Thailand Water Architecture Workshop

21st January – 5th February 2013

Thammasat University in Bangkok

National Cheng Kung University in Tainan

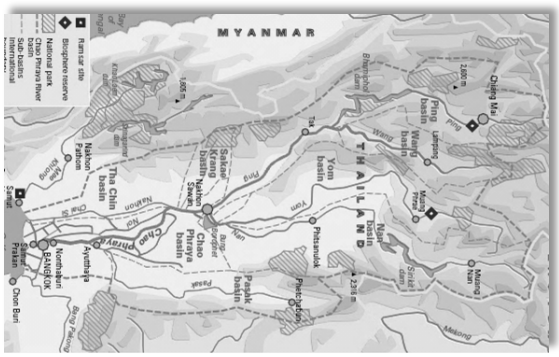
Thailand has a long history with living in flood plains, and has many vernacular solutions to protect against flooding. Yet, in last recent years Thailand got devastated by floods. This workshop will analyze the traditional measures against flooding, such as floating fishermen villages and stilt homes. Gained insights will be used in case study for a small village in central Thailand. On urban scale we will study how water communities can connect to the land, on building scale we will analyze floating buildings and on detail scale we'll try to make a small raft like floating body.

organizers:
Chuta Sinthuphan (Thammasat)
Bart van Bueren (NCKU)

Thailand’s tradition of raft houses is ending. policy is to clear the rivers and raft houses are wrongly accused to be polluters of the water. all that remains are ‘fake’ tourist floating markets. Bart van Bueren and 6 National Cheng Kung University students made a workshop to learn from the very last traditional raft builder in Thailand. this ‘Grandfather’ who almost reached his 80’s was still climbing bamboo trees to select the best branches. in about a week the team built a small Thai raft house according the traditional methods and materials. the building is donated to the local folk museum of Phitsanulok

白汎埔

Thailand Flooding



Source: Chao Phraya River Basin, Thailand http://wwlc.uwaterloo.ca/WWDRMaterials/chao_phraya.pdf

2011 Thailand flood in the center plain from September to October was one of the worst floods since the past 60 years (Great Flood of 1942). Unusual rainfall caused by Tropical Storm Nock-ten, pouring down on Northern Thailand, excess water flowing along rivers joining Chao Phraya River discharge at the Gulf of Siam at the central plain, flooding 1/3 of Thailand. By end of October, water inundates delta of Chao Phraya but trapped at Bangkok due to the rise of high tidal, water could not discharge into the sea which takes up almost a month to relief from this calamity.

Chao Phraya River is the major river of Thailand, important cities located along this river because it was the main waterway of Trading heading to Northern, along this river is home to 23 million people where 8 million live in Bangkok. Hence, to understand the specification of flood prone areas, we visited three important cities that are located along this river where they are more likely to be flooded due to its location on the joint of 2 rivers: Bangkok, waterfront and living with water along Chao Phraya River + TCDC exhibition for living through flood. Ayutthaya, the UNESCO Heritage for the solution to protect from river flooding + floating house by National Housing Authority. Nakhon Sawan for it new improvement of the dyke surrounding city + farmers adapting to living on stilt through yearly flooding.

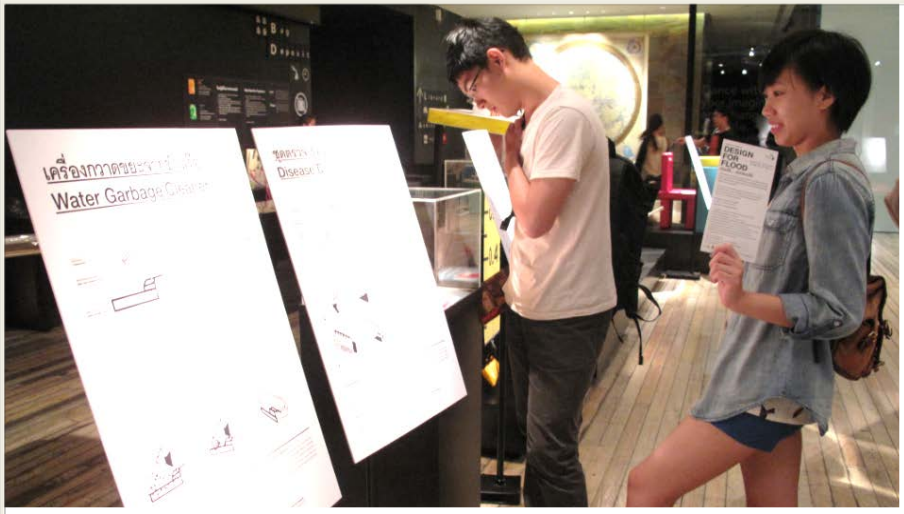
2011年9月到10月之間，泰國中部經歷了60年以來最嚴重的水災。受到強烈熱帶風暴洛坦的影響，泰國北部下雨的雨量比往年多，大量的雨水隨著高原河流流入主要河流湄南河最後流出暹羅灣，一路淹沒了許多沿河的城市。水在10月底已經抵達湄南河三角洲，但由於海水漲潮阻擋了要流入海的水，曼谷和臨海地區面臨因而沉入一個月之久的水災。

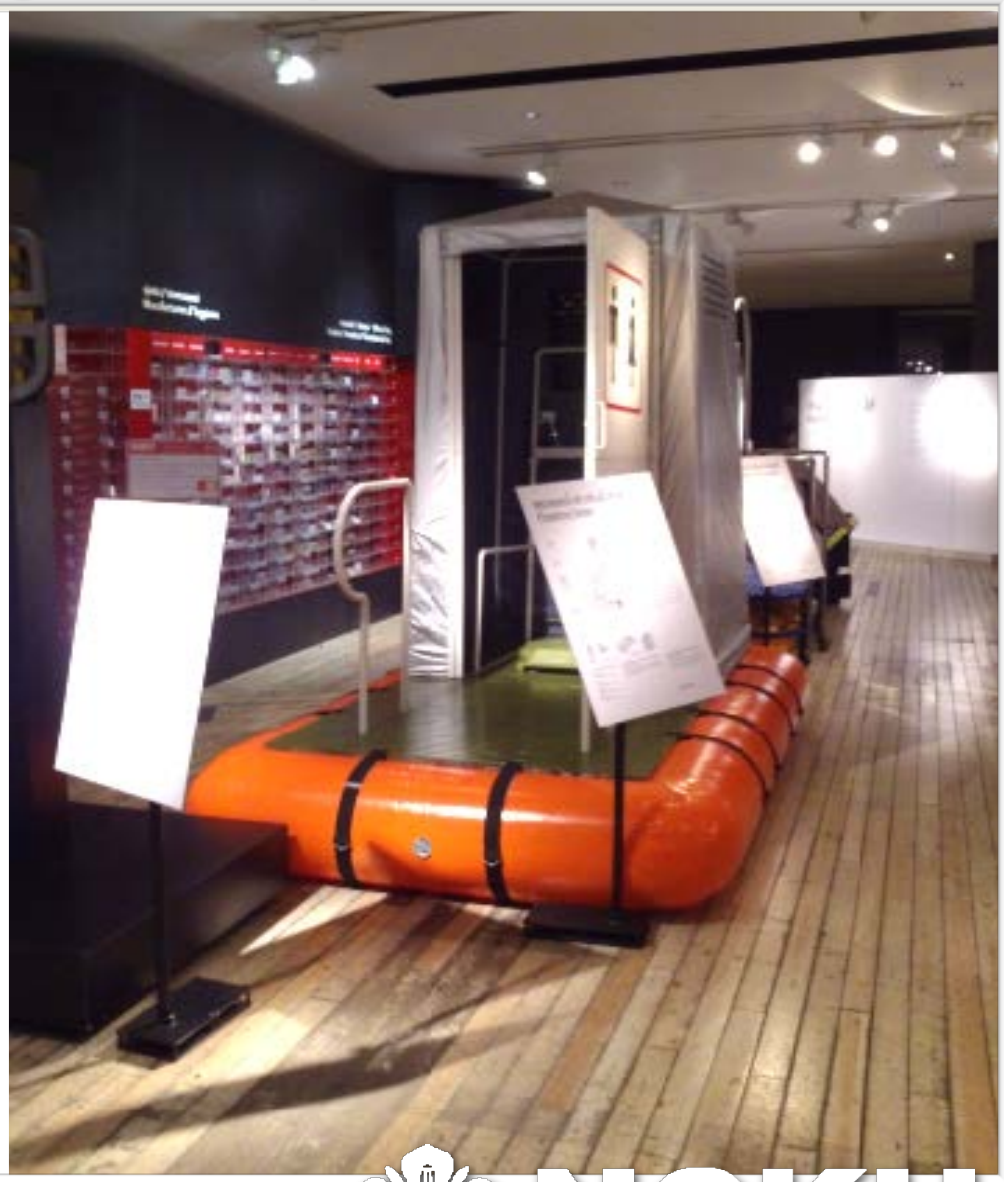
湄南河是泰國的主要河流，曾經是主要水路運輸通往泰國內陸連接北部貿易的路綫，主要城市沿著這條河發展，23萬人口居住在這河流上，其中8萬人住在曼谷。在工作營開始時候，我們先參觀了三個洪水容易發生的城市，他們主要的特徵就是城市座落於兩條河流之間：曼谷 - 居民於湄南河岸與水供存的現況和參觀TCDC展覽提供水災民的便利產品， 大府城 – 沿河古跡的防洪策略和NHA的可以可浮動式的房子，北欖坡府 – 圍城的提防建蓋現況和城外的農民與水供存的特色

文字 Saraya S 孟璇

Thailand Flooding

Design for Flood_Bangkok Exposition





Floating is one of our subject to this Thailand Workshop, our Team paid a visit to TCDC in Bangkok to learn from what other designers have come out with solution to relief in surviving through flood. There showing 10 selected winning prototypes from Design for Flood, subject to how design thinking process can help in the real needs to flood victims which could be further develop.

文字 Saraya S 孟璇

Nakon Sawan

Nakhon Sawan was once a very important Trade Center for rice and teak wood during the Ayutthaya Kingdom, because it location at the joints of 2 major rivers (Ping and Nan) from Northern part of Thailand, which formed Chao Phraya River. These rivers were main trading route before the Northern railway open up in 1922, this city is now being less important in term of trading district.

Floating community developed along Ping and Nan rivers, mainly were fisherman and farmers. Raft houses was their home, their source of income because located on the river made it accessible for trading on water. This community was gradually removed from water blamed to be the cause of polluting the rivers. So far only 44 registered Raft house left in Nakhon Sawan, mainly kept as the storage, water pumping station for household and pier along the joint of the rivers. It is common that fisherman and farm houses settle on stilts along the rivers because riverfront flood every year up to 0.5 m, silt fertile their farmland and therefore many Paddy fields and farmlands can be seen along the river.

Floating restaurants are now the symbolic of Raft community, floating along the waterfront at the city downtown, also known to be the legal floating structures available in this area.

北欖坡府曾經在阿瑜陀耶王朝是一個沿河的重要貿易中心(大米和柚木)，主要是因爲湄南河連接通往泰國北部的Ping河流和Nan 河流。1922年通往北部鐵道開通後，這個城市就漸漸沒落了。

水上村落曾經坐落在這三道河流的交叉處，竹筏屋不僅是一群漁民和農民的家，也同時是他們的做買賣的收入來源。竹筏屋居民漸漸被安排到陸地上是因爲地方政府認爲水上村落是造成河水污染的原因之一。到目前爲止只有44棟合法的竹筏屋存在，用途為儲藏、家用抽水站或小碼頭。由於河水每年汎濫大約0.5米，而讓沿河土地較肥沃的關係，這個城外的沿河的房屋為高架式杆欄建築，處處可見稻田和農田。

目前市中心的河堤乃有幾棟浮動餐廳用來象徵當地曾經存有的水上建築物的文化

文字 Saraya S 孟璇

Nakon Sawan

Nakon Sawan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When 2011 Flood intruded Nakhon Sawan City, dyke around the city was still under construction. Excessive rainfall pouring down from upstream from both Ping and Nan rivers, mismanagement of Dam on Ping river overloaded while Nan River has no dam to control water flow, runoff broke the city dyke and therefore city sunk in water of 5 m height for 2 weeks. While area around the joint of 3 rivers flooded for 3 months.

We drove along the city dykes investigating the new improvement to the dyke, is increased by height to approximately 12 m, and well planned for pedestrian walkway and space for future development yet no solution to the farm houses at the flood prone, so villager built temporary floating houses in case of the next flood intruding again.

受到強烈熱帶風暴洛坦的影響，大量的雨水加上Ping河上游的水壩管理不善的結果，導致位於三條主要河流的北欖坡府市的河堤破堤，城市水災高度有5米高，持續2個星期。 而城外散戶則與水災供存了3月。

我們這次主要是探討沿河堤一帶的改善，河堤的高度被加高到12 米，並有比較好的人行道規劃和空出一個未來可以發展的區域。城外圍的農民區則還沒有改善，所以居民自備防災用的可浮動式小房子。

文字 Saraya S 孟璇

Nakon Sawan

Amphibious House by NHA / Chuta

Amphibious House by NHA / Chuta

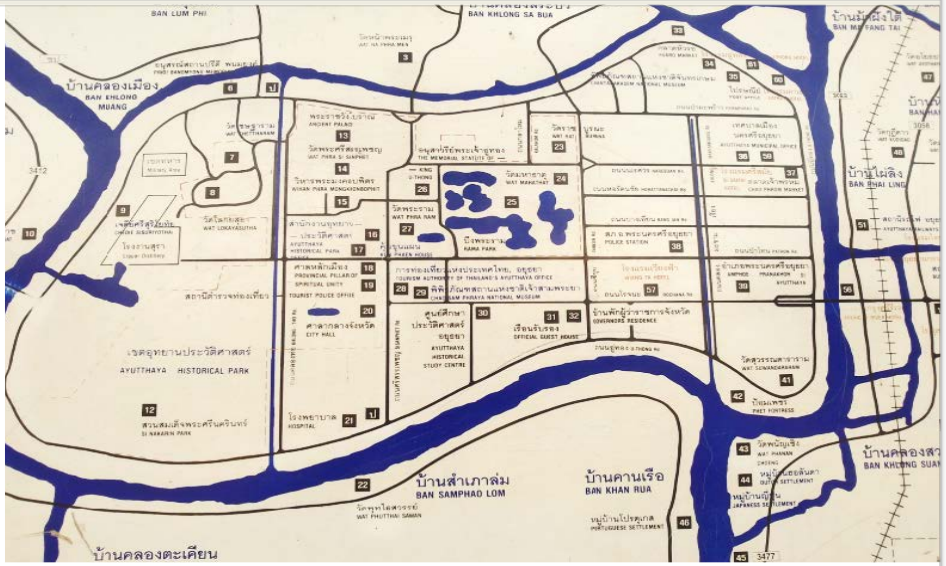
In the last couple of years one of Thailand's big issues has been flooding; areas with no history of flooding have been affected and areas prone to flooding have experience great losses, since events have increase in magnitude and return period. Thai government is looking for permanent and more importantly sustainable solutions. Most of the times relocation is not a solution, communities have deep roots and love for their homes, that without taking into account that most people do not have the resources(money) to build elsewhere, so communities must change and adapt to live with the threat of flood. In this attempt NHA/Chutavaves Sinthupahn have designed and built an amphibious house prototype Rojana Industrial estate in Ayuttaya.

This is a amphibious house designed for areas prone to flooding. The goal of the project is to design a low cost house for families with lower income living in flood prone areas that is easy to afford, build and mass produce. It's a basic nuclear family design, two storey building; living room, dining room, kitchen, two rooms, one bathroom. Passive design; plenty of openings to encourage ventilation, screens to protect from excessive sunlight. The foundation is the main element that makes this house float, hidden from plain sight the foundation of the structure is composed of steel boxes filled with foam that allow the whole structure to rise with the water level in a flood event. Steel columns anchor the house for it not to drift away, and fall back to place after the water is gone. Material selection is fundamental; **light steel roof** has an anti-rust coating, its light, cheap easy to assemble, high durability and fire resistant, but has a relatively high initial cost. **Light weight Walls**(drywalls); it's easy to assemble which means low qualified personnel can put it together, it's cheap and a good noise insulator, but its flammable and has a short life span(5 years).

Amphibious House by NHA/Chuta certainly covers the flooding issue, but the project is having launching problems for mass production; government inefficient bureaucracy (corruption), and culture; people relate lightweight materials like drywalls with low social status, which makes it unattractive to the aimed clientele, who still prefer to build with conventional materials like concrete bricks.

~Leo

Ayutthaya Heritage Jedi Flooding

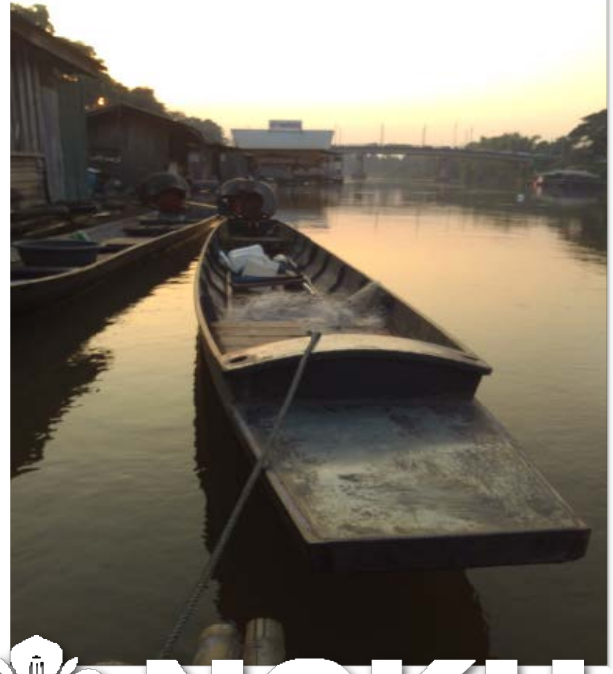


Ayutthaya is one of the oldest city in Thailand, famous for its Jedi temples. The city has faced various threats from the outsiders in the past but today it is endangered by frequent floods. On the walls we can still see the stain left by the previous flood in 2011. The government took some measures to prevent it from happening a flooding. One if these is a wall along the river that can be lifted up from a trench in the ground. The idea behind it is the wall will work as a dyke and redirect the overflow to other places instead of flooding the temple. The wall can only be raised out of the trench by a crane of many man-power. It's questionable if the defense can be set up quickly enough in time during emergencies. The wall was installed before 2011 and functioned, yet the temples got flooded. The riverside was flooded, but the other 3 sides had only low walls, so the flood flowed in from other sides!

Ayutthaya是泰國最老的城市之一並以它的Jedi廟宇聞名，這座城市在過去面對過許多來自外人的威脅但今日卻飽受水患侵擾，現在在牆壁上仍可以看到2011年水災所留下的污漬。在那場水災之後政府採取了一些措施來避免同樣的事情再度發生，其中之一是在河邊建立濠溝渠，其中的想法是讓水渠接納並將泛流的河水引導至遠處，避免神廟被損害，但是在這計劃裡有一個詭異的地方，平常江水渠遮蓋起的石板必須由人力手工搬離，使人懷疑在危急時刻它是否能及時啟動。

Humphrey

Phitsanulok Raft Village



Phitsanulok Raft Village

A small floating community lays at the Nan River in Phitsanulok Muang District. Boats used to lay on two sides of Nan river for over more than 5 kilometers. They are north of Prasrirattanamahathat Temple to the bridge at the north of Chulmanee Temple. People stay at the rafthouses and on the steep shore they plant some vegetables and flowers on the very fertile soil. Characteristic is the use of wood and a zinc roof. The houses are only 1 or 2 rooms.

Phitsanulok Raft Village

The toilet of a rafhouse is usually the back of the house. Actually a toilet is nothing more than a 10x14cm hole in a small private space. The human feces fall in the water and are very quickly eaten by fish. This may sound very dirty, but it's simply a natural cycle. And this cycle goes round, these fish in the river, are very popular fish for Thai curry!

For a small rafthouse 150-200 bamboos are put together make the raft float. Only a few bamboos are really tied to the structure. Most bamboos are locked between some vertical pillars, like an upside down U-shape. Incase the bamboo cavities get filled with water it can sink to down without dragging the raft with it, since it's not attached. This naturally happens overtime and new bamboos can easily be replaced by sliding new ones between the pillars.

白汎埔

Phitsanulok Raft Village

Almost every year big parts of Thailand flood. A traditional solution are floating homes; at high water the houses will simply float up along the water level. Yet this beautiful tradition seems to be getting rare. Many rafthouses have been taken away because the government blamed them from polluting the river. Many human feces have been seen found on the surface of the water. This is strange, because many years ago this wasn't a problem. Usually plenty of fish were hungry for this 'human-feces'-food. The number of fish has decreased because of factories polluting the river with chemicals. In this perspective the raft people cannot be blamed; it are the factories who killed the fish who kept the river clean…

白汎埔

Phitsanulok Folk Museum

แม่น้ำน่านไหลผ่านกลางใจเมืองพิษณุโลก ภาพถ่ายก่อน พ.ศ. ๒๕๐๐
The Nan River flows through Phitsanulok. Photoed before 1957

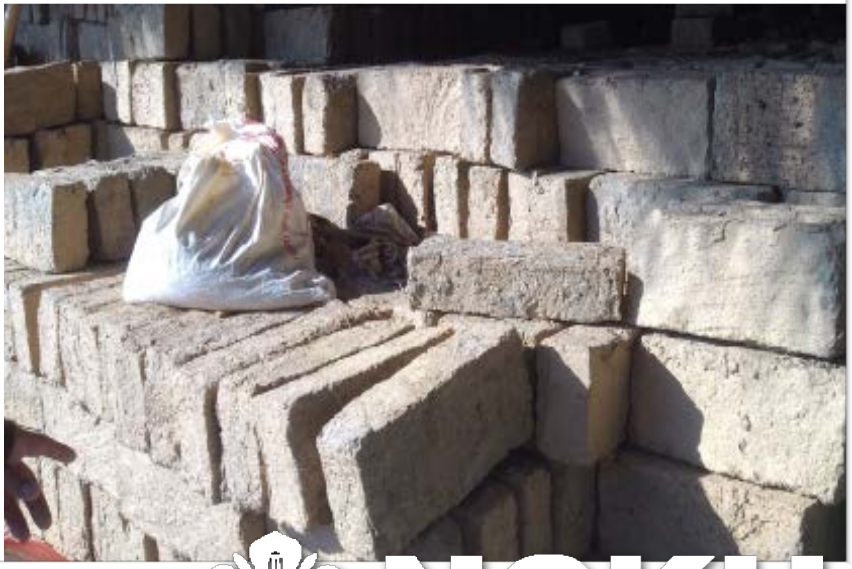
We visited the folk museum in Phitsanulok. Its is a nice place with a large garden and a few small buildings. One building is devoted to rafthouses. Scale 1:50 models are exhibited here of the few remaining rafthouses, but there are also old pictures of when the Nan-river was still full of them. The history of this raft-settlement dates back to 1910 when King Rama was at rule. In that time many immigrants came from other provinces and founded their place on the river.
Later, a Thai rule forbid (raft) houses to be smaller than ca 25m^2. Traditionally rafthouses are smaller and certainly the old houses still are. The raft people solved this by putting two rafts next to each other under one address.

We got a presentation from the local experts on rafts, we learned the remaining raft-people are a strong community proud to be living on the water.

白汎埔

Phitsanulok Folk Museum

CLC Bamboo Factory Chiang Mai



Chiangmai Life Construction (CLC) is the most modern bamboo factory in Thailand. The owner and founder is Markus Roselieb, originally an Austrian doctor. Although he was schooled as doctor and practiced a few years, he was also always busy with buildings. His main idea is to make the modern buildings with bamboo architectures and the quality constructions. He wants to protect the environment with using green materials in a modern way. Markus went to Columbia where he learned the skills of using bamboo as the building material. When he came to Thailand he did a few projects before the decided to built the factory.

All the bamboo needs to be bathed into a salt-solution. This is a very important key point of –conserving the bamboo. It makes bamboo dry faster, stronger, fireproofing and prevents it from damage by insects. To make bamboo in a curve it can be dried under the strong sunshine to bend the shape.
They pick up and separate the different size of radius bamboo.
Most of the joints are completely made out of by bamboo. The architect explains to us that If use the other materials, it will damage the bamboo and make the bamboo structural weaker.

How to choose the right bamboo with the age and species is important. Most of time we will choose the bamboo which already grow more than 2 years, but the one use in structural will be the one grow 3 to 4 years.

Apart from bamboo CLC also constructs with rammed earth, another very natural and sustainable material.

Jenny

Bamboo School Chiang Mai

Not coincidentally the first big project of CLC is next to the factory. It is a school special bamboo school for children. Most children are from rich and international families, the education is special as one can imagine looking at the buildings.

The design was made by the Dutch architecture company '24H architecture'. Ir Olav Bruin was project architect and during construction Markus Roselieb from CLC adjusted parts as bamboo structures can be very much a craftmanship.

Guess what's the material of the eye?
You will use it everyday . . . it's recycle materials.

The dots of the face are the recycle bottles
The eyes of the face are the glass of washing machine!

The green buildings are designed with natural wind flowing to achieve the natural cooling system and the unique shape.

Jenny

Bamboo School Chiang Mai

Panyaden school is the international school in chiang mai Thailand. The architect design it with bamboo and adobe concrete which is eco-friendly materials. The environment in school offer kids to learn how to be friendly to natural environment, such as learn how to grow rice and vegetables by themselves. Also the kitchen in the school offer kids to cherish food and wash their own tableware by their own. The school culture the love, independent personality and the thinking of importance of environment. That's what we need to know nowadays.

Part of the school is this amazing swimming pool. The concept comes from love and care about children.
The shape are two birds like mommy bird take care of the baby bird.

Jenny

Bamboo School Chiang Mai

Lanna Architects Rice Barn

Lanna is a Thai traditional architectural style, which came from the north of Thailand. Lanna Architecture is constructed by wood and some stone piles. These materials can be maintained easily.. The structure is very impressive with the wooden joints, and tree barks as roof and space division.

蘭納是泰國的傳統建築風格，來自泰國北部。蘭納建築木構造和岩石樁主要構造，所以每5到6年他們要修復木材。室內的樹皮屋頂和空間的分頻是非常讓人深刻的印象木關節.

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Lokaz

Lanna Architecture, RiceBarn

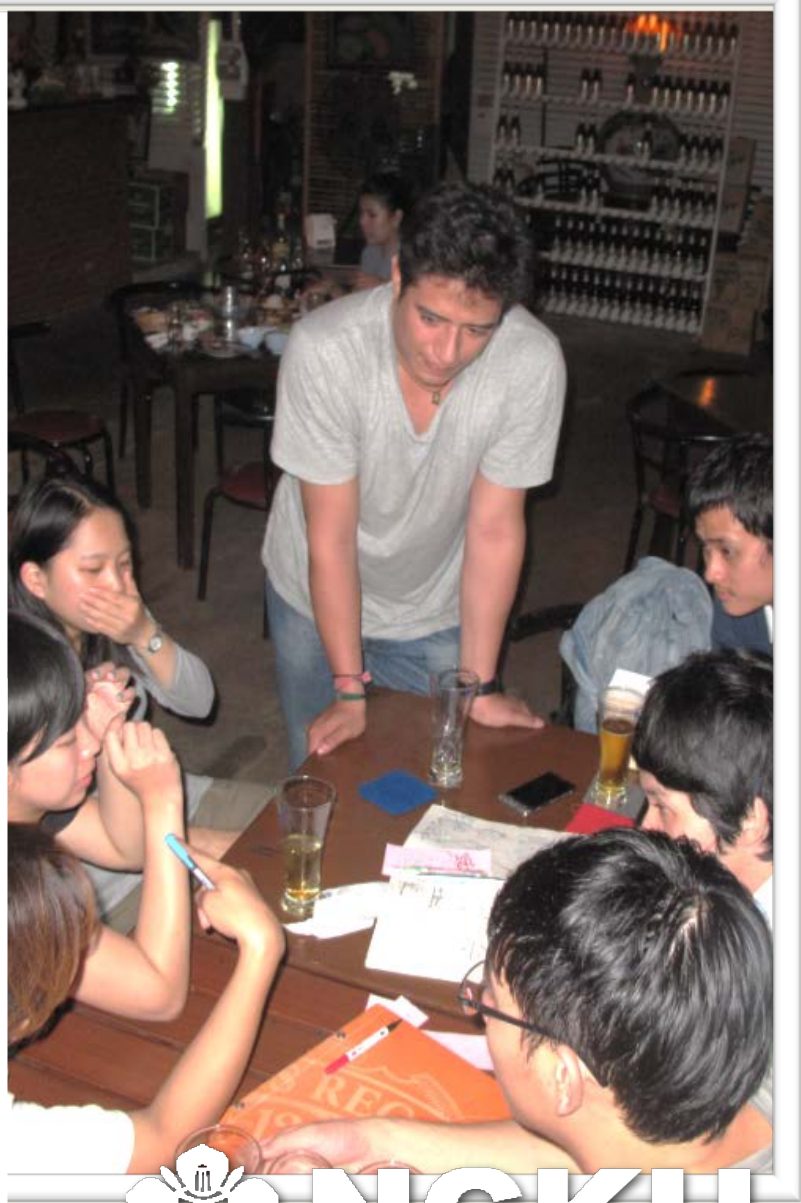
Mae Jam Mountain

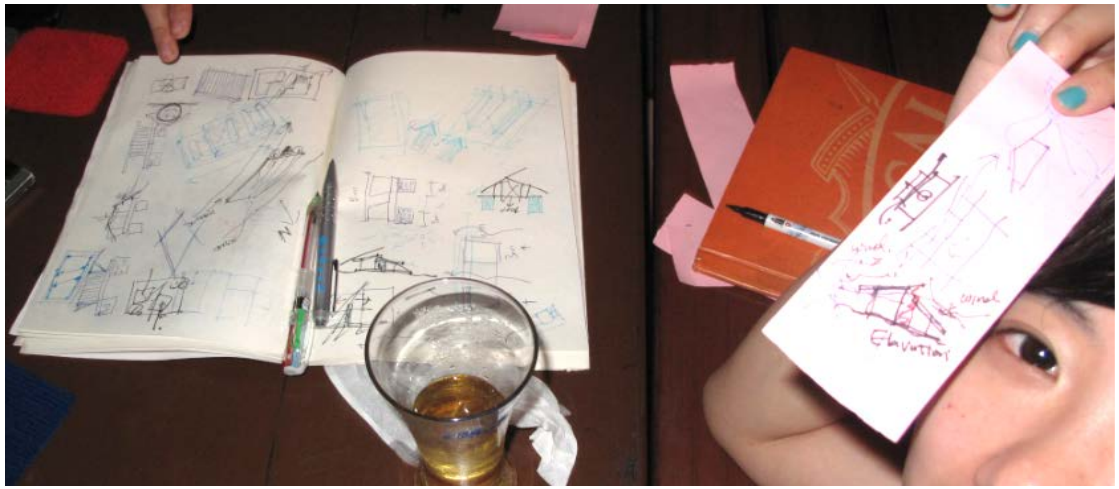
The living area of the hill tribe called “Meo”, is a mountain located at Chiang-Mai. Architecture of Mae Jam is mostly built from natural materials. For example, a rice barn or leaf is a roof and bamboo and wood make the main construction.

和山地族的居民叫“MEO”，位於在清邁，泰國清邁的山。湄醬建築大多是從天然材料打造。例如，使用稻草穀倉或葉是一個屋頂，竹木材有主要建設。

Lokaz

Design Raft





water architect

NCKU

Concerning the design process, it began in the field; visiting existing floating communities, experience how people coexist with the river, how they made do without basic necessities like running water, waste management, sewage system.

for ncku students this was a new experience, it was surprising how well they cope, living in this situation; each space was used to its fullest, the rafts were quite clean, spaces changed function depending on the time' during daytime the main space its a living room and dinning area, during night time it changes to a bedroom

after the field experience, we head to a pub to rest, mingle with thai students and star sketching the locals gave several ideas concerning, illumination, orientation, ventilation, being locals these parameters are known to them ncku gave a different perspective, having an outsider perspective we gave ideas on how to improve the existing conditions.

Andi

Selecting Bamboo

After the design phase, came the construction phase; build a traditional raft from the last traditional raft maker Gran'pa. Everything was made in a traditional way; traditional materials(bamboo), traditional methods, traditional joints, basically using a knife and bamboo. In the art of construction it's all about trial and error, and grandpa had all the knowledge of what works and what doesn't from a life of experience and all the knowledge past down during generations of raft makers in Thailand. Even material recollection was done in a traditional way; grandpa would ride his bike and go to the outskirts of the city were bamboo still grows wildly like grass, he would handpick the right bamboo, right height, right thickness and right color. He would find bamboo of his liking, pay the landowner for permission to cut it, climb the bamboo cluster and cut it. Bamboo was never brought or bought from any store, it was local material in every way.

The most common type of bamboo used in construction in Thailand is called 'Mai Pai Suk'. This is not the biggest type of bamboo since it has only 8-10cm diamter. But for its diameter it is among the strongest and most reliable. For the strongest construction parts 'Golden Bamboo' is used, much bigger in diameter, but therefor it needs to grow longer, grows more locally and is much more expensive. A different type of bamboo was used in the floating foundation; a lighter type, so it would float better. In our trip we met three different bamboo experts: Gran'pa, Mark 'Bambooroo' Palma and Markus Roselieb from ChiangmaiLifeConstruction.

Leo

Raft Building

The building part started for us by being introduced to the very last raft house builder in Thailand. A man we started to love and gained the respectful title of ‘Gran’pa’. In fact, he was 77 years old! He shared his precious skills and knowledge with us. For example he took us to a bamboo forest for material collecting, and then the real deal: the building.

The whole process was both educational and fun, we finally finished and dedicated our raft house to a local raft house museum, we felt it was the best place for our work to be shown, and we were more than grateful that we could be part of the raft house history.

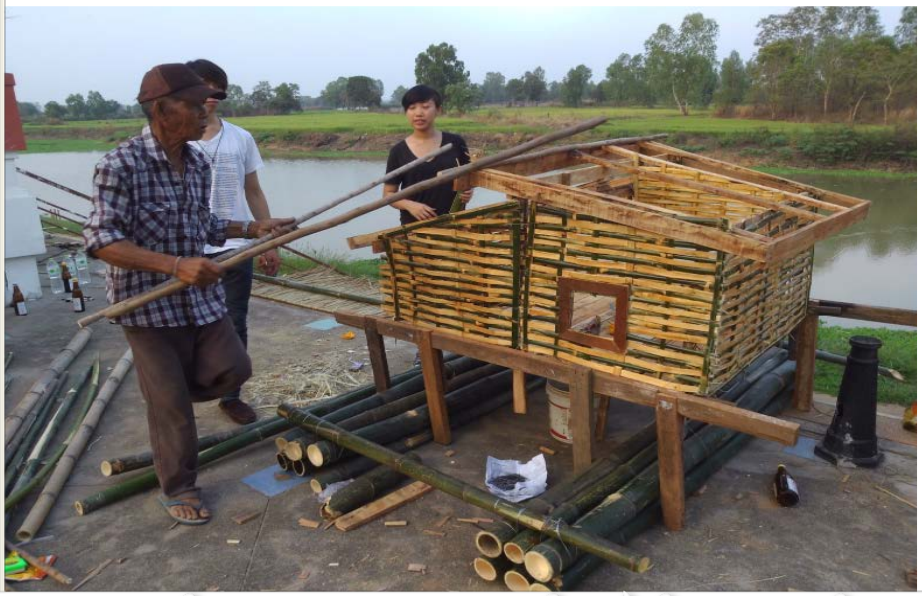
andi

Raft Building

while working with "gran’pa"-the last raft house builder in Phitsanuluk, we learned a lot on the both subjects of building for floating and the fundamental quality of bamboo as a building materials. the trips to bamboo forests for harvesting building material were mind blowing and adventurous, after collecting them we soon applied our knowledge of bamboo onto use, we used the bamboo to complete the foundation which with its hollow joints, allowed the rafthouse to float. as for the facade we sliced the bamboos into slim pieces and weaved together as a fade. we carved windows on them and also used bamboos for the frames of windows. the structures are done with woods, with some cymbopogons on top as roofing, stabilized with sliced bamboos.

andi

Raft Building



The raft studio was a great experience of thai-material bamboo, the thai traditional building methods and thai- culture. Upon arriving we had no idea about how the workshop was going to be and luckily we were able to participate in designing what the workshop should be about and how it should be carried on.

Starting from understanding the history of flooding in Thailand, and the building form-raft house was brought out was very educational. From this we benefit a great deal of knowledge and it interested us to be fully enthusiastic about building a small scale raft house.

Adni

Raft Building

เมื่อต้นปีพศ.2556กลุ่มนักศึกษา6คนจากทางมหาวิทยาลัย National Cheng Kung University ประเทศไต้หวันได้ร่วมกันจัดทำ workshop บ้านแพลอยน้ำในประเทศไทย โดยอยู่การควบคุมดูแลของศาสตราจารย์ B. Van Bueren ทั้งนี้บ้านแพลอยน้ำที่ได้จัดทำขึ้นนี้ก็ได้ความอนุเคราะจากคุณตาผู้สร้างบ้านแพลอยน้ำคนสุดท้ายของประเทศไทยที่ได้ถ่ายทอดวิชาความรู้การสร้างบ้านแพลอยน้ำจากวัตถุดิบจากธรรมชาติ ทางมหาวิทยาลัยหวังเป็นอย่างยิ่งว่า workshop ที่ได้จัดทำขึ้นนี้จะมีส่วนร่วมในการช่วยเหลือป้องกันภัยพิบัติอุภัยน้ำท่วมในประเทศไทยได้ไม่มากก็น้อย

สมาชิก: :

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Chuta Sinthuphan
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Leo Pacheco
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Jenny Chou
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Special thanks to:
Prof. Chuta Sinthupan, Thammasart University
Phitsanulok Thawee Folk Museum
Gran'pa, the last Raft Builder in Thailand
ธนกร ปกปิงเมือง Lanna Architect, Chiang Mai
CLC Bamboo Chiang Mai and Panyaden School
NCKU Architecture
And many others!

Six National Cheng Kung University (Taiwan) students and prof B van Bueren organized a workshop on floating houses in Thailand in 2013. A scaled raft model was made with traditional materials and building methods. Grandpa, last of the raft builders, taught the students the skills of this beautiful tradition. In this workshop four students from Thammasat University also came and helped a weekend. Hopefully more floating buildings will be built to protect Thailand from flooding.

Team:

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