Disaster Risk Management

Community Based Adaptation and Mitigation strategies in a drought prone area

Matobo District, Zimbabwe

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1. INTRODUCTION
HEKS/EPER (Hilfswerk der Evangelischen Kirchen Schweiz, Entraide Protestante Suisse) acts on behalf of the Protestant churches of Switzerland, whose mandates determine its scope of action. At an international level these are: «development cooperation in Africa, Asia and Latin America», «humanitarian aid» and «collaboration with churches and reconstruction aid in Europe».
Nationally they include: «refugee aid», «aid for the under-privileged» and «public relations work».
HEKS/EPER works in more than 20 countries and collaborates with its operational partner organisations to support local initiatives.
HEKS/EPER involvement in Zimbabwe started in the eighties. In the development sector, the two main themes are: “Development of rural communities” and “Peace promotion and conflict transformation”.
HEKS/EPER mainstreams Gender, HIV/AIDS and conflict sensitivity (Do no Harm).
In the “Development of rural communities” theme, the main goal is the following: “Improving the socio-economic conditions of landless, small holder farmers, being women, men and youth by strengthening their food sovereignty and their livelihood”.
HEKS/EPER supports the work of two Zimbabwean national NGOs which are implementing sustainable livelihood programmes in Matobo District (Christian Care and Fambidzanai Permaculture Centre). This District is located in the Matabeleland South Province in Zimbabwe and is considered as a semi-arid/arid area. It is regularly affected by droughts and the rainy season patterns seem to change slightly due to climate change influences.
The concept of adaptation and mitigation in relation to Climate Change is a new objective for HEKS/EPER and shall be seen as part of the Disaster Risk Management concept. As such HEKS/EPER will strive to build the capacity of the operating partners to work with and mainstream the theme “Climate Change” in their work. In the proceeding chapters, an experience in building capacity for mainstreaming “Climate Change” is shared.

2. OBJECTIVES
Between the 5th and the 9th of October 2010, HEKS/EPER along with Bread for All (BFA) conducted a Zimbabwe context analysis (in relation to climate change) and a Community Risk Assessment (CRA) in 2 rural villages in Matobo District. This assessment used the Participatory Tool on Climate and Disasters Risks (CiDR), which has been developed by HEKS/EPER and BFA (the structure and methodology of the tool are strongly based on CRiSTAL and the CARE CVCA Handbook). The assessment was followed up by a workshop on Climate Change and its linkages with developmental work. It was attended by representatives of different Zimbabwean and South African NGOs and an agricultural research institute.
The aim of this assessment and the workshop was the following: to analyse vulnerabilities and capacities of community members of two villages in Matobo District and work on realistic adaptation measures in response to the consequences of climate change with a specific focus on droughts. Additionally, realistic mitigation measures and their synergies with adaptation will be identified in order to reduce the causes and drivers of climate change.
This report draws the lesson from this process and is a practical guideline to implement Community Based Adaptation and Mitigation strategies in the District of Matobo where HEKS/EPER operates.

3. CONTEXT
3.1 Southern Africa
The term “Triple Threat” in Southern Africa refers to the combined danger of the HIV/AIDS epidemic, food insecurity due to climate variability, and weakened government capacity that have led to increasing vulnerability and fragility in the region. Alone, each of these threats pose major obstacles to Southern Africa’s vulnerability, but combined they create a burgeoning crisis on a regional scale that demands new approaches from humanitarian and development agencies. NGOs have established programs aimed to strengthen governance and combat HIV/AIDS, but climate variability is the factor within Southern Africa’s Triple Threat where programs can achieve the highest impact and represents the core dynamic of a regional strategy.
Livelihoods and economies in Southern African countries are highly sensitive to climate fluctuations. Climate exerts a significant control on agriculture and natural resources, and it affects rural and urban water supplies, health, food security, income generation, and basic commodities prices. Climate shocks can also lead to migration, deepening poverty, inability to recover, increased reliance on external food aid, and susceptibility to high-risk behaviour for urban and rural populations. Programs’ focus will work to increase resilience to climate and weather induced disasters.
Although some parts of the region have registered marked improvements in cereal crop production, food and vulnerability assessments indicate that rural populations still face critical food shortages. The global food and fuel crisis introduce additional humanitarian challenges and NGOs will need to adapt their assistance approach to address the root causes of food insecurity rather than providing inputs and food aid to poor households each year at higher and higher costs. (USAID/Office of Foreign Disaster Assistance (OFDA), Southern Africa Region Three-Year Strategy 2009-2011).

3.2 Zimbabwe

Political
Zimbabwe has experienced a decade of crisis whose beginning was marked by the defeat of the constitutional referendum of February 2000. Since 2000, politics in Zimbabwe has been marked by slow regression away from many of the norms of Democratic Governance. These include democratic elections; independence of the judiciary; rule of law; freedom from racial discrimination; the existence of independent media; civil society and the academia.

Wide spread violations of human rights have been experienced in the last 10 years. Subsequent elections have been marked by political violence and intimidation along with the politicisation of the judiciary; military; police force and public servants. Prior to the signing of the Global Political Agreement (GPA) on 15 September 2008 statements by the President and government politicians referred this decade to a state of war or Chimurenga, against opposition political parties, in particular the Movement for Democratic Change – Tsvangirai (MDC-T).

Economic and Social
After 8 consecutive years of negative growth characterized by unemployment rate of at least 90% of the total labor force and where 80% of the population lives below the poverty datum line, Zimbabwe is said to be on the road to slow recovery which has been ushered in by the Inclusive Government. Inflation has been tamed to 5.3% in June 2010 from the astronomical nine-digit figures. But the lack of foreign direct investment and liquidity shortages may continue owing to some political uncertainties.

The education sector has not yet recovered from underfunding, collapse of infrastructure and an exodus of trained teachers. There is more than one quarter of teaching posts that are vacant i.e. not filled in by qualified teachers. Furthermore, the distribution of teachers in the different provinces is highly distorted with some provinces having over 45% of “vacant” posts. The Matabeleland region accounts for an average of 40% of vacant teacher posts.

The Health sector is not spared from deteriorating infrastructure, exodus of qualified medical personnel and under funding (1 doctor for every 12 000 people). Life expectancy of the adult male population is 45.36 years while that of women is 45.16 years. The adult prevalence rate of HIV and Aids in adults fell from 16.1% in 2007 to 14.3% in 2010 (due to adequate response to HIV/AIDS from the Zimbabwean Government). Nevertheless, the effects of the pandemic mainly manifest in the high number (1.6 million) of orphaned children. HIV/Aids in Zimbabwe mostly affect women (51.6%) and out of this 77% are young women between the ages of 15 and 24 years of age.

There is a generally low status of women with respect to access, control and ownership of economic resources and positions in decision making processes in Zimbabwe. The government has enacted a plethora of positive legislation that enhances women’s status. However, the main challenge is in the implementation and consistent monitoring as both women and men are still stuck up in some cultural practices that mainly place women in subordinate roles.

Climate change
There is very little literature on Zimbabwe’s response to Climate change. The Government of Zimbabwe has refused to consider Zimbabwe as a Least Developed Country (LDC). Therefore, Zimbabwe has not developed a NAPA (National Adaptation Programme of Action) nor any climate change related policy. The meteorological service (likewise other Governmental institutions) is weak and therefore forecasts are not done systematically. Additionally, the political will is not present and jeopardize any chances for any changes. However, there are a plethora of efforts by Civic Society Organizations that deal with food security issues and adaptation measures and this need to be coordinated by the existence of a government policy.

4. OBSERVATIONS - Natural Disasters in Zimbabwe – overview and trends
The effects of Climate change are already taking place in Zimbabwe now. Rainfall totals on average decrease from North to South. Apart from the general effects of global climate change and several local factors, rainfall over Zimbabwe is also influenced by El Nino – Southern Oscillation (ENSO).

Drought is expected to be the biggest problem facing Zimbabwe. Recent projections of precipitation and runoff in Africa suggest a drop of up to 10% in precipitation in most of Southern Africa (including Zimbabwe) by 2050. (BFA, Climate Change in Zimbabwe, 2010 and Levine, E., 2006, ‘Domestic Policy Frameworks for Adaptation to Climate Change in the Water Sector Part II).

Table 1: Current situation and trends in terms of temperature, precipitation and extreme weather events in Zimbabwe.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Past Trends</th>
<th>Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>The trends from the metrological stations reveal some intriguing perspectives on the local climate and climate change during the 1960 to 1990 period. Patterns of the temperature trends clearly show spatial cohesion of warming trends across Zimbabwe. Nearly all stations recorded a decrease of the number of cold days, an increase in the number of hot days and an increase in the diurnal temperature range (AIAAC 2006).</td>
<td>Temperatures over Zimbabwe will warm by 0.15°C/decade (low emissions scenario) and 0.55°C/decade (high emissions scenario) by 2080.</td>
</tr>
<tr>
<td>Precipitation</td>
<td>Annual total precipitation has generally decreased across most of the country for the period between 1961 and 1990. Except for the extreme south-eastern areas and some parts of the central watershed where there has been a slight increase. Rainfalls may have increased but it comes in shorter bursts and with longer dry periods. This allows more time for evaporation and runoff is generally higher, leaving less moisture in the ground for plants and agriculture. The maximum number of dry days has increased over the northern areas of the country with a significant decrease over the southern areas (AIAAC 2006).</td>
<td>Rainfall model experiments suggest annual rainfall will decreases across the country particularly during the early and late summer months. By the 2080 rainfall decreases by about 5% (low emissions scenario) and about 18% (high emissions scenario) below the 1961-90 average.</td>
</tr>
<tr>
<td>Extreme weather events</td>
<td>The recent years show a sharp increase in severe climatic and weather conditions. The trends in the occurrence of droughts indicate that they are becoming more frequent than ever before. Long-term averages indicate that in terms of rainfall, out of every 10 years, Zimbabwe has about 3.7 good years, 4 average years, and 2.3 bad ones. Research also reveals that since the 1970s extreme drought affects Zimbabwe in every decade. Flood induced disaster caused by Cyclone Eline in 2000 and Japhet in 2002/03 left also trails of destruction in some parts of the country. Also 16 epidemics occurred during the period from 1982 to 2008 and affected especially people (Civil Protection Department 2007).</td>
<td>Increased incidence of drought is expected to be a particular problem. Other potential changes include localized floods and decreased/varying river flow (GSDRC 2009).</td>
</tr>
</tbody>
</table>

5. ANALYSIS

5.1 Impacts of Climate Change on natural based livelihoods in Matobo District

Matobo District is vulnerable to climate change principally through shifting rainfall and extreme events. Social, economic and political processes affecting human settlements, agricultural patterns and natural resources such as water, vegetation and forestry, are likely to exacerbate climate impacts. Zimbabwe is also vulnerable to having a perennielly high number of malaria cases (Chigwada 2005).

The impacts from literature review reveals that impacts will most probably affect the following sectors:

- **Agriculture and food security**: Almost 90% of Matobo’s District population relies directly or indirectly on agriculture.
- **Water resources**: Various studies indicate an increased water demand for irrigation due to increased evapotranspiration.

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1. BFA, Climate Change in Zimbabwe, 2010
• **Human health:** Climate variability may also interact with other vulnerabilities such as populations affected by HIV/Aids and conflict in the future, resulting in increased susceptibility and risk of other infectious diseases (e.g., cholera) and malnutrition.

• **Social groups:** A recent study in the rural district of Chiredzi found that the most vulnerable households included female headed households (no access to irrigation, and poor).

• **Terrestrial Ecosystems:** The impacts of global climate change on Matobo District’s forests are projected to impact severely on the already very dry forest. The projected shift in forest distribution is attributable to a future decline in precipitation patterns and an increase in ambient temperature. Along with this goes decreasing biodiversity (Matarira and Mwamuka, 1996).

It is important to notice, however, that other factors threaten the livelihoods of Zimbabwe communities as well, e.g. resource degradation and the overexploitation of natural resources in association with the environmental decline.

### 5.2 Assessment of the risks in Matobo District

Following the Community Risk Assessment (CRA) done in Matobo District with farmers (women and men) of 2 wards (Dema and Madweleni) the outcomes revealed that farmers have prioritized three risks: drought as their top priority, HIV/Aids as second biggest threat and pest and disease in crop/gardens and for livestock as the last risk. For compliance purposes, this document will only study the drought risk in terms of impact and adaptation and mitigation measures.

**Table 2: Outcome of the CRA in terms of impact of drought and coping strategies in Matobo District**

<table>
<thead>
<tr>
<th>Risk</th>
<th>Impact (m= men, w=women)</th>
<th>Coping strategies (m= men, w=women)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>Natural resources</td>
<td>Natural resources</td>
</tr>
<tr>
<td></td>
<td>• (w, m) Shortage of water</td>
<td>• (w) Drought tolerant/resistant crops</td>
</tr>
<tr>
<td></td>
<td>• (w, m) High livestock mortality</td>
<td>• (w, m) Conservation farming</td>
</tr>
<tr>
<td></td>
<td>• (w) Loss of fruit tree productivity, loss of grass for livestock and increased land degradation</td>
<td>• (w) Mulching gardens</td>
</tr>
<tr>
<td></td>
<td>• (m) Loss of indigenous seeds</td>
<td>• (w) Dry vegetables</td>
</tr>
<tr>
<td></td>
<td><strong>Financial resources</strong></td>
<td>• (w) Store grain for food</td>
</tr>
<tr>
<td></td>
<td>• (w) Income shortages</td>
<td>• (w) Eating wild roots and fruits</td>
</tr>
<tr>
<td></td>
<td><strong>Human resources</strong></td>
<td>• (m) Seed multiplication</td>
</tr>
<tr>
<td></td>
<td>• (w, m) Diminished food availability/hunger</td>
<td>• (m) Contour ridges</td>
</tr>
<tr>
<td></td>
<td>• (w) Decreased health and nutrition</td>
<td>• (m) NGO support for OPV and diseases</td>
</tr>
<tr>
<td></td>
<td>• (m) High incident of diseases</td>
<td><strong>Physical resources</strong></td>
</tr>
<tr>
<td></td>
<td>• (m) Increase of death human beings</td>
<td>• (m) Dug boreholes/dams</td>
</tr>
<tr>
<td></td>
<td><strong>Social resources</strong></td>
<td><strong>Financial resources</strong></td>
</tr>
<tr>
<td></td>
<td>• (w) Loss of social values</td>
<td>• (w) Steeling</td>
</tr>
<tr>
<td></td>
<td>• (w) Increase in conflicts/domestic violence</td>
<td>• (w) Migration to towns/neighborhing countries</td>
</tr>
<tr>
<td></td>
<td>• (w) Increased criminality</td>
<td>• (w, m) Selling livestock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (w, m) Selling household properties</td>
</tr>
</tbody>
</table>

### 5.3 Adaptation and Mitigation measures

**Adaptation measures**

The following measures were identified by farmers and further developed. These adaptation measures are also in line with what some literature suggests for such environment (Adaptation learning 2010, Chigwada 2005, GSDRC 2009, Mano and Nhemachena 2007, Ebi et al 2005, JIMAT Development Consultants 2008). These have been classified according to some key sectors:

**Agriculture and Food Security**
• Extension information services to ensure that farmers receive up-to-date information about rainfall patterns in the forthcoming season and that they take well-informed decisions on their planting dates. Collaboration with the agricultural extension service is key (early warning);
• Cropping pattern adjustments using climate information, e.g. of rainy season: e.g. changing timing of planting and harvesting dates;
• Redesigning and diversify cultivation technique and crops to ensure a guaranteed minimum yield e.g. high variety of crops, fruits trees, livestock and improved drought tolerant Open Pollinated Varieties (OPV) (sorghum and millet in addition of maize);
• Develop village seed banks with traditional OPV;
• Soil conservation (e.g. management of crop residues, use of organic fertilizers, erosion control (contour ridges), improved soil nutrient management (compost, mulch) conservation farming (CF) or the Zaï technique (manual or mechanized); This technique is rather labor intensive therefore further experiment is necessary especially for a mechanized CF (with donkeys);
• Improve net farm performances for smallholder farms by ensuring increased farmer training (e.g. traditional indicators for predicting climate) and more access to credit and aid facilities and by helping farmers acquire livestock and other important farm assets;
• Agro forestry (e.g. fruit trees in vegetable gardens) and life fencing with legumes (Leucaena leucocephala);
• Reforestation for fire wood with fast growing trees.

Livestock
• Preservations and re-introduction of indigenous breed (big and small livestock) and cross- breeding (Nguni and Tuli with Jersey) for improving drought tolerance characteristics with productive characteristics;
• Use of OPV fodder crop and drought tolerant legumes (e.g. Leucaena leucocephala, Bana grass (elephant grass or Pennisetum purpureum), black and/or white Velvet beans) in parallel with livestock grazing management;
• Supplementary feeding using crop residues (stover) and improve technique to store it during the dry season;
• Promotion of cattle and goats feeding using Zhombe and Mopane leaves and molasses;
• Information on carrying capacity of the ecosystem in terms of livestock.

Livelihood
• Support and protect livelihoods diversification so that people have a safety net to rely on during stages of drought (adding nonfarm activities to farm activities like bee keeping or craft making).

Human resource
• Agricultural extension (AREX) and civil protection: e.g. train monitors to follow-up changing temperature and precipitation patterns and establish surveillance programmes to determine changes (early warning). These activities will depend on the willingness of the different state departments;
• Training on grazing management systems for goats and cattle and the use of raw products (diversification of income);
• Ongoing awareness and reinforcement of farmer association for lobbying;
• Awareness raising on the impacts of climate change and adaptation and mitigation strategies;
• Further awareness raising on HIV/Aids to decrease affected population (better knowledge transfer, human resources strengthened);
• Collection of different organic pest and disease managements methods (manual in local language);
• Gender based roles and responsibilities for financial income;
• Awareness rising in the benefit or organic agriculture.

Water resource
• Increase water supply, e.g. by using groundwater, building reservoirs, improving or stabilizing watershed management, rain water harvesting;
• Decrease water demands, e.g. by increasing efficiency, reducing water losses trough leakage irrigation systems (plastic bottles or clay pots), changing irrigation practices (i.e. drip irrigation or
leakage irrigation instead of flood irrigation), early ploughing, moisture conservation through field cover and mulch;

**Physical resource**

- Climate proof new infrastructures like siphon pump from dams, wind mills on top of boreholes, solar pumps (this last one need to be experimented first);
- Introduce technical methods to add value to an agricultural row product (drying vegetables);

**Mitigation measures**

Energy, agriculture and industry are the sectors with the largest mitigation potential in Zimbabwe. Mitigation measures are not the priority in Matobo although these can contribute to the fight against global warming. In a study of the Ministry of Environment and Tourism (MET 2004) the following agricultural mitigation potential were identified and could contribute modestly towards greenhouse gas emission mitigation. These strategies could also be replicated in Matobo with small farmers:

- Low or no tillage agriculture to avoid burning of crop residues and using fuel for machines;
- Carbon sequestration in soils and forests;
- Ruminant diet improvement to reduce methane emissions;
- Better soil nutrient management to reduce nitrous oxide emissions;
- Use of organic manure as fertilizer;
- Reduce burning of savannas;
- Reforestation (fruit trees in gardens as carbon sinks).

6. SYNTHESIS

Following the community risk assessment conducted in Matobo with women and men (small farmers) from 2 wards, drought was identified as the major threat to their lives (along with HIV/Aids and pest and diseases). Based on the coping strategies already developed by small farmers and in collaboration with them, HEKS/EPER proposed a series of adaptation measures to fight against climate change in Matobo as well as some mitigation measures. Most of them are agriculturally based as this is the major livelihood in this region. Crop varieties (Open Pollinated Varieties) and seed bank, soil conservation, sustainable water management, livestock tolerant breeds, diversification of income, training and capacity building are some elements that have been considered. Key to the selection of these measures was the fact that they must remain simple, pragmatic and applicable and owned by the members of the communities.

It is also important to note that most of the measures are adaptation measures. Some mitigation measures have been presented but considering the context, they are obviously of insignificant intensity. This goes also in line with the new trend at the international level where Developing countries are asked to implement more adaptation measures.

7. CONCLUSION

During the community risk assessment, it was interesting to note that farmers have identified the changes in the rain pattern or temperatures and have developed coping strategies which mitigate the effect of recurrent drought. Using the traditional knowledge and coping strategies of the small farmers and modern literature research in terms of adaptation and mitigation strategies, we identify interesting and applicable measures to be implemented along with the members of the 2 communities in order to mitigate the effects of climate change in Matobo district. HEKS/EPER will of course continue to promote such measures and support their implementation.
Bibliography


Marion Künstler, Bread For All, 2010: Climate Change in Zimbabwe. Climate Change guide.


MET, 2004: Technology Transfer needs assessment in Zimbabwe.

Moyo, 2000, Vincent and Thomas, 1961: Description of natural regions and their farming systems.

Enclosures

Enclosure 1: Map of Zimbabwe and Matobo District
Enclosure 2: Description of the Natural regions of Zimbabwe

Zimbabwe is divided into five agro-ecological regions, known as natural regions (Figure 1), on the basis of the rainfall regime, soil quality and vegetation among other factors. The quality of the land resource declines from Natural Region (NR) I through to NR V (Moyo, 2000; Vincent and Thomas, 1961). Table 1 describes these natural regions and their farming systems.

Table 1: Description of the Natural regions of Zimbabwe

<table>
<thead>
<tr>
<th>Natural Region</th>
<th>Area (000 ha)</th>
<th>% of total land area (%)</th>
<th>Annual rainfall (mm)</th>
<th>Farming Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>613</td>
<td>1.56</td>
<td>&gt; 1 000. Rain in all months of the year, relatively low temperatures</td>
<td>Suitable for dairy farming forestry, tea, coffee, fruit, beef and maize production</td>
</tr>
<tr>
<td>II</td>
<td>7 343</td>
<td>18.68</td>
<td>700-1 050. Rainfall confined to summer</td>
<td>Suitable for intensive farming, based on maize, tobacco, cotton and livestock</td>
</tr>
<tr>
<td>III</td>
<td>6 855</td>
<td>17.43</td>
<td>500-800. Relatively high temperatures and infrequent, heavy falls of rain, and subject to seasonal droughts and severe mid-season dry spells</td>
<td>Semi-intensive farming region. Suitable for livestock production, together with production of fodder crops and cash crops under good farm management</td>
</tr>
<tr>
<td>IV</td>
<td>13 010 036</td>
<td>33.03</td>
<td>450-650. Rainfall subject to frequent seasonal droughts and severe dry spells during the rainy season</td>
<td>Semi-extensive region. Suitable for farm systems based on livestock and resistant fodder crops. Forestry, wildlife/tourism</td>
</tr>
<tr>
<td>V</td>
<td>10 288</td>
<td>26.2</td>
<td>&lt; 450. Very erratic rainfall. Northern low veldt may have more rain, but the topography and soils are poor</td>
<td>Extensive farming region. Suitable for extensive cattle ranching. Zambezi Valley is infested with tsetse fly. Forestry, wildlife/tourism</td>
</tr>
</tbody>
</table>

Source: Adapted from Moyo, 2000; Vincent and Thomas, 1961.

Figure 1: Zimbabwe’s natural regions and farming systems