Sustainable Flood Mitigation Strategies
Pilot Study 3

Community flood mitigation activities

Community: Matidze
District: Mabalane

Report EX 5131
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Summary

Sustainable Flood Mitigation Strategies
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Community: Matidze
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This report describes the development of a sustainable flood mitigation strategy for the village of Matidze in the Limpopo basin in Mozambique. A sustainable flood mitigation strategy is a strategy that can be implemented and maintained by a community to reduce the impacts of flooding on the livelihoods of community members. The work was carried out under a DFID Knowledge and Research (KAR) project, in which information on sustainable flood mitigation strategies were collated in a 'Source Book' and then applied to three communities in Mozambique.

Matidze lies on the Limpopo near the South Africa border, where the river valley is relatively narrow. The houses are above flood level. However, the main source of livelihoods is agriculture which is carried out on the Limpopo floodplain. There is thus a loss of crops during floods, and both people and animals are affected by poor quality drinking water when floods occur.

A series of meetings were held with the community to develop ideas for mitigating the impacts of floods. About 15 ideas were developed, some of which required external support to implement whereas others could be done by the community with external guidance.

Two of the most important mitigation measures, provision of drinking water during floods and pest-resistant seed, were implemented with external support and funding. This was done to help the community deal with some of the most pressing concerns, and stimulate the community to further improvement.

The implementation work was carried out in collaboration with the Eduardo Mondlane University, the Department of Health, the Department of Agriculture and the local District Administration.

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1. Introduction

Sustainable Flood Mitigation Strategies are strategies that can be implemented by communities to reduce the impact of floods on their livelihoods. A strategy for an individual community consists of a number of measures. Examples of measures include strengthening of houses in flood risk areas, to reduce the risk that houses will be destroyed, and providing safe water supplies during flood emergencies, to reduce the risk of sickness.

A Knowledge and Research (KAR) project to identify Sustainable Flood Mitigation Strategies was completed in March 2005. The project includes:

- Development of a Source Book which contains information on sustainable flood mitigation strategies. This is intended for use by Government organisations and NGOs to assist communities to develop their own strategies using a participatory approach. The Source Book is provided in Portuguese and English.
- Posters that can be provided to communities as part of the process of developing their own strategies. These are currently in Portuguese. However the number of words on the posters is minimal to facilitate understanding by any community. Pamphlets have also been produced, that can be used by community leaders and others to explain the posters to communities. These are in black and white, and can also be used as teaching materials in schools.
- Pilot studies in three communities in Mozambique.

The project was undertaken by HR Wallingford Ltd (HRW), the project leader, and the Eduardo Mondlane University (UEM), with contributions from other flood specialists.

This document discusses types of activities that could be included in a strategy for Languene, one of three communities that have agreed to collaborate on the pilot studies. It is based on information obtained from meetings with the Community, particularly a full-day meeting to discuss flood issues in detail, on 5 October 2004. This meeting was attended by community leaders.

A summary of flood related issues at Matidze is contained in **Section 2.**

The needs of the Community are assessed against the contents of the Source Book in **Section 3**, in order to identify measures that could be implemented in the Community.

A number of possible measures have been identified from this assessment, and these are listed in **Section 4**. Thus Section 4 contains initial suggestion of the types of activities that could be included in a strategy for Matidze.

In order to begin a process of developing a flood mitigation strategy for Matidze, it was decided to implement some of the measures with the help of Community members. These are described in **Section 5**.

The Community has taken over these measures, and it is hoped that they will provide an incentive to develop further measures, in collaboration with the local administration and NGOs.

This project ended in March 2005. For any future strategies to be successful, they should be identified by the Community itself. The following approach is therefore recommended:

- Ensure that Committee established to look after the initial measures developed under this project continues to function. This requires follow-up, which could be provided by the local District Administration or NGOs that are active in the area.
- Other possible flood mitigation measures should be discussed in detail with the Community, possibly through the Committee.
- The Community should decide which measures to implement.
- The Community, the local District Administration, and other relevant organisations (for example, INGC, ARA and NGOs) should discuss and agree what support will be provided to the community, and by whom.
- Appropriate training should be provided to the local District Administration, other relevant organisations and the communities in the development and implementation of flood mitigation strategies and measures.

The greatest challenge facing the Community at Matidze is to take as much responsibility as possible for flood mitigation in order to minimise the impacts of flooding.

2. Impacts of flooding at Matidze

The causes and impacts of flooding at Matidze are summarised in this section. A more comprehensive report on this pilot study has been prepared by UEM.

2.1 LOCATION OF MATIDZE

Matidze is located near Mabalane in the Limpopo valley as shown in Figure 2.1.

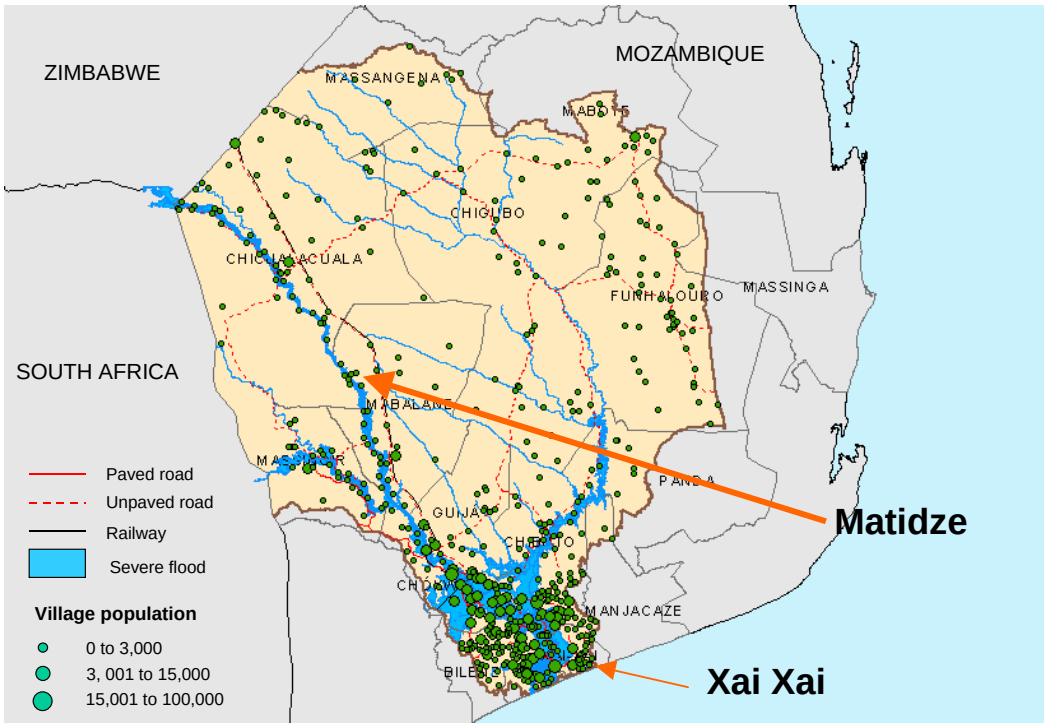

Figure 2.1 Map of the lower Limpopo floodplain showing the location of Matidze

The Community is on the left bank of the Limpopo. The village is on high ground outside the floodplain. The 2000 floods only affected a few houses at the bottom of the village at the edge of the floodplain. Figures 2.2 and 2.3 show typical views of the village. Figure 2.3 was taken during one of the initial meetings with the community.

Figure 2.2 Matidze village

Figure 2.3 Matidze village, showing the meeting area in the centre

The Community cultivates the floodplain, which is about 0.5 to 1.0 km wide. A typical view of the floodplain is shown on Figure 2.4.

Figure 2.4 Limpopo floodplain near Matidze

2.2 FEATURES

The valley side slopes quite steeply down to the river. The floodplain is horizontal overall but with significant undulations. Some crops are grown in the dry season in low parts of the floodplain, where there is residual moisture. The path from the village onto the floodplain is shown on Figure 2.5.

Figure 2.5 Limpopo floodplain at Matidze

Some crops are grown on the high ground in the bush, but the soils are difficult to work (and probably not very fertile).

A variety of crops are grown: mainly maize but melons, beans and sweet potatoes were also evident. Agriculture is rain-fed: there is no irrigation although there is an irrigation pump in an adjacent village. It would be difficult to pump water from the river because of the mobile nature of the river bed and the wide variation in water levels.

The river has large mobile sandbanks. At present there is a large sandbank between the floodplain adjacent to the community and the river channel, and people have to walk across this to collect water. Figure 2.6 shows the Limpopo at Matidze. The river bank is shown on Figure 2.7 and the sandbank on Figure 2.8.

Figure 2.6 The Limpopo at Matidze

Figure 2.7 The Limpopo river bank at Matidze

Figure 2.8 Sandbank on the Limpopo at Matidze

Unlike the lower Limpopo, the houses are close together in one large group and there are few crops grown in the village. The houses generally have wooden frames and mud or wood walls. There is clearly no shortage of wood for building. Typical houses are shown on Figures 2.2 and 2.9.

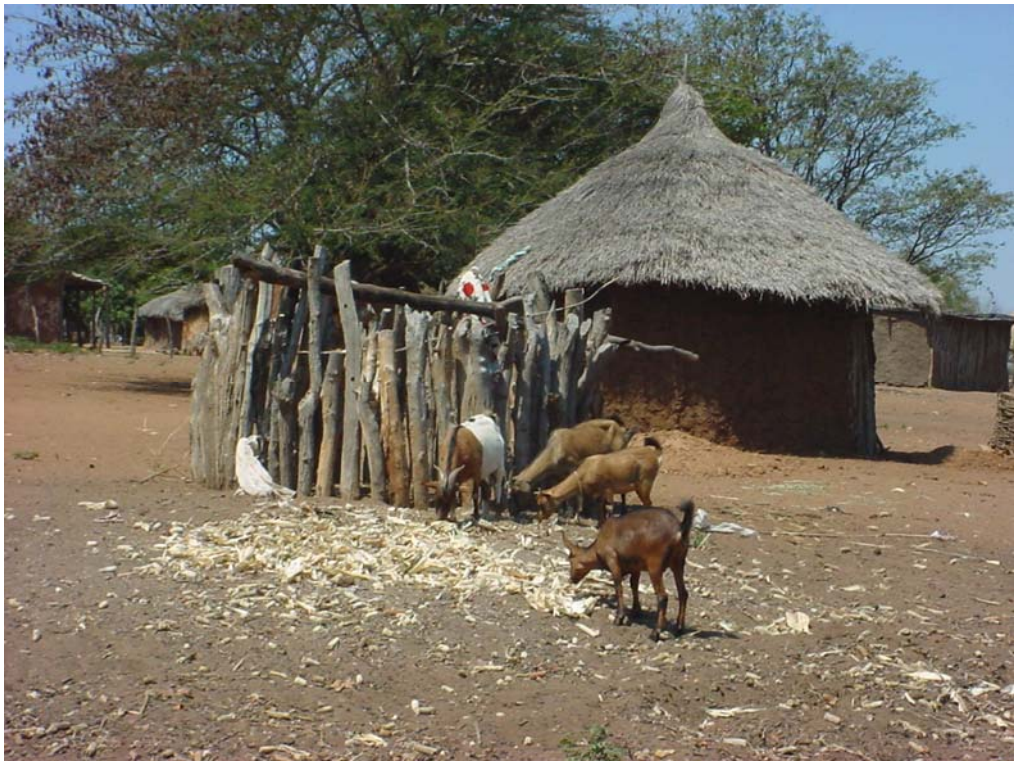

Figure 2.9 Small house and animal pen

There are numerous raised food storage structures consisting of wooden frames on stilts, usually with covers. There was a lot of food evident in the food stores.

2.3 DESCRIPTION OF FLOODS AND IMPACTS

Houses and other buildings are outside the floodplain, and not at risk of flooding. There is a primary school but no secondary school in the vicinity. Young people see little incentive to be educated as there is no secondary school and no jobs. Many young men leave to work in South Africa.

Floods cause a loss of crops that can lead to starvation. The complete wet season crop is lost in a major flood, such as those which occurred in 1972, 1977 and 2000. Smaller floods destroy a large proportion of the crops. Once the floodplain is overtopped it is quickly inundated. Minor floods do not occur every year. There has only been one since 2000, in 2004.

Drought is a more serious problem than flood, and is probably the main reason why food is stored in apparently large quantities. There was a drought in 2001 to 2003, and the bush looks very dry.

Pests are a major problem. The food stores suffer from pests (including rats and beetles). UEM understand that about 60% of stored food is lost in the region. Food stores are constructed on stilts above ground level. Cooking is carried out underneath the food stores to try to reduce pests. A close-up view of a food store is shown on Figure 2.10.

Figure 2.10 Food store

After the 2004 flood, the community planted in the damp soil as soon as the flood receded. However the resulting crop was seriously affected by pests (water rats and

locusts). There are no problems with food for animals during floods as they can graze in the bush.

Water is taken from the river. The community has been given chemicals from the local hospital to purify water but they do not have a person with responsibility for using them. The community leader asked for training in water purification.

Floodwater is contaminated with silt. The community suffers from illnesses after floods including flu-like symptoms and diarrhea. The community said that drinking river water makes animals sick, and this can eventually (but not immediately) kill them.

The community had a well but this was destroyed in the 2000 flood. The community would like a replacement well close to the centre of the village (perhaps 1.0 to 1.5km from the river). Water from the old well was salty and was used to wash dishes etc. It was also used for drinking during floods because it was clean. The community thinks that there will be places in the village where sweet groundwater exists (but there is no basis for this view).

The village is at least 20 metres in vertical elevation above the floodplain. The height from groundwater level to ground level is likely to be large. A well close to the 2000 flood limit would be easier to build but more water carrying would be needed.

Access to the village is via a track that runs along the edge of the floodplain. There is one location where a gulley cuts the access route during wet weather and floods. The community is trying to construct a bridge using wooden columns and beams, and mud as the road surface. However this type of construction is unlikely to survive for long. The structure is shown on Figure 2.11.

Figure 2.11 Access road showing bridge deck construction.

The access problem is regarded as serious by the community as there is no other road into the community. It is possible to walk to Mabalane on high ground and therefore it might be possible to make a track on high ground. However this would require investigation.

Flood warning is provided by a messenger from the District Administrator's Office. A few people have radios but flood warnings are not usually received in this way. The Community does not always get a warning, but people tell each other when the river is rising. People in the Community use sticks to mark the limit of floodwater, to see whether the water is rising or falling.

The warning is expressed in metres and the Community does not know what this means. It is possible that this refers to the expected level at Chokwe where there is a gauge, as the levels given seem to be of the right order of magnitude.

When a flood warning is received (or the river is rising), equipment is removed from the fields. There is little that can be done about the crops as they are not ripe. The Community receives about 3 days warning of a flood. However the warning is often not believed until the water starts to rise at the Community.

After the 2000 flood, some people were given food and seed (but not all). The Community feels isolated from Government support.

There is no other source of income in the area. Mabalane is small and there are few jobs. There do not appear to be any shops in the community. Livestock could be sold to provide income. It is understood that this does not occur after a flood but it does occur after a drought as there is no food.

2.4 COMMUNITY CONCERNS ABOUT FLOODING

Particular issues raised by the community include:

- Can pest damage to stored crops be reduced?
- Can pest damage to crops in the ground be reduced?
- The need for a clean supply of water for people and animals during floods.
- The Community feels that the solution to the water supply problem is a borehole near the centre of the village.
- The access problem should be resolved. Whilst this is not directly a flood mitigation issue, it affects the delivery of any relief supplies and other assistance.
- Ticks are a serious problem for animals. This is a matter for the agricultural service in Mabalane (which seems to be practically none-existent).

3. Application of the Source Book to Matidze

The main headings in the Source Book are listed in this section using bullet points. Each heading represents a measure or group of measures that could contribute to a sustainable flood mitigation strategy.

Under each heading, comment in given *in Italics* on whether the measure (or group of measures) would be applicable to the Community. Those measures which appear to be applicable are listed in Section 4.

Awareness raising

- Source Book suggestion: **Prepare flood maps (national or regional)**
  Response: There seems little point as the high areas are known, and in large (2000) floods the whole floodplain floods to the bottom of the village.

- Source Book suggestion: **Provide support to Regional/Local Government** by disseminating Source Book and other flood information, and providing training:
  Response: There is scope for raising awareness and working with Regional and Local Government to help with flood problems. However this cannot be done in the timescale of the project, and should be done by the organisation that provides long-term support to communities.

  This should be discussed with Regional/Local Government. A local NGO should be involved as they may have capacity to provide assistance.
  Suggested measure: See Section 4.4

- Source Book suggestion: **Provide flood information to communities**
  Response: The Community is aware of flood risk and warning arrangements..

  More participatory work is needed on mitigation strategies. This takes time to develop.
  Suggested measure: See Section 4.4

  Awareness of flood issues could be raised by using the posters and cards in schools, for example the cards that show pictures of water supply. However the Community is aware of the flood risk because of quite frequent flooding.
  Suggested measure: See Section 4.1

- Activities with community
  - Source Book suggestion: **Make flood map with community**
    Response: Areas that flooded are known by the Community.

  - Source Book suggestion: **Seasonal calendar**
    Response: The flood season is known. There is not enough time to grow a crop between the start of the rainy season and the flood season.

  - Source Book suggestion: **Flood marks**
    Response: A flood mark for the 2000 flood could help future generations to know where the flood limit is, although people in the Community know where it is as the flood was very recent.
    Suggested measure: See Section 4.1

- Source Book suggestion: **Keep people aware in periods when there are no floods**
  Response: There may be some scope for raising awareness as floods do not occur every year.

Flood Warning:

- Source Book suggestion: **National/regional flood warning system**
  Response: A flood warning system for the Limpopo exists. We did not find out how messages get to Mabalane.

  – Data collection
    Response: There is no gauge for the flood warning system in the vicinity.

  – Prepare warning message including lead time and magnitude of flood, and all clear message.
    Response: It is understood that warning messages are provided that give an indication of timing and magnitude of the flood. The efficiency of providing the warnings and the information provided to the community could be improved. In particular, there is need to provide more information on the magnitude of the flood.
    Suggested measure: See Section 4.2

- Source Book suggestion: **Local warning system**
  – Flood watch
    Response: The Community has an informal flood watch, although it is not apparent how well the messages are given to everyone in the Community.
    Suggested measure: See Section 4.1

  – Gauges
    Response: No raingauge is needed as the source of flooding is the Limpopo.

  – Trigger level
    Response: The Community seems to know when the river level is dangerous and they should remove tools, etc from the fields.

- Source Book suggestion: **Dissemination of flood warnings**
  – Dissemination to communities
    Response: The Community receives messages from the District Administrator's office. Although some radios exist, they do not seem to be a primary source of warning.

  – Dissemination to remote areas
    Response: The village is compact and remote areas do not seem to be an issue, although this question was not asked.

Prepare for floods

- Source Book suggestion: **Flood defence**
  – Main infrastructure
    Response: None.

  – Local infrastructure
    Response: None

  - Drainage systems
    Response: None

  - Operation and Maintenance
    Response: None

  - Flood fighting
    Response: None. The river is huge and there is little that communities could achieve

  - Sandbags
    Response: Not relevant because of the high depth of flooding that could occur and the fact that the houses do not flood.

- Source Book suggestion: **Safe havens**
  Response: Not applicable.

- Source Book suggestion: **Prepare houses for floods**
  - Strengthen houses
    Response: Not applicable.

  - Flood proof houses
    Response: Not applicable.

  - Raise houses
    Response: Not applicable.

  - Platforms inside or on roof
    Response: Not applicable.

  - Relocate houses
    Response: Not applicable.

- Source Book suggestion: **How to decide whether to stay or leave?**
  Response: Not applicable

- Source Book suggestion: **Evacuation site**
  Response: Not applicable.

- Source Book suggestion: **Evacuation route**
  Response: Not applicable.

- Source Book suggestion: **Evacuation procedure**
  Response: Not applicable.

- Source Book suggestion: **Evacuation shelter**
  - Facilities:
    Response: Not applicable.

  - Management
    Response: Not applicable.

- Source Book suggestion: **Water supply for emergency** including water purification
  Response: Assistance could be given to improve water supplies during a flood. This includes:
  - *storage of water in the village*
  - *collecting rainwater*
  - *water purification using chlorine or bleach. This should be administered by a competent person*

  The Community would like a borehole, but this is beyond the scope of this project..
  Suggested measure: See Section 4.3

- Source Book suggestion: **Health precautions**
  Response: There are health problems during floods including flu and diarrhoea. The Red Cross produces flood kits that include some simple health measures. The Red Cross is not working in this area but there may be other NGOs who can assist. An improved water supply will help to reduce health problems, It may also be possible to reduce health problems by other techniques and advice should be sought from the Local Health Department or NGOs.
  Suggested measure: See Section 4.2

- Source Book suggestion: **Care of vulnerable people**
  Response: Not applicable.

- Source Book suggestion: **Protect water and other services**
  Response: Water is taken from the river. There are no other services.

- Source Book suggestion: **Food supply for emergency**
  Response: Advice on improving food storage is needed, particularly how to deal with pests. Pests are also a problem for crops in the ground.
  Suggested measures: See Section 4.2

  A review of agricultural practices would be helpful, to see whether there are alternative crops, for example faster growing crops, or other things that could be done to reduce crop losses due to floods.

- Source Book suggestion: **Other equipment needed** (fuel, cooking utensils, etc)
  Response: Not applicable, as houses and cooking facilities are not affected.

- Source Book suggestion: **Protect homes from looting/store for valuables**
  Response: Not applicable.

- Source Book suggestion: **Protect access and evacuation routes**
  Response: There is a need to improve the access route, although evacuation is not an issue.
  Suggested measure: See Section 4.2

- Source Book suggestion: **Care for animals**
  Response: There is a need for a safe water supply for animals during a flood.:

- Source Book suggestion: **Protect agriculture**
  Response: Discussed under 'Food supply for emergency', above. Agriculture can be afflicted by soil erosion, deposition of unwanted sands, and damage to bunds

and other works. There appears to be little that can be done to prevent this kind of damage.

- Source Book suggestion: **Protect fisheries**
  Response: Not discussed. Some fishing is carried out in the river but this is not a very significant issue.

- Source Book suggestion: **Store seeds and other essentials to aid recovery**
  Response: There is often a shortage of seed and stored seed is destroyed by pests. A source of pest-resilient seed for new crops is needed.
  Suggested measure: See Section 4.2

- Source Book suggestion: **Protect livelihoods**
  Response: The main livelihood activity is agriculture. There is no paid work. There is probably little scope for reducing reliance on agriculture.

  Support is needed after a flood to restore agriculture and help people during the period when they have no crops.

  The Community should consider if there is anything else they could do to secure their livelihoods when a flood warning is received.
  Suggested measure: See Section 4.1

- Source Book suggestion: Planning for initial community recovery
  Response: Ideas for improving the ability of the Community to recover should be developed with the community.
  Suggested measure: See Section 4.1

- Source Book suggestion: **Planning for floods**
  - Responsibilities
    Response: A meeting should be held between Community leaders and the District Administration to discuss responsibilities in a flood emergency. It is unlikely that the District Administration can assist during the flood, but it may be possible to agree such items as better warning, provision of water purification chemicals, provision of seed after a flood, etc.
    Suggested measure: See Section 4.2

  - Community plan including dissemination of warning
    Response: A Community Plan should be developed within the Community using a participatory approach. This will require a change of thinking and behaviour, and should form part of a long-term strategy to mitigate the impacts of flooding. Suggestions are given in Section 4.

    The Community should decide whether and how to practice the plan.
    Suggested measure: See Section 4.1

  - Equipment
    Response: This would be identified in the Community Plan referred to above.

  - Funding
    Response: The flood mitigation strategy will require some funding, for example to assist with water purification. It may be possible to interest an

NGO(s) in providing assistance. A meeting should therefore be held with potential supporters and involve them in developing the strategy.
Suggested measure: See Section 4.2

– Flood without warning
Response: This is a very low risk scenario. It could be addressed by the implementation of a local flood watch.

- Source Book suggestion: **Development in flood risk areas**
Response: Not applicable.

What to do when a flood occurs

Response: The following items should be considered as part of the community plan. In particular, there should be liaison with the District Administration regarding the way in which shelters are operated, and what information is needed on flooding situations.

- *Implement plan*
- *Help vulnerable people*
- *Emergency relief actions*
- *Provide information on local situation*

Further information on these activities is provided in the Source Book.

What to do after a flood occurs

Response: The following items should be considered as part of the community plan. Further information on these items can be found in the Source Book.

- *Initial recovery actions*
- *Repair roads and bridges*
- *Restore water supply and other services*
- *Telecommunications*
- *Disease prevention*
- *Medical facilities*
- *Community health*

- *Livelihoods*
  - *Cash and in-kind*
  - *Avoid panic selling*
  - *Re-start agriculture*
  - *Restore other economic activity*

- *Review of flood*

The actual actions taken will depend on the impact of the particular flood and the condition of the community after the flood. External assistance will be essential for some of these items in most circumstances. The District Administration should discuss with INGC, ARA and NGOs how best to support flood affected communities.

4. Initial suggestions for flood mitigation activities

From the review of the Source Book in Section 3, the following items have been selected as measures that could be implemented at Matidze to provide a flood mitigation strategy. However, any strategy must be decided by the Community, and therefore these items are initial suggestions only.

The Community Flood Mitigation Strategy should be developed within the Community using a participatory approach. This requires a change of thinking and behaviour, and should form part of a long-term strategy to mitigate the impacts of flooding.

The items are divided into the following groups:

- Things that can be done by the community now.
- What can be done by the community with help from external organisations including the District Administration, INGC, ARA and NGOs.
- What can be done if some funding were available.
- What long-term support can be provided to the community.

4.1 THINGS THAT CAN BE DONE BY THE COMMUNITY NOW

The following items could be undertaken by the Community now, although facilitation would be needed to inform the Community about these issues and what they could do.

- Raise awareness of flood issues in schools using posters and cards, for example information regarding safe water supply for people and animals.
- Make a permanent flood mark for the 2000 flood.
- Ensure that the local flood watch functions so that the whole Community is aware of approaching floods and is able to take action, for example storing water before it becomes too silty and polluted.
- Consider if there is anything else the Community can do to secure their livelihoods when a flood warning is received.
- Consider ways for improving the ability of the Community to recover after a flood.
- The community should prepare a community plan and prepare equipment. The plan should be practised before each flood season. A plan might include:
  - Agreement on the content and dissemination of flood warning messages so that the community can decide whether to evacuate.
  - Measures for providing safe drinking water and flood during and after the flood

4.2 WHAT CAN BE DONE BY THE COMMUNITY WITH HELP FROM EXTERNAL ORGANISATIONS

- Improve the usefulness of flood warning messages and efficiency of delivery.
- Consider methods of reducing health problems in liaison with the Local Health Department and NGOs. An improved water supply should contribute to this.

- Consider the scope to improve the production and storage of food. Key issues include pest control for stored and growing crops, and ways of improving yields of dry season crops. The Government Department of Agriculture should be involved in this activity.
- Improve the storage of seed including prevention of damage by pests. **This is vital for rapid recovery of crop production.**
- Repair the access route to the Community to facilitate post-flood recovery. This may require some external support although the Community has made a start.
- A meeting should be held between community leaders, the District Administration and INGC to discuss responsibilities in a flood emergency.
- Discuss with the District Administration and NGOs possible financial and other support for the flood mitigation strategy.

4.3 WHAT CAN BE DONE IF SOME FUNDING WERE AVAILABLE

- Improve water supply during floods including rainwater harvesting, water storage and purification. **This is vital to minimise health problems during and after a flood.**

4.4 WHAT LONG-TERM SUPPORT CAN BE PROVIDED TO THE COMMUNITY

- Raise awareness of Regional/Local Government of flood mitigation strategies. Ideally this should involve an organisation that would be able to provide long-term support to communities. This could involve a local NGO.
- More participatory work is needed with the community on mitigation strategies. This takes time to develop. Therefore there is a need to identify an organisation to work with the community. This organisation will require training in flood mitigation strategies.

5. Implementation of some flood mitigation measures

5.1 INTRODUCTION

From the list of flood mitigation measures listed in Section 4, it was decided to implement some measures that would involve the community in construction activity. The reasons for this were:

- The Community would become engaged in the process.
- The Community would see some immediate benefits.
- There would be a permanent reminder of the flood mitigation programme.

The following measures were selected:

- Provision of a water purification system together with rainfall harvesting facilities.
- Provision of a rodent-proof seed store together with treatment of seed to prevent pest damage.

These were selected for the following reasons:

- They were considered to be important issues by the Community.
- They should provide a significant reduction in health problems experienced by the Community during and after a flood, and contribute to the restoration of livelihoods after a flood event.
- They could be provided within the project time-scale and budget.

These measures were important for all three communities covered by the pilot studies, and it was decided to provide the same facilities at all three communities.

5.2 COMMUNITY MEETINGS

Initial meetings were held with the Community to confirm that it was willing to take part in the project, and provide some initial information about the project to the Community. An initial meeting is shown on Figure 5.1.

Figure 5.1 Initial community meeting

A full-day meeting took place at the beginning of October 2004 to discuss flood issues and possible mitigation measures. The meeting was attended by Community leaders.

The project team was represented by David Ramsbottom of HR Wallingford, together with staff members from Eduardo Mondlane University (UEM). The language of the meeting was Shangaan and therefore translation was required.

During the discussion of the flood mitigation measures, the project team went through the measures contained in the Source Book and asked the Community to comment on each measure in turn. Prior to the meeting, measures which were clearly not suitable based on the initial meetings were discarded in order to concentrate on the measures that could be effective.

The format of the meeting was as follows:

1. Welcome by the Community leader
2. Introduction by Mr Paiva of UEM
3. Discussion of flood problems, led by the project team
4. Discussion of flood mitigation measures. This was the major part of the meeting.
5. Short presentation on the next steps.

The meeting is shown on Figure 5.2.

Figure 5.2 Planning meeting with community leaders

Some of the issues discussed at the meeting are summarised in Section 2.3, and the main conclusions of the meeting are listed in Section 2.4. The response is summarised more formally in Section 3, which considers each topic listed in the Source Book in turn and the response.

The responses were then used to prepare the list of flood mitigation activities in Section 4, from which the need for safe water supplies during a flood and pest-resistant seed for post-flood recovery were identified as priorities.

5.3 IMPLEMENTATION OF FLOOD MITIGATION MEASURES

The chosen measures consisted of the following components:

- A 3000 litre water tank mounted on a concrete stand about 1m above ground level. The tank could either be filled using river water or by rainwater from the rainwater harvesting facility referred to below.
- A rainwater harvesting facility with a catchment area of 18m^2, constructed using tin sheets on a concrete and wood frame. The facility was connected to the water tank.
- Provision of water purification fluid in collaboration with the Ministry of Health and the NGO PSI. When the facilities were handed over, training was provided by PSI on how to safely purify water in the tank, and also how to purify water obtained from the river in the traditional way using containers of about 20 to 25 litres capacity.
- Provision of a seed store with devices to prevent entry by rodents, together with seed that has been treated to prevent damage by other pests. The seed was treated

in collaboration with the Ministry of Agriculture. The seed store was located under the rainfall harvesting facility.

The construction of the measures is shown on Figure 5.3. The work was directed by a local contractor but labour was provided by the Community.

Figure 5.3 Construction in progress

The almost completed facilities are shown on Figure 5.4.

Figure 5.4 Rainfall harvesting facility and seed store nearing completion

Some issues that arose when designing the system are listed below:

1. The water collection system can be used for both rainwater and river water. Rainwater does not need purification. However it will often be mixed with river water and, in addition, there may be sources of pollution in the tank that have settled out from previous stored water. It was decided to purify all river water added to the tank, and clean the tank regularly.

2. River water contains sediment and this will accumulate in the tank. Thus it is necessary to clean the tank and guidance was given on how frequently to do this.

3. The water purification fluid takes some time to mix with water in the tank or smaller containers. RPI advised that whenever it was used in small containers, there is a need to shake the water containers as people may not leave them long enough to achieve dilution.

4. Two small bottles of the water purification fluid are needed for 3000 litres. To avoid the necessity of trying to measure how much water there is in the tank, it was decided to make sure the tank is completely empty before being filled with river water. In this case two bottles would be needed. There was no need to add additional water purification fluid if rainwater entered the tank.

5. It was stressed that the tank is for emergency drinking water in times of flood (and drought, if they can be filled). The tanks are far too small to provide a regular water supply for a whole community.

6. The water purification fluid has been made nationally available in Mozambique.

5.4 HANDOVER OF THE FACILITIES TO THE COMMUNITY

The facilities were handed over to the Community on 10 February 2005. The handover is shown on Figures 5.5 to 5.6.

Figure 5.5 Handover of the facilities to the community

Figure 5.6 Handover meeting

The Community was instructed on the use of the water purification fluid by members of PSI, and the need for water purification was beautifully demonstrated by the use of theatre, performed by a team from PSI. The production team is shown on Figure 5.7.

Figure 5.7 PSI theatre team

PSI is primarily concerned with the reduction of waterborne disease, particularly cholera. This collaborative action between a flood mitigation team and a disease reduction team demonstrates how collaborative approaches could be adopted to address wider problems faced by communities, notably the impacts of drought, HIV Aids and malaria.

It was however recognised that only one issue should be addressed at a time, to avoid confusion. Thus, the handover on 10 February 2005 concentrated on water purification. The treatment of seeds to prevent damage by pests will be carried out after the crops have been harvested in late March 2005.