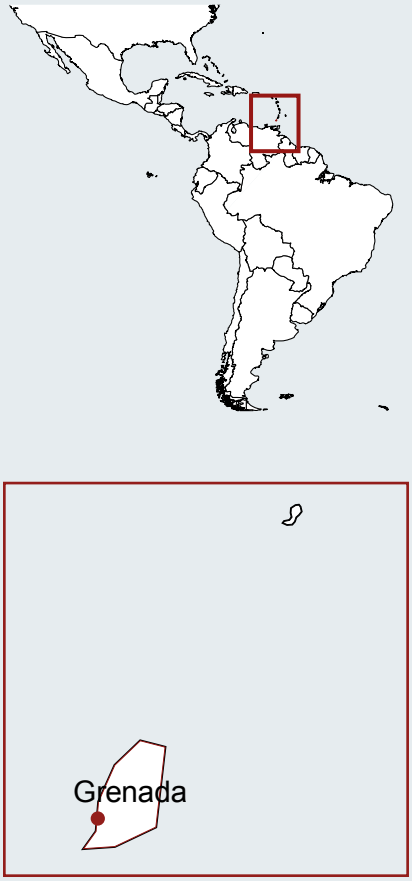
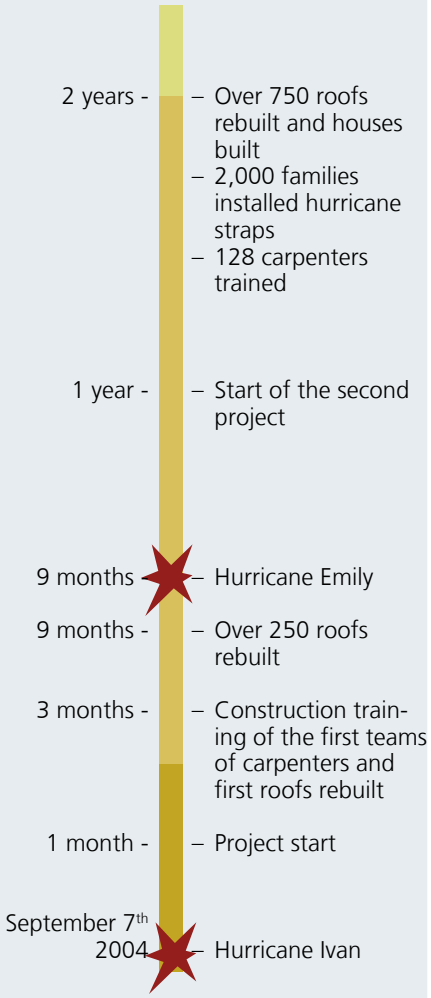
A.3 Grenada - 2004 - Hurricanes Ivan and Emily

Case study:

Country:
Grenada
Disaster:
Hurricane Ivan (Cat. 4)
& Hurricane Emily (Cat. 1)
Disaster date:
September 7th 2004
and July 13th 2005
No. of houses damaged or destroyed:
14,000
No. of people affected:
About 61,000 people;
50% of the population was left homeless
Project target population:
- 750 families received a new roof or a house
- 2,000 families received hurricane straps
- 128 carpenters trained
Occupancy rate on handover:
100% (estimated)
Shelter size:
11m² -70m²
Materials Cost per shelter:
Average cost per shelter repaired 2,500 USD



Project timeline



Project description
Over 2 years, the roofs of over 650 houses were repaired and 100 homes were built from scratch. 128 people were trained and certified as carpenters, over 2,000 houses were strengthened with hurricane straps and 32 communities were better prepared to face the next disaster.

Strengths and weaknesses

✓ Capacities in hurricane-resistant construction techniques were increased through training of men and women.
✓ Those trained during the project received a certification in carpentry. At the end of the project most of them were able to find a related job.
✓ The project was integrated with an island-wide project of disaster preparedness.
✓ Over 2,000 houses were strengthened with hurricane straps as a risk reduction and risk mitigation project.
✓ Fact sheets were distributed through newspapers and with materials. They promoted safer construction techniques.
✓ Community members in 32 communities received training on safer roof techniques.
× The project did not meet the needs of many of the most vulnerable. The weakest houses could not get a roof because they needed too much retrofitting.
× More houses should have been built to replace the destroyed homes.
× The trainees who received materials did not get the community help anticipated. Carpenter teams had to be deployed to help.
× The project focused on the needs of homeowners and did not support tenents.
× Larger houses received a higher financial value of support as their houses were built from more materials.

The project focussed on building safer roofs.
Photo: Emeline Decoray

Before the hurricane

Before the disaster, Grenada had not been hit by a hurricane since 1955. People had forgotten about the hurricane-resistant techniques which had previously been applied by carpenters.

The houses in Grenada are constructed in two types; either from wood or from concrete. Wooden houses have timber frames and are clad in timber and have corrugated iron roofs. Concrete houses are commonly made from concrete blocks and have a corrugated iron roof.

Many wooden houses were resting on concrete or wooden pillars, their structures had no braces, not enough studs and the roofs were flat with long eaves.

After the hurricane

The hurricane damaged 90% of the housing on the island. Concrete structures partially or entirely lost their roofs. Wooden houses were severely affected or totally destroyed. The agricultural sector was also severely affected.

Implementation

Initially, the project focused on re-roofing 100 homes. Six team leaders were trained in hurricane-resistant techniques which had been used by carpenters 50 years earlier. Trainees were selected and assigned to each team leader.

In total 128 men and women were trained. They received a one-day theoretical course followed by hands-on training. At the end of the course, the most capable became assistant carpenters. After gaining more experience some of them became team leaders.

The trainers who qualified, received a certificate in Carpentry and Masonry from the Technical College (T.A. Marryshow). They were evaluated after rebuilding 5 to 6 roofs with a team composed of a team leader, an assistant carpenter and 2 trainees.

After this the trainees could receive material to rebuild their own destroyed roofs.

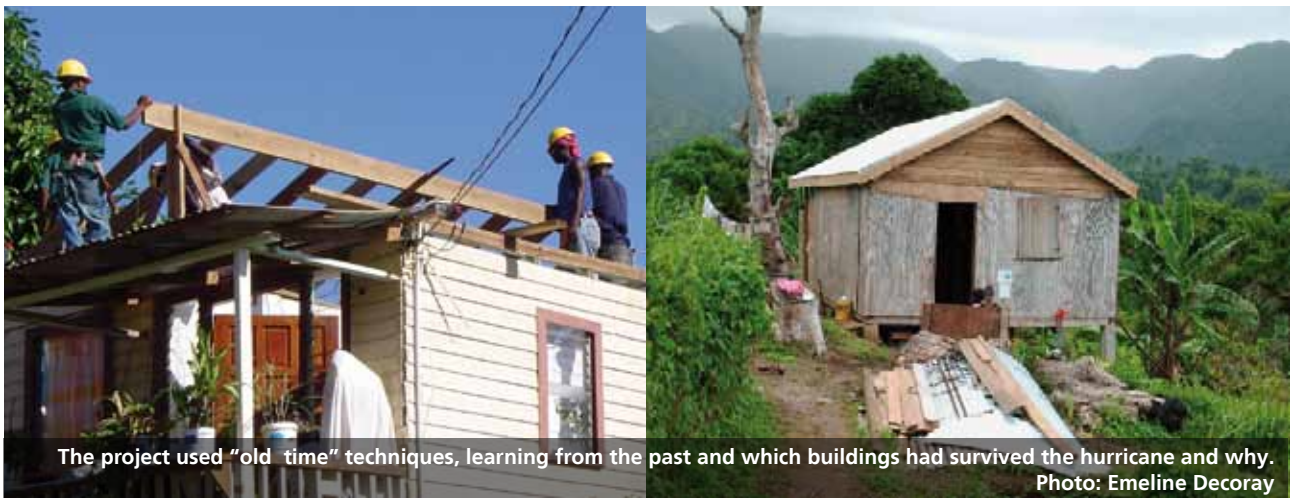
The project ultimately had more than twenty teams of 4 people working island- wide.

A disaster preparedness project was also implemented in 32 communities. On weekends, some public awareness activities were held to train some community members on different topics including rebuilding better roofs. As a mitigation project, 2000 vulnerable homes received hurricane straps which were installed by trained community members.

Selection of beneficiaries

The beneficiaries were selected by the organisation according to criteria defined by the government and the agencies involved in the relief emergency operations. Two types of criteria were used: social (vulnerable people affected by the hurricane) and technical (house damaged or destroyed by the hurricane).

All of the houses were technically assessed before the beneficiaries were selected. This allowed the organisation to decide on the type of assistance the beneficiary would



The project used "old time" techniques, learning from the past and which buildings had survived the hurricane and why.
Photo: Emeline Decoray

obtain. Able-bodied beneficiaries were invited to become trainees and receive the material to rebuild their roofs. If the beneficiary was elderly, or was unable to undertake construction himself or herself, a carpentry team was sent to reinforce and re-roof the house.

Technical solutions

The techniques applied to rebuild the roof and to strengthen the house before building the roof were "old time" techniques, which had resisted Hurricane Ivan. The "old time" wooden houses resisted the wind forces better than the newly built houses, even concrete houses.

The houses received some reinforcement, such as doubling studs in the corners, around doors and windows, bracing the corners in both directions, attaching the flooring beams to the pillars, and attaching them to the foundations with metal straps. The smallest houses received a gable roof with a 30° slope and 25cm eaves, while the largest one received a hip roof.

Logistics and supply

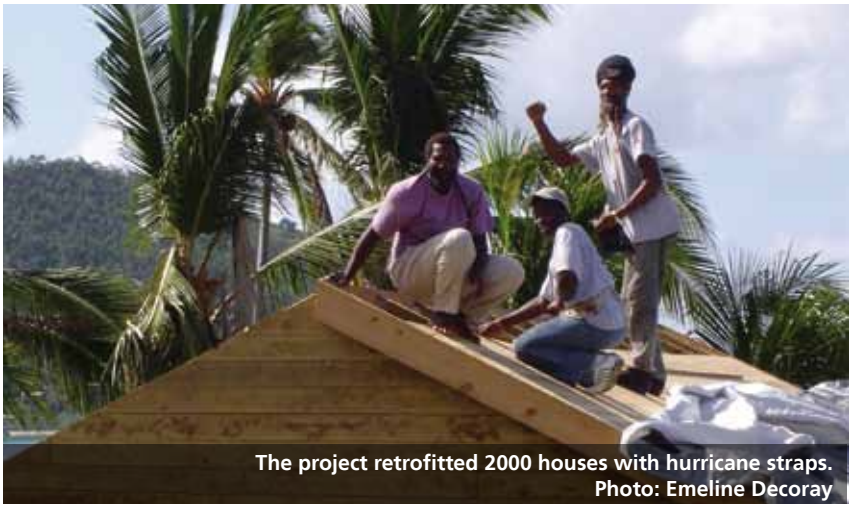
All materials were purchased locally, through local suppliers, even if it was imported material.

After an assessment of each damaged house, a bill of quantity of the material needed to rebuild the roof was drawn up. This was calculated by putting the size of the house into a standardised spreadsheet.

The material was delivered on site before the start of the work. At the beginning, all the logistics was done from the project warehouse: storage of the material, loading of the truck and delivery on site. Because the project grew rapidly, the supplier was asked to manage a part of the logistics from his warehouse. The bills of quantity were sent to the supplier 3 days prior to the delivery date. This way, most of the logistics issues were transferred to the supplier. As a consequence of this, the organisation had to coordinate closely with the supplier.

	A	B	C	D	E	F	G
1	QUANTITY OF MATERIALS						
2							
3						builder:	
4		width		length		surveyor:	
5	house	12.0		18.0	feet	owner :	
6	eaves	8	inches			place:	
7	slope	30	degree	7	inches/feet	date:	
8							
35		thickness	width	length	unit	Quantity	CHECK
36	top plate G	2	6	12	ft	2	
37	ridge pole G	2	6	16	ft		
38	top plate G	2	6	12	ft	2	

A spreadsheet was developed that calculated the materials required given the dimensions of each house.



The project retrofitted 2000 houses with hurricane straps.
Photo: Emeline Decoray