INDIA

Developing Locally Affordable Hazard Resistant Houses

HUMANITARIAN RESPONSE CASE STUDY 14

CRS
CATHOLIC RELIEF SERVICES

PROJECT DESCRIPTION

Country: India

Project location: Puri, Odisha | Cuddalore, Tamil Nadu

Type of locations: Rural | Rural

Disaster: Recurrent Heavy Flooding | Flooding

Disaster date: 2001-2011 | 16 Nov 2015 - 09 Dec 2015

Project timescale: Feb 2013 - Jan 2016 | Feb 2016 - Feb 2017

Project Budget (USD): $ 1,840,266 | $ 211,471

Materials cost per shelter (USD): $ 810 | Fully damaged: $ 395, Partially damaged: $ 92

Partners: Society for Welfare Animation and Development (SWAD) | Pondicherry Multipurpose Social Service Society (PMSSS)

Developing locally affordable hazard resistant houses

With the increase in the magnitude and frequency of disasters, coupled with diminishing funding available for post disaster reconstruction, it is rare that all families affected by disasters will benefit from housing reconstruction assistance. Thus, humanitarian agencies channel support to the most vulnerable, with the thought that less vulnerable families will be able to recover with their own resources. While some of those who "self-recover" are motivated and able to "build back safer," many build back in ways that render them more vulnerable to future disasters.

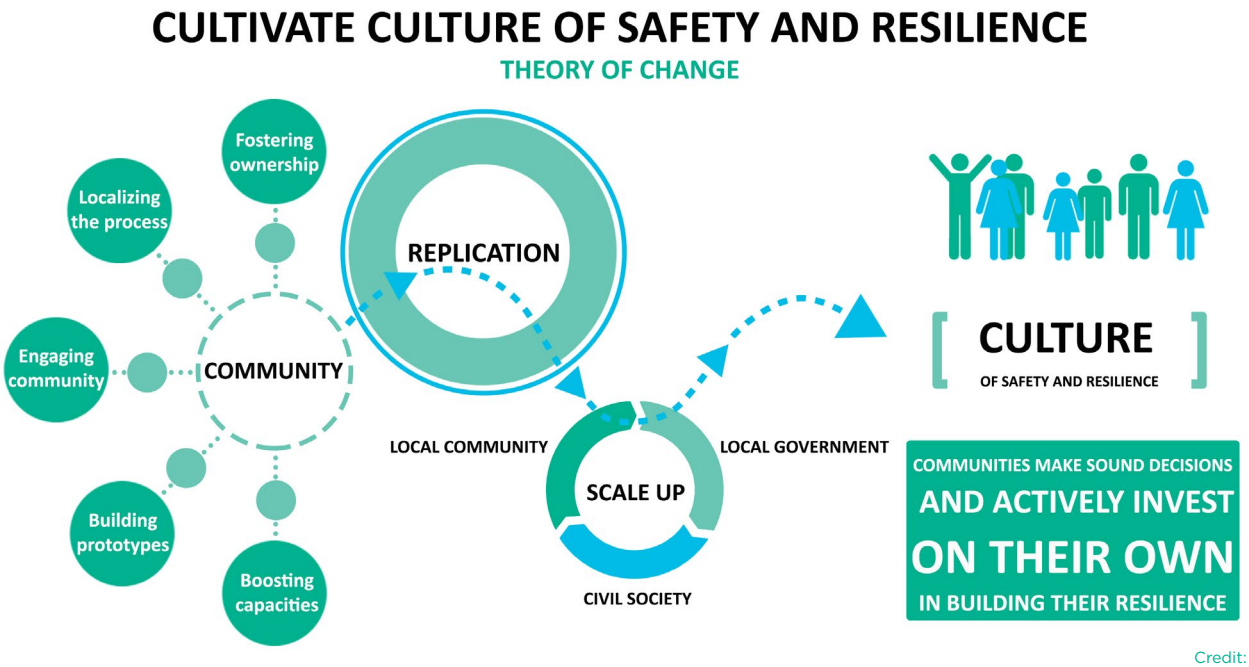
The projects described in this case study sought to address some of the barriers that often hinder self-recovering families from building back safer. Efforts focused on developing hazard-resistant techniques that are more accessible and accepted, thereby helping communities strive towards greater resilience.

Project Principles

These project's main goal was to enable the entire hazard-prone communities of Puri, Odisha and Cuddalore, Tamil Nadu to make sound decisions to invest in their own resilience towards future shocks. Using an asset-based approach, the project sought to help community members reassess their construction practices for reducing vulnerabilities. It made for a first step in behavior change, and helped communities develop affordable, hazard-resistant houses with improved local technologies and materials.

In Tamil Nadu, the design of disaster resilient transitional shelters was adapted from CRS' emergency response in to 2013-2016 flooding in Odisha.

Six "affordable" hazard-resistant construction techniques developed through community consultations



Credit: CRS

Background

India's Odisha state in the Northeast and Tamil Nadu state in the Southeast are both highly flood-prone areas. In 2011, floods in Odisha's Puri district damaged or destroyed 15,984 homes, and in late 2015, unexpected heavy rains and floods in Tamil Nadu's Cuddalore district claimed the lives of 13 people and displaced thousands and damaged or destroyed at least 15,000 homes.

In both locations, most families live in Katcha houses made of bamboo structures with mud-plastered walls and thatched roofs. These structures are rarely strong enough to withstand annual flooding. After each flood incident, families who were affected spent about $500 to $600 over six to eight months for reconstruction while they lived in temporary shelters or damaged homes. Many of them reconstructed autonomously using unsafe practices, and would suffer the same damage with the next cycle of flooding.

What did CRS and Partners do?

- Developed six affordable hazard-resistant construction techniques through community consultations, thereby gaining buy-in from the Puri local community.
- Constructed houses to demonstrate techniques in each of the targeted villages (Puri: 83, Cuddalore: 2), to promote voluntary adoption in these communities.
- Conducted trainings for local carpenters and masons through construction of demonstration homes, to increase community knowledge and capacity to apply the improved hazard resistant techniques.
- Organized participatory evaluation of house models to get community feedback, and adjusted the design to reflect community vision.
- Provided construction materials in Puri and, in Cuddalore, provided materials as well as cash support to accelerate house construction.
- Replicated and adapted the design in Cuddalore using local materials and skills. The revised design incorporated elements allowing incremental construction steps, which transformed the shelter from a transitional structure to a permanent house.
- In Cuddalore, 180 families whose homes had collapsed benefitted from the construction of transitional shelters. For 750 families whose homes had suffered partial damage, they received the support of disaster resilient construction techniques and materials.

"I am the only breadwinner of the family with a bedridden husband and five girls. We are so happy to construct a stable house with strong foundation and tight bound roof. My fear of raising the girls in dilapidated house has passed now".

– Jothi of Melpathi village, Tamil Nadu

A plinth protection wall reduces erosion during flooding
Photo: Sailendra Pattanaik / CRS

Delivery mechanism

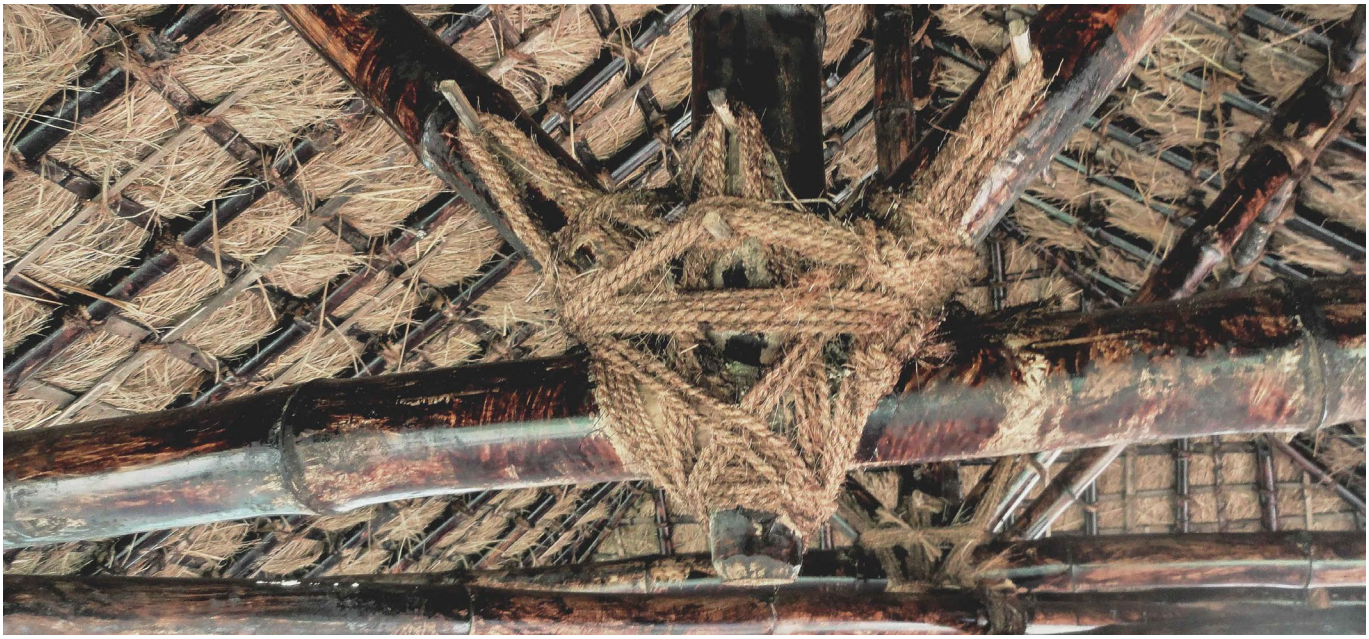
Shelter experts started by developing hazard resistant house models through a series of community consultations, soliciting community feedback at key stages and incorporating their input into the design.

The hazard-resistant techniques developed proved to be more time and cost-efficient, and gained acceptance from the community. Next, CRS and partners hired local masons and carpenters, who attended comprehensive trainings while constructing demonstration houses in each of the targeted villages. These demonstration models served as a training resource for more masons and carpenters. Families identified the material suppliers and community members received detailed information about construction technologies, the Government-sponsored sanitation policies, and protection.

Design

Although the Puri and Cuddalore projects had some design differences, they also shared common elements:

1. Plinth protection wall: This technique protects the raised floor from erosion due to flood waters. The wall is made of single skin of burnt brick, after which sand and soil is filled inside and compacted. These can also be used to retrofit existing plinths.
2. Woven bamboo-mesh walls: This technique adds stability to the structure between the columns, and allows for mud plaster to be used or replaced with concrete or brick in the future.
3. Hipped roof: A hipped roof design can withstand greater wind forces than a gable-end roof due to its aerodynamic form.
4. Improved joints using pins and natural fibre rope: An improved joining detail was developed by using natural fiber rope and pins, offering an alternative to the use of nails that can weaken bamboo structures.
5. Cross bracing to the wall plate and central beams: This technique consists of horizontal and vertical cross bracing in walls and roof structures fixed by bamboo pins and natural fiber ropes to give structural stability. This technique is easy to use to upgrade existing buildings.



Beams and wall joints use locally produced natural fibres which can be easily repaired or replaced and do not compromise the strength of the bamboo poles

Photo: Sailendra Pattanaik / CRS

Participant Selection

Families were selected based on the following criteria:

- Their houses were damaged or destroyed due to the Cuddalore floods in 2015. Any other houses which were already damaged or dilapidated were excluded.
- Their homes had thatched roofs. Concrete houses were excluded.
- At least three walls had collapsed, or their homes had experienced damage to two walls and the roof.
- Families were staying with relatives or in make-shift shelter due to heavy damage.
- Families had not received any support from the government, humanitarian agencies or other source.

> "The Construction Technologies are very much appropriate for our flood prone area. We can collect these materials locally, can build using our own labor".
>
> – Bhimasena Sahoo, Community member, Sirei, Kanas, Odisha

Learnings

- It takes time and several attempts to develop acceptable, affordable and technically sound solutions through a community-led consultation process. But, if done well, they benefit from broad approval.
- To increase potential for replication, the construction of demonstration shelters should be accompanied by improved access to information, skilled labor, materials, and finance.
- It was challenging to encourage the regularly-aided communities to consider investing their own resources because they were used to receiving hand-out assistance.
- Working to strengthen local building techniques with the communities helped to raise the profile of low cost housing solutions as a hazard resistant housing option among local district officials.
- Purchasing materials in bulk by the local partner enabled improved quality assurance and lowered transportation costs.

Disaster Risk Reduction Components

The larger Odisha project heavily influenced the design and delivery of CRS' later flood resilient programs in India, including the Tamil Nadu project, which had much smaller funds to draw on. This project in turn resulted in replication by a third-party peer organization for tribal families in a neighboring district. Additionally, many families who benefitted from these programs have converted the transitional shelters into permanent housing by replacing the woven panel walls for cement bricks, splitting the inside room into two, tiling floors and creating dedicating spaces for cooking and worship.

The woven split bamboo mesh walls are then mud plastered inside and outside, once the hipped roof is completed

Photo: Sailendra Pattanaik / CRS

Edited by: Laura Howlett. Graphic design: Livia Mikulec.
228 W. Lexington Street, Baltimore, MD 21201. For more information, contact tony.castleman@crs.org