# RELIEF FOR THE CURRICULUM:

ARCHITECTURE EDUCATION AND DISASTER RECOVERY

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In a world with an increasing frequency and impact of natural disasters, architects play an important role in post-disaster recovery and development. While schools of architecture can potentially increase students' exposure to this field, it is unusual to find relief, reconstruction and risk assessment in the main curriculum. Nevertheless, architecture students have been leaders in international organisations and have been influential in helping affected communities. More recently, graduate programmes and related specialisations have been developed. Most of these student-led groups have designed and built innovative solutions, showing that there is an interest and a necessity that is not widely covered in the traditional curriculum. Because of the increasing occurrence of natural disasters in the past decades, and the need to raise awareness amongst professionals about planning for disasters and shaping a better future for disaster-prone areas, it is critical that architects take heed of disaster relief and development.[1,2]

## LACK OF HOUSING AND THE ROLE OF ARCHITECTS

When disaster strikes, one of the most pressing issues is to house people who, as a result, have been displaced. Shelter is necessary to provide security, personal safety, protection from the ever-changing climatic conditions, disease outbreaks, as well as to support human dignity.[3]

Earthquakes, storms and floods are considered great disasters because they cause extensive damage in terms of economic loss and people affected. The frequencies of floods and storms have increased in the last five decades, with a commensurate increase in the exposure of vulnerable populations to disasters.[4] Some researchers suggest that the increase is due to three reasons: a rising frequency of natural phenomena, including global warming, climate change and destruction of the ecological balance; an increase in world's population living in vulnerable areas; and an increased tendency to use lower-cost design and materials.[5]

Increasing frequencies of natural disasters between 2005 and 2010 meant that approximately twenty-million people became homeless during that period, resulting in the need for roughly five-million houses.[6] Unfortunately, post-disaster reconstruction often results in houses that are informally built without responding to building codes or seeking expert advice and supervision, and thus increasing the exposure to future disasters.[7] Non-Governmental Organisations (NGOs), relief agencies and experts in this field have pointed out that there is a lack of professionals with local expertise, and a lack of capacity to control or supervise the whole process.[8,9]

The most common approach to sheltering people after a disaster comprises three phases: emergency shelter, temporary accommodation, and permanent housing. In each of these phases, architects can apply their design skills and can help with rebuilding devastated communities. Nevertheless, many transitional and permanent solutions have been criticised for transplanting foreign architecture without engaging with the affected population, and without considering the characteristics of place, including those related to culture, climate, and landscape.[10] Examples from the past, including the Oxfam Polyurethane Emergency House (Fig. 1), the West German Red Cross polyurethane igloo, and more recently metal shelters in Batticaloa (Fig. 2), have been unsuccessful solutions for the affected communities as they were not suited to the local contexts. Fixed and imported designs are often inadequate solutions in the contexts where they have been implemented, especially as they have increased the danger of foreign aid dependence, therefore impeding local economic growth and confidence.[11]

In the last decade, more than two-hundred million people have been affected by natural disasters and hazards, such as the Indian Ocean Tsunami in 2004, the Hurricane Katrina in 2005, the Haiti Earthquake in 2010, the Great East Japan Earthquake in 2011, and the Hurricane Sandy in 2012.[12] After these disasters, questions have arisen about the role and responsibility of architects in these events.[13] It is critical to understand that the process of reconstruction is more complex than merely building structures, because it involves a multidisciplinary approach with the objective of not only restoring habitat, but also reducing future risks on the entire community. This means giving affected people adequate solutions for both their immediate and long-term needs.

Over the past century, architects and engineers have shown interest in designing solutions for disaster situations—whether natural and human-made. Renowned figures such as Buckminster Fuller, Alvar Aalto, Jean Prouve, and more recently Shigeru Ban have developed post-disaster temporary shelters. There are also good examples of international initiatives, student and faculty groups and graduate programmes that are rethinking ways of responding to disasters using a wider perspective. Although these examples are peripheral to most main curricula, they have had an incremental influence in the field and have fostered innovative teaching methods.

## GLOBAL INITIATIVES: INTERNATIONAL NETWORKS

On a worldwide scale, some interest groups with the aims of contributing to post-disaster architectural knowledge have been created in the past decades. Some examples are Architecture Sans Frontières (ASF) International, Architecture for Humanity (AFH), and Article 25.

ASF International is a non-profit organisation founded in 1979 with twenty-three current member organisations in different countries. More recently founded in 1999, AFH is a non-profit design services firm with fifty-five current active chapters. Both organisations work as networks of architects, designers and building professionals that are concerned with designing an equitable and sustainable building environment for post-emergency relief. Most recent of the three mentioned is Article 25, a UK charity founded in 2008, which centres on giving better quality shelters and bringing architects, engineers and builders to the field.

These global initiatives have shown an increasing interest in connecting built environment professionals with disaster relief and disaster risk reduction. By bringing good design to places that rarely have access to it, they also facilitate the collaboration between specialists and NGOs, which is crucial in the highly complex situation of a disaster.

Fig. 1 (title page). Oxfam Polyurethane Emergency House-Making Unit in operation, Turkey, 1975. *Courtesy of Oxfam*

Fig. 2 (above). Transitional shelters in Batticaloa, Sri Lanka, 2004. *Courtesy of Agostino Pacciani*

**RESEARCH / ACADEMIC GROUPS**

Initiatives launched initially by students and academics in different universities worldwide have had a substantial impact on designing and researching for post-disaster reconstruction. They each have a different focus: some groups are interested in collaboration, others in generating innovative prototypes and ideas, while others are centred on involving the community in a participatory process of building and designing. For example, shelterproject.org, an initiative founded by a group of students at the University of Cambridge in the late 1990s for the development of shelter standards in both conflict and natural disaster zones, led to Shelter Centre, an NGO currently based in Geneva. This organisation has created guidelines for post-disaster recovery such as *Transitional Settlement and Reconstruction After Natural Disasters* (2009), in collaboration with United Nations/Office for the Coordination of Humanitarian Affairs (UN/OCHA), and *Transitional Shelter Guidelines* (2012), in collaboration with the International Organization for Migration (IOM). In order to bring together researchers, manufacturers of shelters, donors and NGOs, the organisation provides access to its extensive online library, and organises 'shelter meetings' twice a year.

The Special Interest Group in Urban Settlement (SIGUS), which was established in 1984 at the Massachusetts Institute of Technology (MIT), focuses on service, participation and non-traditional client groups in both developing and developed countries, including post-disaster situations. Its game 'INCREMENTALIZE IT!' highlights the positive implications of incremental housing and promotes the core housing system in developing countries.[14] Although the projects developed in this group have a more academic profile than other initiatives, there is a considerable public interest in its research, evidenced by the massive attendance at a workshop and seminar on the topic that was led by the group in the recent World Urban Forum 2012 organised by UN-Habitat in Naples.

Other examples from the United States include the BaSiC Initiative, Initiative reCOVER and i-Rec. The BaSiC Initiative was founded in 1985 at the University of Washington, and is currently a collaboration of faculty and students from Portland State University and University of Texas at Austin. Although its focus is not limited to disaster relief but also to design and planning to improve local conditions, the initiative has so far developed some post-disaster projects, including the Katrina Recovery Project (2006-2010). In addition, its approach of experiential learning (teaching by design and construction) imparts skills to students through the work experience they have had with real clients and real communities. Since 2007, Initiative reCOVER, which is based in the School of Architecture at the University of Virginia, has focused on research, design and fabrication, and has developed projects such as a factory facility in South Africa, schools in Uganda, and a series of disaster recovery prototypes. With its temporary shelter project called 'Breathe House' (Fig. 3), this initiative has also been recipient of several prize-grants, which have allowed the development of different versions of the prototype.[15,16] In Canada, the web-based international network i-Rec (Information and Research for Reconstruction), which has been based at the University of Montreal since 2002, focuses on the study of reconstruction after disasters and organises an international forum and a student competition every two years. This network aims to generate information exchanges between its members, with the objective of contributing to knowledge, which are related to building in post-disaster situations, particularly in developing countries.

This list is not extensive and certainly more examples can be found in different countries where students and faculties of architecture and design are trying to get involved with disaster relief and development. They differ in their directions, showing that there are multiple approaches to sheltering in post-disaster situations, therefore highlighting the different lessons that can be learned when working for disaster relief and disaster risk reduction.

## ACADEMIC PROGRAMMES

During the last twenty years, graduate programmes specialising in reconstruction and risk prevention have been created in numerous universities. Similar to the initiatives previously discussed, these programmes have different approaches and seek to cover a range of skills, varying from interdisciplinary work in emergencies, to design and urban planning strategies in risk areas.

The School of Architecture at Oxford Brookes University was the pioneer in including disaster recovery as a formal part of their curriculum. The School includes research groups as part of the Oxford Institute for Sustainable Development (OISD) and the Centre for Development and Emergency Practice (CENDEP). Beginning in 1991, it has offered postgraduate studies in the area of post-disaster shelter, humanitarian action, development and emergency practice, with an emphasis on an interdisciplinary approach, bringing together aid workers, academics, professionals and practitioners. In Spain, the Universitat Internacional de Catalunya in Barcelona initiated a new Master of International Cooperation in Sustainable Emergency Architecture in 2009 as part of the Erasmus Mundus European Cooperation programme. Through architecture projects, the Master Programme is aimed at creating strategies of urban planning in developing neighbourhoods by considering energy-saving systems and sustainability criteria that are tied to materials and local culture. In 2011, the École Spéciale des Travaux Publics in Paris launched the Mastère Spécialisé Urgentiste Bâtiment et Infrastructures in collaboration with 'Architectes de l'Urgence' to train international specialists in post-disaster reconstruction. Also in 2011, Harvard's Graduate School of Design (GSD) launched a concentration called 'Anticipatory Spatial Practice', in which students develop the skills to design pre-emptive solutions to disasters. In 2012 this concentration changed to 'Risk and Resilience', a trans-disciplinary post-professional programme.

These programmes try to fill a gap in the architectural training and to raise awareness about the impact of disasters in the built environment. The schools that engage with reconstruction and risk prevention are training future leaders who can have an influence in their future firms or through their roles in society.

## EMBEDDING DISASTER STUDIES AND POST-DISASTER DEVELOPMENT INTO TEACHING

The graduate programmes and initiatives named so far usually run in parallel to main curricula, despite the rapidly increasing global demand for trained architects to work in disaster relief.[17] Therefore, although there are good reasons to argue that it should

Fig. 3. The 'Breathe House' prototype built in Haiti, 2012 by Initiative reCOVER. *Courtesy of Initiative reCOVER*

be part of the mainstream architectural education due to global demand, the inclusion of this topic in curricula is still very limited.

The first reason for including disaster relief into teaching is the current shortage of professional architects in the disaster relief community. A professional architect's knowledge can help to rebuild destroyed communities in a structurally sound way, therefore minimising the damage that future natural disasters might bring. Increased population densities in disaster-prone areas due to urbanisation, when paired with climate change, mean that much more is at stake in the event of a disaster. The potentially higher number of fatalities, (in the event of a disaster) in many increasingly dense areas, makes the demand for professional architects to be involved in disaster relief even more pressing.

Second, the architectural lessons learnt in these contexts are widely applicable to a number of design challenges in both developed and developing countries, and are not necessarily limited to disasters. Although developing countries with low-income populations are usually most vulnerable in the event of a disaster, no country is entirely safe, as the recent devastations in United States and Japan have shown. Therefore, the knowledge acquired in a disaster context can be used to address different design problems, such as lack of resources and land, urgency and speed of construction, prefabrication and use of local materials, transportation and logistics, among others.

Third, according to the Architects Registration Board (ARB) General Criteria and the National Council of Architectural Registration Boards (NCARB), the skills that architecture students should achieve must include the understanding of the relationship between buildings and their environment, and the role of the architect in society.[18,19,20] It follows that since the environment is changing due to diverse factors, an architect should be able to design for these conditions and to take into account social factors when designing in areas that are prone to natural disasters.

Further arguments can be made for 'why' this topic should be embedded in the architecture curriculum, but equally important is 'how'. Rebuilding in post-disaster situations can be an ideal studio project, as any such project will encompass architectural and pedagogical concerns of space, urbanism, landscape, construction, structure, environment and most importantly, community. Most projects will also have to consider the historical implications, as the context before and after a disaster is both unique and temporal. Finally, this topic is also ideal for interdisciplinary collaboration, and can be effectively developed across departments such as architecture, engineering, urban planning, sociology and health studies, among others.

## CONCLUSION

As discussed earlier, there is currently a small number of architecture schools in the world that include design for disaster response, disaster management, disaster risk-reduction and development in their curricula. Previous examples have highlighted the works that some architects, students and faculty members of architecture schools are already doing in relief and design for disaster preparedness and mitigation. These programmes provide alternatives to a traditional design programme by engaging future architects with design projects that have tangible application in the real world.[21] Nevertheless, with the trend of increasing natural events resulting in potentially large-scale disasters, many more architects are required to know how to respond to these risks. These architects will be working with communities across the globe towards sustainable solutions, rather than producing non-contextual and pre-packaged solutions. The inclusion of this topic to the student curriculum could offer future architects the tools they need to design adequate human settlements, which are resilient to such natural events whilst enhancing their overall academic experience.

**Notes**

1. EM-DAT. The OFDA/CRED International Disaster Database. Centre for Research on the Epidemiology of Disaster CRED. Université Catholique de Louvain, Brussels, Belgium. http://www.emdat.be (accessed on 05 May 2012).
2. Marie Aquilino, *Beyond Shelter. Architecture and Human Dignity* (New York: Metropolis Books, 2011), p.9.
3. UN-OCHA, *Transitional Settlement and Reconstruction After Natural Disasters* (Geneva: Shelter Centre, 2008), p.1.
4. The frequency of storm events has increased approximately 350% since 1960 and flood events by 2,500% in the past fifty years. Although earthquakes have not increased at the same rate, their damage in terms of resources (U$D) in the last twenty years is four times greater than thirty years ago. See http://www.emdat.be (accessed on 05 May 2012).
5. Roxanna McDonald, *Introduction to Natural and Man-made Disasters and Their Effects on Buildings* (Oxford: Architectural Press, 2003), p.2.
6. http://www.emdat.be (accessed on 05 May 2012).
7. Maggie Stephenson's talk in the workshop 'Geospatial Tools and Information Needs in Post-Disaster Recovery', organised by Remote Sensing for Built Environment Disasters and Development (REBUILDD). March 29-30, 2012, Sidney Sussex College, University of Cambridge, U.K.
8. See Jo Da Silva and Victoria Batchelor, 'Indonesia: Understanding Agency Policy in a National Context', in *Building Back Better*, ed. by Michal Lyons and Theo Schilderman (Rugby: Practical Action, 2010), p.146; Alcira Kreimer, Margaret Arnold and Anne Carlin, 'Editor's Note', in *Building Safer Cities: The Future of Disaster Risk* (Washington D.C: The World Bank, 2003), p. xviii; Victoria Harris, 'Introduction', in *Beyond Shelter*, p.15.
9. IRP, UNISDR and UNDP-India, *The Guidance Notes on Recovery: Shelter* (Kobe: UNISDR, 2010), p.101.
10. Da Silva and Batchelor, 'Indonesia...', p.145.
11. Robert Kronenburg, *Houses in Motion: Genesis, History and Developments of the Portable Building* (London: John Wiley and Sons, 2002 [1995]), p. 105.
12. Aquilino, *Beyond Shelter*, p.7.
13. Aquilino, *Beyond Shelter*, p.7.
14. Incremental housing refers to a process in which houses are expanded over time by their owners.
15. Such as the University of Virginia's Jefferson Public Citizens programme (www.virginia.edu/jpc; accessed on 05 May 2012) and the ARCHIVE (Architecture for Health in Vulnerable Environments) competition (http://news.virginia.edu; accessed on 05 May 2012).
16. The group developed a temporary disaster relief shelter, as part of a design studio, and participated in 'Building Back Better' communities in Port au Prince in Haiti (2010-2011).
17. Aquilino, *Beyond Shelter*, p.7.
18. 'Under the Architects Act 1997, the Architects Registration Board (ARB) has the responsibility for prescribing the qualifications and practical experience required for entry onto the UK Register of Architects.' http://www.arb.org.uk (accessed on 10 November 2012).
19. The National Council of Architectural Registration Boards (NCARB) coordinates the Architect Registration Examination (ARE®) which assesses candidates for their knowledge, skills, and ability to provide the various services required in the practice of architecture in the US and Canada (http://www.ncarb.org; accessed on 14 May 2013).
20. Architects Registration Board (ARB), Criteria for the Prescription of Qualifications Parts 1, 2 and 3, 2011. http://www.arb.org.uk/qualifications/arb_criteria/arb_criteria.php (accessed on 10 November 2012).
21. Aquilino, *Beyond Shelter*, p.11.