

Post-disaster shelter: A studio-based response to emergency shelter in natural disaster zones.

Nina Hamilton

Uganda Martyrs University, Nkozi, Uganda

ABSTRACT: Through considerations of participatory design and planning processes, innovation in teaching and practice, and turning ideas into actions, we can seek to ameliorate some of the problems facing post-disaster shelter, thus creating socially, culturally, economically and environmentally sustainable design responses. Such processes and outcomes were explored in a seven-week design studio run as part of the Bachelor of Environmental Design program at Uganda Martyrs University.

The studio addressed the myriad issues facing humanitarian design responses, and their application to the design and development of post-disaster shelter in natural disaster zones around the world. In groups of four or five, students were asked to develop the design of a post-disaster shelter prototype that was culturally and contextually appropriate to a given site and the consequences of the specific natural disaster. In addition, students were encouraged to develop solutions that were sustainable, and easily transportable and buildable. Further, teams were asked to consider the possibility of the shelter becoming permanent. Therefore, they had to consider the response in a wider social and community setting, and how to accommodate the extended and growing family unit. Four sites, and corresponding natural disasters, were identified for research. These were: Japan (earthquake/tsunami), Banda Aceh (tsunami), Haiti (earthquake) and Bangladesh (annual flooding).

Conference Theme: Sustainable Education.

Keywords: Post-disaster design, education, sustainable design, natural disaster, shelter.

INTRODUCTION

Natural disasters can strike at any time. They occur when an extreme hydrological, geological, or meteorological event exceeds the ability of a community to cope with that event (Lindell & Prater 2003). Alexander (1991) defines a natural disaster as the relationship between the impacts of extreme geophysical events to patterns of human vulnerability. When disaster does strike, the need for shelter is immediate and urgent, as human vulnerability is at its greatest. Providing temporary, or transitional, shelter for families is a key priority. Natural disasters are often emergencies of great magnitude that overwhelm existing resources, resulting in a call for outside help. Humanitarian agencies, including the United Nations (UN) and Red Cross, are often the first to respond to situations by mobilising aid, such as food, water and basic shelter.

Jha *et al.* (2010, 7) explain that following a disaster, the reconstruction of housing and communities is a continuous process; it begins immediately after the disaster and can often last for years. Davis (1978) and Collins, Corsellis & Vitale (2010) concur, suggesting that post-disaster shelter is a *process* rather than an *object* or *product*. In the English language, however, 'shelter' has many definitions, or meanings. As a verb, *to shelter* is defined as an action, such as protection. As a noun, though, shelter describes an object, such as a tent. Therefore, shelter can be both a process and an object.

This paper will focus on the process and outcomes of a seven-week design studio run as part of the Bachelor of Environmental Design program at Uganda Martyrs University (UMU). The studio asked students to explore the myriad issues facing humanitarian design responses (including, but not limited to, response to place, identity, social ideologies, existing built form), and their application to the design and development of temporary post-disaster, or transitional, shelter in natural disaster zones around the world. In particular, the studio considered ethno-cultural and socio-cultural issues, relating to the sites and disasters given to each team. There was also a focus on sustainable and contextual design.

1. BEFORE OR AFTER: WHEN SHOULD POST-DISASTER SHELTERS BE DESIGNED?

In all humanitarian crises, design response, and building strategies and policies must be economically, socially, culturally and environmentally sustainable. To what extent, though, do these designs respond to the ethno-cultural and socio-cultural aspects of the places for which they are designed, particularly if the shelter becomes a

permanent home? The simple tent, which is the most common shelter type, often neglects to consider these important aspects. Green (1996) argues that both disaster response and research does not adequately focus on the ethnocultural and socio-cultural issues of place. From a psychological point of view, she indicates that it is problematic and difficult to successfully determine successful shelter outcomes given context-specific issues such as cultural vulnerability to trauma, previous exposure to trauma, and differing social and personal resources for coping. These issues can directly affect design outcomes.

Some places and people are more vulnerable to natural hazards than others – particularly those in developing nations. Abramovitz (2001, 23) explains that there are

... growing concentrations of people and infrastructure in vulnerable areas like coasts, floodplains, and unstable slopes mean that more people and economic activities are in harm's way. While poor countries are more vulnerable, in every nation some people and communities— notably the very poor, women, and ethnic minorities—are especially hard hit during and after disasters. For poorer countries and poorer people, disasters can take a disproportionately large share of income and resources.

In response to this, Abramovitz (2001) points out that post-disaster reconstruction can cost seven times as much as disaster risk reduction interventions. Therefore, steps should be taken to consider design responses in disaster-prone areas *prior* to the disaster. Flores (2009, 1) supports Abramovitz, suggesting that responding *after* a disaster is not enough: "It is imperative to tackle vulnerabilities and build resilience within families, communities and settlements if we want to see a different outcome to disasters." She further reveals that some Habitat for Humanity organisations, especially those located in disaster-prone areas "have developed innovative approaches that provide more comprehensive and meaningful assistance – before and after disasters – to the families and communities we serve." (ibid). As it is, though, post-disaster shelters are predominantly considered after the fact.

1.1. Architectural Responses to Post-Disaster Shelter

The studio was initially conceived from the growing number of solutions from architects, designers and students which explore humanitarian design for people displaced by a natural disaster or other emergencies; specifically in reaction to the favourably praised, yet often contentious, 'high design' that architects often over-invest in. Competitions, architectural firms and design-build workshops are exploring, proposing and producing shelter prototypes for disaster relief efforts. Kate Stohr, from Architecture for Humanity, explains, "you can't design for disaster after the fact. Unless it's strategically thought about in advance of disaster, these ideas don't work." (in Alter, 2007). Taking into consideration the views and approaches of Davis (1978), Abramovitz (2001), Stohr (in Alter, 2007), Flores (2009) and Collins, Corsellis & Vitale (2010), the studio was developed to address the design of a socially and contextually responsive post-disaster shelter prototype, which could be easily transported and constructed in the allocated contexts. A shelter that is conceived prior to the disaster: shelter as a process rather than a product.

Prior to undertaking the studio, students' exposure to and knowledge of the issues surrounding post-disaster shelter was very limited, as was their familiarity with the context and culture of the sites. As such, a number of speculative and prototype examples of such shelters were provided to the students at the commencement of the studio, to allow them to think broadly and critically about how to respond to the briefs given to each group. Architecture for Humanity's *Design Like You Give a Damn* (2006) has become a seminal text, which comprehensively illustrates contemporary humanitarian design solutions that are both sustainable and socio-culturally aware. The book also had strong examples of presentation poster graphics, which many of the students lack strength in. Additionally, UNHabitat's *Shelter Projects 2009* (2010) clearly explains the type of construction, and identifies strengths and weakness of the responses to specific disasters. These publications became key reference sources in the studio, particularly for understanding nuances of responding appropriately and sensitively to context and place. Students were similarly directed to websites such as Shelter Centre (which provided many publications on low-tech construction details), Architecture San Frontier, Emergency Architects and Architects Without Frontiers Australia.

Contentious and unbuilt examples were also provided. Vellinga (2005) stresses that despite good intentions, successful outcomes in terms of the cross-cultural transfer of approaches are not always guaranteed. This is illustrated in Sean Godsell's 'high design' prototype for emergency housing, 'Future Shack' (2001). Despite being referred to as a 'friendly object' (Helsel, 2001) and providing shelter for a variety of circumstances – post flood, fire, earthquake, typhoon or similar natural disasters; temporary housing; third world housing; remote housing (Helsel, 2001) – the 'shack' does not consider ethno-cultural and socio-cultural issues. The interior has beautiful and simple plywood detailing, but such detail is superfluous and expensive in terms of emergency shelter. Furthermore, the cost of shipping containers has significantly increased in many developing nations in recent years, so such proposals are no longer cost-effective.

Andrew Maynard Architects' speculative AirDrop House (2010) is a provocative response to the 2010 floods in Pakistan, and received special mention in the 2010 AA Prize for Unbuilt Work. The tongue-in-cheek house addresses the problem of initial emergency shelter in flood-stricken areas that can potentially become permanent housing, with the Jury exclaiming that the design "simultaneously provides water clean up, shelter and food production in a convenient, military infrastructure-friendly package. The humour supports a serious provocation about how architects can and should respond to problems emerging due to climate change, in terms of both emergency relief and the longer-term implications for affected communities." (AMA, 2010). While Maynard's proposal challenged accepted notions of post-disaster shelter, in an innovative and fun manner, students chose to develop 'real' responses to the studio brief.

2. STUDIO-BASED RESPONSE

2.1 Studio Overview

The seven-week studio addressed the design of a post-disaster shelter prototype (often referred to as 'quick-fix' design) that was culturally and contextually appropriate to a given site. Additionally, teams were asked to consider the possibility of the shelter becoming permanent. Consequently, they had to consider the response in a wider social and community setting, and how to accommodate the extended and growing family unit.

Osasona (2011, 68) suggests the "traditional building form, in any culture, should be the starting point in the quest for socio-culturally appropriate, popular building culture", while Rapaport (2005, 78) broadly defines cultural anthropology and ethnography as "the way of life of groups, cognitive and symbolic anthropology, the symbolic role of culture, and ecological anthropology, the 'economic' role of culture". Furthermore, Lawrence & Low (1990) note that dwelling form, metaphors for social and symbolic relationships, and construction methods are important aspects of cultural and social anthropology in relation of the built environment. Therefore, it was important that initial research focused on existing strategies for the sites and communities chosen for the design. These included building forms, circulation, privacy gradients, climatic design, dwelling patterns of various income groups, gender and hierarchy implications, religious practices, basic structural systems, the organisation of outdoor spaces, service provision and, where appropriate, community involvement.

While Abramovitz (2001) identifies that the most vulnerable communities at risk of natural disasters are minority groups and the poor, the beginning of the studio coincided with the Tohoku Great Earthquake and tsunami in Japan, in April 2011. The studio, therefore, sought to demonstrate to students that any community is at risk of a natural disaster. Other sites were chosen based on scale, type and significance of disaster, and accessibility and ease of information collection. Sites and their disasters were:

- Japan [Miyagi Prefecture] – earthquake/tsunami;
- Indonesia [Banda Aceh] – tsunami;
- Haiti – earthquake; and
- Bangladesh – annual flooding.

The objectives of the studio were to: understand theoretical and practical issues behind the provision and design of post-disaster emergency shelter; understand the cultural issues associated with designing in various cultures, countries and socio-economic situations; understand the long-term development issues associated with humanitarian assistance; make basic judgments in relation to the design and development of small-scale shelters in a disaster zone; and demonstrate an appreciation of the socio-cultural, political and environmental issues relating to the chosen sites.

Guy & Farmer (2001) developed the six competing logics of architecture, one of which, *Eco-cultural Logic*, was adapted as a means of understanding sustainability in a cultural context. The approach identifies vernacular, typological and low-tech approaches and aesthetics, and stresses the concept of place and identity by means of "learning to 'dwell' through the buildings adapted to local and bioregional physical and cultural characteristics" (Guy & Farmer, 2001, 141). Frampton (1985), too, recognises the importance of sustaining cultural authenticity through built form. Further, Guy and Farmer (2001, 144) highlight the necessity of preserving a diversity of existing cultures, and the notion that "truly sustainable buildings need to more fully relate to the concept of locality and place". Taking this into consideration, teams were encouraged to explore strategies and techniques that reduced overall construction costs and that used innovative methods of design, fabrication and construction, that enable portability and quick construction. Emphasis was also placed on developing a design that responded to the local environment and culture with the application of 'passive' design principles, selecting building materials suitable for the construction, and developing construction details. The use of predominantly indigenous materials, familiar to those affected, could potentially contribute to the local and regional economies. The Office of the United Nations Disaster Relief Co-ordinator (1982) suggests that salvageable materials are often overlooked in the construction of shelters. Some teams considered the salvage and recycling of materials as part of their approach to local construction techniques and sustainability.

2.2 Studio Outcomes

The studio was run as a series of lectures, and research and learning-by-making workshops. Students were expected to engage fully in the exploration – both intellectual and in crafting (testing ideas through models) – of culturally appropriate design responses surrounding humanitarian and natural disasters issues. It was expected that students kept individual research/design journals for the period of the studio, thus sharing information. Unfortunately, many students chose not to do this, preferring, instead, to approach the studio from a practical perspective, and use models. There was a focus on the use of models as a primary means of exploring strategies and techniques that reduce overall construction costs and that use innovative methods of design, fabrication and construction. Student feedback was positive in terms of the skills and competency of model making they developed as a result. One student commented: "The fact that physical models were emphasised was a plus to the project. I have discovered the beauty of physical models and it is a skill I hope to carry through my architectural education." Models were produced and tested at 1:20, with additional details (joints/fixings etc) at a scale deemed appropriate by each team. However, without the research and theory behind the ideas, some of the proposals were not as strong as they might have been.

There was a direct correlation between the outcomes of the first research task and the end result. Those teams who intensively engaged in research from the onset developed much stronger responses, as the design process and model testing was more thorough due to a significantly increased understanding of the problem posed. They were able to discern what was required of them to meet the objectives of the studio, and extend beyond what was asked of them. Students embraced the challenges presented in the studio with enthusiasm and three of the four design outcomes were intelligent and sensitive, and considered most, if not all, the problems set. Many had an interest in the broader area of humanitarian design, but had not undertaken such a design problem. The students learned that often, simple solutions were most effective.

2.3 Restrictions

As with many 'studios across borders', there were a number of restrictions encountered in the running of the studio. Understanding the restrictions that faced the students at UMU and developing the studio accordingly was, therefore, important. First, funding and resource restrictions meant that research was undertaken through literature reviews, as opposed to site visits and 'real' experiences, which some institutions deem important. Model making materials were limited and students had to 'make do' with what was available. The reinterpretation of available materials into 'other' materials suitable to the design was often well done, and sometimes witty.

Second, time restrictions on both allocated studio time (seven weeks) and the development of the brief had implications on the way in which the studio was run. The brief was developed over a two-week period prior to the studio's commencement. As such, sections of the brief and assessment tasks evolved as the studio progressed. Limited studio time required students to work diligently and consistently, both during and outside allocated studio time. However, working patterns of students at UMU are often erratic, and this resulted in one group failing to fulfill all the requirements of the studio. This was also due, in part, to incompatibility of personalities within the team.

Finally, as noted by Vellinga (2005), successful outcomes in terms of the cross-cultural transfer of approaches are not always guaranteed. Therefore, expectations were appropriated to the understanding that students' exposure to and knowledge of the issues surrounding post-disaster shelter was very limited prior to the commencement of the studio. Consequently, the aims and objectives of the studio took these into considerations. Therefore, grading focused on the research and design process and subsequent outcomes, as opposed to judging against existing proposals.

CONCLUSION

Through considerations of participatory design and planning processes, innovation in teaching and practice, and turning ideas into actions, we can seek to ameliorate some of the problems facing post-disaster shelter, thus creating socially, culturally, economically and environmentally sustainable design responses. Despite the restrictions encountered and the complexity of the design brief, students were generally able to grasp critical concepts and translate them into practical, credible and intelligent design strategies. Students developed a mature awareness and innovative approach to humanitarian design issues, as well a greater appreciation of human needs and social responsiveness to design problems. Most importantly, though, is that students understood the importance of culturally and contextually sensitive and sustainable design/architecture.

REFERENCES

- Abramovitz, J. (2001). Unnatural Disasters, Worldwatch Institute (paper 158).
- Alexander, D. (1991). Natural Disasters: A Framework for Research and Teaching, *Disasters*, Vol. 15 (3), pp. 209-226.
- Alter, L. (2007). Gimme Shelter: Designing for Disaster, Treehugger. Retrieved from <http://www.treehugger.com/sustainable-product-design/gimme-shelter-designing-for-disaster.html>
- Andrew Maynard Architects (2010). Airdrop house: an AMA fiction. Retrieved from http://www.maynardarchitects.com/Site/houses_1/Pages/Airdrop_House.html
- Architects Without Frontiers Australia (2012). Retrieved from www.architectswithoutfrontiers.com.au/
- Architecture for Humanity (ed) (2006). *Design Like you Give a Damn: Architectural Responses to Humanitarian Crises*, Metropolis Books: New York.
- Architecture Sans Frontiers (2012). Retrieved from www.asfint.org/
- Collins, S., Corsellis, T. & Vitale, A. (2010). Case Study No. 5: Transitional Shelter: understanding shelter from the emergency through reconstruction and beyond, ALNAP Innovations. Retrieved from <http://www.alnap.or/pool/files/innovationcasestudyno5-shelter.pdf>
- Corsellis, T. and Vitale, A. (eds) (2005). *Transitional Settlement: Displaced Populations*, Oxfam Publishing, Oxford. Retrieved from <http://www.sheltercentre.org/library/transitional+settlement+displaced+populations>
- Davis, I. (1978). *Shelter After Disaster*, Oxford, Oxford Polytechnic Press.
- Emergency Architects (2012). Retrieved from www.emergencyarchitects.org.au/

- Flores, M. (2009). Expanding Disaster Response: New methodologies and programs address the same urgent mission, *Habitat for Humanity: The Forum*, Vol. 16 (2), pp. 1-2.
- Frampton, K. (1997). *Modern Architecture: A Critical History*, 3rd edn, Thames and Hudson: London.
- Green, B. (1996). Cross-national and ethnocultural issues in disaster research, in: Marsella, Anthony J., Friedman, Matthew J., Gerrity, Ellen T., & Scurfield, Raymond M. *Ethnocultural Aspects of Posttraumatic Stress Disorder: Issues, research, and clinical applications*, American Psychological Association: Washington, pp. 341-361.
- Guy, S. & Farmer, G. (2001). Reinterpreting Sustainable Architecture: The Place of Technology, *Journal of Architectural Education*, Vol. 54 (3), pp. 140-148.
- Helsel, S. (2001). Future Shack, *Architecture Australia*, Vol. 89 (5), Retrieved from <https://www.architecturemedia.com/aa/aaissue.php?issueid=200109&article=11&typeon=2>
- IASC Emergency Shelter Cluster (2008) Shelter Projects 2008. UN-HABITAT, UNHCR & IFRC. Retrieved from http://www.sheltercentre.org/sites/default/files/IASC_shelter_projects_2008.pdf
- Jha, A. K., Barenstein, J., Phelps, P. M., Pittet, D. & Sena, S. (2010). Chapter 1: Early Recovery: The context for housing and community reconstruction. In: *Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disasters*, The International Bank for Reconstruction and Development/The World Bank: Washington, pp. 7-21.
- Lawrence, J. & Low, S. (1990). The Built Environment and Spatial Form, *Annual Review of Anthropology*, Vol. 19, pp. 453-505.
- Lindell, M. & Prater, C. (2003). Assessing Community Impacts of Natural Disasters, *Natural Hazards Review*, Vol. 4 (4), pp. 176-184.
- Novick, L. F. (2005). Epidemiologic Approaches to Disasters: Reducing Our Vulnerability, *American Journal of Epidemiology*, Vol. 162 (1). Retrieved from: <http://aje.oxfordjournals.org/>
- Office of the United Nations Disaster Relief Co-ordinator (1982). *Shelter After Disaster: Guideline for Assistance*, United Nations: New York.
- Osasona, C. (2011). Traditional Building Form and Techniques in Africa, in Mare, E. C. and Lindegger, M. (eds) *Designing Ecological Habitats: Creating a sense of place*, Permanent Publications: Hampshire, pp. 62-68.
- Oxfam International, (2005). A place to stay, a place to live: Challenges in providing shelter in India, Indonesia, and Sri Lanka after the tsunami, Oxfam Briefing Note.
- Rapoport, A. (2005). *Culture, Architecture and Design*, Locke Science: Chicago.
- Shelter Centre (2012). Retrieved from <http://sheltercentre.org/library/>
- UNHabitat (2010). *Shelter Projects 2009*, UNHabitat: Nairobi.
- Vellinga, M. (2005). Anthropology and the Challenges of Sustainable Architecture, *Anthropology Today*, Vol. 21 (3), pp. 3-7.

Post-disaster shelter: A studio-based response to emergency shelter in natural disaster zones. In Sustainable futures: Architecture and urbanism in the global south, Kampala, Uganda . 27-30 June 2012. Mobile and flexible architecture: Solutions for shelter and rebuilding in post-flood disaster situations. In blue in architecture 09_proceedings_IUAV digital library . Lizarralde, G., & Bouraoui, D. (2012). User's participation and satisfaction in post-disaster reconstruction. In G. Lizarralde, R. Jigyasu, R. Vasavada, S. Havelka & J. Duyn Barenstein (Eds.), Participatory design and appropriate technology for disaster reconstruction. Conference proceedings. Emergency shelters pose a particularly tricky challenge for designers and architects, as a successful model needs to take into consideration such concerns as delivery, speed of construction, durability, and cost. The following disaster shelters range from concept renders to real units that people are living in right now. They also vary between a very simple and basic hut, to more sophisticated designs that boast solar power and rainwater collection. Each one has the same aim though; to save lives with good design. Preparedness is an important part of disaster response. Learn about what roles exist for volunteers and how to get involved. Preparedness is an important part of disaster response, particularly with so many people working in different capacities in a crisis setting. In the wake of a natural disaster, a variety of responders volunteer to provide physical and emotional relief to the affected population. In 2018, the American Red Cross activated more than 14,000 workers (90 percent volunteers) to respond to major disasters. But for those who haven't served in a disaster response capacity, knowing which organizations to connect with, what capacity to serve in, and how to prepare to enter disaster sites can be overwhelming. Emergency Shelter, Post Disaster Reconstruction, Post Disaster Recovery, Post-Disaster Shelter & Reconstruction. Post-disaster periods are usually divided into four phases based on specific time intervals following an event, which have been assigned a variety of different names. The name established by the UNDP ("relief", "early recovery", "recovery" and "development") have been used in this paper. Turkish Government built post-disaster houses in Dinar and its villages instead of survivors' destroyed houses. After eight years passing through this earthquake, they have been still living in these post-disaster houses. They have noteworthy experiences living in a post-disaster house, and try to adapt themselves into the new social and physical environment. Instant emergency shelter. Posted by Agim Meta on Tuesday, October 8, 2019 · Leave a Comment. Share Tweet Google Pinterest LinkedIn Mail. The idea was to design a shelter that will be built in phases so that it can satisfy the need for instant emergency shelter and grow up with time to provide a temporary habitat for a society. I chose bamboo as a primary material for partition and shell which is easily available in Southeast Asia. The construction techniques used to create the panels were vernacular, so the victims can contribute to the construction, which will not only reduce the cost of con