



ZIMBABWE: FLOOD MANAGEMENT PRACTICES - SELECTED FLOOD PRONE AREAS ZAMBEZI BASIN

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Abstract. Information is provided about the flood management approach in two areas in Zimbabwe prone to flooding. The causes of flooding are described, as well as the flood management practices, both structural (achieved through a series of dams) and non-structural (mainly by means of flood forecasting). This is complemented with information on the legal instruments and on institutions in place to manage flood events. Finally, as part of the “*lessons learned*”, a way forward is proposed, drawn from the negative effects of recent flood events, and which takes into account the new concept of IFM

1. Location

The term Mzarabani in the local language means flood plain or an area that is frequently flooded. The *Mzarabani* and *Guruve* districts are some of the most vulnerable areas to flooding in Zimbabwe. Both are located in the northern part of Zimbabwe, within the Zambezi basin, the fourth largest international basin in Africa shared by eight countries. The Zambezi River itself starts in Zambia and flows 2800 km in an easterly direction into the Indian Ocean. The Zambezi basin, with its various tributaries and large water bodies, also contains a large number of wetlands.

The Mzarabani and Guruve study areas, of about 8,000 km², are located in the lower Zambezi valleys. For a long time there was no activity in both due to adverse environmental conditions which made human habitation difficult. It was only in the past thirty years that Government started opening up the area after realizing that it had very high agricultural potential due to fertile land. Today there is both commercial and subsistence agriculture as the main economic activities, as well as wildlife management. Livestock rearing is done at subsistence level. The current population is estimated at 300,000.

The study area has a large amount of natural vegetation, which consists of dense forests and grass. The vegetation does well as a result of the seasonal floods, which deposit soil fertility and leaves the ground saturated, as well as recharging the groundwater aquifers. Large tracts of forests have therefore been set aside for wildlife management. A community-based project has been initiated for the sustainable management of natural resources and wildlife by the locals; in turn, these tend to benefit from the funds generated through tourism and hunting, which are then used for projects chosen by the community, such as construction of schools, clinics and bridges.

2. Nature of floods

The rainy season is largely dependent on the inter-tropical convergence low-pressure system, which moves to the southern part of Zambia in November and reaches its peak in January or February. The large storms due to tropical cyclones from the Indian Ocean also affect the Zambezi basin. Although year-to-year droughts have been experienced especially in the last decade, the current decade has seen floods of unprecedented magnitudes.

As a result of the above, two types of floods affect the area under study. The first and most frequent is the seasonal flood, occurring in most years normally in January or February, at the peak of the rainfall season. The second and not so frequent one is the cyclone-induced flood, having become more frequent than before. In February 2000 and March 2003 cyclones hit the basin bringing with it intense storms which also caused flooding in the area.

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Guruve and Mzarabani are flood affected because of their location. Both are downstream of the Kariba dam but upstream of the Cabora Basa dam and at the confluence of two main tributaries. When the Kariba rises to a certain level, water is released to avoid dam failure. Most releases are done between December and February, which causes the discharge in the Zambezi to increase substantially. Further downstream the Cabora Basa dam levels continue to rise by inflows from Kariba and Zambezi tributaries, which then leads to flooding in the study area. This has produced loss of livestock and human life, crops and infrastructure have been destroyed, affecting mostly the rural population. Disease outbreaks such as malaria and cholera have been quite common during this period

3. Flood management measures

There are *structural* and *non- structural* flood mitigation measures in place in Zimbabwe. The first consist of dams and weirs. Although these were put in place to improve water security, they also serve as flood mitigation structures. The flood control is however limited by the amount of storage available and the way these dams are operated prior to, and during the rainy season. Zimbabwe being in a semi-arid region, it is difficult for the water managers to release water in anticipation of floods because of uncertainties in the occurrence and magnitude of runoff during the coming season. Besides the Kariba, there are 11 dams that play a part in flood mitigation in the study area; however, most of these have the disadvantage that they are located farther upstream of the study area. Since between the latter and these dams a substantial amount of runoff is generated, to the extent that the contributions from intermediate catchments can cause flooding, they only offer a limited mitigation potential. The Kariba dam plays a mayor role in reducing the impact of floods as it has a huge capacity, except when releases are done once the water level reaches potentially dangerous levels, as mentioned above.

As regards the non-structural flood mitigation measures, these range from flood forecasting to rescue operations, as well as defining areas to settle. Meteorological forecasts are issued throughout the year and during the wet season the amount of rainfall is also predicted. This information is used in forecasting the river flows so as to assess whether there will be floods. Based on this, the appropriate authorities take the necessary steps to ensure the information is disseminated and the potential victims evacuated before or during the flood events. However, two problems have been noted: the first one is the lead-time between the flood forecast and the flood event; at the moment the models being used for meteorological forecasts can only provide very short forecasts in an accurate form, which may not allow enough time to reduce the impact of the event. The second one is the accuracy of the forecasts; due to previous false alarms, people no longer took forecasts seriously, as was demonstrated during the recent cyclones.

During recent years information exchange has significantly improved. Data collection of rainfall and discharge in rivers is done by the relevant national agencies. Other sources of information are satellite/radar observations, forecasts from other institutions, information from the local communities and local authorities. Dissemination of information is normally through the newspapers, radio, television, telephone, Internet, and awareness programs by Government and non-governmental organizations.

There has also been a marked improvement in co-operation following recent extreme events at both local and national level. Multi-sectoral meetings on flood management, coordinated by the Civil protection agencies, are well attended and positive contributions are made. Awareness campaigns held recently in flood prone areas have shown that people are now more willing to participate in flood management than before. Topics which are normally covered during these campaigns include informing about what floods are, where they normally occur, that people should be aware of the normal behavior of their rivers, areas to relocate in the event of floods, the need to work as a community when floods occur, survival tactics, what to do after the floods, as well as on



the type of house to construct, materials to use in order to reduce the impact of floods on shelter, etc.

4. Flood and water management instruments

The *Civil Protection Act* spells out the legal instruments for disaster management and the powers vested in individuals as well as organizations in the case of disasters such as floods. The responsibility of disaster preparedness and response rests with the *Civil Protection Department*; however, it can call on any government department or private sector to assist wherever such assistance may be required. This Act is undergoing revision and is soon to be renamed *Emergency Preparedness and Disaster Management Act*; its main thrust is to address structural and organizational gaps to ensure a multi sectorial representation.

The *Meteorological Services Bill (2003)*, soon to be an act of parliament, states as one of *Meteorological Services Department's* functions the issue of weather and climate forecasts, and advance warnings on weather conditions likely to endanger life and property.

The *Water Act (1998)* promotes Integrated Water Resources Management, which has since been adopted as a basis for water resources management in Zimbabwe. The country has been subdivided into seven Catchments, each managed by a Catchment Council. Each Council consists of elected representatives from the different water users, and actually manage the water resources in their basin and have the powers to allocate water.

The *SADC Protocol on Shared Water Course Systems* spells out how international rivers within the SADC community shall be managed. It also stresses the importance of information dissemination during floods and droughts to neighboring countries in order to reduce flood impact.

The *ZACPRO (Zambezi Action Program)* is an initiative by the Zambezi basin states to bring countries that share the Zambezi to manage the basin as one and in an integrated way. At the moment member countries have different policies on management of their portion of the Zambezi.

Financial resources allocated annually by Government for flood and disaster management in general are very low. If the disaster is such that large resources are required, Government will provide funds as available, and the international community and private sector are approached for assistance.

5. Institutions responsible for flood management

The *Civil Protection Organization* of Zimbabwe has the overall responsibility for the management of flood emergencies. There is a working party comprising the following Government departments: health, foreign affairs, water, mining, state security and information. Other organizations related to floods may be co-opted as and when required. The working party is subdivided into three sub-committees, as follows:

(i) *Emergency Services*. The *Zimbabwe National Water Authority (ZINWA)* and the *Meteorological Department* form the early warning unit (weather and flood forecasts). The *Zimbabwe Defense Force (ZDF)* and *Zimbabwe Republic Police (ZRP)*, *Civil Aviation* and *Ambulance* services assist in search, rescue and relocation of flood victims and provide security during flood crisis. The *Health Services* and the *Social Welfare* attend the injured and look at the needs of flood victims, as well as provide social/ psychological support to the victims during and after the crisis.

(ii) *Food and Water Crisis*. Responsible for the food and water requirements in disaster events. It establishes the extent of crop and animal losses during floods and draws up plans to solve the situation and also look at long term plans to restore the situation. The *District Development Fund* and *ZINWA's* role are to establish the current water situation in terms of its quantity and quality to



meet human needs, as well as the water infrastructure. The *Department of Transport/ZRP/GMB/ZDF* provides the logistics for distribution of provisions such as food, medicine and water.

(iii) *Epidemics and Zoonotics*. Considers disease outbreaks that may occur during flood events to both animals and human beings. It draws up plans on how to control as well as eradicating the diseases. The plans will also include personnel and medicine requirements.

Although these Committees are based at Central headquarters, there are similar structures in the provinces and districts, which work closely with the local authorities.

6. Policy

The National policy for disaster management is that every citizen of the country should assist wherever possible to avert or limit the effects of disaster. Central government initiates hazard reduction measures through sector ministries, with local administration taking the responsibility for implementing and maintaining its effectiveness. The system uses existing government, private and non-governmental organizations whose regular activities contain elements of prevention and community development. The organizations are adopted structurally, materially and technically so that they can be shifted rapidly from their regular activities to undertaking protective, relief and rehabilitation measures in times of disaster.

From the above policy it is clear that stakeholders participate in the management at local level. It was written soon after the recent cyclone induced floods to try to address the weaknesses identified in the management of flood events. The change in policy reflects a major shift towards integrated floodwater management approach.

7. Main lessons learned

- Zimbabwe has a considerable number of dams, where water is stored as security for the dry years or seasons. There is therefore reluctance to release water from the dams in order to accommodate floods. The non-structural approach, which includes flood forecasts, is therefore used as an alternate strategy for flood management. If forecasts were accurate and the lead time reasonable, water resources managers would be in a better position to make decisions on whether to release water or not. Thus both structural and non-structural approach to flood management could be used to reduce the impact of floods and drought.
- The involvement of a broad spectrum of the population in management of floods, with particular emphasis on management at local level, has recently made the management of floods a lot easier than the traditional centralized approach.
- There is need to harmonize the water, land-use, development planning and disaster response laws as a way of encouraging IFM. At the moment the laws seem to be independent of each other.
- Communication needs to be improved so that the potential victims can be reached. There is also need to create awareness on the impact of floods and how people should respond to such events at local level.
- The Zambesi basin must be managed as one unit. At the moment each country has its own way of managing floods. A coordinated approach to flood management is needed, which would involve all eight countries sharing the basin.