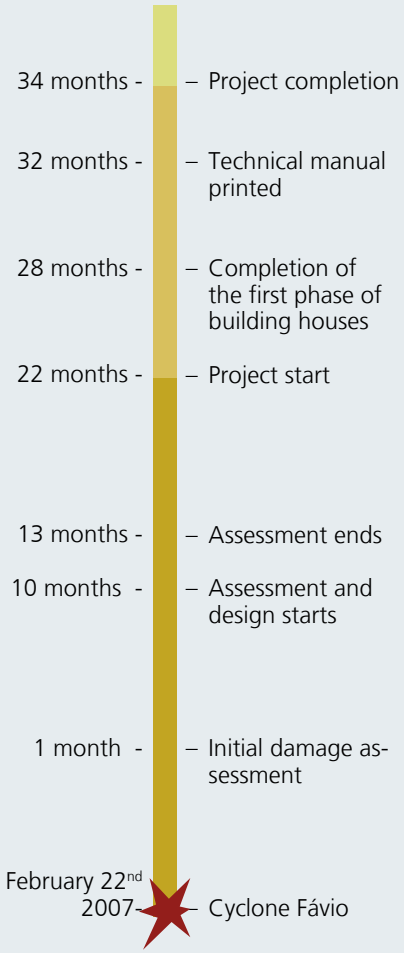
A.18 Mozambique - 2007 - Cyclone Fávio

Case study:

Country:
Mozambique
Disaster:
Cyclone Fávio
Disaster date:
February 22nd 2007
No. of houses damaged:
6,500
No. of people affected:
160,000 people
Project target population:
10 communal cyclone shelters
Shelter size:
35 m²
Materials Cost per shelter:
3,500 USD
Project cost per shelter:
5,000 USD

Project timeline



Project description
The project identified and tested innovative small-scale mitigation interventions for cyclones. It used participatory approaches and focused on local capacity building in vulnerable pilot areas. The major focus of the project was to disseminate the initiative and prepare the conditions for future replication. It also built 10 cyclone shelters.

Strengths and weaknesses

✓ A construction handbook was developed and accepted by local governments as a building code. This was translated and disseminated in other countries.
✓ The project focused on mitigating the impacts of future events.
✓ Continuous technical support provided by architects and civil engineers. Training of local master builders.
✓ Construction techniques were accepted by local population, local master builders and the municipality.
✓ The city council remained the owner of the shelters. They were freely provided to the most vulnerable households in the city.
✓ The houses serve as community cyclone shelters for the neighborhood sheltering about 1000 people.
× The design did not allow the houses to be modified or extended.
× High cost of ferro-cement for the context prevents large scale uptake.
× During the first phase, kitchens, latrines and water wells were not included in the project.
- There was a process of experimentation and "learning by doing".
- Some architecture students and other municipalities that have the same risk were interested by the project.
- After the project, some residents constructed houses using the ferro-cement roofing technique, and the council decided to replicate the vaulted structure in a school.
- Some humanitarian institutions were interested in replicating the construction techniques in new schools and emergency infrastructure located in disaster prone areas.

The project built 10 cyclone shelters, but used the project to advocate nationally for safer construction.
Photo: Arianna Francioni

Before the cyclone

Mozambique has a large coastline exposed to the Indian ocean leading to the threat of cyclones. Additionally Mozambique is prone to floods, droughts and earthquakes. The number of events has dramatically increased this century.

Coastal areas of Mozambique are very prone to cyclones. However, at country and local level, there was neither interest nor technical knowledge on how to build resistant houses and / or community shelters.

Vilankulo municipality is a geographically exposed coastal town that has been hit several times by cyclones and strong winds.

In the urban context of Vilankulo municipality, infrastructure and houses were very vulnerable to strong winds.

After the cyclone

In 2007, Cyclone Fávio hit some coastal areas of the central region of Mozambique, generating torrential rains and wind speeds up to 220 Km/hour. It hit an area that had already been flooded the month before. High wind speeds caused the majority of damage.

Field assessment

One month after cyclone Fávio, a technical team conducted a field assessment in order to determine damage on houses and public facilities, and realised that most of the buildings were not resistant to strong winds. This was due to the construction techniques and quality.

The study reported that it was more sustainable to reconstruct in a resistant manner than to spend money every two or three years rebuilding after cyclones.

Catalogue of housing

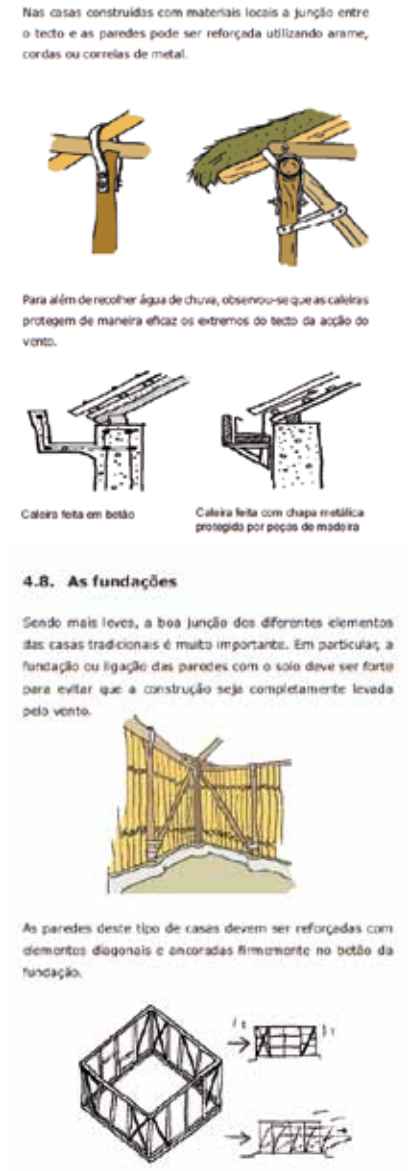
Following the cyclone, a catalogue of different housing solutions adapted to urban contexts in Mozambique was produced. It included some pre-industrialised techniques and materials. The catalogue targeted master builders and technical staff.

Prototype testing

To support the introduction of cyclone-resistant construction techniques in the country, and to demonstrate the real feasibility of the technical proposals in the manuals, different prototypes using different materials were tested by being built in the field.

In building the prototypes ways to improve them would be identified. It was also hoped that by building them replication would also be encouraged, as craftsmen would "learn by doing".

The site where the shelters were built was located in a council owned land in a suburb area, home to some of the most vulnerable people in the city. The original houses that were built on the site with local materials were destroyed by the cyclone.



A construction manual was developed, adopted nationally and shared regionally.

The organisation worked with the municipality at local level, and the National Institute of Disaster Management at country level. This allowed different government institutions to be involved and allowed for advocacy at different levels.

Implementation

Some of the techniques tested were already available in Mozambique and others were imported from different countries around the world. Architects, engineers, and students of the national university participated in the process of design and building.

As part of the project a manual, posters and other materials were developed.
Credit: Eduardo Feurhake

"The purpose of demo projects is to ultimately influence national and local policies, so that if proper building techniques are integrated in the codes and regulations, then the scale of the impact is both national/local."

Project technical director

In the town, local master builders and municipality technical staff were very involved in the construction of the shelters. They received special trainings on the new techniques and practiced by building the shelters.

Inhabitants of the suburb could see the site and visit the houses. This involvement allowed local people to become aware of the importance of building resistant houses, and which techniques to use.

In the municipality some families are now building their new houses replicating the techniques. The municipality is also building new facilities according to the building recommendations and new techniques.

At national level, the building process was periodically presented to national government institutions and other stakeholders (including humanitarian institutions, universities and private sector), which were also invited to visit the construction site.

Manual developed

A first manual with simple recommendations on how to improve local construction techniques had been developed before the cyclone.

With the experiences gained during construction of the prototypes, the existing manual "Building with Winds" was reviewed and reprinted. It was targeted at technicians and local communities. It included simple graphic designs and explanatory texts. Its content was used for developing posters that can be put up in the communities. The online version of the manual is now available and spread worldwide in different languages.

In building the cyclone shelters, local builders "learnt by doing".
Photo: Fernando Ferreiro

Different institutions from the government and humanitarian agencies are interested in the experience and want to replicate the building techniques for public facilities such as schools and health centres.

The purpose of developing technical manuals and implementing pilot projects was to ultimately influence national and local policies, so that proper building techniques and be integrated in the codes and regulations.

Technical solutions

The cyclone shelters were built with reinforced concrete structure (foundations, columns and beams). Walls were made from concrete blocks (first phase) and compressed earth blocks (second phase).

Different solutions for covering were tried:

- 3cm thick ferro-cement vaults (0.70 x 6m) manufactured on the ground and then raised.
- 8 cm thick concrete vaults (3 x 6m) using a metal formwork on the beams for easy assembly and disassembly.
- Self-supporting dome made with compressed earth blocks.

The houses were built by local masons (the beneficiaries are very old or handicapped people so they could not participate in the construction).

As part of the project a game was developed to share learning surrounding the threat of cyclones and flooding.
Credit: Eduardo Feurhake