

WORKING WITH AVAILABLE RESOURCES TO DEVELOP LOCAL KNOWLEDGE TO SUSTAIN DEVELOPMENT DURING CRISES

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This past April 2016 the coast of Ecuador suffered a devastating magnitude 7.8 earthquake. The automatic response was to run to the disaster area and help, not knowing that most of the time these unskilled volunteers became another casualty. Months later, government, universities etc. are working nonstop in order to responsibly restore the area. None the less, are we being efficient in order to prevent the possible effects of disasters to come? Almost 70% of Latin America is built on informality, and almost 80% of the destroyed and demolished infrastructure was due the lack of technical support. As professionals and academics, are we acting where it is necessary? A crisis creates opportunities, and knowing that most of Ecuador is in constant danger because of probable natural disasters, acting local may be more effective and can have a long lasting effect, rather than focus all the resources and effort in the disaster areas. These two academic case studies, one which took place just a couple of days after the earthquake which required immediate attention and the other several months later which required a local analysis, value the endogenous work in order to build a consciousness about our reality as a stronger service than simply rebuilding.

Keywords: Crisis management, Endogenous, Resilience, Habitat III, Informality, Ecuador.

1 INTRODUCTION

In April 2016, the coast of Ecuador suffered a 7.8 magnitude earthquake (IGEPN 2016) that was devastating. “More than 30,000 houses have been affected, and more than 8,000 structures have been demolished.” According to technical evaluations of the Army Corps of Engineers, 70% of the infrastructure in Pedernales has to be demolished because it shows serious damage to its façade, interior areas and its physical stability is compromised (Actualidad 2016). 70% of real estate in the area was destroyed. There are buildings standing, but the internal collapse forces them down (Ortega 2016). Most of those edifications were built with none or misleading technical support. Nevertheless, almost 70% of Latin America is built on informality, as well, in Ecuador “70% of the construction sector is built informally and 3,000,000 houses are poorly built,” (Inmediato 2011). Are we as architecture and engineering professionals and educators teaching and acting where it is necessary?

This paper based on two case studies, suggests an active and continuous training method within the academia in order to be ready for future natural disasters, knowing that Ecuador, and the Andes area as a whole are very susceptible for earthquakes and other adversities. First we will show the Ecuadorian and Latin American reality where probable natural disasters occur, then

will analyze a probable energy crisis environment where acting endogenously (local) might be a way to go. Finally, we will describe two case studies in order to illustrate how thinking and acting locally is an effective tool in order to be ready.

Within Latin America, Ecuador, because of its geographical condition lives in seismic danger. “Ecuador has a history of large subduction zone related earthquakes. Seven magnitude, seven or greater, earthquakes have occurred within 250 km of the April event since 1900. On May 14th, 1942, a 7.8 magnitude earthquake occurred 43 km south of the April 16th, 2016 event. On January 31st, 1906 an 8.3 magnitude earthquake (reportedly as large as 8.8 magnitude in some sources) nucleated on the subduction zone interface 90 km to the northeast of the April 2016 event, and ruptured over a length of approximately 400-500 km, resulting in a damaging tsunami that caused in the region of 500-1,500 fatalities. The April 2016 earthquake is at the southern end of the approximate rupture area of the 1906 event. A shallow, upper crustal 7.2 magnitude earthquake 240 km east of the April 2016 event on March 6th, 1987 resulted in approximately 1,000 fatalities.” (USGS 2016). See Figure 1.

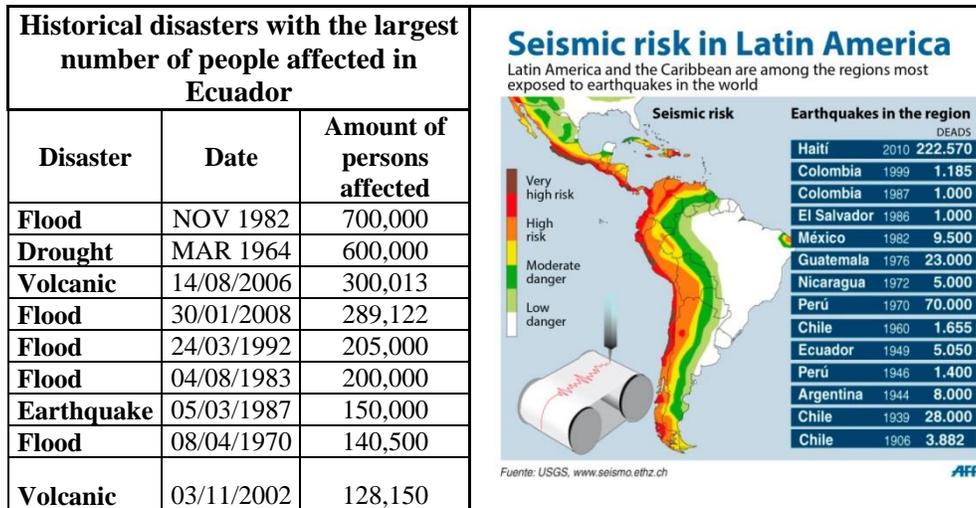


Figure 1. Historical disasters in Ecuador (Flasco *et al.* 2008), Seismic risk in Latin America (Klinker 2010).

Looking beyond natural disasters, what may be a future environment where architectural students and engineering students will build in? Energy crisis and decreased oil production, “as natural resources become harder to obtain, capital is diverted to extracting more of them. This leaves less capital for investment in industrial output. The result is industrial decline, which forces declines in the service and agricultural sectors. About the year 2030, population peaks and begins to decrease as the death rate is driven upward by lack of food and health services.” (D.H. Meadows 2004). Ideally we should not see this as a catastrophic future but an opportunity. “Heinberg shows how oil peak, peak water, peak food, etc. lead not only to the end of growth, and also to the beginning of a new era of progress without growth,” (Heinberg 2012), acting endogenously may be a way to think, act and react in order to face these probable environments. “Endogenous development: a development by and for local communities, focused on building a community of interest in production and consumption, where economic exchanges are ‘embedded’ in proximity social relations,” (Dissau 2014).

During the last Habitat 3 held in Quito, Ecuador, one of the main topics was the concept of “resilient cities”, “resilience refers to the ability of human settlements to withstand and to recover quickly from any plausible hazards. Resilience against crises not only refers to reducing risks and damage from disasters (i.e. loss of lives and assets), but also the ability to quickly bounce back to a stable state” (UNHabitat 2012) the idea of being resilient for us to be responsive and coherent to our specific realities in order to know how to plan and react articulately.

Most of the institutions, government and universities are working at the disaster zone by rebuilding, at local governments; proposals are also being received from specialists from several universities for reconstruction, such as *Católica de Guayaquil*, *SEK*, *Uleam de Manabí*. (Veintimilla 2016). The Ministry of Urban Development and Housing, within the plan “Rebuild Ecuador”, signed an inter institutional agreement with the Technical University of Manabí and *Laica de Manabí*, with the objective that teachers and students of the last year courses of Architecture, Civil Engineering, Administration and Social Work to become supervisors of the construction and reconstruction works (PB 2016). All that work is important, but thinking locally brings us to the question: how to make us ready? Our commitment to education and academics leads us to think that by understanding our local environment we will be able to act when it is necessary and for as long as is necessary.

These two case studies show endogenous approaches for two different environments during the post-disaster period where academics were expected to work.

2 CASE STUDY 1 – AMBATO PROACTIVO: RUTAS DE VIDA (PROACTIVE AMBATO: ROUTES OF LIFE)

Four weeks after the earthquake, we were invited to a programmed activity within the architectural school at the Technological Indoamerican University, (UTI for its Spanish acronym) a university located 340 km from the April earthquake area in a city called Ambato. This activity meant an integration day with all the students working to develop a given topic in two days. It was suggested to think about the earthquake in order to put the exercise together. Some possibilities arrived at included everything from designing a probable urban plan to the construction of an emergency house prototype. Although by thinking endogenously the decision of local acting was a guide.

The exercise began with research into the disaster history in Ambato, showing its vulnerability. The 6.8 magnitude 1949 Ambato earthquake killed 5,050 people, eruptions of Tungurahua in activity since 2006 and Cotopaxi volcano in activity since 2016 show constant risks proving the city has a possible disaster to come. Knowing what to do would help students and local citizens to think about their own environment and probable future natural disasters. The idea was very simple, to walk the city and evaluate it: every group of approximately ten students was in charge of a different neighborhood of the city, covering most of the urban area.

- Examine possible escape routes to safe areas: Students walked through their city with an analytical eye. Informing about the safe zones and the best way to get there. Students and citizens could then detect safe areas. See Figure 2.
- What would be a good and a bad construction practice, and a probable solution? The discoveries were interesting, because bad practices were very evident and very easy to solve in most cases. This gives firsthand evidence to the citizens of poor construction habits, why it was a bad practice and how to solve it if possible. See Figure 3.
- Trace previous disasters by recovering stories from people who lived through an event. When asking people about the history of disasters in Ambato and letting them talk about

it, especially the students became aware about the real impact of the earthquake on the construction and families. See Figure 4.

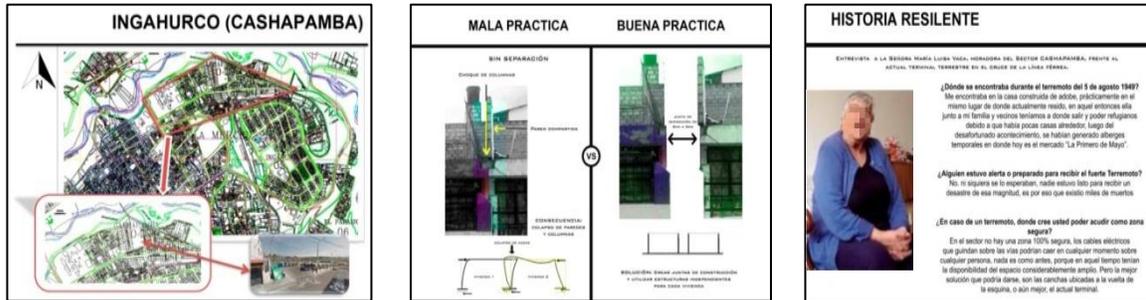


Figure 2. Safe routes, safe areas. Figure 3. Bad practice, solutions. Figure 4. Local testimonies.

The final product of this exercise was a small publication that was meant to be distributed within the city by the university and will be digitally accessible. See Figure 5.



Figure 5. Final product of Proactive Ambato: Routes of life.

By thinking on the local level with the local particularities the impacts from our actions were more effective, rather than being “resilient” and run to the disaster area where students would have had an interesting experience but disconnected from their own reality.

3 CASE STUDY 2 – SANSHAYAKU GREENHOUSE

This case study took place 3 days after the April earthquake. While working with the “*Con lo que hay workshop*”¹, in Quito, the earthquake happened 174 km from the site where our community greenhouse was going to be built was destroyed. See Figure 6.

After completing two months of participatory design and with the plans ready to be built, the tremor and constant rain made the soil unstable. Lots of questions arrived at that time: what should we do about the earthquake? Should we go there and make our best effort for the people that are suffering? Should we design and build an emergency house for the coast? It was very

¹ *Con Lo Que Hay (CLQH)*: “With what is available”, an academic workshop with hands on experience for college students, a pre-professional course. Academic knowledge is applied in a specific community. Working with a real client, an organized community, with a participatory design process to evaluate a real need followed by a consensus based design process and community construction of the infrastructure. With specific resources and problematic in each location and social environment.

important to analyze the problem not from the resilient stand point of resistance but from the endogenous logic. We had our private disaster, with a community that suffered a small but significant adversity in their own territory. Although there was no physical or personal damage, a lot of time was invested in the design process of their greenhouse. See Figure 7.



Figure 6. Project site (Sanshayaku Gully), before and after.



Figure 7. Design process, community work in site before earthquake and work at new site.

Our immediate resilient “hero” response was put in crisis by the endogenous logic, by thinking in our small calamity. The reaction was to relocate the greenhouse site and redesign in order to be accurate to its new location. After the design came the construction process and the workshop finished with the greenhouse built and functioning. See Figure 8. Another pertinent response was the production of a small audiovisual that, from the community and the workshop stand point, helped to create consciousness about the importance of acting and thinking locally: An account of resilience, is a small video that was distributed during Habitat III and also online, it deals with the hard decision making by the community and students about what to do facing our own disaster. See Figure 8.



Figure 8. Project in use and shots from the video “An account of resilience.”

For both the community and the students this was a lesson on how to act, react locally with the specific need from our localities. In both cases acting local had more impact than going to the earthquake area and trying to be a hero.

Just after the earthquake many people went to the area not knowing anything about first responders' aid requirements becoming another casualty. Knowledge of local reality would have helped us to be non-resilient but reflexive. Most of the time people will still make the same mistakes if training is not provided. Other than being ready for non-predictable disasters, the idea of acting local with a coherent time and space analysis will train professionals to act and react facing predictive and non-predictable circumstances. Being ready does not mean being a hero. Being preventive means thinking and acting local.

4 CONCLUSION

Both case studies, each from its own experience, affected the way students understood the resilient concept. In the first case, understanding their own experience and history will help to create consciousness and therefore being ready for a possible local disaster. The Sanshayaku Greenhouse case helped to understand that acting and thinking endogenously lead us to identify local urgent considerations rather than run to the disaster area and try to be heroes.

Being able to react to a specific disaster situation is not a matter of action but a matter of profound reflection and then accurate action. This matter within academy is achieved not only during crisis time but by recognizing real, local problems with possible endogenous logic responses.

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