
FINAL REFLECTION



FLOATING HOUSE, THE PHILIPPINES

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MSc Architecture, Urbanism and Building Sciences, Track: Building Technology

P5 REFLECTION

Graduation Design Studio 2020

Floating House, the Philippines: Recommendations for Improvement of the Building Design by Evaluating the Indoor Environmental Quality of the Pilot Floating House Project in Macabebe, the Philippines

Mentors: Ir. Eric van den Ham, Building Physics
Ir. Pieter Ham, CITG

Examiner: Dr. Hilde Remoy, MBE

Supervisor: Bembong Balgan, Muncipal Counsellor of Macabebe

INCEPTION

Selection of the Field of Research

My personal experiences of flood disasters back home prompted me to think of the living conditions of the low-income group of people affected by the flood. I saw people who lost everything in these floods. Therefore, when I heard about the graduation research topic on the floating house project in the Philippines, it caught my attention. As this project focuses on improvement of living quality of low income group in the disaster prone areas, I found it as an opportunity to learn about the challenges in design and construction and implement what I learn from the research, locally. The pilot floating project in the Philippines is an outcome of the Masters research projects of Ir. Joran van Schaik and my second mentor Ir. Pieter Ham.

Formulation of the Research Topic

The proposed research topic by Pieter Ham had clear objectives and this helped me to formulate the topic for my research. In order to improve the design and construction of the housing type it is important to see how the building performs in real life scenario. Initially the plan was to study the climate and structural behaviour of the pilot building to recommend design improvements. With further study and discussions with my mentors the decision was to narrow down the focus to the indoor environmental quality and thermal comfort performance of the house due to constraints in time. In addition to this, the thesis also has an objective to develop an economical measuring and monitoring system for the parameters necessary to evaluate the thermal comfort performance for a longer period. The thesis thus expects to contribute to Pieter Ham's broader research on the construction of sustainable amphibious buildings in the flood prone areas of South-East Asia.

PROCESS & CHALLENGES

P1 to P2

Not having any prior experience in electronics and programming, I was a bit skeptical of developing the monitoring device, before starting the thesis. Being concerned about the reliability of the device, I decided not to focus on it initially. Instead I planned to find alternative economical solutions for measuring and monitoring the parameters. To commence with, all the research materials and specifications regarding the pilot project were provided by Pieter. It helped me to understand the design and construction principles of the pilot project. Having only basic knowledge in building physics and climate design, Eric's constant guidance and sufficient data from the literature study helped me to perceive the concept of the evaluation of indoor comfort performance, especially adaptive comfort model for a hot and humid region like the Philippines. This understanding was inevitable as it would be the base for the in situ measurement plan, hence the decision was to do the field visit after P2 presentation. As the focus was not on the measuring devices, I did not have a solid measurement plan for P2 presentation. It was a bit challenging to make the whole remotely accessible measuring and monitoring device in just two weeks time, but when the first device was made the rest were relatively easy. Pieter's experience with the initial devices was helpful as he shared it with me.

Field visit and P3

The field visit to the Philippines with Wietse de Haan, who is researching on designing floating classroom for a school in the same region was fun and informative. His help with installation of devices was noteworthy. In situ measurements are significant for the evaluation of the comfort performance and to make other observations regarding the indoor qualities. As the house was not occupied during the visit, I was a bit worried about the prepared interviews and daily reviews. It was still possible to have a general survey with the family who used to live in the house and the carpenter who was part of the construction of the floating house. Moreover, the field visit gave me a first-hand experience of the house. While at the house, I asked myself what improvements are needed for the house. This also provided more insight into the user-friendliness of the existing design. Meetings with the Municipal Counsellor of Macabebe, Miss Bembong and Vice Mayor of Hagonoy, Angel Cruz were of great help especially to visit and understand the vernacular architecture of the region. It also gave insights into the strategies being undertaken by the authorities to deal with land subsidence and seasonal flood.

I was fortunate to be back in the Netherlands before the lockdown in the Philippines due to Covid19. With guidance from Eric, I was able to represent the analysed data and check the comfort performance of the pilot house.

After P3

During the simulation of improved strategies, I realised that I could have done the Technoledge

Climate Design course. The details provided by Dr. Willem van der Spoel and my batchmate Hamidreza Shahriari on the DesignBuilder software were very useful. The importance of calibration of the DesignBuilder model with respect to the in situ measurements was understood in the process. I did not realise it would take time. I also did not notice the schedule of door and window operation during the field visit. Therefore I had to speculate the same for the simulation. Also I was not able to get the local climate data, as it was not available in digital format and the office was closed due to the lockdown. Therefore, same simulation settings (with Manila weather data) are used for comparing the results of improved designs and existing design. The observations from the visits to local architecture were very useful during the design recommendation phase, as I could borrow design elements from them.

After P4

After the P4 presentation, I worked on the suggestions from my mentors, which mainly was to consider the results of the IoT devices and the daily review with the present occupant of the house. In addition, I ran DesignBuilder simulations with recent weather data in order to see the effect. After that, it was time for me to ask myself “What did I learn so far?”. I have tried to answer this through my self reflection titled “Compassion + Technology For Sustainability”.

CONCLUSION

This research gave me an opportunity to learn aspects of indoor environmental quality and thermal comfort performance of a naturally conditioned building. In addition it helped to understand and experience the concept of floating houses in the Philippines, which focuses on providing good health and well-being for people. Towards the end of the course I was able to get a clear direction as to how I should proceed. I believe, this experience will help me in my future endeavours.

COMPASSION + TECHNOLOGY FOR SUSTAINABILITY: A SELF REFLECTION

“Experience is the best teacher and the worst experiences teach the best lessons.”

My first devastating experience of FLOODING was in 2015 in Chennai, India, when I was visiting my uncle. I woke up to see that the ground floor of the apartment was flooded while we were sleeping. With electricity cut off and with no time to spare, we were quickly transported by boat to a safe zone. My boat journey was a great learning experience! The streets we were passing through had houses belonging to the rich on one side contrasting with the slums on the opposite side. I was disheartened to see the life-long savings of the poor being swept away, cars under water and houses washed away in the flood. What shocked me the most was some materialistic men and women looting in the midst of all this, risking their own lives! I saw a man drowning while trying to take a cooking gas cylinder. One man jumped into the water, pulled the drowning man into the boat and asked him whether he needed his life or the gas cylinder?

With memories of the first flooding still haunting me, I ran into a second one in 2018, less than a week before my trip to the Netherlands. This time it was in Kerala, India, the worst flood in a century! I was supposed to be boarding the flight from Trivandrum, the capital city of Kerala state. It took me 10 long hours for a 190km trip - the journey, where I was able to experience the devastation caused by the flood in different places.

Floods followed me like a ghost, it struck a third time! This was in August 2019 and my flight to the Netherlands got cancelled as the airport was flooded. I had to learn the hard way- reschedule my flight to finally make it to this day! I was even nicknamed “THE DISASTER” by my friends.

So, when I heard about the floating house project, I found it as an opportunity to learn more about the compassionate use of science and technology in order to improve the well-being of the people.



Figure 01: Personal Experience: Chennai Flood, 2015



Figure 02: Kerala Flood, 2018 (source: teambhp.com)

The Research: Indoor Environmental Quality: Adaptive Thermal Comfort

When young, I shared the room with my grandfather. When I insisted on using the fan, he would ask me why I needed a fan? I would ask him whether he was not feeling hot. At night he would find me covered in a blanket from head to toe. Now, when studying the adaptive thermal comfort, I could relate my studies to

my experience and understand the logical answer about a person's perception on indoor comfort and how people who are used to naturally conditioned buildings are adaptable to wider range of temperature.

The Research: IoT devices

While working on the IoT devices, I found Raspberry Pi as a powerful piece of technology that opens various possibilities in an economical way. During my school days, my focus was mostly on history and general knowledge while my schoolmates were working on various science exhibits with available technology of the time. I was thinking, if I could make working IoT weather monitoring devices without any prior experience in electronics or programming. The highly motivated school students of present generation might be able to make wonderful equipment using Raspberry Pi. In Macabebe, students could do that as part of their school project.



Figure 03: Students engaged in class



Figure 04: Students having a science event

The Research: Field Visit

It was a great opportunity to experience a different culture, spend time with people and be part of their lifestyle. Floating house is relatively a new concept for the people in Pampanga. During the visit, we could find that people were skeptical about the floating house initially, about timber structure. I think it is human nature that anything new may be looked upon with suspicion. The older generation have fond memories of old architecture with bamboo and timber with passive climate responsive design features whereas the younger generation is inclined towards concrete structures. The generation gap was evident. But moving towards inner villages we could still see new buildings being built in vernacular style.



Figure 05: Visiting a local house in Hagonoy with Vice Mayor



Figure 06: A recently built hut, where we stayed for a day

The Research: Recommendations for Improvement

‘You can analyze the past but you have to design the future’, says Dr. Edward de Bono (2008). This is something I always keep in mind. While traveling around the Philippines, I visited many local buildings along with Wietse. I could find solutions for design improvements for the floating house in the Philippines itself, solutions that the local people are used to.

Humanity

I think, from time immemorial, humanity has been given importance and various principles were set to sustain humanity with the knowledge available at that point of time. They were limited to a geographical area or culture. Hence different principles were created for each culture or region. As time passed, people moved from one region to another. Their principles, clashed, so each group would have tried to establish their own principles by dominating the other. People would have blindly followed the leaders without THINKING. If people had focused on HUMANITY, there would have been happiness and prosperity.

Even though culture and tradition are different in different parts of the world, science is the same everywhere. The efficient utilization of science and technology can improve the quality of life. By improving the indoor environmental quality of the houses, the health of the people will improve. For all these, knowledge is the key resource. A compassionate approach plays an important role in binding people together under science with use of technology.

Compassion, Is COMPASSION, a key to achieve Sustainability?

One day I asked my mentor Eric what he thought about my research in general. He replied that I had done a lot of work and asked me what I had learned from it, that is what is more important. That evening in a conversation with my father, about what could be done to make the world better, he asked me to read the correspondence between Albert Einstein and Sigmund Freud in 1931-32 regarding the menace of war. According to Freud, there are two types of human instincts, those which conserve and unify on one side and those which are aggressive and destructive on the other side. Even though suppression of the latter is difficult, I believe, we can overcome its ill effect by focusing on actions based on compassion.

Daniel Goleman (2004) refers to Paul Ekman, a psychologist who suggests that destructive emotions were necessary for survival in the past but now they are harmful to the individual and society. Here compassion has a definite role which will redirect our attention from destructive emotions.

Later I happened to see a documentary, “The Buddha” by David Grubin and narrated by Richard Gere. I would like to mention a portion of the story here. Whether it be true or false, the moral is what is important.

“When Siddhartha Gautama was born, it was said that he would be either a great emperor or a great sage. His father, being the King gave young Siddhartha all the privileges and did not let him see what is happening outside the palace. One day, when he was 29, he went and saw an old man, a sick man, a dead man and a monk. Until then he had no idea of what was happening around and these were a shock to him. He eventually

*decided to leave his palace to find more about the world and learn to make world better. He sought help from various spiritual teachers and yet could not find answers. He decided not to eat and started meditating. He became mere skin and bones and was on the verge of death without food. That is when he remembered his childhood, when he was standing on a field for the village planting festival, he saw insects and their nests on the ground. He felt sad when they were destroyed by men. That's when he realized the problem is within the Man. He continued meditating, but was hungry and wanted to eat food. A compassionate lady offered him a bowl of rice. The **generosity and compassion** of that stranger made him realize the importance of these virtues. later taught his principles to disciples for sustaining humanity”.*

As in the period of Buddha, the present world is also suffering from human behaviour! We now realize that sustainability is very important when, deforestation, climate change and human lifestyle changes have depleted the resources tremendously and earth is beginning to become uninhabitable. With the support of the much more freely available information and knowledge, the United Nations have set the principles of sustainability, the 17 Sustainable Development Goals (2015) for the betterment of Humanity by balancing the three dimensions of sustainable development: the economic, social and environmental, similar to Buddha developing his principles for the humanity. Like prince Siddhartha, many of us are privileged with pretty much everything but isn't it important for us to be compassionate about others in the immediate surrounding and different parts of the world, as we are all in it?

“Compassion is defined as the emotional response when perceiving suffering and involves an authentic desire to help” (Compassion and Technology Conference, 2013).

My realization about the power of Compassion

I come from a small town. My father, a pediatrician used to examine patients who came home. One night, I woke up to the calling bell and saw a panicked family with a new born baby. My father examined the patient and referred them to a hospital. A couple of days later, the father of this new born baby came to our home. He offered money which my father declined. He said, my father was like a God.

I think, it is the power of COMPASSION. Such an act of kindness from a knowledgeable person could have been considered to be something great and might have been equated to God in the past. The Philippines experiences also showed me the power of compassion. Many people in Macabebe told me, Pieter Ham is a best friend and they always talked about him.

Relevance to the present world

A recent news report regarding housing shortage says that 845,000 homes must be built by 2030 in the Netherlands, Figure 07 (nltimes.nl, 2020). At first, I saw it as an issue in the Netherlands, but I think it is a global issue. Why is more housing needed? Why are people trying to migrate? As a result of industrialization, people moved to places of work, which was facilitated by better modes of commutation in vehicles. Migration to cities with a hope for better living has created new problems in already saturated cities. We have to focus on the well-being of people of cities and rural areas all over the world. We should find global solution and act accordingly. With the development of technology, the need for people to go to cities is coming down.


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HOUSING SHORTAGE: 845,000 HOMES MUST BE BUILT BY 2030

By Janene Pieters on Tuesday, 16 June 2020 - 09:55



Construction site in Urk brought to a standstill by the coronavirus, 28 March 2020. (fokkebok / DepositPhotos - Deposit Photos)

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Figure 07: A recent news in NLTIMES.NL

Commuting to office and back home after work has been reduced much which is a great relief to people as they can 'work from home'. The "Covid19" pandemic has made this transformation rapid. All these transformations are partly due to compassion as we focus on helping people and convert the ideas into action by design. While working on the remote monitoring weather device, I felt the power of IoT .

By creating the floating house using technology with the co-operation of people from different strata of the local community, we have helped the local people. If we borrow the words of Peter Drucker (2001), we draw nourishment from local roots and help them to nourish their own local culture. Thus, each one of us can become a "citizen of the world" in vision, horizon and information as Peter Drucker envisages.

O'Rourke, who has impeccable credentials in industrial ecology was focused on the technical issues at first, eventually realized that the real impediments for improvements were never the technology, but decisions about product and process design and the inertia in organization (Goleman, 2009)

How to encourage sustainability with compassion?

I find it is our duty to teach that sustainability is for humanity. We should compassionately spread the words of sustainability so that people take it in their mind. It is necessary to teach what sustainability is from young age, involving the family and the community.

The Floating House Context

I would like to quote a verse from the Bible; Matthew 13:13. "This is why I speak to them in parables: Though seeing, they do not see; though hearing, they do not hear or understand".

As the Project is being worked out along with the Municipality of Macabebe, people in the region are now familiar with the floating house. We are giving further help from the Netherlands using technology. For longevity and further development of the floating house concept, I think we have to put the scientific researches in a way the local people understand and accept. So, they can think and develop the system for future and have a better life with floating structures in future.

Now they are looking forward for the floating classrooms. We can explain our researches to the local people through handbook and visual media so that they can understand different aspects of sustainability, concept of floating house, indoor comfort etc. Children can visit the floating house; they can be given assignments to understand how it works. We can plan to incorporate sustainability and floating buildings in the school system. Critical thinking is very important for this. The community and various organizations can be involved in the thinking and learning process and guided, just like the mentors guide a research student to do the research. When the local people are actively involved in the project their confidence will increase. They will get a feeling that even though they are living in a remote area, they can do much. Others who see this compassionate approach will also be motivated to actively participate in the working of floating homes. When we are part of such projects, we will also have a sense of gratification.

COLOR CODED RAINFALL ADVISORIES	RAIN MEASUREMENT	FLOOD POSSIBILITY	RESPONSE
RED WARNING TORRENTIAL	MORE THAN 30 mm RAIN OBSERVED IN 1 HOUR AND EXPECTED TO CONTINUE IN THE NEXT 2 HOURS	SERIOUS FLOODING EXPECTED IN LOW LYING AREAS	EVACUATION
ORANGE WARNING INTENSE	15-30 mm RAIN OBSERVED IN 1 HOUR AND EXPECTED TO CONTINUE IN THE NEXT 2 HOURS	FLOODING IS THREATENING	ALERT FOR POSSIBLE EVACUATION
YELLOW WARNING HEAVY	7.5 - 15 mm RAIN OBSERVED IN 1 HOUR AND EXPECTED TO CONTINUE IN THE NEXT 2 HOURS	FLOODING IS POSSIBLE	MONITOR THE WEATHER CONDITION

Figure 08: Information about flood in a school, Macabebe



Figure 09: Information about Covid19, Macabebe

What next for me?

I realize that there are much more aspects to learn and experience and I would like to look at this with a compassionate approach to achieve sustainability.

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