CASE STUDY

NEPAL 2017–2018 / FLOODS

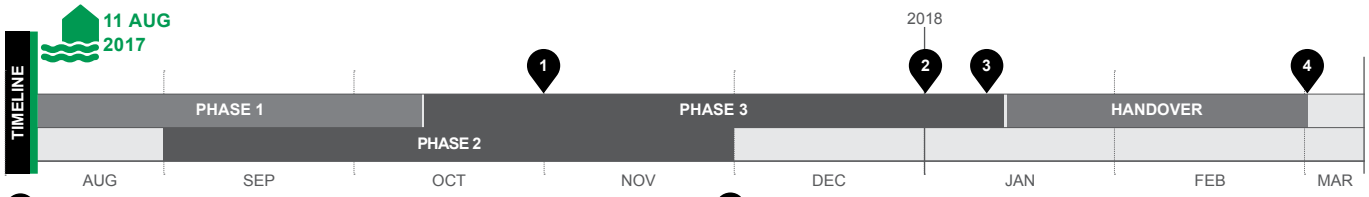
KEYWORDS: Emergency shelter, Local construction techniques, Training, Links to recovery

CRISIS	Floods, 11 August 2017
TOTAL PEOPLE AFFECTED	**336,695 households*** (1,688,474 individuals)**
TOTAL PEOPLE DISPLACED*	**158,575 households**
TOTAL HOUSES DAMAGED**	**41,626 damaged, 150,510 destroyed**
PROJECT LOCATIONS	18 municipalities in Morang, Sunsari, Jhapa, Saptari provinces in east Nepal; Banke province in west Nepal
PROJECT BENEFICIARIES	**1,418 households** (approx. 6,950 individuals) supported with NFIs and temporary shelter solutions **1,300 individuals** trained on bamboo construction
PROJECT OUTPUTS	**1,418 temporary shelters** built **400 NFI kits** distributed **21 trainings** conducted in communities
SHELTER SIZE	**21m²**
SHELTER DENSITY	**3.5m²** per person (up to six people)
MATERIALS COST	**USD 344** per shelter
PROJECT COST	**USD 393** per household

PROJECT SUMMARY

This project provided 1,418 flood-affected households with emergency shelters through a participatory process and using locally available materials. Shelters were made of bamboo and included several risk mitigation features. Trainings were conducted on safe construction techniques, resulting in many people upgrading their shelters during and after the project. The organization also advocated and paved the way for longer-term reconstruction programmes, and looked at addressing land tenure issues of landless populations.

* Nepal Red Cross Society, Situation Report, 20 Aug 2017.
** National Planning Commission, Post-Floods Recovery Needs Assessment (PFRNA), Nov 2017, https://bit.ly/2Riom6D.



1. 31 Oct 2017: **15 demonstration emergency shelter units constructed and training implemented.**
2. 1 Jan 2018: **1,341 emergency shelter units constructed.**
3. 10 Jan 2018: **Extra 62 units constructed with remaining resources.**
4. 1 Mar 2018: **Handover event attended by the government to formally hand over the shelters.**

STRENGTHS

+ Risk mitigation through design features.
+ Cultural appropriateness of the materials and design used.
+ Innovative monitoring and evaluation tool.
+ Community participation and complementarity of assistance.
+ Volunteer and community mobilization for improvements.

WEAKNESSES

- Some elements of the shelters were not always preferred due to households' differing backgrounds and low flexibility of the design.
- Limited WASH solutions for remote locations.
- Problems with the bamboo supply.

Heavy rains in August 2017 caused heavy flooding and massive damage to housing. The floods displaced over 150,000 families and damaged nearly 200,000 houses.

CONTEXT

Nepal has three distinct regions stretching east-west, namely Himalayas, Hills and Terai (plain land). Most of the 2015 earthquake-affected districts lie in the hilly region, while the 2017 floods mainly affected the southern plains, where most of the agricultural production of the country comes from.

Humanitarian organizations working in Nepal in 2017 were mostly involved in ongoing reconstruction programmes after the 2015 earthquakes, while in the flood-affected districts only a few organizations were active in development projects, including the organization implementing this project.

SITUATION BEFORE THE FLOODS

People living along the river banks were highly vulnerable to floods, primarily due to the increase of climatic events and the environmental degradation of the region, compounded by their financial situation that made them unable to adopt mitigating measures (such as relocating to safer areas or retrofitting their existing dwellings). Although disaster preparedness activities had been conducted by various stakeholders (including the government), these proved insufficient to avoid the disaster.

SITUATION AFTER THE FLOODS

In August 2017, days of heavy rain resulted in large-scale flooding, affecting 35 districts and causing massive damage. Despite response efforts by humanitarian agencies and local government, many displaced families were forced to stay in overcrowded locations and makeshift tents, with no privacy nor basic facilities. Many flood-displaced families temporarily settled close to the highways (usually on higher ground), exposing themselves to severe health and safety risks – such as dust, fumes and accidents.

NATIONAL EMERGENCY RESPONSE

A state of local emergency was declared in the affected districts, the cluster system was activated and local and central government, humanitarian organizations, I/NGOs, business groups and communities supported affected populations with emergency items. Damage and needs assessments were conducted by the National Planning Commission. The Flood Reconstruction and Rehabilitation Project (FRRP) was established under the National Reconstruction Authority (NRA) to coordinate recovery activities. The NRA distributed a grant of about USD 98 to each affected household and USD 0.7 per person per day for 30 days, for immediate emergency support.

PROJECT IMPLEMENTATION

The project aimed at enabling affected households to recover as quickly as possible. As such, it was designed in three phases, implemented through local partners and with a high involvement of the selected communities.

PHASE 1 (EMERGENCY DISTRIBUTIONS). Launched immediately after the flood, this phase primarily focused on distribution of NFI kits including tarpaulins, water filters and purifiers. At the same time, donors were approached to secure funds for the construction of temporary shelter units.

PHASE 2 (DEMO SHELTERS). As funds were secured, 56 demonstration shelters were built in several affected communities to refine and agree designs, bill of quantities and construction procedures. Bamboo was chosen as the main material for the frame, as it was locally available, culturally appropriate and cost-effective, as well as relatively easy and fast to assemble.

PHASE 3 (SHELTER CONSTRUCTION AND TRAINING). An additional 1,362 emergency shelters were built in this phase. The construction was accompanied by distribution of tools to selected families and training of the wider community on bamboo construction techniques.

COORDINATION

The project was undertaken in close coordination with the government, particularly with the FRRP. Weekly meetings to review project steps were conducted with government officials, who also participated in the supervision, monitoring and evaluation of the project. Meetings were also conducted with local NGO partners and community representatives, to quickly address project implementation issues.

IMPLEMENTING PARTNERS

As international organizations cannot directly conduct activities in Nepal by law, this project was implemented through existing local partners and other actors with extensive experience in working in the target communities. Partners were responsible to implement specific project activities, such as coordinating with local government, distributing NFI kits, mobilizing the community and building the emergency shelter units.

The project provided emergency shelters for flood-affected populations using local materials, and was implemented by local organizations who trained community members on bamboo construction techniques.

SHELTER DESIGN & TECHNICAL SOLUTIONS

The main frame of the shelter was made of untreated bamboo. Treatment was not used due to the temporary nature of the shelters and the decision to prioritize the scale and timeliness of the response. The walls were made of tarpaulins that could be later replaced, while the roofing was made of corrugated galvanized iron (CGI) sheets.

Some key features of the shelter were as follows:

- **Raised floor** to reduce the effect of seasonal floods. However, some families claimed this was not needed when shelters were built in areas not prone to flooding. The design was adapted following this recommendation.
- **The posts were wrapped** in plastic sheets for the portion underground, to protect them from damp and water and increase the shelter lifespan.
- **Bamboo was used to tie down the roofing sheets** with lashing connections and not nailed down onto the rafters; this way, the CGI sheets were not perforated and could be reused to build permanent houses in the future.
- **The central CGI sheets were raised** by an extra layer of purlins to allow the heat to escape from the gap created at the top. The high ceiling was also aimed at providing better ventilation.
- **Bamboo bracings** were used to strengthen the frame by making it a single structural unit.
- **Connections** were done with lashings.
- **Anchorage** was used to increase stability.

COMMUNITY ENGAGEMENT

Community leaders participated in the selection process and volunteer mobilization. They lobbied with government officials to leverage the resources to provide permanent housing following this project, especially for the landless and other vulnerable groups.

Family members – including women – participated through various tasks, including distributing NFI kits, safeguarding materials and providing labour to build the emergency shelters.

The shelter design was developed through a workshop with 48 households who were supported in the first phase of the project. After the consultation, the organization's technical team prepared the designs and provided the communities with a step-by-step manual with technical and 3D drawings. Although this process was largely successful, some elements of the design (e.g. windows and one-sloped roof) were not preferred by a few families and more flexibility could have been given to adapt to the intended design (e.g. selecting alternative walling materials).

Communities were also mobilized to make improvements to the shelters provided, such as improved mud floor, mud plastering in walls, and substitution of plastic sheeting by bamboo mats.

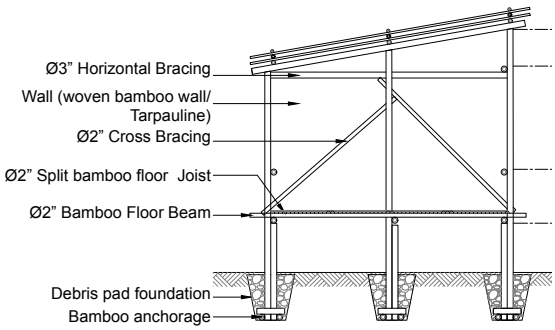
TARGETING

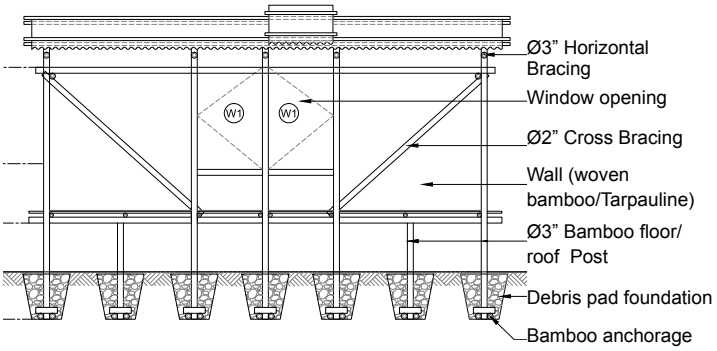
All decisions regarding project locations and beneficiary selection were taken in close consultation with government officials, local leaders, implementing partners and community members, in order to guarantee transparency and validation of the process.

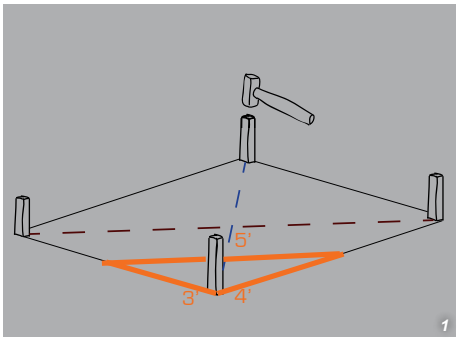
Families had to be enlisted as flood-affected by the government, have a fully destroyed house and have not received any previous shelter support. As general vulnerability criteria, landless, poor and vulnerable families (e.g. women heads of household, disabled, orphans) were prioritized for this project. Families were selected from diverse communities in terms of caste and ethnicity, including minorities.

The selection process was conducted in three steps. The list of potential beneficiaries was obtained from the local government, then verified through field visits and, finally, validated through meetings with local stakeholders.

Shelters included mitigation features, such as raised floors, bracing and secure connections, and allowed for some adaptations, such as the upgrade of floors and walls.







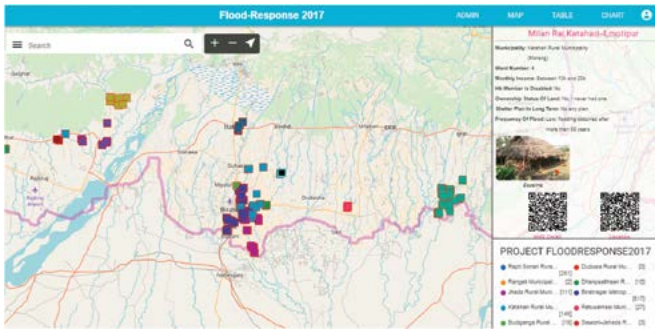
Left (1): Draw lines for foundation according to the dimensions and place the stakes in the ground. Check whether the stakes are at right angle using the 3-4-5 method. Centre and Right (2-3): Dig 21 post holes of 2' x 2' in the ground. (Photo credits: Habitat Nepal).

Left (4-5): Cut the required length of floor and roof posts with saw, tie them together and wrap them with polythene sheet. Cut the upper ends of the posts with a fish-mouth cut. Right (6-7): Place and tie floor beams to the bamboo floor post with rope. Place the next set of beams on top, perpendicular to the beam below. Place split bamboo joists above the floor beams. (Photo credits: Habitat Nepal).

Left (8-9): Tie bamboo posts to the anchorage and place it inside the post hole. Then fill the hole with debris and tamp using wooden tamper. Right (10): Tie diagonal bracings of required dimensions to the roof post. Then tie the horizontal bracing at lintel level. Place the roof beams on top of the bamboo post and tie with rope. Place the cross bracings at roof level and then tie to the beams with rope. Right (11): Place bamboo purlins on top of the roof beam and tie with rope. Arrange 8 CGI sheets over them leaving one sheet width vacant in the middile. Tie 2 layers of purlins together to hold the CGI sheets in place. Place the remaining CGI sheet over the void and place 3' length purlins on top of each purlins below to hold the sheet down. This provides air movement inside the shelter through the roof. (Photo credits: Habitat Nepal).

MOBILE MONITORING TOOL

A web- and mobile-based Monitoring and Evaluation tool was used from assessments and baselines to progress reports. It created interactive maps and charts and allowed to collect an open-source database of all supported households, for future use by the organization or other stakeholders as needed.



MAIN CHALLENGES

PROCUREMENT DELAYS. Due to the large quantity of bamboo needed at short notice, the identification of vendors able to deliver was lengthy. To address this challenge, bamboo components were directly harvested from nearby plantations, in consultation with vendors and certified bamboo cultivators. However, for the western region, the bamboo had to be transferred from the east to maintain uniformity in material price – as per requirements from the donor – and because bamboo supplies were not sufficient in the west. Additionally, after the disaster the prices of construction materials spiked, so the organization negotiated with suppliers on bulk quantities to keep prices down.

LAND ISSUES. Many of the affected families residing along river banks did not have proof of ownership. To include them in the project, the organization only requested the tenure status to be validated by the community leadership and local authorities, as the shelter solution was temporary. Around 75 per cent of the shelters were built on government or community land. After the floods, the government developed plans to provide safe land and housing for families living in disaster-prone areas, including river banks. At the time of writing, in some communities in the east 220 families had already received an official letter from the local government to access safer plots of land.

POORER FAMILIES WERE DISADVANTAGED. Extremely poor families – who depended on daily wages – could not attend to their livelihood activities, because household members were involved in the construction and other project activities. To mitigate this negative effect, guidance was given to help families access food distributed by the government and other organizations.

EXTENDED LIFESPAN OF THE SHELTERS

The minimum lifespan for the shelters was estimated at six months, but it could be prolonged with regular maintenance, repairs and protection measures from the elements. Early observations after the project was finished showed that beneficiaries were already upgrading the original shelters, for example by substituting worn plastic sheeting on walls with bamboo mats and plastering, improving floor finishes and installing more secure windows and doors. This was mainly because bamboo was a locally known material and households and local masons had been involved in the construction process. A year after the completion of the project, families were still living in the shelters and it was expected that the structures could last for at least another year or two. It was also anticipated that, depending on the longer-term solutions for each household, the temporary shelters would continue to be used, either by recycling the materials or giving alternative uses to the shelters.

LINKS TO RECOVERY

The organization took steps to support flood-affected families in their path to recovery. It hosted an official handover event which drew top government officials, aiming at making the government accountable toward landless and vulnerable families. It advocated for these families to be included in reconstruction programmes from the government. Community leaders also played a vital role in this regard, throughout and beyond the emergency project. As an outcome, both the central and municipal governments allocated funds for 2019 for housing programmes for landless flood-affected families, and the latter also allocated land. Additionally, households who received the emergency shelters were considered for a joint permanent housing project by the Biratnagar municipality and the organization.

WIDER IMPACTS

The emergency shelter project avoided further displacement of the targeted households. This made it easier for other organizations to initiate support projects in the affected communities, such as food distribution and health and sanitation programmes. For example, some communities were supported with toilets and public water taps after the construction of the shelters.

In addition, the use of bamboo benefited local cultivators and businesses, reinforcing the local building culture and the use of an environmental sustainable material. The skills provided to the communities in terms of bamboo construction techniques allowed the families to perform repairs, maintenance and expansions of the emergency shelters and beyond, and could increase future livelihood opportunities.

Materials and designs were culturally appropriate and designed in consultation with the affected households. After the project ended, families were already upgrading the shelters and it was expected that these could last for up to two more years, if properly maintained.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED

STRENGTHS

+ Mitigation by design: the shelters were elevated on stilts to mitigate flood risk; connections throughout the structure were reinforced with nylon elements that work well with bamboo; the bamboo post footing was protected from water to increase its lifespan.

+ Cultural appropriateness: construction materials were locally appropriate, and the shelter design was contextualized thanks to thorough consultation with the affected families.

+ Innovation: the mobile-based monitoring and evaluation tool was extremely useful during the project and created an interactive, open-source database available to the organization and partners for future projects.

+ Community participation: affected community members, including women, contributed to project activities, from selection to implementation to advocacy. This was successfully complemented by technical and in-kind inputs, and enhanced by the involvement of local government and implementing NGO partners.

+ Volunteer and community mobilization for improvements of original shelter solutions provided.

Affected families were actively involved in project activities and, for example, contributed to the distributions of materials in their communities.

WEAKNESSES

- Relatively low flexibility of the designs. Some elements of the design were not always preferred and the use of alternative wall materials was not sufficiently discussed. This was mainly due to the differing backgrounds and preferences of targeted households. However, issues only occurred in a few cases.

- Limited water and sanitation solutions for shelters built in remote locations.

- Problems with the bamboo supply: transportation costs were excessive for some locations in the west, and delays were faced in material procurement, as normal procedures were followed, resulting in untimely delivery of bamboo and unavailability of vendors.

MATERIALS LIST

Items	Unit	Qty	Unit cost (USD)	Tot cost (USD)
Shelter Materials				
Bamboo	pcs	70	1.67	116.90
CGI sheets	pcs	9	11.11	99.99
Lashing rope	kg	4	1.97	7.88
Polythene sheets	kg	1	3.25	3.25
Tarpaulin sheets	sq ft	566	0.10	56.60
Tools (to be used by 2 families)				
Hammer	pcs	1	2.46	2.46
Saw	pcs	2	4.92	9.84
Measuring tape	pcs	1	2.46	2.46
Marker pens	pcs	2	0.59	1.18
Shovel	pcs	2	2.95	5.90
Pick	pcs	2	3.44	6.88
Tamper	pcs	1	7.87	7.87
Cotton thread	roll	5	0.20	1.00
Khukuri (knife)	pcs	1	5.90	5.90
Lime (powder)	bag	1	0.49	0.49
Labour				
Skilled mason			7.87	15.74

LESSONS LEARNED

- **Use of alternative materials according to the context and household preferences:** bamboo is a renewable resource and is culturally appropriate as construction material in the targeted regions. However, cultural preferences on materials and shelter design should be better understood and **greater flexibility should be allowed** for households to express their feelings during consultation and make modifications.
- **A streamlined procurement process should be in place** to prevent delays in the order and awarding phases, ensure availability of the quoted items and mitigate price increases. A systematic distribution flow should also be identified prior to implementation, to ensure smooth and fast release of materials.
- **Local government's involvement** in relief programmes helps making distribution processes smoother and reducing implementation challenges, particularly those related to beneficiary selection.
- **Secure tenure and permanent shelter solutions are directly related in Nepal.** While it is challenging to work with landless populations, emergency shelter projects should explore modalities to support people regardless of tenure status. Organizations can advocate for households' tenure security, which is directly linked with recovery.