long-term standing of large water bodies, providing breeding ground for water-borne diseases. Although the Oshanas are naturally filled with run-off water from the upper catchment areas, and increased water flow, linked to warmer temperatures, enhances mosquito breeding. The occurrence of malaria will become more wide spread and more persistent.
- The risk of the spread of other serious waterborne diseases such as Cholera and Bilharzia is directly linked to an increased flood risk. Flooding especially of sanitation facilities, as well as the limited opportunities for hygienic sanitation during floods events (i.e. toilets are not

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<sup>8</sup> Oshanas is the Oshivambo term for the water drainage system cutting across the Cuvelai-Etosha Basin. The Oshanas only carry water seasonally, and mostly the run-of water that originates from upstream evaporates. In years of intense rainfall the drainage water can accumulate in Etosha pan.

<sup>9</sup> Review and Update of National Circumstances( DRFN, 2009).

accessible, or faeces are washed up) provide an excellent breeding ground for the bacterium, and epidemics can easily build up.

- During severe flood events, people and homesteads may be cut-off from service centres for a prolonged period of time. People affected by waterborn diseases may not be able to access health care, and those in need of regular medication e.g. Antiretrovirals (ARVs) are unable to source their medication.

### **Energy and Infrastructure**

- In Namibia, including in the rural areas of the Cuvelai Etosha Basin, people do depend mostly on biomass as a source of energy. Most households use wood for cooking and heating of water. Electrification of the rural areas is poor, and limited use of alternative sources such as gas of paraffin is made. Climate change will affect the distribution and availability of wood resources. Although the time horizon of a marked shift in vegetation types is long term, and local energy availability and use should be more advanced by the time such shifts are observed, it is an important policy impetus to plan for relevant development and adaptive measures already now.
- On a larger scale, hydro electrical projects such as at Ruancana, may be affected by changes flood regimes, siltation and related challenges, further highlighting the importance to invest in the development of alternative energies such as solar.
- The severe floods of 2008 and 2009 in the Cuvelai Etosha Basin have shown that infrastructure is vulnerable to flooding. Settlements situated close to the Oshanas were severely inundated, and many people experienced damage or loss of their homes, belongings and goods. Public services were interrupted for prolonged time periods (e.g. schools) and e.g. roads and storage facilities were damaged.
- Flood events are predicted to become more aggressive, destructive and frequent in the Cuvelai Etosha Basin (GRN. 2002<sup>10</sup>; DRFN. 2008) in the future, and damage to infrastructure may be significant.

### **Disruption of business as usual, emergency relief and economic impacts**

- Any emergency situation, such as severe droughts and floods, require government and private sector emergency support. Assisting vulnerable people with evacuations, food relief, and other support is a costly undertaking with significant impacts on state coffers.
- During the floods of 2008 and 2009 in northern Namibia, the business community indicated major losses in business and income, and household economics were badly impacted<sup>11</sup>.
- Lack of savings and more formal insurance schemes that would protect rural households from livelihood threatening impacts of climate related risks render such people extremely vulnerable. Losing a seasons' harvest, a home or any belonging can have detrimental effects on already marginally living people.
- A disruption of public life, such as the prolonged closing of schools during emergency situations, can bring with it an accumulated negative social effect. Not only do children miss on important preparatory time for exams, they also have longer spells of "unsupervised" time, which can lead to side effects such as increased teenage pregnancy.
- Reconstruction of damaged infrastructure can be costly to Government as well as individuals. Any emergency is a set-back to local development and poses a challenge to public services.

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<sup>10</sup> GRN. (2002) Initial national communication to the United Framework Convention on Climate Change. Retrieved August 10, 2009, from <http://unfclimatechange.c.int/resource/docs/natc/namnc1.pdf>

<sup>11</sup> See archived articles at <http://allafrica.com/stories/200802080513.html> and <http://allafrica.com/stories/200803250494.html> or see [http://www.namibian.com.na/index.php?id=28&tx\\_ttnews\[tt\\_news\]=48326&no\\_cache=1](http://www.namibian.com.na/index.php?id=28&tx_ttnews[tt_news]=48326&no_cache=1)

## 4. Framework for an holistic adaptation approach

So what can be done about climate change and how can Namibia prepare for its impacts? Before going into the practical actions which can be taken, it is useful to first analyse a bit more systematically at which levels interventions must be planned.. Who are the main stakeholder groups in the Cuvelai Etosha Basin, and what are their climate change adaptation needs?

Figure 6 depicts a generic map of distinct stakeholder groups that are affected by or have to deal with climate change. Firstly, each of everyone is affected as an individual, a household or community. Livelihoods are directly impacted by and at risk from climate change. Secondly, institutions, which may also be affected by the climate change impacts, have to address climate change risk and adaptation in their work portfolios, i.e. through their extension services and product orientation.

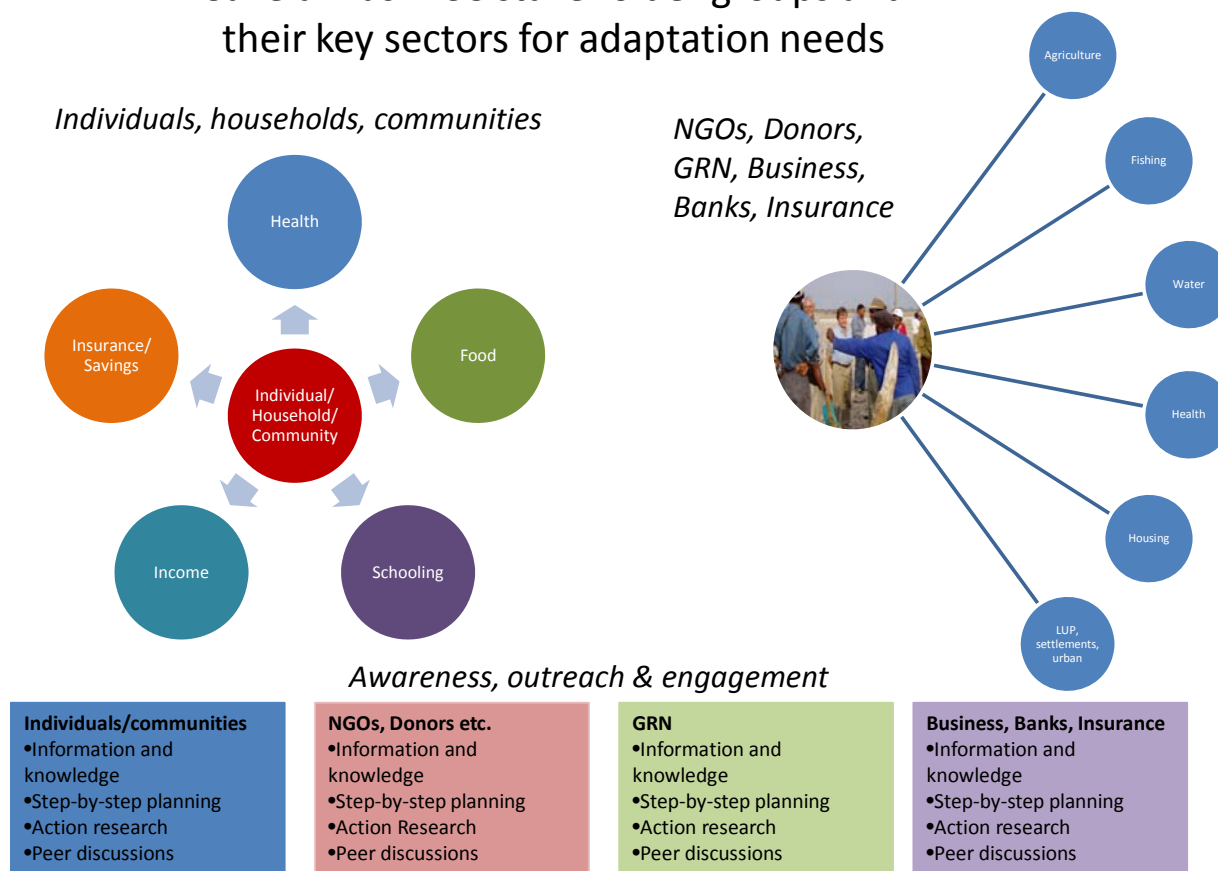
Box 2 provides some fictive descriptions of the cross-sectoral nature of climate change impacts and points to the need to address climate change in an integrated and holistic manner.

**Box 2:** Examples of how climate change may affect the (1) individual or household level and (2) work of public services can be visualised by the following fictive descriptions and accounts:

(1) Living in rural areas in the Cuvelai Etosha Basin, it is likely that food supply is directly affected by climate and extreme events, either on individual level or even on the market, where the supply of mahangu and other local produce will depend on the annual agricultural productivity. In poor rainfall years, under prolonged dry-spells and drought conditions, food security might be poor and health impacts due to unmet nutritional needs may occur. A lack of income because of a failed harvest or dying livestock may ban children to go to school. With no savings or insurance, household economics are driven into real poverty. On the other hand, in a year with an excessively strong flow of water in the Oshanas, low-lying fields are inundated, crops perish and army worm outbreaks destroy the harvest. Meme Lachia from Okaku village recounts: *“Flooding destroyed our belongings in the house, and the children were unable to go to school. Grandpa, who has a chronic heart disease and high blood pressure, was unable to get his medication from the pharmacy and seriously fell ill. No cash income could be generated from the farm this year, and due to a lack of money, the destroyed goods at home cannot be replaced. The floods seriously have impacted on our family life, and our resource base at home has been destroyed”*.

(2) For institutions, the challenges are mostly that climate change is a reality that must be addressed in their sectoral work. Governmental extension services are tasked to assist vulnerable communities in preparing for the projected future impacts, and information and knowledge about what the real climate change risk will be, what impacts are to be expected and how to address them are needed. Knowing that community outreach is difficult even under the best climatic circumstances, risk preparedness and adaptation capacity building must be integrated into ongoing development work. So far, climate change has been seen to be an environmental issue of concern mainly in emitting or “polluting” countries, with mitigation being of major importance. As the long-term climatic changes are still difficult to pin down and scientific evidence is still afflicted by high levels of uncertainty, it is difficult to transmit unequivocal messages to farmers, land managers, business people, and the community per se on what they must do to protect themselves from climate change risks. The recent floods in the Cuvelai Etosha Basin are a compelling example of what climate change impacts could look like – even if these events are probably more related to naturally variable climatic conditions. Mr. Kandjinga of the Ministry of Agriculture, Water and Forestry says: *“As Government service we would like to convince the private sector to develop better support actions for our farmers, helping them to build adaptive capacities. We need to be well informed to be able to discuss e.g. micro insurance schemes with relevant institutions. Also, as Ministry of Agriculture, Water and Forestry we have been involved in climate change issues since three years or so, but so far we have not been able to generate a sense of urgency for such matters with other sectoral counterparts, which is frustrating our work”*.

## Cuvelai Basin CC stakeholder groups and their key sectors for adaptation needs



**Figure 6:** Two distinct stakeholder groups in climate change and climate change action are (i) individuals, households and communities, who are directly affected by the impacts of climate change and (ii) NGOs, Donors, Government, Business, which are intermediaries assisting or dealing with climate change interventions. Different sectors or issues are affected by climate change in these stakeholder groups, and holistic adaptation options are sought for to build climate resilience. When planning climate change adaptation support, it is important to identify what type of awareness, outreach and engagement activities are required by each stakeholder group to be better prepared to take adaptive actions.

## 5. What can be done? Learning from existing coping mechanisms and adaptation innovation

Considering that Namibians have been exposed to difficult natural conditions for centuries, many local practices and drylands adapted policies are in place already. Mostly such practices need to be improved to cater for the expected worsening climatic conditions and impacts, and flexible updating and evolution of existing systems is recommended. Valuable lessons can be learnt from so-called existing coping strategies and from new innovations in Namibia or elsewhere in the world. Based on initial studies undertaken in northern Namibia, and on discussions with sector experts, a suite of practical suggestions for possible adaptive measures has been identified.

### Ideas for adaptation at the individual, household and community level

#### Health

- Boiling water from Oshana plains before use to ensure that bacteria such as the ones causing Cholera are killed
- Using clean or boiled (disinfected) water is particularly important for babies, infants and small children; breastfeed as long as indicated for your child if you can, to avoid usage of contaminated water for bottle preparation
- Protecting yourself from mosquitoes and other pathogens (agents of disease) e.g. by using mosquito nets; malaria can be prevented significantly if we sleep protected from mosquitoes
- Keeping savings to buy food in emergency situations, such as long drought periods; stock up on emergency food when droughts or floods are expected
- Eating wisely and use nutrient and vitamin supplements to avoid under-nutrition especially in harsh climatic conditions
- Ensuring that an adequate supply of subscription drugs is stored at home, in case flooding prohibits people from visiting the next health care centre
- Preventing heat stroke and dehydration in hot climates by wearing appropriate clothing (light fitting, light colours; wear hats); ensure that one drinks sufficient water or other liquids that rehydrate (avoiding alcohol, which dehydrates!); avoid the hottest part of the day by rather getting up early to go for work in the fields
- In the case of flooding, care should be taken when entering the water, especially with children; for people who cannot swim; drowning is a real threat; small children must be guarded in particular; human “chains” can be build to provide hold.

#### Agriculture and Food production<sup>12</sup>:

- Testing and application of drought tolerant crops and heat resistant livestock breeds
- Changing to improved and traditional crop varieties (use of improved crop varieties)
- Diversifying the resource base (to minimize the risk due to harvest failure, they grow many different crops and varieties, and they also fish and gather wild food plants)
- Application of conservation agriculture systems, crop rotation and intercropping
- Improving soil fertility through application of fertilizer and manure
- Application of conservation tillage practices
- Applying adaptive resource management principles, de-restocking when there is no grazing or supplement fodder, and restocking when fodder is available again; moving animals to cattle posts during the dry season
- Adjusting previously known agricultural or farming calendars to new climatic conditions

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<sup>12</sup> Most of the examples given in this section are based on a report focusing on Omusati region: Kuvare, U., Ogunmokun, A., & Maharero, T. (2008). Assessment of Current and Ongoing Projects and Programmes to Identify Existing Coping Strategies with regards to Climate Change Variability. Namibia UNDP Report



- Using relevant weather forecast and drought and flood warnings in decision making; access relevant information; tracking of local rainfall and natural resources
- Using environmental cues both on flora and fauna to predict the likely weather scenario for the season, if you feel confident that your indicators are indeed working
- Enhancing food security and agriculture-based livelihoods by careful planning for emergency situations (e.g. storing of grains for future use, setting aside savings for necessary farm investments)
- Applying household level irrigation methods for home gardens, if water is available (e.g. from rainwater harvesting, desalinated ground water etc.)

It is noted that especially in the agriculture sector numerous local level innovations already occur, and these should be viewed and further refined in the context of still worsening climatic conditions. Issues such as extension and research support will be discussed below.

### **Water, Irrigation and Floods**

- Applying water harvesting technologies (e.g. runoff, rooftop)
- Digging wells to be a sources of water (for keeping water) during dry season
- Building earth dams to store water underground and replenish water holes
- Applying water use efficiency measures e.g. using household waste (grey) water for garden irrigation; managing livestock watering in efficient ways
- Using water gauges to track consumption
- Reducing water usage for irrigation by applying most appropriate technologies, e.g. soil water harvesting methodologies such a drawing trench lines or furrows, and appropriate timing of irrigation (length of watering)
- Reducing evaporation from irrigated areas e.g. by applying netting to reduce wind – which increases evaporation
- Increasing the water-holding capacity of soils through enhancing the soil organic matter (SOM) content; biochar<sup>13</sup> can potentially be applied and promoting soil organisms with positive soil-physical – and chemical characteristics
- Combating soil erosion and soil compaction, which leads to poor infiltration and ultimately runoff and loss of water

### **Housing, Infrastructure and Sanitation**

- Building in heat efficient ways – cool in hot summer climates, warm in cold winter climates
- Flood risk proofing of buildings in high risk areas, e.g. building stone walls or embankments surrounding the main houses, building houses close to the Oshanas in an elevated manner e.g. on stilts
- Rain proofing granaries and storage facilities
- Building away from flood prone areas; avoiding building in high risk areas
- Building “secure” toilets, not vulnerable to flushing out during floods
- Using dry-adapted sanitation systems in water restricted areas (no water flushing)

### **Schooling and Education**

- Re-establish access to schools for children affected by the floods, by repairing and reconstructing schools as required through community action

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<sup>13</sup> Biochar is a 2,000 year-old practice that converts agricultural waste into a soil enhancer that can hold carbon, boost food security and discourage deforestation. The process creates a fine-grained, highly porous charcoal that helps soils retain nutrients and water.

- Setting aside monies for school fees and consumables in the long-term (i.e. savings), which can be drawn upon in emergencies (e.g. after a loss of harvest and household income due to climate related risks and impacts)
- Learn from school going kids/ pupils about new adaptation and climate change learning and knowledge

#### **Income and household economics, and keeping updated**

- Seeking opportunities for income diversification establishing viable and climate risk resilient income generating activities
- Engage actively in economic activities, e.g. do not simply keep livestock herds as a matter of principle, but invest in income building
- Saving up money for emergencies
- Positioning for qualification for credits and bank loans in emergencies; securing insurance coverage as relevant and available
- Keeping updated with current knowledge developments related to climate change and the Cuvelai Etosha Basin; learn about research, follow outreach activities by extension services, get engaged with community activities such as e.g. planning of local level adaptation plans

Generally it is a good idea to develop community-adaptation plans, and to seek ways of how to keep informed about what can be done in terms of climate change adaptation and risk preparedness

#### **Ideas for adaptation for NGOs, Donors, GRN, and private business**

##### **Cross-sectoral**

- Undertaking of relevant risk and vulnerability studies; developing the research and policy framework
- Sourcing funding and investments that support climate change resilience building in all sectors
- Developing and implementing climate change risk management plans and activities
- Establishing multi-agency climate change risk management task teams
- Embarking on sector-specific and/or cross-sectoral community outreach and awareness activities
- Facilitating sector and donor coordination with regards to climate change risk management and adaptation action
- Dove-tailing of climate change risk management and emergency management actions, focusing on preparedness

##### **Settlement/Urban planning and Housing**

- Ensuring proper and sustainable urban planning through zoning of areas with development potential; apply climate change risk analysis to identify unsuitable areas
- Prohibiting settlement in high risk areas such as the low lying Oshanas/ floodplains
- Developing climate change resilient/ proofed building codes and enforce them
- Seeking opportunities to incorporate climate change risk information and adaptation options into future and existing developments
- Developing flood management plans
- Developing drought management plans (and emergency relief interventions, however especially for rural areas)
- Improving public awareness and education concerning climate change vulnerability and risks

- Avoiding maladaptive<sup>14</sup> actions that will make it more difficult to cope with climate risks in the future
- Providing support to the most vulnerable communities and individuals to build houses with durable materials (flood resistance e.g. on stilts)

### **Adaptation in Water**

- Providing Early Warning Systems on possible extreme events such as floods
- Climate change proofing critical water infrastructure (e.g. main water canal, dams, urban water supply system, water holes) e.g. against flood risk
- Developing water resources management plans that incorporate climate risk analysis
- Conserving water and exploiting new/ alternative sources, e.g. improving management of drainage systems, relocation of boreholes, investing in phytoextraction of salt
- Investing in the local development/ adoption and adaptation of water harvesting technologies and their application (e.g. artificial recharge, interception wells)
- Developing and implementing public education programmes on sustainable water use and water use efficiency measures
- Strengthening institutional capacities to implement the Water Act on a local level i.e. through participation in Basin Management institutions

### **Adaptation in Agriculture**

- Providing Early Warning Systems on possible extreme events such as floods and droughts
- Delivering agro-climatic and weather forecasting information to farmers
- Improving and strengthening the coverage of Agricultural Extension Technicians (AETs) and ensuring staff is knowledgeable about state-of-the art climate change and adaptation management
- Identifying and demoting maladaptive practices; developing strategies for shifts to adaptive practices and investments
- Establishing enabling environment for adaptive actions by farmers, i.e. setting policy into practice that would increase the availability for drought and humidity adapted/ resistant seeds, fertilizer and other implements, policies that would facilitate the adaptive de- and restocking in drought and good rainfall years
- Developing farmers information systems and pathways of dissemination e.g. on revised agricultural calendars, information campaigns to inform communities when to start preparing for cultivation, impending pest threats and how to manage them

### **Adaptation in Fisheries**

- Undertaking research on seasonal migrations, changes in target species abundance and occurrence, overall stocks
- Optimising exploitation of fish resources and reducing the demand and supply disequilibria by developing and enforcing relevant harvesting regulations
- Producing fish for rural consumption through aquaculture where sufficient water resources are available, thus where no risk of maladaptation is evident

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<sup>14</sup> See definition on p. 3.

### **Adaption in Health**

- Controlling of malaria and other climate change-related diseases through mosquito net distribution, vaccination and drug dissemination programmes; providing medical supplies (e.g. water purification powder sachets)
- Assisting with vector control equipment and prevention measures
- Educating about appropriate sanitation systems, including excreta disposal, solid waste disposal and drainage, and setting policy incentives for the building industries, businesses and individuals to act on them
- Conducting climate change related hygiene education and health promotion campaigns, focusing on behaviour change through targeted communication actions (e.g. posters, educational materials, flyers)
- Training of disease surveillance personnel and setting up of Early Warning Systems in case of pandemic outbreaks
- Fostering accessibility of health centres during times of emergencies (e.g. floods) through strategic location and access planning; ensuring emergency supply stock of key relevant drugs and medical supplies

### **Adaptation in Schooling/Education**

- Pre-positioning of disaster management and response materials for the education sector, e.g. tents, building materials; ensuring that school buildings are climate change proofed
- Re-establishing access to schools for children affected by floods, by repairing and reconstructing schools as required through community action
- Improving road access to schools and fostering accessibility of schools during times of emergencies (e.g. floods) through strategic location and access planning
- Integrating curricular on climate change related issues and providing in-school awareness-raising on disaster risk reduction and management of emergency situations
- Strengthen the capacity of multipurpose community centres to access early warning information and services and sensitize their communities on risk reduction measures

## **6. Planning for communication outreach – a plan of action and description of a possible information campaign**

Based on the information presented in the previous sections of the report, an initial information campaign on climate change related information for stakeholders in the Cuvelai Etosha Basin was proposed and discussed at a stakeholder workshop held in Oshakati on 25 October 2010. The initial proposal made by the consultants is included in Annex 3 for reference purposes. Transcripts of the working group discussions are included in Annex 4. The two target groups, (1) individuals, households and communities, and (2) service providers, incl. NGOs, Donors, GRN, private sector (e.g. banks, insurances) are planned for separately.

### **(1) Individuals, households and communities**

It is realised that, to be fully effective, a more comprehensive communication strategy must be developed in the longer-term, however, at this moment a focused “entry point” campaign is planned for.

**Aim:** Bring the issue of climate change risks and adaptation options closer to the local people, especially affected rural communities and help them to realise practical solutions to help themselves.

**Goal:** A simple initial information campaign to inform accurately about important issues revolving around climate change, relevant to the Cuvelai Etosha basin.

**Objectives:**

1. To provide initial overview information on climate change, relevant to people in the Cuvelai Etosha basin
2. To help people in the Cuvelai Etosha basin to realise effective and simple help-yourself actions

**Key challenges:**

- *Remoteness of rural villages and homesteads:* communication medium must be selected accordingly
- *Accurateness of information:* communicating about climate change requires that the most accurate information possible is being disseminated; considering that especially information on future climate change projections and the associated climate change risk is often associated with a high degree of uncertainty, the most compelling way of communicating on this uncertainty whilst providing practical ideas for adaptation action needs to be identified
- *Long-term strategy:* At this moment interventions on CC are still punctuated and limited by budget and approach; it would be desirable to develop systematic long-term and integrated strategies,, well coordinated by the various service providers and donors (see group 2 below)

**Proposed approach: Airing a Radio series**

Target group	Living contexts	Media	Content	Delivery
Individuals, households, communities	- Rural areas of Cuvelai Etosha basin - Peri-urban and urban areas	Radio series	Develop radio role play series on CC and adaptation issues (see details below)	Air on a regular basis (e.g. once daily or once a week in vernacular (Oshiwambo)

- It is suggested to develop a sequenced role play on selected content issues, which would be delivered over a period of time
- Although the role play is primarily targeting the public, it can also serve as a platform to communicate on issues relevant to service providers (see below)
- In comparison to e.g. a road show, it is envisaged that more people could be reached over a longer time period. Whilst the usefulness of a roadshow were discussed, based on the experiences the NGO Creative Entrepreneurs Solutions (CES) has made with the rolling out of the GEF/UNDP facilitated community adaptation toolkits (Box 3), the required inputs were thought to be so intense that as an entry level activity a radio-based communication approach is favoured by the stakeholder from the basin.
- The experience of the “Total Control of the Epidemic” (TCE) youth approach to combating HIV/Aids was cited as a very innovative and effective approach to engaging unemployed youth as “barefoot agents” in awareness campaigns. Although this approach is not favoured as approach to an initial information outreach, it could be integrated into a longer-term strategy.

**Radio role play series: draft content elements**

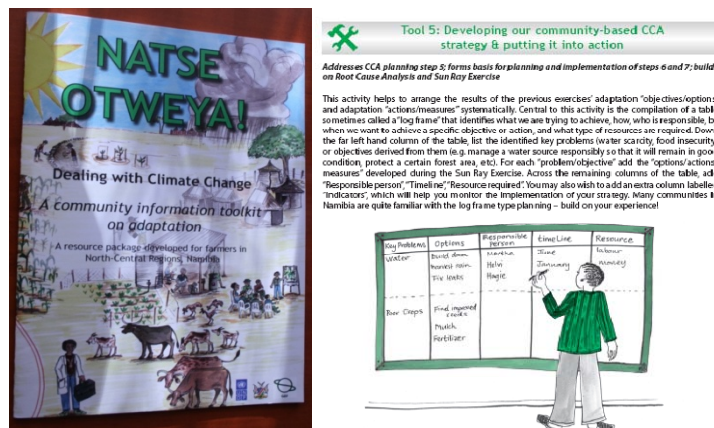
1. Introduction to climate change: definition of terminology and context
2. What is the international debate on CC? Why is it important to us?
3. What risks do we face in the Cuvelai Etosha basin?
4. How will CC affect us in our daily lives?

5. What actions can we take to be prepared and adapt?
  - a. Which elements of our daily lives will be affected?
  - b. Agriculture
  - c. Health
  - d. Income and savings
  - e. Housing
  - f. Dealing with emergencies

**Box 3:** Community outreach supported by the Ondangwa-based NGO Creative Entrepreneurs Solutions (CES) using the Natse Otweya toolkit

Natse Otweya is a community toolkit on adaptation that was developed as a pilot approach through a GEF/UNDP facilitated project of the Ministry of Agriculture, Water and Forestry (MAWF) in the Omusati region. The initial pilot project was designed based on a review of communication best practice relating to climate change and other development work with communities, and a strategic review of the current literature on international experiences was presented during the pilot phase. IECN undertook a climate change awareness baseline assessment in parallel to generating local input for the Omusati pilot toolkit, and solicited specific information on communication needs in terms of content, used media and follow-up during the implementation of the pilot project. The Omusati toolkit proto-type entitled NATSE OTWEYA is available at the website of the Ministry of Environment and Tourism (MET) at <http://www.met.gov.na/CPP/Pages/ReportsandBrochures.aspx>. The direct link for the booklet is <http://www.met.gov.na/Documents/Natse%20Otweya%20Book%20Insides.pdf>.

CES is using the toolkit as a communication tool to discuss climate change and adaptation with communities in the north-central regions and Kavango. Whilst the approach is very successful, the outreach requires very intense inputs, and if organised as a “roadshow” requires at least two days in each community to discuss the content and options presented.



The prototype for the toolkit was developed by IECN as part of the CCA Omusati Pilot project of MAWF, funded by GEF/UNDP SPA. A selection of six practical step-wise planning tools are part of the toolkit. Based on the communication needs identified with local farmers in the region, the toolkits has been specifically illustrated with examples from the region.

## (2) Service providers, incl. NGOs, Donors, GRN, private sector (e.g. banks, insurances)

**Goal:** Targeted information on sector specific climate change issues and adaptation options relevant to the Cuvelai Etosha basin.

**Objectives:**

1. To communicate accurate and relevant climate change risk information relevant to the basin as a foundation for appropriate adaptation planning and action relevant to the Cuvelai Etosha basin
2. To provide sector specific technical information on climate change, relevant to specific service providers in the Cuvelai Etosha basin

**Key challenges:**

- *Accurateness of information:* communicating about climate change requires that the most accurate information possible is being disseminated; considering that especially information on future climate change projections and the associated climate change risk is often associated with a high degree of uncertainty, the most compelling way of communicating on this uncertainty whilst providing practical ideas for adaptation action needs to be identified
- *Level of technical knowledge needed:* Detailed and sector-specific technical information is required by different practitioners rather than general information.
- *Long-term strategy:* At this moment interventions on CC are still punctuated and limited by budget and approach; it would be desirable to develop systematic long-term and integrated strategies, well coordinated by the various service providers and donors

**Proposed approach: Professional updating**

Target group	Where?	Media	Content	Delivery
NGOs, Donors, GRN, private sector	- Based in the NCRs, covering the Cuvelai Etosha basin -	Professional updating events	Develop "curriculum" relevant to various institutions and sectors	Technical professional updating seminars and indication of longerterm updating mechanisms

- The various institutional representatives at a stakeholder meeting held in Oshakati in October 2010 indicated that they are in need of quite specific technical information in terms of climate change risks to their sector as well as possible adaptation measures. They feel that relevant research is needed as well as capacity and knowledge building in the longer-term. In terms of an initial communication intervention they indicated that basic awareness is there, but in-depth technical knowledge is lacking.
- Professional updating seminars would potentially be a useful mechanism for delivery. It was also noted that internet based longerterm updating possibilities would be of use to the technical practitioners. It is noted that the Africa Adaptation Project (AAP) housed at the Ministry of Environment and Tourism (MET) and facilitated by UNDP could provide opportunity for collaboration.
- Updating events should try to provide in-depth knowledge for different sector specific target groups. Instead of trying to be one thing for all it was suggested to rather pick key target groups and deliver high quality and target group relevant content.

**Identifying a slogan for the campaign**

First ideas for a possible slogan for an information campaign on climate change in the Cuvelai Etosha basin were brainstormed at the Oshakati meeting in October 2010. A collection of ideas is depicted in Box 4. No ranking or selection of a final slogan took place at this stage.

**Box 4:** Initial ideas for a possible slogan for the information campaign were brainstormed at a Cuvelai Etosha Basin stakeholder meeting held in Oshakati on 25 October 2010

*Climate change – Let us live through it*  
*Climate change “yearly to yearly”*  
*Climate affects all, get ready*  
*Changing times - innovative measures! Let’s tackle climate change*  
*Climate change - think of survival for yourself and others*  
*Climate change - be ready to adapt the situation!*  
*Be alert and be ready for climate change*  
*Climate change for adaptation and mitigation*  
*Let’s end climate change now*  
*Do not change with the climate, change your mind set*  
*The climate is changing, change your mind set*  
*Climate change is real - hence the time to act is now*  
*Beginning the omega of climate changing*  
*Live your climate*  
*Know your climate and change as it changes*  
*Preparing you for the climate change, are you ready*  
*Climate change- adapt to survive*  
*Climate change, adaptation for the better*  
*The heat is up! Let’s act on climate change*  
*Climate change demands adaptation*  
*Climate hits! We respond bravely*  
*Be innovative, adapt to climate change*  
*Climate change is real*  
*Climate change necessitates a thinking change, Adapt now!*

## Next steps

It was suggested to keep the Basin Management (1) Committee (BMC) and (2) Forum (BMF) updated on the planned project activities and provide overall briefing sessions. As such specific briefing events designed as 1 to 2 days professional updating events could be a suitable entry point.

Also the next meetings should include an update on the consultancy.

## References

Biggs, R., Bohensky, E., Desanker, P. V., Frabricius, C., Lynam, T., Misselhorn, A. A., Musvoto, C., Mutale, M., Reyers, B., Scholes, R. J., Shikongo, S., & van Jaarsveld, A.S. (2004). *Nature supporting people: The Southern African millennium ecosystem assessment*. Pretoria: Council for Scientific and Industrial Research.

Dahlberg, E., & Wingqvist, O. G. (2008). *Namibia Environmental and Climate Change Policy Brief*. Sweden: University of Gothenburg, Department of Economics. Retrieved October 14, 2010, from <http://www.sida.se/Global/Countries%20and%20regions/Africa/Namibia/Environmental%20policy%20brief%20Namibia.pdf>

DRFN. (2009). *Review and Update of National Circumstances*. Retrieved 15 September, 2010, from [http://www.met.gov.na/Documents/Review%20and%20Update%20of%20National%20Circumstances\\_Final%20Report.pdf](http://www.met.gov.na/Documents/Review%20and%20Update%20of%20National%20Circumstances_Final%20Report.pdf)



DRFN. (2008). *Climate change vulnerability adaptation assessment Namibia*. Windhoek: Ministry of Environment and Tourism.

Government of Namibia (GRN) (2002). *Initial National Communication to the United Nations Framework Convention on Climate Change*. Windhoek: Ministry of Environment and Tourism.

Hesselink, F., Goldstein, W., Paul van Kempen., Garnett, T., & Dela J. (2007). *Communication, Education and Public Awareness (CEPA): A Toolkit for National Focal Points and NBSAP Coordinators*. Montreal. Retrieved October 15, 2010, from <http://www.cbd.int/cepa/toolkit/2008/doc/CBD-Toolkit-Complete.pdf>

IPCC (2001). *Summary for Policy Makers. Climate Change 2001: Impacts, adaptation and vulnerability*. Cambridge: Cambridge University Press.

IPCC (2007). *Climate change 2007: Impacts, adaptation and vulnerability*. Cambridge: Cambridge University Press.

Kuvare,U., Ogunmokun, A., & Maharero, T. (2008). *Assessment of Current and Ongoing Projects and Programmes to Identify Existing Coping Strategies with regards to Climate Change Variability*. Namibia UNDP Report

Midgley, G., Hughes, G., Thuiller, W., Drew, G., & Foden, W. (2005). *Assessment of potential climate change impacts on Namibia's floristic diversity, ecosystem structure and function*. Cape Town: South African National Biodiversity Institute.

Newsham, A & Thomas, D. (2009). *Agricultural adaptation, local knowledge and livelihoods diversification in North-Central Namibia*. Working Paper 140: Tyndall Centre for Climate Change Research.

Reid, H., Sahlén, L., MacGregor, J., & Stage, J. (2007). *The economic impact of climate change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy*. Environmental Economics Programme Discussion Paper 07-02. London: International Institute for Environment and Development. Retrieved October 12, 2010, from <http://www.iied.org/pubs/pdfs/15509IIED.pdf>

Scholes, R. J. and R. Biggs. (2004). *The regional scale component of the Southern African Millennium Ecosystem Assessment*. Millennium Ecosystem Assessment. Pretoria, South Africa: CSIR.

Stankiewicz, J., & De Wit,M.(2006). *Changes in Surface Water Supply Across Africa with Predicted Climate Change.Science, Vol 311*. Retrieved September 12, 2010, from <http://www.sciencemag.org/cgi/content/figonly/311/5769/1917>



## Annex 1: Some useful web-based resources

Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL) <http://www.cristaltool.org>

Wiki Adapt [http://wikiadapt.org/index.php?title=The\\_Climate\\_Change\\_Explorer\\_Tool](http://wikiadapt.org/index.php?title=The_Climate_Change_Explorer_Tool)

Adaptation Learning Mechanism of UNDP <http://www.adaptationlearning.net/>

International Institute for Environment & Development – Climate Change  
<http://www.iied.org/climate-change/home>

Community-based Adaptation Exchange on ELDIS <http://community.eldis.org/cbax/>

Natural Resource Management - Where communication and media are central to Natural Resources  
<http://www.comminit.com/en/section2/306/306%2C23>

Practical Action <http://practicalaction.org/home>

Capacity Strengthening for Least Developed Countries (LDCs) for Adaptation to Climate Change (CLACC) <http://www.clacc.net>

Environmental Change Institute – Climate Change Communication  
<http://www.eci.ox.ac.uk/research/climate/communication.php>

Overseas Development Institute – climate change  
<http://www.odi.org.uk/work/themes/details.asp?id=6&title=climate-change-environment>

German Development Cooperation (GTZ) – climate change  
<http://www.gtz.de/en/themen/25486.htm>

UNEP – climate change <http://www.unep.org/climatechange>

FAO - climate change <http://www.fao.org/climatechange/en>

United Nations Framework Convention on Climate Change (UNFCCC) [www.unfccc.int](http://www.unfccc.int)

Intergovernmental Panel on Climate Change <http://www.ipcc.ch>

Climate Systems Analysis Group, University of Cape Town <http://www.csag.uct.ac.za>

Communication, Education and Public Awareness (CEPA) toolkit <http://www.cepatoolkit.org>

ESPACE Climate Change Communication Strategy <http://www.espace-project.org/part1/publications/reading/WSCClimateCommunications%20Strategy.pdf>

## Annex 2: Concepts for a communication and outreach campaign

Based on the information presented in the previous sections of the report, an initial information campaign on climate change related information for stakeholders in the Cuvelai Etosha Basin will be developed. In terms of communication best practice, it is prudent to clearly determine and describe the communication concept and formulate the aim and goal of the campaign, and identify key challenges relating to the proposed set of climate change awareness raising activities. In the longer term, the detailed development of a climate change communication strategy and a costed implementation plan for the Cuvelai Etosha Basin is recommended.

For this specific campaign it would be desirable to identify a “slogan”, which could be brainstormed at the planned stakeholder workshop on the draft report. The workshop is planned for the end of October in Oshakati, with key representatives from the Basin Management Committee and selected individuals.

Broad stakeholder group	Detailed target groups	Proposed media
Individuals, households, communities	<ul style="list-style-type: none"> <li>- Farmers</li> <li>- Local business people</li> <li>- School kids</li> <li>- Teachers</li> <li>- General public</li> <li>- Decision makers</li> <li>- Basin Management Committees</li> </ul>	<ul style="list-style-type: none"> <li>→ Radio</li> <li>→ Road show &amp; participatory video as part of action learning</li> </ul>
NGOs, Donors, GRN, private sector (e.g. banks, insurances)	<ul style="list-style-type: none"> <li>- Technocrats and managers in line Ministries and NGOs</li> <li>- Donors</li> <li>- Industry representatives</li> </ul>	<ul style="list-style-type: none"> <li>→ TV &amp; Documentary (link to participatory video)</li> <li>→ Trade fair participation</li> <li>→ Specific face-to-face presentations</li> </ul>

### Individuals, households, communities

#### **Radio**

Using radio as a communication medium is considered the most effective way of reaching rural communities. Numerous surveys from different disciplines or sectors have established this, also for climate change specific communications (e.g. IECN, 2008). Designing a radio play or show on climate change and especially adaptation could be one relevant way for reaching out to the Cuvelai Etosha Basin inhabitants on climate change issues, targeting a wide range of people. Detailed scripts would have to be developed, based on the presented baseline information.

#### **Road show & participatory video as action learning approach**

Targeting a smaller group of people, developing action learning approaches as more in-depth communication and learning tools could be useful for more intensive interactions with a key focal group such as Basin Management Committees. Whilst the road show would communicate on technical and scientific background information, it would specifically facilitate multi-directional interactions between stakeholders in the basin, and provide room for learning from one another<sup>15</sup>.

<sup>15</sup> Creative Entrepreneurs Solutions & Namibia Resource Consultants (CONTILL) recently produced a CD Rom entitled “Community-based Adaptation Testimonials 2010”, capturing adaptation experiences of communities in the northern regions of Namibia, mainly focusing on projects funded through the Namibian Community-based Adaptation project funded by UNOPS. This CD could provide some interesting background materials. CES can be contacted at [info@ces.org.na](mailto:info@ces.org.na).

Using participatory videoing in the road show working sessions would generate valuable footage that could be later used for producing a TV documentary on climate change issues in the Cuvelai Etosha Basin, to be screened on national TV or used for information videos for higher level managers and decision makers.

*“People listen to what appeals to them. People tend to listen to what fits with what they know or believe, and select what they give their attention to. If they have no interest they may not listen to or read environmental messages. They may not therefore see or hear your carefully prepared messages”.*  
CEPA Toolkit (Hesselink et al., 2007) -

## **NGOs, Donors, GRN, private sector (e.g. banks, insurances)**

### ***TV documentary (link to participatory video)***

It is asserted that a documentary on practical climate change issues would be a useful communication tool particularly for higher level managers and decision-makers responsible/relevant for the Cuvelai Etosha Basin. Although a much broader audience will be reached if such a documentary would be screened on national TV, the primary target group should not be blurred. Using footage from participatory videoing would provide an excellent angle to visualising local climate change issues.

### ***Trade fair participation***

The Ongwediva Trade fair is a vibrant platform for interaction with national and regional policy- and decision-makers, as well as the public. Using the TV Documentary and potentially developing other communication materials (large scale photography, posters, flyers) could reach a good deal of target audience. However, it seems appropriate to treat the Trade Fair as an “additional” communication avenue, and not a primary mechanism.

### ***Specific face-to-face presentations***

Many higher level managers, policy- and decision-makers can be specifically engaged through personal face-to-face updating meetings. The TV documentary could potentially be used as one communication tool in support of such meetings.

## **Annex 3: Transcripts of workshops deliberations and list of participants**

### **Transcripts of workshop session**

#### ***Climate Change Adaptation – Planning Communication Interventions Workshop*** **IWRM Cuvelai Etosha Basin Project** **GTZ**

**Monday, October 25, 2010, 9:30 – 15:00**  
**Oshakati**

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A half-day workshop on the “**Study on the effects of Climate Change in Cuvelai Etosha Basin and possible adaptation measures**” was held in Oshakati October 25<sup>th</sup> 2010.

The workshop was organised by the IWRM Project of the German Technical Cooperation (GTZ). The objectives of the workshop were to

- Review and comment on main recommendations from adaptation report
- Make contributions to the picture documentation of the study
- Identify or confirm stakeholder information needs and most effective communication media
- Agree on final design of information campaign
- Brainstorm slogan for campaign

The workshop was co-facilitated by Juliane Zeidler and Asellah David of Integrated Environmental Consultants Namibia (IECN).

#### **1. Presentation on study content**

A PowerPoint presentation was delivered by IECN, introducing the key content of the draft study on the effects of climate change in the Cuvelai Etosha Basin and possible adaptation measures. An interactive question and discussion approach was taken along the introduction of the study.

Whilst numerous useful clarifications on the content were requested and an engaged debate on key issue took place, most valuable contributions stemmed from participants contributions of own experiences with climate change adaptation work already ongoing in the Cuvelai Etosha Basin and adjacent areas. In particular the Creative Entrepreneur Solutions (CES) are actively involved with the implementation of Community-based Adaptation (CBA) projects under the UNDP Small grants Programme. Lessons learnt especially on information and outreach needs by various relevant target groups were shared and debated.

#### **2. Working sessions: Stakeholder information needs and most effective communication media**

Two working groups were formed to discuss and further elaborate the draft ideas for a potential communication campaign on climate change and especially adaptation in the Cuvelai Etosha Basin. The two groups conducted their discussions in parallel, using the initially proposed communication campaign elements as venture point for their discussions.

	<b>Broad stakeholder group</b>	<b>Detailed target groups</b>	<b>Proposed media</b>
<b>GROUP 1</b>	Individuals, households, communities	<ul style="list-style-type: none"> <li>- Farmers</li> <li>- Local business people</li> <li>- School kids</li> <li>- Teachers</li> <li>- General public</li> <li>- Decision makers</li> <li>- Basin Management Committees</li> </ul>	<ul style="list-style-type: none"> <li>→ Radio</li> <li>→ Road show &amp; participatory video as part of action learning</li> </ul>
<b>GROUP 2</b>	NGOs, Donors, GRN, private sector (e.g. banks, insurances)	<ul style="list-style-type: none"> <li>- Technocrats and managers in line Ministries and NGOs</li> <li>- Donors</li> <li>- Industry representatives</li> </ul>	<ul style="list-style-type: none"> <li>→ TV &amp; Documentary (link to participatory video)</li> <li>→ Trade fair participation</li> <li>→ Specific face-to-face presentations</li> </ul>

### **GROUP 1: Individual, household and community level**

#### ***Information needs***

- Lack of information on climate change, adaptation and mitigation and possible extreme events such as floods and droughts.
- Lack of awareness amongst the stakeholders, which raise uncertainty about dissemination of information. This can only be successful if GTZ work hand on hand with other organizations which deal with climate change such as UNDP (AAP) and can also look at existing programs and available materials.

#### **Communication media**

- Access to information can be facilitated most effectively through a radio campaign following the seasonal calendar of events of the year.

#### **Planning for information campaign**

- Pamphlets, posters and posters in local languages should display a strong message or slogan (leaders, politicians / role models can play a role for people to listen).
- Pilot in community with schools, teachers, traditional leader etc, on community needs and is a good way to promote community dialogue to share their experiences and learn together (2 way communication).
- There is a huge need for training programs for adaptation and mitigation for all levels.

### **GROUP 2: NGOs, Donors, GRN, private sector**

#### **Stakeholder identification**

- NGO's: Creative Entrepreneur Solutions (CES), Women's Action for Development (WAD)
- GRN institutions: Ministry of Health and Social Services (MOHSS), Ministry of Agriculture, Water and Forestry (MAWF incl DWA), Ministry of Environment and Tourism (MET), Ministry of Fisheries and Marine Resources (MFMR), Ministry of Education (MoE), Ministry of Information and Broadcasting (MIB)

- Regional and Town Councils: e.g Oshangwena, Oshikoto RC, Oshakati, Helao Nafidi town councils,
- Private sectors: Insurance companies, IWRM-GTZ, Road authority, NCCI- *Namibia* Chamber of Commerce and Industry
- Media: Newspapers, NBC
- Others: traditional authorities, farmers association, church/faith-based organisations, Unam

### Information needs

- Epidemiology (MOHSS/MAWF)
- Risk information and early warning systems on floods, drought, storms etc.
- Knowledge of adaptive land use practices at community level
- Innovative technology options for mitigation
- Profound / survival techniques (e.g. for schools)
- Land use and settlement planning information (flow models e.g. information on expected water flows in oshanas)

### How to get the knowledge?

- Internet (area of investment e.g. hardware), general media outlets (e.g. newspapers, radio)
- Internal newsletters
- Needed: centralised information or point resource centre
- Meetings/updating workshops (specifically for traditional leaders)
- Regional information centres
- Network systems amongst stakeholders (long-term)

### Slogan Ideas

*Climate change – Let us live through it*  
*Climate change “yearly to yearly”*  
*Climate affects all, get ready*  
*Changing times - innovative measures! Let’s tackle climate change*  
*Climate change - think of survival for yourself and others*  
*Climate change - be ready to adapt the situation!*  
*Be alert and be ready for climate change*  
*Climate change for adaptation and mitigation*  
*Let’s end climate change now*  
*Do not change with the climate, change your mind set*  
*The climate is changing, change your mind set*  
*Climate change is real - hence the time to act is now*  
*Beginning the omega of climate changing*  
*Live your climate*  
*Know your climate and change as it changes*  
*Preparing you for the climate change, are you ready*  
*Climate change- adapt to survive*  
*Climate change, adaptation for the better*  
*The heat is up! Let’s act on climate change*  
*Climate change demands adaptation*  
*Climate hits! We respond bravely*  
*Be innovative, adapt to climate change*  
*Climate change is real*  
*Climate change necessitates a thinking change, Adapt now!*



**List of Invitees: confirmed participants list climate change workshop, 25 October 2010, Oshakati, 09h30 (list of final participants awaited from GTZ office)**

Quantity	Institution	Name	email	fax
2	MoHSS	Hilda.Namwenyo.Tonateni Haiping, Regional Health Director Omusati – 251800 Simon Jason – Control Environ Health officers)	<a href="mailto:hntaiping@gmail.com">hntaiping@gmail.com</a>	251071
1		Karorine Shiyagaya– 2233119, regional Dir, Oshana	<a href="mailto:nhamata@mhss.gov.na">nhamata@mhss.gov.na</a> ; <a href="mailto:hamatant@iway.na">hamatant@iway.na</a>	220303
1		Or David Kakololo	<a href="mailto:a.kakololo@gmail.com">a.kakololo@gmail.com</a>	263225
1	MAWF – DEES,	Vilho Imalwa, DD, NCRs 233821		
2	MAWF – DWSSC	Ron Kaheka Mr. Katuno		221449 221449
1		K Kapolo, Oshakati TC	<a href="mailto:kapollokk@yahoo.com">kapollokk@yahoo.com</a> <a href="mailto:ijambo@oshtc.na">ijambo@oshtc.na</a>	220435
1		Erickson KalundingoHelao Nafidi TC		
1		Mr. Pandu Shindiwe, Ondangwa TC	<a href="mailto:ceo@ondangwatown.com.na">ceo@ondangwatown.com.na</a> <a href="mailto:admin@ondangwatown.com">admin@ondangwatown.com</a>	
1	RCs ( 4 regions)	Joseph Mupetami		224478
1		N Ndaitwa, DD, Rural Services Tunomukwathi Ashipala	<a href="mailto:nndaitwa@ohangwenarc.gov.na">nndaitwa@ohangwenarc.gov.na</a>	263033
1		Ms. Priskila Lyakwata DD Rural Services, Oshikoto RC		244071
1	TA (Uukwambi, Ombalantu, Ombadja, Oukwanjama)	Maria Amungungu, Uukwambi TA		220668
1		Shilimetindi Ana, Ombalantu TA	0812553147	251598
2	MoE (4 regions)	Mr. Shapumba Phillips	<a href="mailto:fidifidi@iway.na">fidifidi@iway.na</a>	240315
		Simon Vaeta, Ohangwena - 281900		240190
1	OUC	Fanuel Ekondo	0812496249	2235294
1	MTI	Ananias Uusiku 0813395369	<a href="mailto:uusikua@yahoo.com">uusikua@yahoo.com</a>	244191
1	Unam	Enkondo Fanuel		2235294
1	Ministry of Fisheries	Panduleni Elago, Senior Fisheries Biologist	<a href="mailto:panduleni@iway.na">panduleni@iway.na</a>	259007
2	Creative Enterprise solutions for CC	Mr. Andreas Tweendeni field coordinator Maria Johanson	<a href="mailto:info@ces.org.na">info@ces.org.na</a>	
1	IWRM in CEB	Tuwilika Haludilu, Community Mobilisation Officer	<a href="mailto:Tuwilika.haludilu@gtz.de">Tuwilika.haludilu@gtz.de</a>	224305
1	Red Cross	Mr. Lot		263286
<b>25</b>				

