

# Typhoon Haiyan – November 8, 2013 Philippine Islands

## Building Reconstruction

Brief handbook for good practices,  
for use by non-governmental organizations





## Introduction

On November 8, 2013, the central region of the Philippines was struck by a typhoon of a violence rarely observed, with winds of 315 kmh. It affected 14 million people, with 7500 dead or missing after the resulting storm surge. It left 4 million people homeless, having destroyed 1.1 million houses and many public facilities (including schools and health centers). This exceptionally huge natural disaster stirred up an outpouring of solidarity around the world. For its part, Fondation de France collected around 2 million euros to help the victims.

Based upon its experience from the Bangladesh floods in 1991, the Algeria earthquake in 2003, the Indian Ocean tsunami in late 2004, and the Haiti earthquake of 2010, Fondation de France puts a great priority on the quality of the implementation of its projects.

For this purpose, it provides NGOs and partners a set of recommendations regarding principles of good practice. While these recommendations do not represent in-depth project specifications, the drawing up of which are not the role of Fondation de France, they can be used by these NGOs and partners to help design and round out their projects.

*Document prepared by Bruno LAM QUANG, architect and Fondation de France consultant.*

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## 1. Values promoted by Fondation de France

### 1.1 Commitment to solidarity

Rebuilding and helping communities start up normal life again, via programs for building/rebuilding facilities (schools, health and social centers, etc.) and housing, and for economic recovery.

### 1.2 Sustainable projects

Making post-disaster reconstruction projects part of a development process for the communities concerned.

Respecting local culture and customs, by relying on local solidarities and networks in order to determine the needs as closely as possible with the local population and by working along with the latter.

Building better than before, to deal with other disasters: taking more factors into account and working according to proper trade practices, or at least best practices.

Opting for an approach by which the project is integrated into its environment.

### 1.3 Qualitative approach

This is based on:

- the dignity of an everyday environment;
- the expected lifetime of the constructions;
- the moral commitment to the donors.

## 2. Intervention principles

### 2.1 Sustainability of the action

Integrate the environmental context as a whole

A project will be all the more successful if it meets, as closely as possible, the many questions that arise from all the aspects that are part of its implementation. A holistic approach is therefore required.

Physical environment: The physical constraints of the site—climate, topography, seismicity and nature of the soil, local natural resources, communication infrastructures—are to be determined by the NGOs in order to propose suitable measures.

The NGOs should make sure that they include, as much as possible, the preservation of the environment in their project, especially via alternative technologies, through:

- the use of local materials and techniques;
- renewable energies (solar energy, rainwater);
- the reduction of greenhouse gas effects (material whose manufacture and transportation pollute less);
- the planting of trees/plants that are incorporated into the climatic system of housing/buildings and of outside spaces;
- and, finally, recycling of materials/debris following the typhoon and reconstruction.

Human environment: This concerns mainly the socio-cultural environment of the project's beneficiary populations, as much in the physical design of the habitat as in the implementation methods (locally available skills and technology) and maintenance methods depending on their resources. There is also the institutional environment, which sets the regulatory boundaries.

Place the beneficiaries at the center of the project.

Determine the orientations with the beneficiaries beforehand.

Incorporate these in the implementation phase.

***The process of consulting families from the design stage and involving them in the implementation is essential for the project success: This ensures ownership of the project and the maintenance of the buildings built/rebuilt, and it provides the conditions for integrated extension of the structure at a lower cost.***

## 2.2 Operational strategies

### React fast, but without rushing

In crisis situations, the governmental structures concerned are taken unawares and generally need a period of several weeks—or even months—to become operational in terms of: reinforcement of existing structures or creation of new ones, legal framework (land tenure), environmental directives, construction standards, project validation process, etc.

For NGOs, this period should act as an opportunity to carry out well-reasoned plan, based on in-depth fieldwork. This is why Fondation de France gives preference to supporting NGOs already operating locally before the disaster. Experience shows that the time invested at an initial stage makes it possible to foresee problems and thereby save time later.

The NGO (or its local partner, as the case may be) must make the stakeholders understand that—despite there being an emergency situation—this approach ultimately leads to the sustainability of the project.

***For short-term and long-term sustainability, the reconstruction of a neighborhood concerns not only housing, but also more broadly access to the vital needs of the community: physical infrastructures, water, waste treatment, and food.***

### Put priority on an integrated approach

Return to normal life cannot be limited to the perimeter of the dwelling or building only that is built/rebuilt, especially during the post-crisis period. It's necessary to extend the perimeter taken into consideration so that it includes such aspects as access infrastructures (roads, transportation), water (supply and treatment), basic facilities (dispensaries, schools, small shops), and public areas (tree plantations, waste management).

While the project is not responsible for meeting all these needs, it must raise the relevant questions and meet the needs that it can, at its level. Networking with NGOs specialized in this sector can be considered or suggested.

### Build Back Better

The disaster showed that buildings are weak under natural aggressions. The Philippines experiences around 20 typhoons per year, and people have gotten used to taking minimum steps as a result. In the case of a super-typhoon like Haiyan, these practices need to be upgraded: Even if we do not currently know if such typhoons will occur more frequently, we can ask ourselves if there isn't a greater probability of them from now on. For this reason, such practices can no longer be ignored.

We must thus improve these practices, to aim for more sturdiness (and not necessarily for more solidness, if we consider light materials that “don't kill,” compared to masonry). The last part of this guidebook gives some recommendations along these lines.

Where to build is also an aspect to determine, especially in seaside locations, and this issue has not yet been settled at the current stage. Caution nevertheless calls for building further away from the coastline, with special care required for designing housing for fishing communities.

### Disaster Risk Reduction

Providing/re-providing housing or facilities is not just building/rebuilding, even if their design meets the “build back better” criterion. Large-scale risks are part of the geographical context of the Philippine Islands, and risk prevention should be included in the project via awareness-raising exercises for users, in terms of behavior inside the building and of its evacuation. The Local Disaster Risk Reduction and Management Fund (LDRRMF, defined according to the 2010 decree RA 10121 of the National Disaster Risk Reduction and Management Plan), encourages local authorities to invest around 5% of their budget in the matter, but it is not applied everywhere. NGOs could thus get in touch with the local authorities to examine how this program can be supported, if the case may be.

### Prepare the project withdrawal strategy

Empowering the beneficiaries and making them responsible for the project provides a guarantee that the action will be sustainable, and thereby that it will be a success. It's within this framework that the withdrawal of the NGO must be considered.

Withdrawal is a phase in itself, which should be planned from the design phase along with a budget, if necessary, to support the beneficiaries in the event that there remain services to be secured when the NGO leaves (getting back bearings in the event of relocation far from where they lived before the disaster, social harmonization, economic project linked to the construction, etc.). This support can take several forms: the French or local NGO staying on for as long as necessary, another NGO being identified to take over for specific support, self-help groups set up during the project taking over themselves, etc.

## **3. Project management: operating procedures**

### **3.1 Contracting Body, and Project Manager**

In all construction projects, two functions must be clearly defined: the contracting body (or the Employer) and the project manager.

The contracting body is the entity responsible for the construction project and that commissions it. It is in charge of stating the needs (objectives, budget, timetable), but it doesn't necessarily have the technical skills to implement the project. It represents the end-users for whom the project is intended. The NGO and its partner association can be considered to be the contractor.

The project manager is responsible for project design, as well as for operations if it supervises the construction work according to the deadline, cost, and quality terms defined in a contract. In this respect the project manager must be embodied by someone skilled in the art or by a competent body (consultancy, architect, or engineer).

As it is not a contracting body in the usual sense of Client, the NGO must master the processes for making contracts for the work. It is thus essential to determine the roles of the players, in order to

establish the rights and duties of each one. The prevailing rule is "the one that pays gives the orders." The NGO is thus the project operator and the legal entity that contracts the various service providers.

### **3.2 Due diligence**

The NGO receiving the funding is responsible for the project financially and legally throughout the duration of the project, up to the hand-over. But it does not offer a post-construction guarantee (such as a 10-year warranty). It thus has a duty of due diligence and must respect the regulations, codes, and standards in force locally (and see that they are respected). These include:

- Safety for the people employed at the construction sites ;
- Respect of administrative procedures;
- Seeing to it that the projects are in accordance with construction standards (including against earthquakes and typhoons).

### **3.3 Operating procedures**

To meet this requirement of due diligence, an operating procedure to be mastered at each step of the project can be helpful, mainly at the:

#### Design phase

- Project documentation: This is required before launch of construction. It includes at least the following:
  - A memo on the functional and physical planning of the spaces to build;
  - An informational and well-supported notice on the construction principle (skills and materials);
  - A realistic image of the project atmosphere (a sketch when the grant application is submitted to Fondation de France is accepted; a full image will be given after approval and before construction launch);
  - A budget that also includes a section on risk prevention.
- The NGO's withdrawal from the project is also to be planned at this stage.



### Construction phase

- Provision of materials: This is dependent on the proper/best value-for-money relationship, based on a schedule of prices (including nature/quality, quantity, unit price), in order to compare the different suppliers (transport methods should also be specified);
- Construction of a prototype for housing construction will enable the beneficiaries to see and validate it; the NGO to verify its approach, design, and impact on the site; and workers in the field to verify the technical aspects. Experience should be capitalized in order to make the adjustments needed before duplication.
- Supervision of the worksite will aim for proper implementation in accordance with the documents provided and for progress. The teams will be provided with one or more experienced foremen. A steering committee, which shall also ensure coordination, will be made up of a representative from each party (NGO/local partner, implementation team, beneficiaries) and will write a weekly internal report.

### Official acceptance of work and delivery to the beneficiary

The NGO must provide for the formal delivery of the work to the beneficiary in order to be free from all later responsibility. A moral commitment from the NGO may be requested for possible later problems, over a 1-year period for example. It is also possible to transfer the guarantee to the builder.

A model document for official acceptance of the work (report) will be drawn up, as will another separate one (attestation, certificate) for the delivery of the construction to the beneficiary.

Two types of operating procedures are to be established according to the projects received for funding, and for which the specific characteristics should be stated.

### **3.3.1 Self-help housing: informal contracting**

The operator organizes the worksite by directly recruiting, under the supervision of a project manager, hired hands to help the families. These are housing projects in which the NGO, via this operative management linked to the proper implementation of the project, shows its added value in comparison with a traditional contractor.

The schedule of pricing concerning the projects of a larger scale (more than 30 housing units) will be a special document: The criteria concerning the nature and quality of the materials appearing succinctly on the schedule of pricing will be explained, as will be their implementation, in the form of a small specification sheet. This will guarantee uniform quality over the whole operation. The schedule of pricing will be annexed to the document.

The report on acceptance and the construction hand-over certificate will be signed by representatives of the NGO and of each family.

### **3.3.2 Working with a contractor: formal contracting**

The operator signs contracts with one or more contractors and service providers registered in the construction sector. This procedure is in accordance with the private market rules in force in the Philippines. According to the contract signed, the main contractor may itself take on the responsibility for the project.

This operating procedure applies more to more complex systems (housing made from non-temporary materials, renovation of facilities, etc.) that call on proven technical expertise (structural systems, structural metal work, etc.).

In the design phase:

A model of a document for private market will be drawn up for invitations to tender, with one section describing the obligations between the contractor and the NGO/local partner and a second section on the description of the constructions and materials referring to the local standards in force, and the schedule of prices.

A structural design note will be annexed for the structural elements.

In the implementation phase:

Tests of materials being used on the worksite will be carried out.

The steering committee will include a representative from the NGO/local partner, the contractor, and the Client (local organization, local authority in education or health care, families if it is a complex or large-scale housing project).

The completion certificate and attestation of delivery of the housing or facilities will be signed by the representatives of the parties.

## 4. Technical recommendations

### 4.1 The institutional and regulation context

Project implementation must be in accordance with local regulations, from construction stake-out to delivery. The NGO will therefore have to find out about these regulations beforehand from the local authorities and monitor information for possible changes (modifications, cancellations due to local populations and/or feasibility by the associations or NGOs, etc.).

The governmental institutions concerned with reconstruction are:

- The National Economic and Development Authority (NEDA), a cabinet-level agency in charge of development design. NEDA plays an important role in the governance of regional and local development councils. It serves as vice-chair of the task force in charge of recovery and reconstruction.
- The Department of Public Works and Highways (DPWH) oversees implementation. In the Visayas, it has offices in Iloilo, Roxas, Tacloban, and Cebu. It is the reference agency for construction-related regulations.

Other institutions:

- The National Disaster Risk Reduction and Management Council (NDRRMC) is made up of members of the government and of civil society organizations, and NGOs, etc. It manages affairs related to risk reduction (decree RA 10121 of 2010) and created the Local Disaster Risk Reduction and Management Fund.
- The Department of Social Welfare and Development (DSWD) is part of the NDRRMC and leads the planning, coordination, and monitoring of disaster response efforts via the Risk Reduction and Management Program Division.

Regulations follow two approaches:

- One was created ad-hoc, along with the RAY - Reconstruction Assistance on Yolanda initiative/directive, which will be led by the Office of the Presidential Assistant for Rehabilitation and Recovery. The RAY document should be distributed to the local

authorities (Local Government Units, in theory down to the neighborhood/barangay level). The regulations, and national and local standards can be consulted at the PWDH branch offices.

- The other, already existing one is the Building Code used for building construction.

NB: A parallel information approach is being carried out by NGOs or NGO platforms (see, for ex., the Red Cross network – links at the end of this document).

### 4.2 Implementation aspects

The set of recommendations on the technical principles given here for use by NGOs and operators does not represent project specifications strictly speaking, but recommendations that can be used by them to design or round out their projects.

These recommendations should in no way replace the building professional that the NGO will consult for the design and construction stages.

These technical principles are also intended for families that will co-produce their housing and thereby acquire a better knowledge of construction.



## Physical design

This is part of a process of sustainable action (cf. § 2.1), by including the impact of socio-cultural codes on common and domestic spaces, which include a front porch roof; the "kitchen," which cannot be limited to a kitchenette; the toilet section, located in back or even separately; and an elevated floor to protect against flooding and ground humidity.

The design shall include aspects to protect against earthquakes and typhoons, such as compact volumes to limit wind resistance.

Transversal and vertical ventilation systems for the rooms shall be included, with eaves large enough to protect against rain and sunlight, reduction of rain noise, vegetation nearby to provide increased thermic regulation, and a shading system to allow light and ventilation in case of rain.

The immediate surroundings shall also be dealt with (access, water flow, possible outdoor storage/reserves).

## Foundations

The soil properties determine the type and depth of the foundations. A minimum study should thus be carried out by a professional. Clayish soil requires special attention. Foundations should not be made on landfill or embankments, as these can take up to 20 years to stabilize.

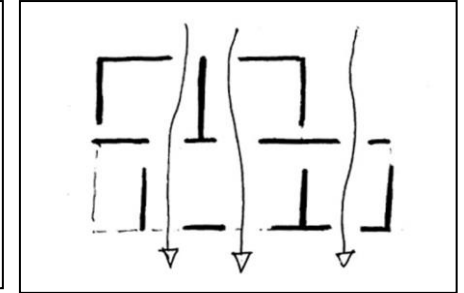
Building on slope areas is to be avoided for cost reasons. Continuous foundations must be stabilized with large-scale measures (terracing, support walls, etc).

Continuous foundations receive linear loads (supporting walls), with continuous footing using reinforced concrete. These are not recommended because of complex device: homogenous bed, draining.

**Independent footings:** These are good for various soil types and any type of program, including wooden housing. The columns are set on a pedestal and bolted into lateral metal plates treated against rust and sealed into concrete blocks at level above water. This system lasts long and facilitates replacement if needed. Do not anchor the wooden columns directly into the ground!

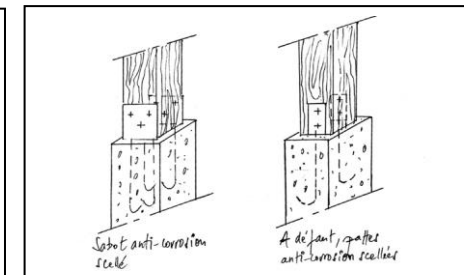
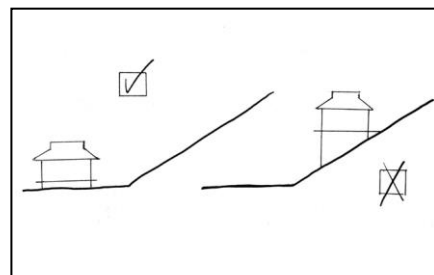
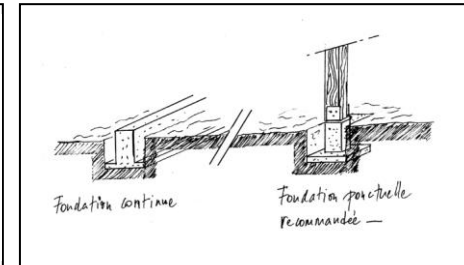
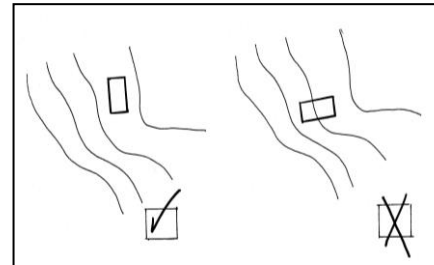
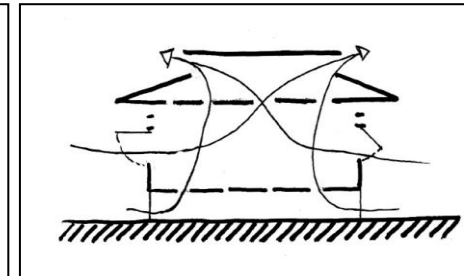
### Layout

Protected location if possible – winds, flooding  
Easily accessible  
Orient according to sunlight and winds  
Provide for minimum distance between houses for ventilation and future extension



### Domestic spaces

Deal with outside-inside spatial continuity in subtropical environments  
Respect public-private distribution  
Design kitchen according to local customs  
Adjust distance from ground level to window sills according to family's lifestyle and furniture  
Provide for extension space



## Structural work – earthquake-proof and typhoon-proof

Storm bracing for structural elements (columns, beams, joists) shall be made using systematic bracing in the three dimensions: vertical, horizontal, and at the junction of the two, and also at openings. These elements shall be properly sized, bonded by fasteners (or by sandwiching depending on the know-how).

Masonry buildings shall be braced horizontally and vertically, with the tie-columns poured into indented spaces, after the walls are built. Columns are preferable to supporting walls.

The roof frame shall be braced in three dimensions and secured to the structure with diagonal beams connecting the roof trusses (against buckling) and X-braces for longitudinal pressure.

Any roof overhang or eave longer than approx. 60 cm, for optimized protection against sun or rain, will be supported by hinges, which will add to the solidity of the structure.

Hip roofs (4 slopes) are preferable, in order to limit wind resistance, with aeration located in the upper part. The slopes shall conform to the local device, and the gutters/rainspouts will help to stock water.

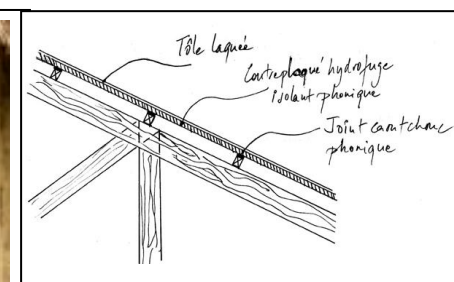
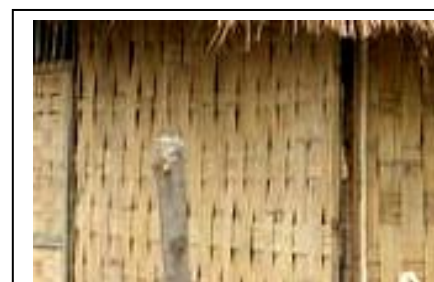
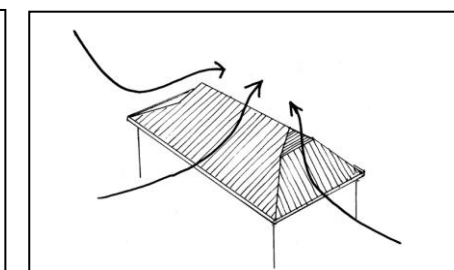
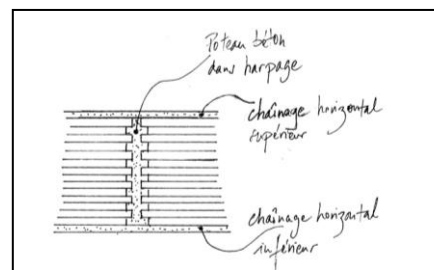
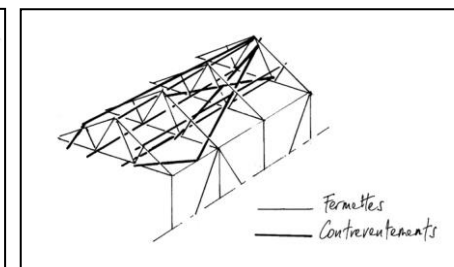
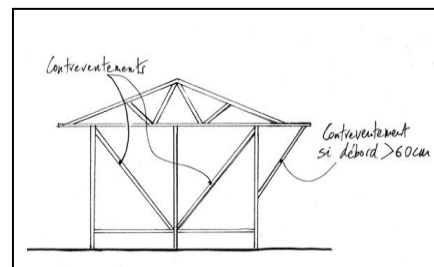
## Materials

The good quality of materials and how they are assembled are guarantees of better durability. For wood, the parts with sapwood are not to be used.

Sheet-metal roofs: The sheets should cover well and be secured carefully. Provide for a waterproof plywood layer to reduce rain noise and the sun's radiation; failing that, provide a false ceiling under the roof truss, with passages for air evacuation into the roof space.

The dividing walls should enable ventilation: Woven panels that can be replaced by the families are recommended. Otherwise, waterproof plywood, with upper and lower vents.

For buildings made with concrete, precautions regarding production and implementation should be observed: quality, particle size and cleanliness of the sand and aggregates, sand-cement-water dosage, iron bars as calculated and implemented according to the blueprints, forming, pouring, and curing.



### Quality of materials for construction in masonry

Appropriate particle size for aggregates

Should be clean before implementation

Appropriate dosage according to usage:  
ex. 350 kg of cement per m<sup>3</sup> of high-resistant concrete

Quality steel, with proper sections

PS 20-cm cinder blocks with central ribs.

### Good practices

Follow principles of confined masonry

Work with reinforcement blueprints

Supervise to ensure proper mixing, pouring, and curing of concrete

Regular worksite meetings with reports

Certificates of completion.

## Water (supply and treatment) and Electricity

Soil pollution, and thus wells in rural areas, or by the sea raises problems in water supply. In the hypothesis (which is likely) of return to normal not being before a year, this issue must be covered in the plans and in the measures provided for: treatment units (included in the project, or offsite with means of transport) and individual filter kits. A system for rainwater recovery provided for in the projects will be one answer—and will also limit soil erosion.

For wastewater disposal (kitchen, washing), many systems exist, including oxygenation by plants. The NGO should refer to the regulatory documents.

Likewise for sewage treatment (WC) – traditional wet septic tank (provide for hook-up to plumbing), dry pit, or eco-latrines with two alternate pits for compost recovery. The system chosen will have to be approved by the families, who will be in charge of maintenance.

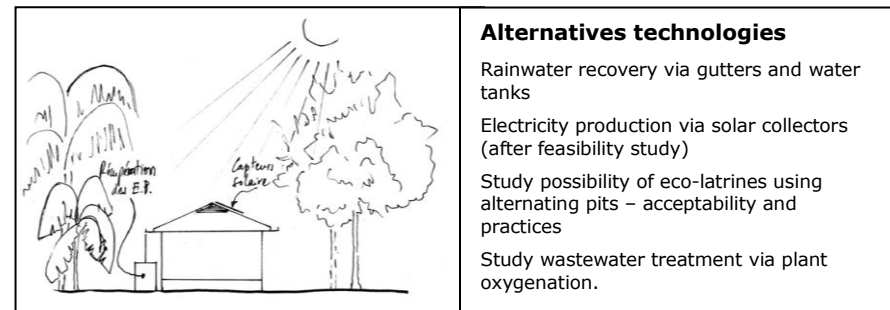
The projects should specify how they will deal with drinking water supply and treatment. In each case, the NGO should contact the governmental agents or specialized NGOs.

Electricity production before the typhoon often consisted of informal tapping into the municipal network, for many disadvantaged families. Although the NGO might not succeed in ending this practice in the long term, it may consider an alternative technology, via solar panels, to provide lighting. A preliminary study will have to be made to evaluate the costs and maintenance for the families.

### Useful links

<http://www.rappler.com/move-ph/issues/disasters/recovery/46793-storm-resilient-shelters>

<http://preparecenter.org/topics/preparedness-issues-philippines-typhoon-haiyan-recovery> -



**Work WITH families and communities rather than working for them.**

*The most important isn't to give him the fish to eat, but to teach him how to fish. – universal saying*