

Temporary Houses from Emergency to Sustainability

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Abstract: Globally, the impacts of disasters have risen rapidly over recent decades, affecting almost all sectors and rich countries and poor countries alike. Several hundred million people are affected annually and losses reached a record US\$ 371 billion in 2012. This average is increasing until this year. (According to UNISDR). In some regions numerous smaller-scale and unreported events are a major source of aggregate loss, especially in developing countries and poor communities. These disasters include natural disasters such as floods and earthquakes and man-made disasters such as wars.

The damages that these disasters cause may destroy urban communities thus leaving a huge number of people homeless. Architects always interfere after the disaster to participate in reconstruction. Aid in case of disasters usually happens on several stages:

1. Emergency relief stage: (emergency shelters such like tents.)
2. Rehabilitation stage: (temporary housing.)
3. Reconstruction stage: (permanent housing.)

Temporary housing provision plays a crucial role on those programs since it is one of the most important needs for people and essential for their well-being. Therefore, the paper aims to highlight various shapes of temporary houses as well as to identify their main sustainable problems. In an attempt to avoid these problems, in addition this paper proposes some recommendations for more efficient sustainable building of temporary house.

Keywords: Temporary Houses; Emergency; Sustainability; Rehabilitation

1. Introduction: Sheltering and Housing Definitions and Difference

While housing is typically viewed as a longer range and more permanent solution to the need for a safe and healthy living environment disrupted by the disaster event. Within a disaster context, it is often referred to as reconstruction or rehabilitation housing. As a more complex intervention, a more comprehensive range of activities is often involved. These activities are designed to support the repair, reconstruction, or new construction of full or partial homes damaged or destroyed by a disaster event. (1)

However, housing is defined as “the process of providing permanent dwellings and the related physical, social and administrative infrastructures” (2). On the other hand, the main definition of shelter is: “a habitable covered living space, providing a secure, healthy living environment with privacy and dignity to those within it”.

The main difference between sheltering and housing; is that, while shelters provide a secure place to stay during the period that immediately follows the disaster interrupting daily activities, Housing allows for a return to household responsibilities and daily routine (3). Since people cannot stay in shelters for a long time, as they cannot resume their daily life in here, and reconstruction works often take time, there is a time gap to bridge and temporary housing seems to be the obvious solution (4).

Not only does it protect and provide privacy, but it also allows people to regain their daily life and it introduces some sense of normalcy, enabling them to perform the normal activities, such as housekeeping, cooking, working, etc. Additionally, it may promote the success of the overall reconstruction, since there is time for better community planning to reduce risks and improve sustainability of the future construction (5).

2. Disaster Definitions and Types

The high density of cities and human settlements make them particularly vulnerable to disasters and hazards. Not a week goes by without news of a disaster, natural or manmade, affecting huge losses on humans and the environment as a whole. Disasters are becoming more complex, where ranges of multiple factors in the social, cultural and natural spheres are increasing the risks associated with disasters.

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. Disasters have always been a result of human interaction with nature, technology and other living entities. Sometimes unpredictable and sudden, sometimes slow and lingering, various types of disasters continually affect the way in which we live our daily lives. (6)

Types of Disasters

Most of the disasters have a natural origin. However, some disasters are manmade as well. On this basis, disasters can be broadly classified into two groups: natural disasters, man-made disasters.

- **Natural Disasters**

Natural disasters are disasters caused by natural forces, over which man has hardly any control. The list of natural disasters include weather phenomena such as tropical storms, extreme heat or extreme cold, winds, floods, earthquakes, landslides and volcanic eruptions. These disasters cause enormous loss to life and property.

- **Man-Made Disasters**

When the disasters are due to carelessness of human or mishandling of dangerous equipment's they are called man-made disasters. Disasters caused by humans have included war, bomb blasts, transportation accidents, industrial accidents, release of hazardous materials and the collapse of buildings, bridges, mines, tunnels, etc. (7)

3. Selection of Case Studies

The case studies were selected using the following criteria:

- The shelter project must have been totally completed, or solid conclusions achieved, from the project execution by late 2011.
- The case studies should emphasize a variety of approaches to meet shelter and settlements requires. Supplying shelter is more than simply designing architecturally magnificent structures, and looks beyond the construction of individual houses.
- In this paper, we will discuss the case study of Syrian refugees' shelters in Jordan that has been resulted from crisis in Syria.
- Also a case study of the relocation of a whole community in Doña Ana, Colombia in response to chronic, rather than catastrophic flooding.

4. Colombia – 2011 – Floods

Emergency:	Flooding, Colombia.
Date:	Recurrent floods over many years.
People affected:	Community of 148 families (1,054 people).
Project location:	Doña Ana, San Benito Abad Municipality, Department of Sucre. (Fig.1)
Beneficiaries:	Entire community.
Outputs:	148 housing units, settlement infrastructure (water, sewage, energy and school construction).
Occupancy rate:	100%.
Shelter size:	49.75m ² (including kitchen, bathroom and 2 bedrooms).
Cost:	Materials and labor: US\$ 11,100 per household. Total cost including administration and connection to utilities: US\$ 21,300 per household.

Project Description

This project supported the whole community of Doña Ana to voluntarily resettle to a new location, due to severe annual flooding. The project was performed by an association, which included a private foundation, public bodies and aid organizations.

Community's flexibility and capacity to develop sustainable living solutions in their new village. In total, 148 families were supported with new houses and infrastructure. Furthermore, the project may serve as a model for similar future interferences.

Strengths

- Strong engagement of national authorities in both project planning and resolution of land-tenure issues.
- Social and community mobilization established
A sense of belonging as well as facilitating construction.
- Environmentally friendly development: introduction of new ecological water treatment plant.
- A holistic approach to the project included socio-economic support, psychosocial support, and capacity building of woman's groups along with infrastructure and education components.

Weaknesses

- The community is reliant on fishing but the industry itself is in decline. New, sustainable income generation activities are hard to establish.
- Ventilation of the houses was limited, requiring adaptations to doors and patio to better adjust to heat and humidity.
- Additional psychosocial support is necessary to help the elderly overcome the loss of the old village and increase collective ownership of the new village.
- Additional training on water and solid waste management has been required to ensure sustainability of the water treatment plants and environmental education efforts.

Observations

- The resettlement process goes beyond the project's lifetime, with a continuous effort required by all parties to ensure a successful transition.
- It is important to consider links and interactions between the new settlement and neighboring areas to maximize integration and development.

Living Conditions in the Old Village

- The community of the 'old' village of Doña Ana, located within a lagoon system, was increasingly affected by seasonal, protracted, 2-metre-high floods, which lasted several months. The floods damaged houses and assets, reducing incomes and livelihoods, and ultimately made living conditions very difficult.
- During flood periods, people built timber mezzanines inside their homes to elevate the floor, but this meant people could not stand up in their own homes. Sometimes water levels reached roof-level, collapsing some of the weaker structures, with the church and the school inaccessible for long periods.

Living Conditions in the New Village

- Although the 'old' and 'new' Doña Ana settlements are located only half an hour from each other by boat, the change in living conditions is dramatic in terms of house typology, settlement density, access, livelihood development and general lifestyle pattern.



Fig. 1: Doña Ana, Colombia Source: UNHABITAT, IFRC, UNHCR, Shelter Projects 2013-14 Available from: www.ShelterCaseStudies.org.

- Children and younger people easily and happily adjusted to the new circumstances, especially given that they were forced to live confined inside their houses during several days or weeks when floods hit in the old settlement.
- The elderly population found it more difficult to overcome the feeling of loss that they had, mourning the end of the old village. Feasibility studies are being carried out, as part of an environmental education and DRR project in the lagoon, to create a sort of ‘memorial park’ in the old (and often under-water) village, to ensure that people can return to honor the dead, who remain buried in the cemetery in the old village.
- Currently the community envisages various collective projects, fundraising for new places of worship and creating new cooperatives in order to generate income and ties with the surrounding villages.

Following is an example of a community that provides the labor for shared facilities such as the community center. The emphasis on working together for a new future motivated most community members. (Fig.2)



Fig. 2: Photo: Alejandro Diego Bravo/Colombian Red Cross.

Source: UNHABITAT, IFRC, UNHCR, Shelter Projects 2013-14 Available from: www.ShelterCaseStudies.org

Technical Solutions

Technical aspects of the project included: Land surveys to ensure a safe relocation site.

The design and construction of durable housing, based on minimum space standards and disaster-resistant features.

- Water pumping with filtering beds to clean wastewater before it returned to the lagoon.
- Rainwater harvesting.

Materials

- The majority of materials were purchased from local suppliers, following a tendering process. The materials were brought to Porto Franco, the closest town, and then transported by canoe to the project site.
- When housing construction was underway in Phase 1, a road was built, which improved access for Phases 2 and 3.

Wider Impacts

- The project is unique in Colombia in its combination of funding from private foundations and civil society, and implementation by a well-established national humanitarian organization, with the support of the community and local government.
- The funding requirements of this multi-phased project may be difficult for other communities to replicate, but the modalities and mechanisms of implementation of this program demonstrate a model that could be replicated in other areas of Colombia or other parts of the world.
- This project is an example of a success story for a community struggling with the adverse effects of flooding, a situation many remote communities around the world find themselves in. The story of the project has been disseminated at a number of high-level conferences including the World Urban Forum in Medellin.

5. Syria Conflict – 2011 onwards – Overview

Ongoing conflict in Syria since March 2011, and in Iraq since June 2014, has led to rising displacement of Syrians and Iraqis. Many people have been displaced more than once as the pattern of conflict has changed. Currently there are 6.5 million people displaced internally in Syria, 1.8 million people displaced internally in Iraq, and 3 million refugees spread primarily across Lebanon, Jordan, Iraq, Egypt and Turkey with smaller numbers in North Africa, the Gulf States and Europe (figures as of October 2014). (8)

Jordan – 2013 – Syria conflict Case study

Emergency:	Syria crisis, refugees in Jordan.
Date:	Conflict begins March 2011 (ongoing). Refugee numbers increase.
People affected:	Over 3.1 million refugees from Syria. Around 620,000 in Jordan (October 2014).
Project location:	Azraq camp, Az Zarqa Governorate. (Fig.3)
Beneficiaries:	Up to 67,000.
Outputs:	13,500 T-Shelter units. Over 7,000 completed as of September 2014.
Camp occupancy rate:	Capacity: 67,000 people. Population September 2014: approx. 13,000.
Shelter size:	24m ²
Cost:	Materials per shelter: 900-1,000 Jordanian dinars (US\$ 1,270-1,410). Total cost per shelter (including contractor and indirect costs): 1,650 Jordanian dinars (US\$ 2,330).

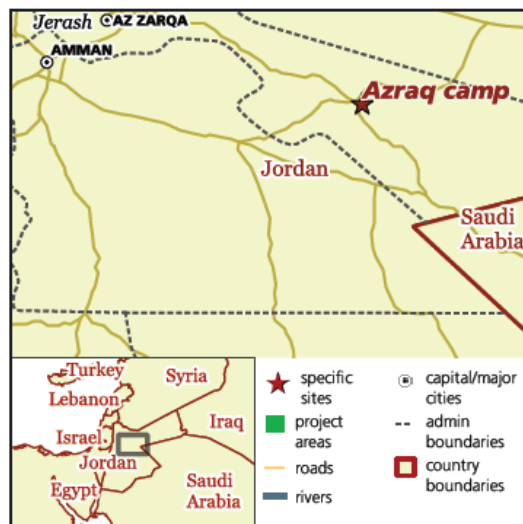


Fig. 3: Syrian Refugees' Shelters, Jordan
Source: UNHABITAT, IFRC, UNHCR, Shelter Projects 2013-14 Available from: www.ShelterCaseStudies.org

Strengths

- The production, manufacture and assembly of the T-shelters is less technically complicated than prefabricated solutions, meaning more contractors are able to produce the units faster and cheaper.
- T-shelters can be dismantled and re-used, making re-siting possible and can potentially be part of a return package.
- Kits can be stored as contingency stock.
- Positive impact on local labor market, with contractors employing more than 400 laborers.
- Though government policy originally opposed semi-permanent solutions, close collaboration on the design and contractor tendering process meant that the T-shelter solution was accepted.

Weaknesses

- Despite relatively fast production time, tents are still potentially necessary for response to population spikes until production meets demand.
- Inverted Box Rib (IBR) corrugated sheet, one of few roofing materials available, was hard to seal off against dust, wind and rain and had to be painted white to reduce heat gain.
- Due to time and cost reasons, the construction of a porch had to be cancelled, which caused beneficiaries to complain, particularly in relation to reduced privacy.

Observations

Prefabricated caravan units have been used in other camps, but have been found to be expensive solutions due to high transport and production costs.

Situation before the Crisis;

The majority of Syrian refugees lived in urban settings in Syria, particularly in areas such as Daraa City and Homs, with a range of different income levels and housing standards.

Crisis Began

Flows of refugees from Syria to other countries began to increase in late 2011. Azraq was chosen as the site for a new camp as it was owned by the state and had previously been developed as a camp for Iraqi refugees in the 1990s (though it was never inhabited). The site was already linked by road to the towns of Azraq and Zara and had previously undergone some drainage work.

Following is an example of contractors produced and erected the shelters according to specifications developed by the main organisation. (Fig.4)



Fig. 4: Photo: Werner Schulenburg/UNHCR

Source: UNHABITAT, IFRC, UNHCR, Shelter Projects 2013-14 Available from: www.ShelterCaseStudies.org

Shelter Strategy

- The finalized shelter strategic guidelines were endorsed in September 2013 (updated a year later). A brief summary of the two main strategic objectives is as follows:
- Settlement: Enable refugee communities to access settlements, which provide access to services, transportation and economic opportunities.
- Shelter: Increase the availability of adequate shelter solutions.
- With the majority of refugees (80%), finding shelter in urban settings, mostly by renting, there has been considerable strain on the affordable housing market, affecting housing costs for both refugees and for vulnerable Jordanians.
- This has led the government to pursue a policy of developing camps, particularly to provide shelter for those who are priced out of the rental market.

Disaster Risk Reduction (DRR)

The T-shelters provide protection against the strong winds, dust, and extreme changes in climate.

The site itself has some steep slopes and is in a seismic risk area. The T-shelter mitigates against structural weakness by anchoring it to the ground with long re-bar bolts connected to each vertical frame pole.

Design, Production and Construction

- The development of steel-frame T-shelters was in part a reaction to issues with the prefab ‘caravans’ used in Zataari camp. Problems with the caravans included:
 - Sandwich-panel manufacture required specialist machinery, making caravans costly and limiting the number of producers.
 - Slow production rates meant that it was difficult to scale-up.
 - There were environmental issues surrounding disposal.
 - Caravans were costly to transport, requiring a crane for loading/unloading, and placing heavy stress on roads from large trucks.

6. Conclusions & Recommendations

- One of the issues that triggers some reflection is that in every single shelter response, there is a need and obligation to involve and strengthen local capacities to enable sustainable solutions and proper housing reconstruction for the affected population. Moreover, we need to emphasize the importance of putting

survivors of these crises at the centre of the sheltering process, supporting their role in re-building their own dwellings and the training and awareness raising of local builders in safe building design and construction.

- Another key lesson, clearly reflected in the Colombia 2011 Floods response, is that since settlements provide the context for any shelter intervention, the focus on the provision of shelter “products” alone is too limited. Instead, a larger settlement response is required - without immediate strategic planning covering many areas (land use, tenure, livelihoods, essential services, housing reconstruction, etc.) shelter response plans will always be limited in impact and at risk of failure due to the lack of integration with these other critical issues.
- Strategic address is shifting from humanitarian assistance, characterized by direct action to support Internally Displaced Person (IDPs) and refugees as outlined in the case studies, to a resilience-based approach, supporting local and national capacities to absorb refugees and strengthen livelihoods of refugees and host communities.
- The initiative in Jordan to encourage private investors to build affordable rental housing for refugees and host populations on low incomes through enabling investment guarantees through private banks.

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