

B.4 Indonesia - Aceh - 2004 - Tsunami and earthquake

Case study: Shelter or housing?

Project type:

Emergency non-food item distribution
Land rights advocacy
Housing

Disaster:

Earthquake followed by tsunami

No. of houses damaged:

252,000 destroyed or partially destroyed, all within 5km of the coast

Project target population:

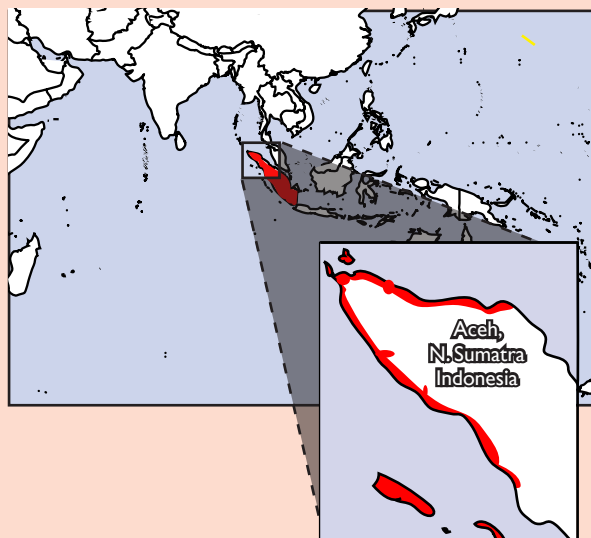
1,564 houses created in 28 villages in seven regions

Occupancy rate on handover:

95%, compared to 79% for all of Aceh

Shelter size

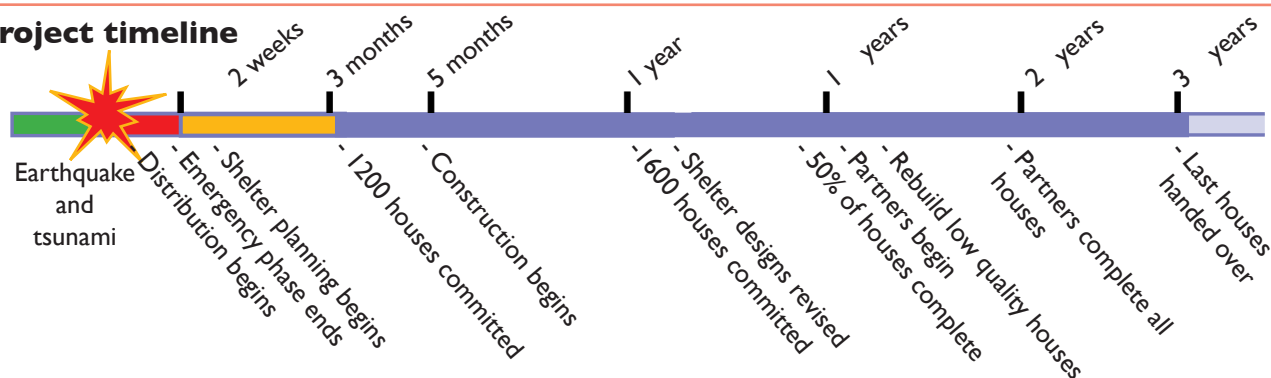
36m² per family, all with additional water/sanitation facilities



Summary

This programme began with the concept of community-built, 'transitional' timber-framed shelters, managed and implemented by the community over a period of months. Due to the challenges in procuring legal or sustainable timber, local politics, the availability of significant funds and the number of other NGOs working in the area, the project evolved into a programme to build houses made from reinforced concrete and brick. The programme lasted over three years. Towards the end of the programme, many of the shelters were built by partner organisations.

Project timeline



Strengths and weaknesses

- X The project was able to adapt from community-built transitional shelters to durable houses constructed by implementing partners and contractors.
- X There was success in negotiating land for families displaced by the conflict and affected by the tsunami.
- X Lessons were learned from mistakes made by other organisations. The large budget allowed mistakes to be rectified.
- W Major structural changes were made to the house designs without full consideration of the logistical, technical and managerial implications.
- W It was not possible to get the right quantity and quality

- of materials as a result of a huge demand.
- W Unrealistic expectations were raised among beneficiaries. This led to challenges with community relations during the programme. Because of the budgets available to NGOs there was competition for beneficiaries and communities. Beneficiaries had a choice of organisations and designs.
- W Lack of management staff available with experience of construction projects led to an unexpectedly large amount of management time being required.
- W The phrase 'building back better' was interpreted in many ways. The emphasis should be to 'build back safer' and reduce future risk.



In the first weeks after the tsunami, people found shelter in large collective tents (left), squatted buildings (right), tents, rented housing or with friends and family. The government built transitional living centres (centre).

Before the tsunami

The Indonesian state of Aceh is a densely forested state in the north of the island of Sumatra. The majority of the population live along the coast and the main access is by sea or along the coastal roads.

Aceh has had intermittent periods of conflict since 1976. In May 2003, the government of Indonesia declared martial law in the province. As a result of the conflict there was limited involvement of non-governmental organisations in the province.

After the tsunami

The earthquake that struck on 26 December 2004 was one of the largest ever recorded and damaged many of the larger concrete-framed buildings in Aceh. The ensuing tsunami caused extensive damage in many of the countries in the Indian Ocean. The province of Aceh was the worst hit, due to its proximity to the earthquake and because the majority of the population live in low-lying coastal areas.

Following the tsunami, the majority of emergency shelter needs were met in the first weeks by the Indonesian military, Indonesian organisations and beneficiaries themselves. This was due to logistical challenges and the fact that foreign access was limited by infrastructure damage and travel restrictions resulting from the ongoing conflict. Shelter was provided in collective tents, existing buildings, individual family tents, by use of plastic sheeting and by families moving inland to where the damage was not as bad.

Throughout the response and reconstruction, government housing policy had a strong impact on the response. Policy required that the shelters that were built create a minimum covered area of 36m². The only official transitional response was the building of transitional living centres, also known as 'barracks'. These were long, timber-framed and panelled buildings on stilts with plywood separation between families.

Technical solutions

Traditional coastal Achinese shelters are entirely made of local timber and have thatched roofs. They are often on stilts to keep them off the ground. More recent construction has a concrete plinth and low brick walls, with a timbered superstructure built on top. The roof is covered in corrugated iron.

This project began building semi-permanent shelters based on local designs. These had concrete and brick foundations and low brick walls, and were topped with timber frames, a corrugated iron roof and timber panels.

About ten months after the tsunami, the house model changed to a reinforced concrete-framed structure with brick walls and a wood-framed roof. It included over 50 separate components, as well as toolkits. This was seen as 'building back better', although there were some safety concerns where builders had taken shortcuts.

This project was based in five distinct districts, with different designs and implementation methods developed in each district.

As part of the agreements reached with the communities, the first semi-timbered shelters, which had provided transitional shelter for as long as two years, were upgraded at the NGO's expense once all shelters had been completed.



Road shown two years after the tsunami. Access was initially difficult along much of the west coast of Aceh.

Who builds?

Planning of the programme started approximately six weeks after the tsunami, as a community-led construction programme to build shelters similar to those that many families had before the disaster. The programme sensibly aimed to build skills and capacities within the villages, create livelihood opportunities and cultivate a higher level of ownership by encouraging self-build approaches.

The scale of the construction in Aceh was significantly greater than had ever before been experienced in the region, requiring over 109,000 houses from a building industry that had only built a fraction of that number. As time passed and villagers started to regain their livelihoods, NGOs found it harder to find a workforce from the villages.

In 2006, as local community contractors and other NGOs became



Many people built their own shelters using reclaimed materials.



One of the completed shelters in Sigli, Aceh

available in Aceh, the NGO started to work with implementing partners in the local community and contractors to construct the remaining houses. They were finally able to complete construction by the spring of 2008, just over three years after the tsunami.

Despite the challenges, community-built houses were perceived by the community as being better at resisting minor earthquakes because 'we were able to monitor the construction quality'. Any construction project in post-tsunami Aceh had to have a very high level of monitoring by INGO staff and the community or there would be poor construction undertaken by the contractor or the beneficiaries. For example, the construction of 86 houses in three communities in Aceh Besar employed nine staff members who were in the field every day.

'The house is a base for people to operate their daily lives [from]. The construction of a house is an essential shell to secure early livelihood recovery, as it gives privacy, stability and a physical asset. The shell needs to be filled with life to make it a home'.
– Internal project report

Logistics and materials

Following the tsunami, roads were severely damaged in three of the five project areas, although access improved during the programme. In some villages, bridges, roads and drainage had to be built before work could start on the houses. The community-built housing programme was quicker and more successful in the two areas where

access to materials from the non-affected city of Medan was easier.

Logistics delays, combined with raised expectations, led to villagers becoming frustrated by waiting.

Why did the programme change?

The programme changed from self-build, semi-timbered shelters to contractor-led reinforced shelters for several reasons, many of which were specific to the post-tsunami environment of Aceh.

The availability of funds and the number of different organisations operating in Aceh led to competition between organisations, which served to raise expectations of what could be built. The government in Aceh strongly encouraged the construction of durable shelter, and agencies, eager to fulfil their early promises, started to implement significantly more complex construction programmes than originally intended.

The availability of materials strongly impacted the shelter designs used. There were significant challenges in



Obtaining good quality building materials remained problematic. These bricks decayed rapidly in the rain.

obtaining legal timber locally, while importing timber was slow and problematic. Strangely, the amount of wood burned to make bricks may have had a larger environmental impact on the local forest resources than using timber would have done.

Sample bill of quantities for one of the finished houses:

material	quantity
Mountain stone – foundations	12m ³
Sand	20 m ³
Gravel	14 m ³
Filling Soil	28 m ³
Rebar 12mm x 10m	61 pieces
Rebar 8mm x 10m	50 pieces
Tie wire	4 rolls
Nail 1"	1 kg
Nail 2"	15 kg
Nail 3"	15 kg
Nail 4"	12 kg
Bolt diameter "x6"	45 pieces
PVC gutter no hole	2 pieces
PVC gutter 1 hole	2 pieces
Gutter hanger plate	32 pieces
Gutter side bracket	4 pieces
Gutter connection	2 pieces
PVC glue	1 tube
Plywood/ 8'vx 4'vx 4 mm	30 pieces
Timber - concrete formwork 2 x 20cm x 5m	28 pieces
Timber-concrete formwork 2 x 5cm x 5m	15 pieces
Timber - gable 2 x 20cm x 5m	20 pieces
Timber - fascia board 2 x 20cm x 5 m	8 pieces
Timber 5 x 10cm x 5m	20 pieces
Timber 5 x 7cm x 5m	20 pieces
Timber 4 x 12cm x 4m	6 pieces
Timber 5 x 5cm x 5m	25 pieces
Cement (40 kg)	135 pieces
Masonry brick	6200 pieces
Zinc roofing sheet	46 pieces
Zinc plate for ridge	4 pieces
Zinc roofing nails	4 boxes
Door hinge 6"/4"	28 pieces
Window hinge 3"	14 pieces
Window wing	14 sets
Window lock 2.5"	2 set.s
Door lock 4"	10 sets
Door/window handle	7 pieces
Door handle with key	4 pieces
Door screw no. 7	2 boxes
Door screw no. 6	1 box
Window screw no. 5	2 boxes
Paint for walls / waterbase (25 kg/can)	4 cans
Paint for timber frame/oil base (5 kg/can)	8 cans
Door frames	4 pieces
Window frames (single)	1 piece
Window frames (double)	3 pieces
Door panels type A	2 pieces
Door panels type B	2 pieces
Window panels type 1	1 pieces
Window panels type 2	3 pieces