

D.8 Tonga - 1982 - Cyclone Isaac

Case study: Disaster mitigation

Project type:

Quick Impact Projects
Shelter disaster mitigation

Disaster:

Cyclone Isaac, 3 March 1982

No. of people displaced:

45,000 made homeless

Project target population:

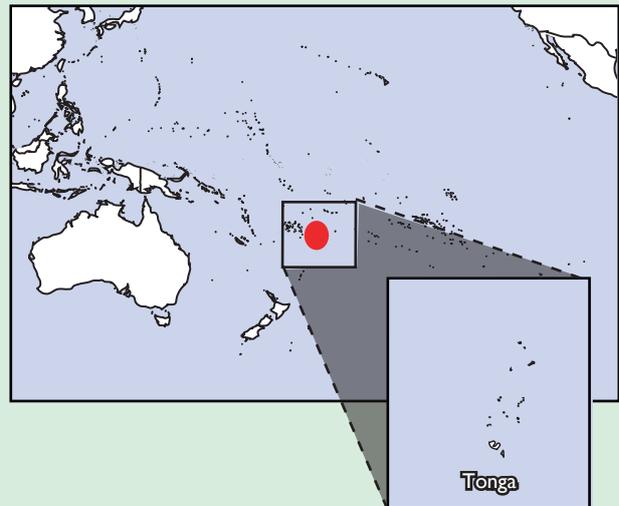
6,600 people in 34 villages for Small Projects programme; 95,000 people (entire population) for disaster mitigation/preparedness programme

Occupancy rate on handover:

Unknown

Shelter size:

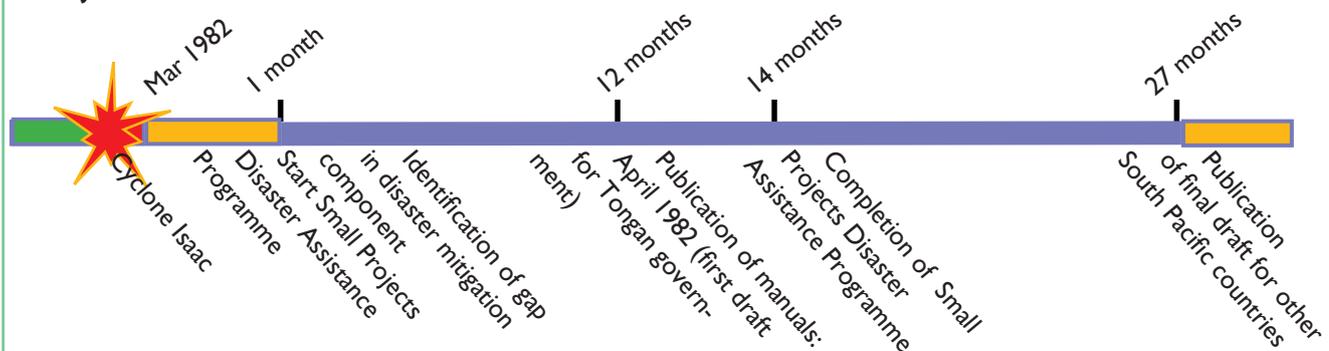
Various



Summary

The settlement-focused 'Quick Impact Projects' gave responsibility and control to beneficiary villages. A parallel programme on disaster mitigation strategy offered the technical tools to ensure that the awareness of how to 'build back safer' would be incorporated into projects.

Project timeline



Strengths and weaknesses

X Communal projects supported recovery on a settlement-wide basis.
 X Beneficiary-led proposals allowed a wide range of different projects to take place, all tailored to each village's needs.
 X Disaster mitigation measures were designed to be incorporated into the quick-repeat cycle of disasters, as both preparation and response at the same time.

X Using simple techniques and local materials increased the likelihood of acceptance by the affected populations.
 W Lack of technical support left questions about the hazard-resistant quality of the Small Projects.
 W There is a lack of clarity as to what extent the recommendations of the strategy were followed through.

Before the cyclone

Tonga consists of 170 islands, 36 of which are inhabited. Approximately two-thirds of its population of 95,000 people live on one main island group.

Tonga is exposed to a number of hazards (earthquakes, volcanic eruption and tsunamis) of which cyclones are the most common, striking once every 1.6 years on average. Cyclone Isaac was declared by the Tongan authorities to have been the worst disaster in Tongan history, in part because of the magnitude of the destruction of housing, public buildings and livestock (95% of livestock were killed in some places), but also because of the proportion of damage caused to the more heavily populated island of the capital city, Tongatapu.

The emergency response was constrained by the large number of islands, the dispersed nature of the population and limited communications. It emerged after the cyclone that there had been no comprehensive government disaster mitigation or disaster response programme in place.

Repeated cycles of disaster and short-term emergency response had contributed to a lack of disaster-preparedness and disaster-mitigation planning. The repeated disasters had both forced resources to be used for emergency response and had damaged the local population's capacity for self-reliance.

Public buildings were designed using seismic and cyclone codes from Australia and New Zealand, but these were not applied to private housing. The modernisation of some of the housing stock in the prior decade had also seen many houses built with badly secured metal roofing sheets.

After the cyclone

Relief agencies and the armed forces of Australia, New Zealand and other countries worked quickly to bring food supplies, medicine and other support to the affected population. The largest immediate concern was the widespread destruction of livestock and crops. While 1,000 tents and tarpaulins were delivered in the first few days, many families had already started the rebuilding process.

Small Projects

The implementing organisation, in cooperation with the Government of Tonga and a major international donor, started their programme three weeks after the cyclone. The project was intended as a form of 'Quick Impact Project'. It was called the Small Projects Disaster Assistance Programme and had a shelter and settlements focus.

The uneven speed of progress in the completion of some projects meant that the programme did not finish until the end of June the following year. The Small Projects programme was already on the ground before the emergency. The consultants employed to create a shelter strategy were also involved in a broader project of disaster mitigation for housing in the South Pacific.

Disaster mitigation strategy

For some time prior to Cyclone Isaac, the same international donor had also been funding the first stages of a shelter-focused disaster preparedness study for all of the anglophone South Pacific islands. Parts of the study specific to Tonga were then written in direct reference to the cyclone and a draft was released in April 1982. This then informed studies for the other islands. The consultant continued to work with the same donor and with research organisations until 1984 to produce guidelines for other South Pacific countries.

Selection of beneficiaries

Small Projects The size of many small islands and the prior stationing of the implementing organisation's staff allowed information about the Small Projects programme to be delivered to each community by word of mouth. Villages made proposals as a whole and each village's proposal was assessed by the implementing organisation. The national government was informed of all decisions. A number of field visits to each village were made during the projects to monitor for quality and speed of progress.

While it was designed primarily for the Government of Tonga, the strategy for disaster mitigation and preparedness was also intended to be accessible to the country's entire population.

Land rights / ownership

For the most part, beneficiaries built back on their customary land.

Technical solutions

The villages were left to decide whether there were any proposals for which they would like to apply for funding. Staff worked with the villages to prepare the actual technical proposals.

Responsibility for all construction and for the construction quality of the Small Projects was left explicitly to the beneficiaries.

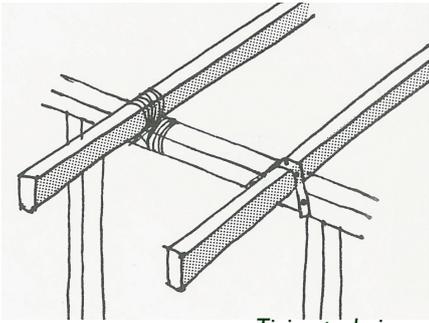
Because most villagers were able to quickly build basic shelters, and because they were applying as a village, the proposals were often for communal facilities in the village, or groups of structures that benefited the shelter and settlement recovery as a whole. These included restorations of village fences, showers, kitchens and toilets, as well as community food gardens. Other projects, not directly related to shelter, included the restoration of poultry units, water tanks and a wind tower.

Disaster mitigation strategy

The consultant realised that most traditional houses were built and maintained incrementally by the families. Outside support, whether it was materials or information, often arrived while the recovery and reconstruction process was already underway. The fact that this process was often ongoing when Tonga was faced with the next disaster led the consultant to develop a series of illustrated information booklets that advocated:

- self-reliance and self-build techniques for the affected families;
- use of traditional techniques and locally available materials;
- last-minute strengthening measures applicable to both transitional and permanent housing; and
- the incorporation of hazard-resistant measures into the repair of disaster-damaged housing, as few houses were torn down and built anew from scratch.

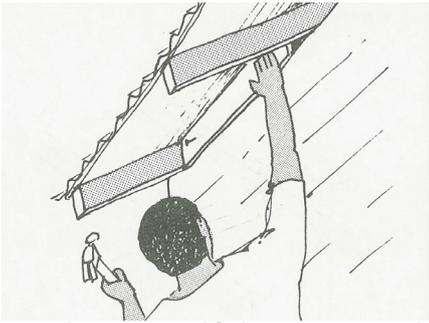
The guidelines had to take into account the wide range of hazards that were possible in Tonga. The main guidelines concerned strengthening



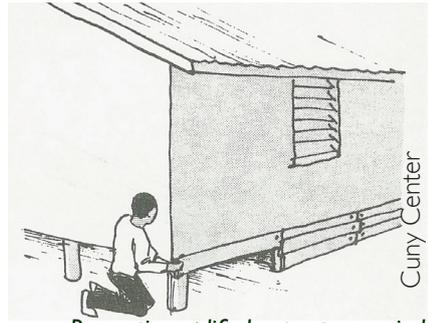
Tying techniques



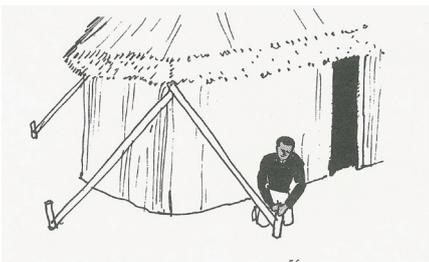
Bracing techniques



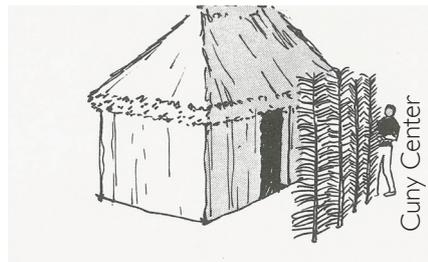
Preventing uplift due to strong winds



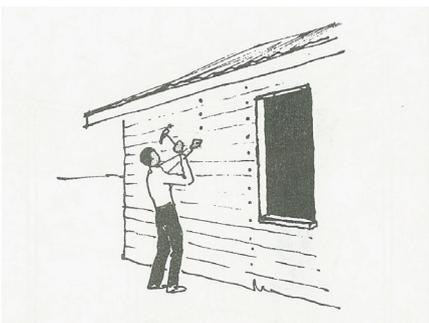
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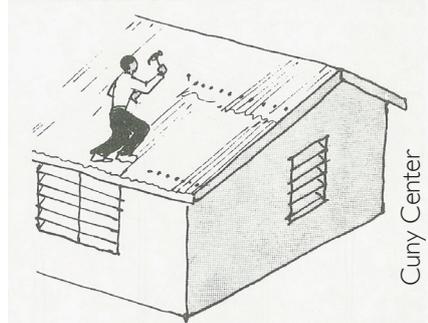
Lateral bracing



Wind resistance techniques



Safe wall cladding fixture



Safe roof fixture

against both cyclones and earthquakes, focusing on the binding of roofs to wall posts and the binding of ring beams and reinforcement of joints.

The guidelines included the planting of bushes in front of houses to protect them from objects blown by high winds. The most important element was the realisation that post-disaster mitigation measures would be implemented both before and after repeating disasters, as part of a cycle of

reducing damage, repair and upgrading.

The graphics guidelines were also accompanied by other documents that focused on the setting up of permanent disaster preparedness capabilities within government structures.

Implementation - Small Projects

Proposals for each project were received on a rolling basis; approval took about three weeks in each case.

The site was visited and the proposal was checked to ensure that it answered a cyclone-related problem, was within a maximum of US\$ 5000 and met other criteria.

A clear agreement on the division of responsibilities was drawn up between the organisation and the village. The organisation was to procure the materials, while the village would pick up the materials from the local depot and would take responsibility for construction.

One challenge involved ensuring that the villages understood what the materials would be used for. This issue became more central in villages where the leadership structures were not clear.

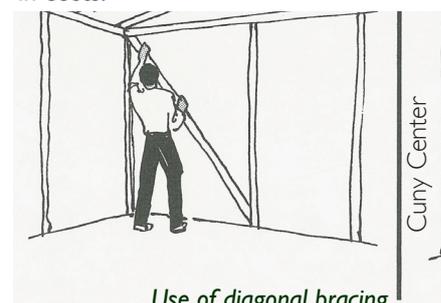
Disaster mitigation strategy

The studies and the illustrated guidelines were made available to the Tongan government. Other consultants developed similar illustrated guidelines that were published as supplements in a local newspaper.

Logistics and materials

Small Projects In some of the small projects, the NGO was able to ask a village to show how much construction material they already had and were willing to use in the project. The resulting project budget was then used to meet the shortfall.

In some projects the implementing organisation was not able to survey the available construction resources beforehand and they therefore made a more comprehensive budget. Some materials (e.g. timber, thatch) could be sourced locally, but many other materials had to be brought to the different islands, making projects longer to implement. The implementing organisation was able to buy scarce materials duty free at the government store, which saved an estimated 27% in costs.



Use of diagonal bracing