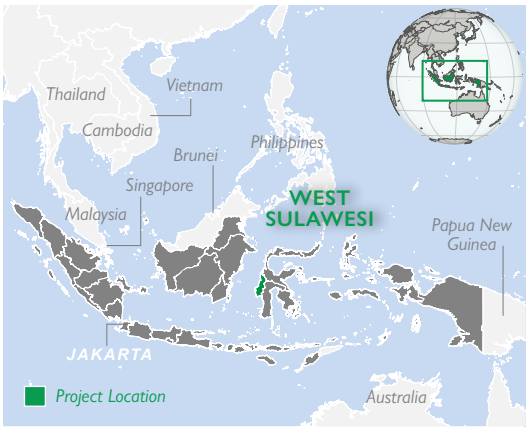
CASE STUDY

INDONESIA 2021 / EARTHQUAKE

KEYWORDS: Community engagement, Gender mainstreaming, Housing repair and retrofitting, Training

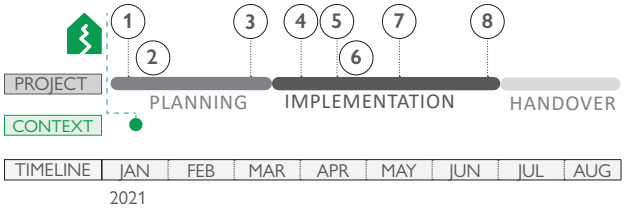
CRISIS	Earthquake
PEOPLE DISPLACED	95,157 individuals displaced*
HOMES DAMAGED/ DESTROYED	16,293 homes*
PEOPLE WITH SHELTER NEEDS	65,172 individuals (average HH size of 4)*
PROJECT LOCATION	Karampuang and Botteng village, Mamuju District, West Sulawesi Province
PEOPLE SUPPORTED BY THE PROJECT	536 HHs
PROJECT OUTPUTS	- 67 houses retrofitted | 7 household toilets constructed | 2 community facilities renovated - 232 HHs received community shelter repair kits | 150 HHs received hygiene kits | 80 HHs received PPE - 46 people received Community Based Disaster Risk Management (CBDRM) training | 61 people received basic construction training | 134 people received training on home improvements
SHELTER SIZE	25-45 m² per shelter
SHELTER DENSITY	5-9 m² per person
DIRECT COST	USD 1,035
PROJECT COST	USD 1,383



PROJECT SUMMARY

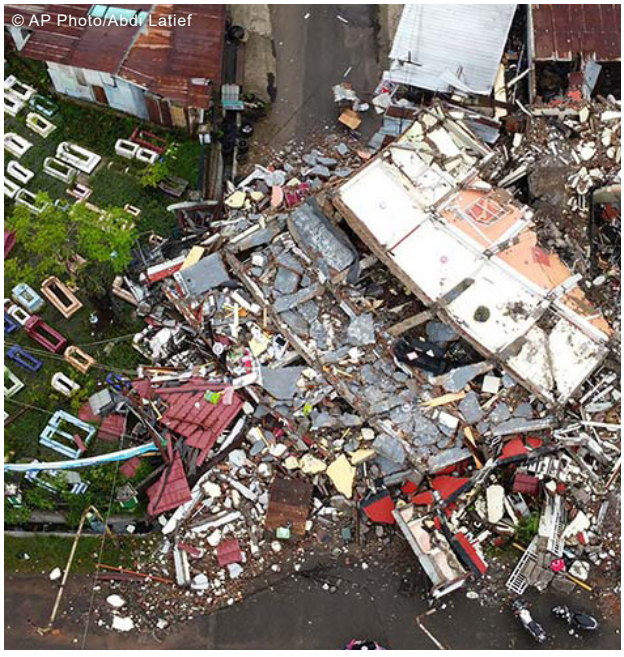
West Sulawesi Disaster Response (WSDR) project is a housing repair and retrofitting project that focuses on medium and light damaged houses after the earthquake in 2021. The project developed participatory assessment tools to gather related information such as building typology, damage spots, site safety, type of technicians needed, using local resources and existing skill while introducing retrofitting with ferrocement techniques through an encouraged women participation in the construction implementation and project monitoring. A program was launched in collaboration with other Shelter Sub-Cluster members involving the participants throughout all the stages of the project, which was a model to respond to future disasters, especially in the early recovery stage.

*Disaster Info: Issue 1, January 2021, BNPB



15 Jan, 2021: An earthquake of magnitude 6.2 rocked Majene and Mamuju District resulting in more than a hundred fatalities.

1. **20-29 Jan, 2021:** Rapid Response Team Assignment & Project location selection.
2. **25 Jan, 2021:** Distribution of community rubble removal tools to to clear debris and prepare site for transitional shelters.
3. **1-31 Mar, 2021:** Rapid assessment of damaged buildings, and detailed engineering design development.
4. **1-15 Apr, 2021:** Durable shelter solution through customized reconstruction techniques.
5. **15-30 Apr, 2021:** Distribution of community shelter kit, hygiene kit and PPE Covid 19.
6. **1-31 Apr, 2021:** Family selection.
7. **1-30 May, 2021:** Trainings and workshops on DRR.
8. **15-30 Jun, 2021:** Construction, implementation and completion.



An aerial view of a damaged building following the earthquake in Mamuju, West Sulawesi.

CONTEXT AND NATIONAL RESPONSE

A 6.2 magnitude earthquake struck West Sulawesi province in Indonesia on 15 January 2021, resulting in 101 fatalities, 3 disappearances, over 95,000 people evacuated, and significant damage to homes and infrastructure. Typical home construction in the area used to combine a timber-post frame with brick or infill walls which would have no anchorage or connection with the frame or with crossing walls. Many of these walls collapsed due to the earthquake, while the timber frame often did not suffer relevant damage.

Initially, the government assumed assistance for families whose homes suffered heavier or total damage, while requiring that NGOs would assist those with moderate and light damages. These were primarily homes where the timber frame resisted, and retrofitting was needed mainly on the walls. Some homes were clad in wooden plates instead of brick walls.

During the second stage, the government assigned USD 3,200 as in-kind assistance for households with a totally destroyed house, USD 1,600 for those with damage assessed as medium, and USD 960 for those with a lightly damaged house.

PROJECT DESIGN/STRATEGY

The project's initial activities consisted of rubble removal and the distribution of Community Shelter Repair Kits to 232 families in the first selected locations, as well as hygiene kits to 150 households and COVID-19 PPE to 80 HHs, before the repair of the first 67 homes began with the involvement of the homeowner. The Community Shelter Repair Kits included tarpaulins, shovels, hoes, crowbars, etc. The training was organized for both homeowners (home improvement training, attended by 134 individuals, both males and females) and laborers (basic construction training, attended by 61 individuals. Community-Based Disaster Risk Management training was also conducted to identify the community vulnerabilities and strengthen their capacities through the learning captured from past events, identifying potential hazards, and establishing response teams to address future shocks.

The project team assessed the areas most affected by the earthquake, some of them on remote islands just accessible through long boat trips, and conducted technical assessments of the damaged homes using tools developed for the project to determine the scope of the repairs needed, materials, and works. Following those assessments, the technical team decided to address the repair of the walls using ferrocement, a construction technique introduced in Indonesia in the 1960s by Engineer Teddy Boen, who spent most of his life disseminating its adequacy for reinforcing the existing constructions. (*See the dedicated piece to Teddy Boen on page 193-94*). The field assessments also verified property documents for a preliminary selection of households to be supported by the project.

To accelerate the planning and monitoring process of each activity stage, several open-source tools and applications related to Information and Communications were introduced for the use of the field staff.

IMPLEMENTATION PROCESS

i. Initial survey and shelter needs assessment to determine project location selection.
ii. Formation of village committees.
iii. Household selection and damage level verification.
iv. Public announcement of selected households.
v. Technical assistance for households.
vi. Agreement with households on construction design and BOQ.
vii. Construction implementation and capacity building.
viii. Evaluation.

TARGETING

The locations for the project interventions were selected based on the results of the field assessments conducted for medium and lightly damaged households. The project focused its activities especially on Karampuang village, given the high needs identified and the fact that there was no other organization providing repairs to damaged houses in the area.

Local youth communities helped transport the building materials from ship to beneficiaries' homes.

Discussion meeting regarding the pre-construction implementation with the local committee members in Karampuang village.

The project team developed household selection criteria together with the local village committee. It was agreed to support the households (HHs) that would meet the following conditions:

- HHs registered in the village and affected by the earthquake.
- HHs not included in the government list of recipients.
- HHs whose house damage was assessed as either light or moderate.
- HHs able to provide proof of land ownership through evidence such as village certificates.
- HHs with preexisting vulnerabilities (underprivileged communities, widows, households with toddlers, disabilities, or pregnant women).
- HHs willing to contribute, participate and assist in the home improvement process and attend each meeting and training held by the project.

COMMUNITY ENGAGEMENT

The involvement of the community was key to ensuring the adequate composition of the local committees. Each household contributed some building materials where possible and assisted the project staff during the project. The local committee team undertook supervision functions, while the project team managed the admin tasks and oversaw the distribution of materials.

The community played a huge rule in the distribution of building materials. Homeowners controlled the quality of materials that were distributed.

Discussion meeting regarding the implementation process with the local committee members in Karampuang Village.

The technical consultant presented the building technique in construction training for homeowners and local builders.

Process of Ferrocement Construction

1: Construction training; 2: First formwork; 3: Inner plastering; 4: Outer plastering; 5: Outer plastering completed; 06: View of a completed room.

COORDINATION

The project was coordinated within the Sub-national Shelter Clusters, using the data provided by the Government of Indonesia regarding the levels of damage in the affected areas and the coverage of the Government-led response, avoiding overlapping. The project reported all households supported to the District Disaster Management Agency and District House and Settlement Unit.

MAIN CHALLENGES

- Delays were faced in obtaining household damage data from the government. The project team coordinated with the Sub-national Shelter Cluster and followed up closely until the data was shared.

- Project implementation coincided with the longer Eid celebrations in the affected areas, limiting the availability of the community and the laborers. The project team agreed with the donor an adjustment on the timeline of the project to accommodate the limitations in the period.
- Due to recurrent high tides, accessibility challenges were faced in reaching Karampuang Island for the distribution of construction materials. The project team coordinated closely with the village committees to determine the most suitable schedules for the deliveries of the materials, in some cases utilizing local resident boats.

GENDER MAINSTREAMING

The project team engaged in community consultations on the possibility of involving women in the training and the construction activities, as in the traditional culture in Mamuju such an approach was not common. As a result of those efforts, a final ratio of 40 percent female and 60 percent male was agreed with the community and respected during the project.

LINKS WITH RECOVERY

The project distributed Community Shelter Kits including tarpaulins, shovels, hoes, crowbars, etc. to 232 households and later repaired 67 homes with the involvement of the homeowner. From the outset of the project, the same location was targeted to bring the community through pathways to permanence, from the relief stage to the recovery stage. In addition, the project coordinated with the government on an assessment to determine the areas where the project would intervene during the recovery period.

MATERIALS AND SUPPLY

Supplies such as coconut wood for the house frame, wood for doors and windows, and stone for the foundations were procured locally in project villages. Cement, iron, sand, and wire were sourced from vendors in the city and were transported first to a seaport before being moved to the island. The project established relationships/partnerships with the private sector aiming to contribute to the local economy in a wider manner while preparing the organization to react to similar crises.

EXIT/HANDOVER

The exit strategy applied was to provide training on retrofitting (ferro-cement) methods to the community. The method installed ferro-cement layers with chicken wire on both sides of the wall, so that it is wrapped in a layer of ferro-cement to enhance durability when shaken during an earthquake. This method was very suitable for the situation and economic conditions of the area. Through enhanced knowledge of more durable retrofitting measures, the community was able to utilize the practice in the construction and repair of homes post-project conclusion.

OUTCOMES AND WIDER IMPACTS

Direct outcomes:

- A total of 536 households received Community Shelter Repair Kits, hygiene kits and COVID-19 PPE.
- 67 homes were repaired using the retrofitting method, 241 were Community Based Disaster Risk Management, Basic Construction with the retrofitting method, and Healthy Home Improvement Solutions.

Indirect outcomes:

- Community members have the capacity to utilize retrofitting methods, develop disaster management plans, and enhance gender parity in construction/repair activities.

Wider Impacts of the project:

- Supported households identified that the improved condition of their homes could eventually open livelihood opportunities, such as a small business operated from the house.

The Karampuang Village Community Hall before and after reconstruction. The project facilitated the community in Karampuang to the renovate two Community Centres. The renovations were carried out using retrofitting and ferrocement methods, The renovation focused to improve better space, ventilation and lighting.

- Approximately 70 percent of respondents agreed that they would have a better chance to get a job and 77.5 percent of respondents agreed that they had better opportunities to earn money after the project.
- The project – and the retrofitting program in particular – received positive responses from local authorities and individuals in the Karampuang island area (where challenges in construction materials transportation were experienced). Because material transportation to this area relied on ocean currents and the availability of boats, it took time to provide the community with an understanding of participatory and retrofitting methods.

A family outside their completed transitional shelter. 67 houses were retrofitted in total across the project.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED

STRENGTHS

√ **Community Engagement**. The project put people at the center of the response as the main actor, and community participation continued from the design phase to the conclusion of the project.

√ **Gender.** The project enhanced female representation during all phases of the post-disaster recovery process.

√ **Durability.** The retrofitting method enhanced the strength and safety of non-engineered homes. Retrofitting with ferro-cement can provide shelter solutions for families who are unable to afford the building of a house in compliance with the Indonesian building code.

WEAKNESSES

x The organization-centralized procurement and payment system was **not flexible enough to accommodate a recovery project** in a remote area with limited internet and bank access.

x Needs assessment planning did not properly factor in **the fasting period and Eid al-Fitr**, delaying the construction implementation period.

x **Financial limitations** of the implementing organization inhibited the rental of additional boats to support material transport to Karampuang Island.

√ **Livelihoods.** The project used local laborers and vendors. In some cases, individuals reached were able to restart home-based entrepreneurship again after house completion.

√ **Suitability.** Most households viewed home repairs carried out through retrofitting and ferro-cement methods as an easy and inexpensive way to make home improvements that may be further developed. This approach also empowered individual homes to retrofit their homes to suit their own needs, rather than forcing a one-size-fits-all solution across all identified households.

Construction training using retrofitting method (ferrocement) for women in Karampuang Village.

LESSONS LEARNED

- Due to limited monitoring staff from the implementing organization and accessibility challenges, construction monitoring was carried out by village committees and assisted by laborers and affected households. Via this participatory monitoring process, homeowners' and laborers' capacity was enhanced regarding safer home construction/repair.
- Retrofitting – in particular with the ferro-cement method – was initially considered strange by residents, and the prevailing notion was that costly brick walls provided the most durability. Through the retrofitting methods using the ferro-cement method, community shelter knowledge was enhanced, the durability of homes increased, and construction costs were reduced.
- The project triggered the promotion of three webinars post-project completion and offline training with the Mamuju District officials and the Karampuang community. Non-engineered homes remain widespread across Indonesia, and the project could be upscaled to enhance communities' resilience and involve broader shelter practitioners. Technical guidelines and guidelines for villages to reach funding sources to construct more durable homes should be promoted.

RECOMMENDATIONS MOVING FORWARD

- Rapid assessments and planning should factor in community cultural seasons and/or events, especially in relation to livelihoods and activities that impact project schedule (ex. seasons when ships cannot be developed).
- While the procurement of material in large quantities is cost efficient, it is necessary to consider external factors such as small capacity carriers and less spacious port capacity to unload shipments. This may be managed by a committee or members of the affected community.
- There is a need to develop a participatory and inclusive monitoring model in the construction of housing improvements, including the monitoring of gender and social inclusion.
- There is also a need for capacity building within existing local community organisations, such as Disaster Risk Reduction forums.
- A strategy could be developed to integrate the strengthening of community livelihoods within the construction and/or repair of community members whose livelihoods were affected by the crisis.

FURTHER READING ON SHELTER PROJECTS

On Indonesia: A.13 / INDONESIA 2018–2020; B.5 / INDONESIA, JOGYAKARTA 2006; A.12 / INDONESIA, SUMATRA 2009

On earthquakes: A.18 / NEPAL 2016–2017; A.4 - A.11 / HAITI 2010; B.7 / INDIA 2001

On housing repair/retrofitting: A.24 / SRI LANKA 2017; A.34 / IRAQ 2015-2016; A.6 / HAITI 2012