THE 2011 BANGKOK FLOODS:

Live Peacefully, Live Harmoniously

Nimitmai 40 Road, Khlong Sam Wa District, Bangkok, Thailand

SASATHORN INTHASUWAN

2018
Figure 1. Nimitmai 40 Road and community. Author's image.
THE 2011 BANGKOK FLOODS: COMMUNITY RESILIENCE

Nimitmai 40 Road, Khlong Sam Wa district, Bangkok, Thailand

Figure 2. Nimitmai 40 Road community's ritual. Author's image.
THE 2011 BANGKOK FLOODS: FLOOD RESILIENCE

Nimitmai 40 Road, Khlong Sam Wa district, Bangkok, Thailand
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Live Peacefully, Live Harmoniously

Nimitmai 40 Road, Khlong Sam Wa District, Bangkok, Thailand

BY

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ABSTRACT

Thailand’s Bangkok has experienced rapid population growth and subsequent expansion over recent decades. It has resulted in an unintentional increase in vulnerability within rural-residential and metropolis areas. Flood prevention strategies, such as dams, irrigation canals, and flood detention basin, and Kaem Ling ‘Green belt Embankment’, have been slowly built and activated in response to this suburban catastrophe (Vanno). In recent years, King Rama IX of Thailand, initiated Kaem Ling’s, ‘Monkey’s Cheek’ project; a reference to the common parable of an intelligent monkey storing its food in its saggy cheeks rather than swallowing. This has allowed the Western and Eastern suburbs of Bangkok to function as waterways, diverting the destructive water paths away to protect the metropolis.

Beginning in July 2011, a significant rainfall from the highlands of Thailand flooded down to Bangkok. With affected areas lying less than 10 metres above mean sea level and some as low as 1.5 metres, some areas remained flooded until January 2012. By October, the inundated metropolitan Bangkok began to negatively impact on industries, such as computers and automotive. Both critical supply networks for other manufacturing operations outside of Thailand. This ‘vulnerability’ where the inter-connectedness of economies could mean the closing of factories and manufacturing assembly lines in one country because of a flooding disaster in another had not been recognised.

The 2011 Thailand’s flooding death tolls surpassed 815 deaths (with 3 missing), affected 13.6 million people and classed 65 of Thailand’s 77 provinces as flood disaster zones (Benfield, 2012). During the extreme environmental activity, decisions were made to close several district gates in last-ditch efforts for protecting the metropolitan areas. This caused many other peri-urban areas of Bangkok to flood. These suburban areas were intended to act as waterways to protect the metropolis, but instead became a reservoir. Nimitmai 40 Road, situated in Klong Sam Wa district, was in the middle of the 2011 flooding zones became the locus and main area of interest in this research.

Several initial studies, of precedence and technical data, explored objectives of building resilience in response to flooding and community. This research further utilised field study surveys, interviews, and case studies, all of which provided a wealth of information and contextual material. They contributed to design propositions developed through a series of critical reflections.

This research aimed to build community resilience, encapsulating spiritual elements in cultural and psychosocial elements of suburban Thai community’s livelihood and to provide flood resilience through both non-technical and technical solutions. Final outcomes of the design iterations suggested a merging of Thai monastery and community centre as a spiritual anchor for the community’s resilience and strengthen my neighbourhood’s sense of place.
Triggered by my neighbourhood area and its built environment, my community, and the unexpected disastrous event that affected them in 2011, my personal attachment with the site initiated this design research. The site, of my childhood upbringing, lies within suburban residential Bangkok at Nimitmai 40 Road. This community hosts types of residents, originating from different parts of Thailand, from low to mid-range socio-economic demographics. A shared factor between the people of the community is the simplicity of lifestyle.

In the early morning, families and friends gather in the communal spots with the same purposes; to make morning merits to the monks from the temples nearby and to have breakfast from the local stalls. Most of us work in the Bangkok metropolis, some own businesses around the site area or nearby and children go to nearby schools. Housewives do their morning and evening exercises together in groups. This tranquil community in the outskirt of Bangkok has existed largely interrupted and at peace for centuries, until 2011; when the unexpected masses of flood inundated Nimitmai 40 Road and devastated the area.

To me, this place is a home that my feet may leave, but my heart never will. To the Nimitmai 40 Road community, this place means everything. This research, in response to flooding in Bangkok, the risks, and devastation of elevated sea level, has become a wakeup call. One that only strengthened over the course of this research. I hope that through revision of my work, you too may become aware of this environmental catastrophe and take design knowledge that we may apply to architectural responses to mitigate these issues in both Thailand and abroad.
DEDICATION

To my childhood home and its community.

To everyone I met during my field study in Thailand, and especially the Nimittai 40 Road community.

To my family.

ขอขอบพระคุณมากค่ะ
I would like to express my heartfelt gratitude;

To my supervisor, Regan Potangaroa, and his wife, Florence Leung, for their immensely guidance and support.

To my family: my parents, my sister, and my dogs; who always fuel me with love.

To Olly, Katy, Kenny, Pranil, Oscar, Divy, Anerta, Kimmy, David, Vera, and all of my friends from wherever in the world you are, who are always there through my ups and downs throughout the years.

To the generous locals I met in the Thailand Field Study, the local architectural firms, the relevant Government departments; the Association of Siamese Architects, the National Housing Authority, and the Architecture of State Engineer of State Public Town Planning, the relevant professionals such as urban planners, professors and relevant organisations such as Design for Disasters.

To every single one who has supported me.

Thank you, Home, which has always inspired me.
Primarily, one must take into account that every place and community holds its own unique culture and identity. When a disaster hits, the uniqueness appears to be taken for granted and overlooked. However, one must realise that it is the essential key to a solution for a site-specific issue.

There can never be one path to address a disaster-affected site. Therefore, the local needs, issues, complexities, and resources are the major elements in building the potential approaches. This research design intervention considers both pragmatic and conceptual aspects of the research issues.
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“You treat water like a drowning person. We treat it like a long distance swimmer.”

(Watson & Adams, 2010, p. 240)
"How can I make the community livelihood better?" thought the author.
Figure 7. A view from local stalls. Author's image.
The Nimitmai 40 Road community never expected to face floods. Houses were built with heavily constructed; masonry infill wall with immovable reinforced concrete frame structure. The community was devastated by the 2011 inundation. Their most critical necessities were essential amenities, such as water, sanitation, and the need of stability, (or peace of mind) which were lacking.

1.1 Problem Statement & Research Question

What then is the role of architecture in making a suburban Thai community resilient during these unexpected floods?
1.2 Research Aims & Objectives

This research portfolio investigates the role of architecture to provide resilient options for the community in the time of flooding; to build community and flood resilience. Primarily, it aims to focus on the community’s livelihood. As the research develops, the aim also develops to enhance the spiritual elements of cultural and psychosocial aspects of the suburban Thai community; to minimise the negative consequences of disaster, while offering the facilities to fulfill the community’s needs, ultimately offering the community a peace of mind.

Aim 1.) To build community resilience

Objectives:
- To prepare, to cope, to recover by the spiritual elements of the cultural and psychosocial aspects.
- To sustain ability of a community to withstand, to mitigate the stress of a disaster, and to recover from adversity.

Aim 2.) To build flooding resilience (resilience from the natural landscape for inland flooding)

Objectives:
- To apply lessons from natural systems with the purpose in designing for extreme conditions
- To improve the water resources.

Aim 3.) To sustain sense of place (focusing on place making and place attachment)

Place making:

Objectives:
- To tailor the community and its collective desires, backgrounds, cultural identification and understanding.

Place attachment:

Objectives:
- To allow participation and empowerment to overlook emotional connections to place in order to create an emotional bond to place in addressing place attachment.
1.3 Scope of Design Research

This site-specific research significantly contributes towards research on community resilience, the flood resilience, and the sense of place. By employing the Auckland University Resilient Tool in analysing information gained from the Thailand field study and outcomes of design processes, aspects of resilience, the lack of the cultural and the psychosocial recoveries became the main design drivers and catalysed significant shifts in the design developments.

1.4 Proposition

This design research strives to hearten community resilience by merging Thai monastery, library, and community centre to act as the community ‘mothership’. This can offer the community a peace of mind, fulfill community’s needs and withstand the sense of place by tying the community together, like a spiritual anchor, especially in time of flooding.
"Coming into a realization of the significant nature of my neighbourhood," thought the author.
An overview of each stage of the design research is initiated by my queries as an outline. Research is then provided to justify the scope of each query. Design stage one and design stage two have different sets of case studies to further evaluate and study the developing interventions of the research. This is to be rationalised with the design guideline to inform the research aims and objectives. Thailand field study, interviews with experts, relevant organisations, and professionals are the key methodologies that prove the developing design interventions, which lead to the final design outcomes. As a conclusion to each design stage, the designs are critically reflected, resonating the strengths, weaknesses, and future plans (see Figure 11).

2.1 Research Structure

An overview of each stage of the design research is initiated by my queries as an outline. Research is then provided to justify the scope of each query. Design stage one and design stage two have different sets of case studies to further evaluate and study the developing interventions of the research. This is to be rationalised with the design guideline to inform the research aims and objectives. Thailand field study, interviews with experts, relevant organisations, and professionals are the key methodologies that prove the developing design interventions, which lead to the final design outcomes. As a conclusion to each design stage, the designs are critically reflected, resonating the strengths, weaknesses, and future plans (see Figure 11).
This research engaged with both qualitative and quantitative methodologies. Firstly, initial research and analysis was conducted in relation to the research issues, encompassing the site, the community, and the 2011 unexpected flood event. Literature reviews and initial case studies, including the natural disaster of flood and the responsive systematic innovations, the water-based and land-based background of Thailand, and the theoretical idea of coexistence between the design of settlements and habitats, were all taken into account.

Secondly, a field study is undertaken to document and to assess the current conditions of the site and the community. Interviews with experts and the affected community, were purposed to collect information on their experiences and responses to the occurrence of the 2011 flood. Further information was gathered from the local architectural firms and organisations that have already done relevant researches. Analyses of the existing land-use, community assemblage, and The Auckland University Resilience analysis also proved the lacking aspects of the cultural and psychosocial recoveries. Moreover, flood resilient design, spiritual and traditional values of Thai indigenous architecture, and adaptive residential were examined. Case studies on the flood resilient design were examined to incorporate appropriate land uses and strategies to respond well with unexpected flood.

Further literature reviews in regards to the community resilience, sense of place, place making, and place attachment were broaden to improve the design guidelines, while literatures on community livelihood, risks, and vulnerabilities were also acknowledged. Design strategies, involving the spiritual aspects, further developed into an architectural outcome (see Figure 12).
COMMUNITY RESILIENCE
- To sustain the ability of a community to withstand and recover from difficulty.

FLOOD RESILIENCE
- To maximize the opportunity from the flood threat.
  Prioritizing flood resilience, encouraging designs for extreme conditions as learnt from natural systems and improving water balance as a resource and principal of flood control engineering.
  (By Donald Watson and Michele Adams)

SENSE OF PLACE
Place Making
- Identity of a place in the way that “concerns the connections between people and places, movement and urban forms nature and the built fabric…” (Marichela Sepe)
- To embrace the local scale for elements involving with the materials.
  “Indeed, in order for identity to be captured it needs to be visible at every engagement with place and use for the environment to affect its natural evolution” (By Barbara and Pierino)

Place Attachment
- To emphasize participation and empowerment with the purpose to allow the community to overlook emotional connections to place for place attachment recovery.
  (By Yvonne L. Matsui, Douglas D. Perkins)
  To create a sense of bondedness in creating sense of community is to build the sense of being a part of one’s neighbourhood.
  “Relationships based on shared values and emotions are at their core more meaningful than emotional bonds that do not manifest to community issues alone” (By Spier and Hogger)

COMMUNITY RESILIENCE
- To sustain ability of a community to withstand and recover from adversity.

FLOODING RESILIENCE
- To apply lessons from nature systems with the purpose to design for extreme conditions.
- To improve the water resources.
In time of crisis, the role of architecture acts as the foundation for livelihoods (Boano & Hunter, 2012). In assessing the site, it is important to distinguish the unique and particular factors that the community and the existing site hold, as there are complexities of how they perform in time of disaster.

The relevant professionals have projected a limited perception in responding to the role of architecture in response to flooding. Arguably, a number of them have attempted to seek a better flood resilient architectural proposition. But only a small number of them have pursued and tested their designs, thriving for a bigger goal. However, the community's specific immediate and unique needs, such as facility and accessibility, needed to be investigated and encountered as they seemed to have been missed in these tests. The absent elements in achieving resilience were not only that the community resilience was overlooked but also that the one grounding aspect that offers Thai people a peace of mind daily was disregarded.

### 2.3 Introduction

In time of crisis, the role of architecture acts as the foundation for livelihoods (Boano & Hunter, 2012). In assessing the site, it is important to distinguish the unique and particular factors that the community and the existing site hold, as there are complexities of how they perform in time of disaster.

The relevant professionals have projected a limited perception in responding to the role of architecture in response to flooding. Arguably, a number of them have attempted to seek a better flood resilient architectural proposition. But only a small number of them have pursued and tested their designs, thriving for a bigger goal. However, the community's specific immediate and unique needs, such as facility and accessibility, needed to be investigated and encountered as they seemed to have been missed in these tests. The absent elements in achieving resilience were not only that the community resilience was overlooked but also that the one grounding aspect that offers Thai people a peace of mind daily was disregarded.

The key idea of maximising the opportunity from the flood threat is suggested by Donald Watson and Michele Adams. They significantly emphasise the improvement in water balance as a resource and principle of flood control engineering. Flood resilience is prioritised to encourage designs for extreme conditions adapted from natural systems. The Inland flooding resilient strategy is also suggested, with consideration to the vegetation and adequate habitat in the water movement pathways through the area (Watson & Adams, 2010). This seems to be the key factor of case study for Nimitmai 40 Road.

However, community resilience, highlighted by Anita Chandra (et al), is the ability to sustain a community to withstand and to recover from difficulty. Preparation, protection, ability to respond, and most importantly, recovery, are recommended as the main aspect in building community resilience. In times of emergency, building community resilience is critical. Particularly for Nimitmai 40 Road as deliberate flooding of the area (rather than draining flood water which was intended) was not the intention. Thus, there were minimal to no technical solutions and instead the community was required to depend on their own resilience.

They suggested that it “entails the ongoing and developing capacity of the community to account for its vulnerabilities and develop capabilities that aid that community” (Chandra et al., 2011, p. 9).

Two key responses derived from their studies are to reduce pre-disaster vulnerabilities and to conduct pre-event prevention activities in order to minimise the negative consequences of disaster.

A theory on “interrelationship” between a community and the occupying space, as explored as a collective memory of a place in Halbwachs’ studies (p. 7). This can assist the reduction of the community's vulnerability.

Marichela Sepe expands the idea of identity of a place in the way that “concerns the connections between people and places, movement and urban forms nature and the built fabric…” (p. 9).

While Sepe further argues that the sense of place may refer to the local scale for elements involving the livelihood; “indeed, in order for identity to be captured it needs to establish a deep engagement with place and local life in order to affect its natural evolution” (p. 22).

Moreover, place attachment recovery is encouraged by Lynne C. Manzo and Douglas D. Perkins to emphasise participation and empowerment with the purpose in building community bonding and overlooking emotional connections to place. Frameworks for understanding community interaction as an assemblage leads to this idea of cooperative efforts (Manzo & Perkins, 2006).

Finally, Speer and Hughey claim that “relationships based on shared values and emotional ties to others produce more meaningful and sustainable bonds than emotional reaction to community issues alone” (p. 344): The sense of place, intertwining the place making and the place attachment, plays a pivotal role in the processes of this research.
“It was unexpected and unprepared,” thought the author.
In 2011, a significant rainfall from the highlands of Thailand flooded down to Bangkok around July and some areas remained flooded until January 2012 (Benfield, 2012), in part because much of the affected area was less than 10 metres above mean sea level, some were as low as 1.5 metres (see Figure 14, 15).

By October 2011, the flood inundated metropolitan Bangkok and also started to impact on industries (Haraguchi & Lall, 2015). Decisions were made to close certain gates and thereby better protected these industrial and metropolitan areas. Instead, many other peri-urban areas outside of Bangkok metropolis were flooded and became a reservoir to drain the deluge. Particularly the rural residential areas were getting more severe impacts and a significant increase in vulnerability (Kondo & Sararit, 2005). These areas included the Nimmitma 40 Road area, situated in Khlong Sam Wa district, which is purposely one of an agricultural area with a restriction of residential development (see Figure 16). It was in the middle of the flooding zone during the 2011 floods, when the inundation was unusual and unexpected. It was triggered by both the natural and man-made factors.
Water has always been the norm to Thai culture, transportation, commerce, and economy. Thailand has water-based civilisation. The majority of the population in Thailand has always lived on floodplains. Siamese (Thai) architecture and built environments have evolved accordingly over time.

"In Siam, the two systems interwove considerably" (Na Ayutthayā, 1997, p. 78).

Originally, the principal of the Hindu-Buddhist cosmological model has grounded Siam's strategic urban planning as an articulation of the Thai belief, allowing the Thais to settle in the floodplain. Flooding normally happens seasonally as a repeated cycle in Thailand. In adapting to the unique environment and water based conditions, a tensile material has been used for water-based households and masonry has been used for the land-based household. These are the most efficient structural principles, including floating, standing on stilts, and braced stilt households for the water-based housing (Na Ayutthayā, 1997). Recently, amphibious or water borne systems have started to be developed and tested in Thailand.

Power orientation of the Siamese political culture and the plan of securing strategic alliances of the ruling elite have been foundations of Thailand's mediation of power and signification of identity. This 'welding power' method has become the norm for Siamese society. As a consequence, this norm has become a new perspective of 'civilisation'. Thai architecture has employed modernism, encompassing other twentieth-century aesthetic styles, while Thai inventions have begun to be neglected by its people. Westernisation has critically influenced Thai architecture and built environment until now. The only advantage from this change of perception was Thailand's welcoming responses to technologies and ideas from abroad (Noobanjong, 2013, p. 408).

"Changes on land use and increased precipitation" (Watson & Adams, 2010, p. 49).

However, the 2011 flooding event was a crucial example, demonstrating how floods are "growing more frequent and could be reaching unprecedented size and impact" (Cosgrave, 2014). Thailand water management, disorganised flood prevention plan, inefficient land use and infrastructure, and poor human behaviours were the most critical man-made factors (Watson & Adams, 2010).
"I wasn't at home when the unexpected flood happened. I could only imagine the event from what my parents have explained to me. But I have always wondered about the community and their livelihoods during the 2011 flood. What if the flood occurs again? How can the role of residential architecture allow the community to continue their daily lives?" thought the author.
Figure 18. Flood prevention protecting the Bangkok metropolis. Author's image.

Figure 19. Nimitmai 40 Road Site Plan. Author's image.
From my memory (see Figure 20), this rural residential area where I am from, was normally filled with paddy fields, houses, and communities. It became a pond filled with red Sacred Lotus and fishes, while the community was devastated by the unexpected water influx. During the two to three months of flooding, the community was not able to continue their daily routines and Nimitmai 40 Road became ‘a void’, without a sense of place (see Figure 18, 19).

This preliminary stage investigated the affected community’s livelihood during the unexpected floods. The community’s crucial impacts were water and sanitation service, mental health because of unpreparedness, inefficient immediate solution, and inaccessibility.

The government organisation’s disaster risk reduction approach was with an assumption that the flood may not recur frequently. The community’s current immediate plan targets livelihood recovery by repairing and replacing assets. However, as a long term plan, in allowing a protection of assets (Cosgrave, 2014), initial architectural design response pursued to find the role of residential design in making this community more resilient to such floods, expected to occur in the foreseeable future. Initial site analysis in addressing the 2011 flood at Nimitmai 40 Road was done by studying available online information and creating flood simulation to replicate the situation in 2011. Both theoretical and design approaches through a series of design iterations were tested.
This initial context analysis illustrates the affected areas in Nimitmai 40 Road during the 2011 flood. Referring to available online sources, the community's livelihood was changed as the inundation increased. For example, boat became the new vehicle for the community.

4.1 Initial Context Analysis

This initial context analysis illustrates the affected areas in Nimitmai 40 Road during the 2011 flood. Referring to available online sources, the community's livelihood was changed as the inundation increased. For example, boat became the new vehicle for the community.
Programme analysis of existing residential in Nimitmaï 40 Road demonstrates special elements of Thai household. Thai-style kitchens are usually located semi-outdoors at the back of the house, while the standard kitchen is allocated inside of the house. A living room, a dining area, a storage, a bathroom, a carpark, and a terrace are included on the ground floor. On the first floor, there are three bedrooms and one shared bathroom. Considering the 2011 flood, the community were not able to live on the ground floor due to its inundated situation.

4.2 Programme Analysis

Programme analysis of existing residential in Nimitmaï 40 Road demonstrates special elements of Thai household. Thai-style kitchens are usually located semi-outdoors at the back of the house, while the standard kitchen is allocated inside of the house. A living room, a dining area, a storage, a bathroom, a carpark, and a terrace are included on the ground floor. On the first floor, there are three bedrooms and one shared bathroom. Considering the 2011 flood, the community were not able to live on the ground floor due to its inundated situation.
Flood simulation in addressing the 2011 flood at Nimitmai 40 Road, Three-Dimensional (3D) site mapping allowed a significant degree of details from the knowledge obtained from the context analyses. This simulation also allowed planning scenarios to be applied and presented in a way that can be readily understood and informed decisions to be made. It addressed flood awareness and became a design platform, enabling the conditions to be assessed and complex scenarios to be communicated.

The 3D site mapping also illustrated “the authentic appearance” (Morello & Piga, 2013, p. 454) of the site to be represented by having the author’s input. My memories of Nimitmai 40 Road were implanted into the site mapping, as images possibly are unable to recall the unique identity of Nimitmai 40 Road as argued by Morello and Piga, “the balance of objectivity of forms and subjectivity of experiences related to the place” (p. 457). As a result, this method revealed the lost atmosphere and intangible cultural values as a representation of the “spirit” of Nimitmai 40 Road (Morello & Piga, 2013). This design platform helps set the design guidelines and test design ideas and iterations.

Thus, this efficient communicator showed the 2011 flood simulation from the ground level, ankle level, knee level, and head level, depending on the existing land height. Initial aim was obtained from the flood simulation which was to prioritise the ability for the community to stay above the flood and to engender the principle of livelihood.
Figure 27: As a result from the flood simulation, a mixed media illustrates the 2011 inundation impact on the households, the local’s stalls, the road, and the paddy fields. Author’s image.
Several initial case studies help depict what resilience could or should mean in such a context, which was explored in the preliminary stage. Study of the evolution of Thai water-based and land-based residential designs from the very early years of Sukhothai Kingdom, Ayudhaya Period, Thonburi Period, Rattanakosin Period, and to present were the successful indigenous structure systems that have given rise to the new flood resilient architectural technique, and amphibious architecture.

### Case Study 1:

In regards to the water-based context of Thailand, tensile material was discovered as the most efficient structural principle. Light three-way lattice, floating, and stilts have been the three main techniques that were used in Thai traditional residential design to respond to seasonal floods (Na Ayutthayā, 1997, p. 67).

In Thailand and throughout South-East Asia, masonry and wood were used together to correspond to Thai cultural background and context. As a result of the population shift onto land-based period, masonry architecture was prominently built (Na Ayutthayā, 1997, p. 79).

**Sukhothai Kingdom 1238-1438**

The principal of the Hindu-Buddhist cosmological model was used in the architectural planning. Royal Chapel in Bangkok, Thailand was based on the principal of the cosmological model (Na Ayutthayā, 1997, p. 22).

**Ayudhaya Period 1351-1767**

1. Houses on water (p49-55)
2. Boat houses
3. Stilt house
4. Braced stilts: If greatly exposed to flood, currents and wind, the latter would have to be quite high and braced, that is, triangulated.

Masonry and wooden house

**Thonburi Period 1768-1782**

Westernisation has had a significant influence on Thai architecture since the 1850s. The monarchy, government agencies, and wealthy private citizens, both indigenous Siamese and foreigners, were the three key groups of patrons that led the rise of Modern Architecture to be embedded in the ‘Thai society, as westernisation is seen as a ‘civilised identity’.

“In the future, the Siamese people would say that I am really fond of Western architecture, while being negligent of the culture of my own origin” (Noobanjong, 2013, p. 82). King Chulalongkorn expressed his concern regarding the western influence on Thai architecture. The construction to date proves the western material culture influence in built forms as it generates “a contradiction between the syncretic forms and conflicting meanings of the built environment” (Noobanjong, 2013, p. 408).

**Rattanakosin Period 1782-present**

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**Westernisation**

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Mount Meru

The principle of Mount Meru guided the axis of Thai Monastery architecture. The belief in sea surrounding Mount Meru was incorporated in the urban scale planning. White sand from the sea, heated from being exposed to the sun, was articulated with the lower platform surrounded the Thai Monastery. This metaphorical technique influenced the human’s perception of hell as the hot area and heaven as cool area where the monastery is located. The sense of hierarchy of space zoning articulated the relationship between human occupants and Thai monastery architecture (Chitramukho).

Thai Traditional Residential Design

Natural ventilation studies at a local scale, with the purpose to diminish the heat; the Thai traditional household design portrayed the significance of the stilt system, roof, and platform designs.
Case Study 2: Flood resilience case study

Amphibious residential architecture

The flood resilient designs were based on Archimedes principle that ‘the house’s mass and volume are less than the equivalent of water’.

Amphibious systems allow this residential design to make space for water. Terraces in the landscape design function as an early warning for flooding. The house has two separated structures. A light weight structure, timber framed structure sitting in an excavated ‘wet dock’, allowing the flood to enter and escape naturally, and a clad in zinc, shingles with glazed gables. Akin to a boat, waterproofed concrete foundation wraps around the lower ground floor of the house.

Project: Amphibious Homes
Architect: BACA Architects
Location: An Island in The Thames, the United Kingdom
Case Study 2.1: Flood resilience case study
Amphibious residential architecture

This successful design intervention responds to the Thai 'civilised' circumstances, influenced by the rise of modern and westernisation. This design uses a prefabrication system, which has a short assembly timeframe. It therefore enables the design to be used effectively during unexpected flood events. This amphibious housing system was successfully established and tested in Thailand in September 2013 as a response to the prediction that Bangkok could be under water in 15 years from now and the recent 2011 flood event. This case study demonstrates the capability of the amphibious system and its integration with Thai household.

Project: Amphibious House
Architect: Chutayaves Sinthuphan
Location: Ban Sang, Ayutthaya Province,
Thailand

Case Study 3: Landscape case study
The design of Watersquare Bethemplien raises an awareness of community engagement and public play. Their proposition reveals in an urban scale, through effective use of the land, which results in a design for mutual benefits between being a public space and being a hydrological reservoir in order to retain flood inundation during the heavy rainfall.

Project: Watersquare Bethemplien
Designer: De Urbanisten
Location: Rotterdam,
The Netherlands

Figure 33 (top). Section diagram demonstrates the public function and flood resilient design, functioning as a reservoir during heavy rain.

Figure 34 (bottom). Plan view shows the rain flowing from the surrounding roof public area that can function as a reservoir.
4.5 Concept I: Community as Generator

Initial residential design concepts responding to the 2011 floods significantly grasped the idea of having ‘the community as generator’. This preliminary idea encouraged one household to be self-sustained and to be able to generate three primary factors for livelihood; water, food, power. This community resilient approach aimed to decrease the level of vulnerability and sustain the community livelihood (Hamdi, 2010). This place-making design strategy encouraged the consideration of the built environment as being for the community that lives within it. Basically, it can be described as ‘a house becoming a home’. The preliminary aim then expanded to allow each household to be connected and to revive the community during flooding. Community participation was one of the place-making kit in tailoring the community’s culture, understanding, and desires to the ‘void’.
4.6 Design Iterations

The standard household was able to be lifted vertically in the occurrence of inundation with the application of the amphibious system. This enabled the community to live at home during flooding.

The amphibious system allowed each household to be able to adapt vertically along the flood heights. The idea of allowing a household to be lifted up during unexpected floods and descended back down when the flood receded.
Roof form and water catchment design as a response to the rain.

In exploring the 'community as generator' concept, water management in a local scale was the focus. This iteration aimed to achieve the integration of the use of courtyard in Thai household and water catchment strategy.

Final preliminary iteration of residential design extended from the existing local stalls

This final iteration of the preliminary stage demonstrated the integration of the Thai indigenous architectural qualities, 'extended household', and water catchment where the local stalls and paddy field are located. Water catchment was incorporated to maximise the opportunity for the community's capacity in self-sustaining. The residential design extending from the existing local stalls articulated the concept as the stalls were not inundated in the 2011. The design continued the structural language of stilts from the local stalls which had the potential to develop into the amphibious system.
4.7 First Review / Preliminary Study

4.7.1 Overview
The preliminary iteration addressed the 'community as generator' concept with the purpose to achieve flood resilience and community resilience. According to the preliminary design outcome, the stilt system can be further developed into an amphibious system as an extreme solution to flood resilience. However, this arose an issue involving the existing paddy field which was located underneath the design intervention.

Moreover, these iterations developed an argument, considering Nimitmai 40 Road's confinement and restriction. They suggested a change in direction as the initial research seemed to miss an essential aspect which further led the research to a subsequent progression.

4.7.2 Critical Reflection
The preliminary research conveyed the potential for the interplay between Thai indigenous residential design quality and the innovative system in achieving flood resilience. However, the site response during the flood needs to be further explored, especially the site with paddy fields. Hence, further site study needs to be investigated, especially the land levels, and the community assessment.

4.7.2.1 Strength
"Create the opportunity of turning the threat of flooding into the opportunity for resilient design of our buildings and communities" (page XVIII).

Allowing lessons from past events in making better preparations and protections to reduce risk and vulnerability, this initial research aimed to sustain the community to withstand and to recover from the flood.

4.7.2.2 Weakness
The existing western influenced style houses and the site condition of paddy field occurred to be a critical site constraint.

4.7.3 Conclusion
The 'community as generator' concept acted as a flood resilient design for Nimitmai 40 Road. The experiments were encouraged to further analyse the research issue to consider the community livelihood. Furthermore, this initial design and concept had the potential to be a good example where refuge replicate.
“When I revisited my home area as part of a field trip, I came to realisation of what actually happened, how the community actually resided, what was needed, what were their solutions, and what are their perspectives on the future?” thought the author.
Figure 42: View from the local's stalls. Author's image.
The key methodology of this research was the Thailand field study and interviews with the experts, relevant professionals and organisations and Nimitmai 40 Road community. Assessment of the current site and the community condition identified the site restriction and confinement, and acknowledges critical responses from the community.

The characteristic of the context and the community were documented and analysed. The land height, the local resource and craft, and the community characteristic were investigated. Light timber material and stilts structural system used for the local stalls informed the consideration of adaptive indigenous architecture as they act as the systems for the flood resilient design and cross ventilation. Thus, this study conveyed the unique identity of Nimitmai 40 Road and its community, which were valuable to the design considerations (see Figure 43).

Comprehensive knowledge and different perspectives were gathered from relevant professionals and organisations, such as Thai architects, urban planners, local architecture firms (who have different design approaches in relation to Bangkok floods), and local organisations, National Housing Authority and Department of Public Works and Town & Country Planning. A number of architecture firms have undergone similar studies, focusing on either conceptual or practical aspects. As a result, it was suggested to investigate the infrastructure, such as services, instead of the water borne system.
Figure 44 (top). Photograph documents the local craft and construction. Author’s image.

Figure 45 (bottom). Photograph documents another construction technique from the locals. Author’s image.

Figure 46. A close-up photograph investigates the local’s furniture design, craft, and construction. Author’s image.
5.1 Assessment of Site Conditions

“Visualisation is about the relationship between images and human creativity” (Burnett, 2005, p. 14).

The site context was documented by sketches, photographs, videos, and having personal experiences with the community. These discursive, intellectual, and emotional media were used to analyse the site context and to further contribute to the digital design platform.

5.1.1 Impacts & Responses

A number of trees and plants died. There was a lack of production for the farmers from the rice paddies. The houses were inundated as the mass of water arrived. Not only the furniture was damaged, but the floods also left dirt and smells in the households. Land subsidence has been the common long term impact occurring in most of the households.
5.2 Assessment of Relevant Professional and Organisation

All ‘experts’ agreed with the stance on the research issue in building community and flood resilience. However, they have focused more on the residential issue and water borne system. Their aims were to generate either practical solutions or innovative solutions that introduces new theoretical approaches.
5.3 Assessment of Nimitmai 40 Road Community

The community leader and the affected households revealed current pre-warning media; news and government representatives. Because this community has never had severe flooding, the majority of the people never expected the inundation to impact their properties. They expected the flood to be only a few centimetres high. The unpreparedness resulted from the lack of knowledge about both the site condition and an efficient response.

1. Preparation:
A common preparation of the majority of the community was to layer sand bags by their household’s openings and to move their furniture. Unexpectedly, the flood was inundated from the soil and underground pipes. Therefore, the sand bags were not an effective solution. Fleeing and living on a higher ground were their immediate solutions. Unfortunately, the provided evacuation centre was occupied only by the desperate elderly or certain affected people, while most of the affected people preferred to stay in their own houses. The evacuation places were allocated at two neighbouring buildings which are normally the community clubhouse and a school. The critical issues were lack of privacy and accumulated anxiety in leaving their properties.

2. During the flood:
Firstly, accessibility was the main issue. There was no public transportation and only bigger vehicles were able to access the area. Secondly, water contamination also attracted insects such as mosquitos, as well as mould. The locals from all parts of Thailand contributed and delivered foods. However, the food was never enough. Luckily, plenty of fish came with the floods. They were the key supply that helped sustained the community.

3. After the flood:
Thorough cleaning and repairing the damages (mainly the floor tiles with cement underneath and walls) were the first priorities. The major concerns of the community were the health and well-being, especially the mental health. Unfortunately, there were no post disaster plans, only an amount of funding from the Thai government was given to the affected households.
5.3.1 Impacts & Responses

The deluge has given both short term and long term impacts to the community in regards to the livelihood, natural environment, and assets.

“The probability of an outbreak increases when populations are displaced, and when there are interruptions to water supply, sanitation, and health-care systems.” (Congreve, 2014, p. 17)

- Livelihood has had impacts with both short term and long term consequences. Temporary relocation was a common response when faced with flooding. In a long run, some households have decided to relocate permanently. However, temporary relocation can be a positive solution if the spiritual value of the community can be revived.

- Water and Sanitation Services
  The water and sanitation services and utility connections, such as electricity, water, sewage, and natural gas were the main issues. The affected households were not able to live on the ground floor due to the water blockage in the bathrooms.

- Natural Environment
  Affected environment, such as landslides and land subsidence were the critical impacts on site.

- Health and Well-being
  Long term impact on health and well-being of the affected community has resulted in stress and anxiety during the two month period of flood duration.

- Lost Assets
  Unbelievably, thieves took advantage of the situation and caused the accumulation of anxiety.

- Destroyed Assets
  Destroyed assets were a minor concern as they were repairable and affordable.
Figure 54. Photograph of the affected household shows long-term consequence from the flood. Author’s image.

Figure 55. Photograph of the affected household shows long-term consequence from the flood. Author’s image.
Figure 56: Photograph documents abandoned houses to emphasize the long-term consequence, land-subsidence, from the flood. Author’s image.

Figure 57: Close-up photograph documents abandoned houses to emphasize the long-term consequence, land-subsidence, from the flood. Author’s image.
"No one wants to leave," said the community.

The study area filled with paddy fields, swamps, ponds, households and peacefulness. As a collective community it has a unique identity which contributes to the sense of place. As the community’s post disaster solutions, rich local craft and construction were developed to respond to the floods. Short period construction techniques and the community’s skills were used, akin the adaptive architecture. This community resilient solution should be further incorporated to the design development.

"Turning the threats of flooding into Opportunity" (Watson & Adams, 2010, p. XV).

Thai’s fundamental characteristic believes in hope and seeks to be optimistic, even in a desperate time. From the ‘experts’, they agreed on the positive determination in generating positive prospects from the threat.

"Plan for the longer term: planning is the least costly strategy and requirement for due diligence, to assess risk and determine solutions, ready to be implemented as opportunities and needs appear" (Watson & Adams, 2010, p. 223).

As a result from the field study, both immediate and long term plans were encouraged. The relevant professionals and organisations have suggested the immediate needs to be further considered, instead of focusing on the water borne system. The needs involve people and place, specifically the culture and its rituals. Thus, the sense of place has an obligation to shape the community and the place. Place making is necessary. This encompasses the spiritual values of the community’s livelihood, belief, quality of life, health, and well-being.

The power of Buddhism came to realisation, where the monks are like the spiritual anchors of the community. They offer a sense of stability, continuity of life, and a hope for the community. They are the most significant part of Thai society, tradition, and culture, as the key source of a peace of mind. Becoming a monk, for at least a period of time in their life, is every Thai males’ aim to do for their parents and respected ancestors. The field study revealed that not only monks depend on the community but the community depend on the monks. This showed a relationship where the monks hold the soul of the community, which I personally found invigorating, even if I am Thai. This field study evoked questions about who will feed the monks during the flooding, especially in unexpected occurrence.

However, the site limitations have put into realisation that the amphibious system was inapplicable to this site-specific issue. The main points made were that the amphibious system is a successful system but it has not been developed to be equipped for the occupant to survive in the flood event in Thailand and, most importantly, water and sanitation was suggested to be the focus of the further research.
Figure 59. Mixed media shows the community making merit in their morning ritual. Author's image.
Chapter 6 Design Guideline

6.1 Design for Resilience: Flood and Community Resilience
   6.1.1 Flood Resilience
   6.1.2 Community Resilience
   6.1.3 Auckland University Resilience Tool
      6.1.3.1 Cultural and Psychosocial Aspects

6.2 Sense of Place & Sense of Community:
   6.2.1 Place Making and Place Attachment
      6.2.1.1 Place Making & Place Attachment
Figure 60. Photograph portrays the paddy fields and the western influenced residential design. Author's image.
6.1 Design for Resilience; Flood and Community Resilience

6.1.1 Flood Resilience

- To maximise the opportunity from the flood threat.

Flood resilience is to be prioritised by encouraging the design’s aim for extreme conditions, as learnt from natural systems and improving water balance as a resource and a principle of flood control engineering (Watson & Adams, 2010).

- Resilient Design Derived From The Natural Landscape.

Natural elements can be used to balance the amount of water in the natural cycle of precipitation, such as vegetation, evaporation, watercourses, and reservoirs (Watson & Adams, 2010).

- Resilient Design for Inland Flooding.

Natural features are to be protected as they provide ecosystem services, allowing the movement of water through the area, wet areas and flow pathways (Watson & Adams, 2010).

6.1.2 Community Resilience

"Entails the ongoing and developing capacity of the community to account for its vulnerabilities and develop capabilities that aid that community in.” (Chandra et al., 2011, p. XV)

Community resilience (Chandra et al., 2011) is to sustain the ability of a community to withstand, mitigate the stress of a disaster, and recover from adversity.

2 key responses:
1. To reduce pre-disaster vulnerabilities
2. To minimise the negative consequences of disaster

Applying and adapting "the normative qualities to the indigenous contexts" (Sintusingha, 2006, p. 169) of the suburb of Bangkok.

1. To generate ‘mediate change’
2. To engage at a local level.
In assessing the 2011 flood event in Nīmatūrī 40 Road situation in the Auckland University Resilience Tool, it reveals the lacking cultural and psychosocial aspects. Other lacking aspects include land-use planning, economic recovery, monitoring and evaluation, legislation and regulation, and stakeholder management.

6.1.3 Auckland University Resilience Tool
6.1.3.1 Cultural and Psychosocial Aspects

In assessing the 2011 flood event in Nīmatūrī 40 Road situation in the Auckland University Resilience Tool, it reveals the lacking cultural and psychosocial aspects. Other lacking aspects include land-use planning, economic recovery, monitoring and evaluation, legislation and regulation, and stakeholder management.
6.2 Sense of Place & Sense of Community; Place Making and Place Attachment

6.2.1 Place Making & Place Attachment

- Place identity in the way that “concerns the connections between people and places, movement and urban forms nature and the built fabric…” (Sepe, 2013, p. 63).

The sense of place is built by the relationship of Nimitmai 40 Road and its community. The local skills, resources, and the local’s “shared values and emotional ties to others” (Manzo & Perkins, 2006, p. 344), such as materials, craft, and construction skills, are to be encouraged to build “a deep engagement” (Sepe, 2013, p. 22). This is to emphasise “participation and empowerment” (Manzo & Perkins, 2006, p. 335) and to create community bonding with the purposes to sustain the identity and to allow the community to overlook emotional connections to place as a recovery.

- Place making “mediates the interests and values, cultural norms and religious practices of all the different and sometimes conflicting kinds of community we find in place: communities of interest, cultural practice and resistance” (Hamdi, 2010, p. 33).

Site-specific interventions are to focus on building resilience, reducing vulnerability, and sustaining livelihoods:

1. Identify activities.
2. Examine needs, aspirations, and assets.
3. Prioritise problems and opportunities; symptoms and primary and secondary causes of the problems.
4. Investigate tangible and intangible aspects, such as skills, materials, land, neighbourliness, social, physical, financial, natural assets, and human resources assets.
5. Design for changes for the community to adapt in order to deal with problems and implement options.
“Who will feed the community? Who will feed the monks?” thought the author.
In addressing the new knowledge from the Thailand field study and acknowledging the design guideline, people and place of Nimitmai 40 Road, in regards to the culture and the ritual, were to be articulated. Water and sanitation, health and well-being, livelihood, and privacy for each household were the community’s immediate needs. By employing the Auckland University Resilient Tool, it evidenced the lacking elements of the community’s recovery; the cultural and psychosocial aspects became the focuses on this development design to capture the spiritual values of the community’s livelihood.

In discovering the way to unlock this research issue, I realised the power of Buddhism. In this case, monks have always been the ones who offer peace of mind to the community in their daily lives. Thus, monks seemed to depend on the community. However, the previous investigations informed that the community is dependent on monks instead. This proved that the monks hold the soul of Thai community. This invigorating way of holding the community and the place together can build community resilience, fulfilling the community’s immediate needs, generate preparedness, and ensure recovery.

The community and its unfortunate land have the potential to develop resilience in flood and community by sustaining the sense of place and community. Hence, the research then took the shift to develop into the concepts of ‘Water as Blood’, ‘Thai Monastery as Spiritual Anchor’, and ‘Emergency Residential as Community Assets’. These design interventions of ‘Suburban Core’ concept aimed to allow the community to harmoniously live with the inundation, rather than to have a war against the water. Flood resilient design was also comprehensively articulated in the roles of architecture and urban fabric.
Who will feed the monks?
Who will feed the people?
2011 Unexpected Flood at Nimitmaj 40 Road (suburban of Bangkok, Thailand)

Assessment of Current Conditions

2011 Flood

Impact

Community Place

Response Plan

Design Research

Identification of site

Restrictions and confines

Possible improvements

Site Investigation

Interviews with Experts

Affected residents in the community

Architectural firms

Professionals

Organisations

Design Consideration

"Flood Resilient" "Sense of Place"

Water

Electricity

Food

Transportation

Natural Environment

Cultural

Spiritual

Religious

Economic

Social

Livelihood

Figure 68. The new obtained knowledge results in a developed research investigation and focus. Author’s image.

Figure 69. Developed concepts depicted from the developed research aims. Author’s image.
7.1 Context Analysis

Another site analysis was undertaken as a result from the new information accumulated from the field study. The food distribution centre during the 2011 flood was plotted to determine how far into the site the community can receive help. People's daily routine movement was studied, depicting the communal centres which are located on the main roads alongside the paddy fields. Waterways were projected to see the potential flood circulations. This pinpointed the design decision in allowing the community to be prepared to adapt their livelihood to the inundation. This site analysis also investigated the urban fabric, in terms of the existing surrounding resources and properties.

In Thailand’s official seasons, summer is from March to June, while the hottest period is normally from April to June. This has the average temperature of 36 degrees Celsius. Monsoon season starts from July to October. It varies from afternoon showers to major flooding. After that, winter normally begins, when the landscape is lush and temperature is cooler, which is approximately from November to March.
7.2 Concept II: Suburban Core

'Suburban core' generally aimed to offer a peace of mind to the community, while providing designs for preparedness, coping, and recovery for the community. This informed the research issues regarding the community livelihood and the sense of place. They were aimed to be sustained by the spiritual approach of the cultural and psychosocial aspects. It also responded to the challenges from the initial stage, asking if Thai vernacular design can be integrated in the design to serve for the community.

7.2.1 Water as Blood

"Vetturale di natura" (The vehicle of nature) Leonardo Da Vinci
(The belief that the water to be to the world what blood is to our bodies.)

Instead of transferring "flood risk by reducing flood risk in one location only to increase it in another" (Jha, Bloch, & Lamond, 2012, p. 489).

The community's current solution to the inundation was to create a landfill to raise their properties. To begin with, the contribution of land use planning allowed the mitigation of urban flooding. The 'water as blood' concept, a notion communicating how the water is to the world, was similar to how the blood is to our bodies. This strategic approach was integrated into the urban fabric to develop flood resilient designs towards more adaptable and incremental non-structural solutions, instead of hard-engineered defence solutions. It included advanced warning systems and catchment locations; flood storage, environmental buffers, infiltration plantation, and recovery strategies (Jha et al., 2012).

Layers of flood resilient design were applied in the urban design to function in both normal time and during flooding. These layers performed in phases; transition, absorption, and mitigation during flooding. Low land level area were allowed to be turned into canal, as flood storage. The outer layers, soft edges, functioned as defences with the purpose to be the early warning system. They also were the first catchment location. Secondly, park bio-swale was designed to be the second stage to delay the flood. Permeable paving was designed to be the inner layer which was the last flood catchment storage before approaching the built environment area.
The water is not a problem but an inspiration. Instead of denying entry to it, Scarpa allows it to flow more freely. The idea of linking the terra firma, allowing the water to move from front to back and canal to courtyard, captures almost like a vessel to accommodate the water in its recurrent floods. It acts as a mechanism that aims to transform the dimensions and the perception, which stems from the changing height of flood at different times of year. It conveys a great example that maximises the opportunity in building the community and flood resilience, especially in addressing the health and well-being issue. This approach interprets a more adaptable solution which can be integrated in the design iterations.

Project: Fondazione Querini-Stampalia
Architect: Carlo Scarpa
Location: Venice, Italy
“Building community-wide resiliency”

Efficient flooding resilient design strategies for the lowlands include creating space for ecological rehabilitation and water storage by maximising the reverbed and providing water storage. Secondly, improving the water quality encompasses upstream re-infiltration of purified waste water and connects the urban area to the river. These strategies aim to improve the urban quality and local identity which can be incorporated with the design objective.

“Create affordable opportunities for people to live out of harm’s way.”

Project: Rebuild by Design
OMA’s Comprehensive Strategy - Resist, Delay, Store, Discharge
Location: Hoboken

These flood treatment strategies are efficient for both during inundation and in normal time. The designs allow more water storages and natural flood treatments to co-exist with the community and the public.

Project: Copenhagen Strategic Flood Masterplan
Architect: Ramboll Studio Dreiseitl
Location: Copenhagen, The Netherlands

Figure 75 (top). Drawing shows the efficient flooding strategies. Author’s image.
Figure 76 (bottom). Urban fabric strategies to delay water. Author’s image.
7.2.2 Thai Monastery as Spiritual Anchor

Thai monastery was the focal hierarchy of this design intervention, aiming to provide communal prayer hall and monks residential units. It was purposed to be the location where the food contribution is able to be delivered to. Thus, the prayer hall was classified as the most significance space for the community as it held meditation and ‘Vipassana’, which was the ways to discover wisdom within oneself. The highest teaching key concept called ‘Dharma’, The Great Truth that is embraced in the Buddhism, was revealed within this development.

Programme planning considered the monk’s routine, i.e., they read and study during daytime and meditate and sleep in night time. Hence, electricity and artificial light were not required during both times of the day. In responding to their daily activities, natural environment, and daylight, the design allowed cross ventilation to cool underneath the roof and floors, while provided shading from the sun. Relationship between Thai Monastery architecture and human was articulated. Building form was designed to be rectangular to embrace the sense perspective, perception, and memory, while the roof form design intended to be perceivable. Sense of balance, discouraging sense of complication, offered emotions to the design. A journey containing a sense of soothing of the circulation design was an articulation from the Buddhism belief of tranquillity.

Figure 78: Local’s morning ritual of making merits conveys the power of Buddhism. Author’s image.
7.2.2.1 Case Study

The design encourages the occupants and the nature to co-exist harmoniously. The roof is designed to allow the natural light to enter and the wall is designed to allow a cross ventilation. These sustainable design techniques do not only maximise the natural surroundings, but also reminisce the Buddhism teachings. The Buddhism teachings significantly embrace in the simplicity of its form and spatial design which encourage a sense of minimalism. Thai architecture incorporates water into the design. This project uses water as a transition between the outside and inside worlds. It is also used to protect the educational architecture, such as the library, from termites. The fence design integrates water services and circulations. Land inclines, where the fence sits, function as a device to allow the water flow.

Project: Wat Khao Buddhakodom
Architect: Suriya Umpansiriratana
Location: Si Racha, Chon Buri, Thailand.
7.2.3 Emergency Residential As Community Assets

Reflecting the nature of 'Thai extended households', the residential unit acted like a modular system, where the house units surround a central courtyard as the family expands. The timber stilt structural system can easily be constructed for the extensions. Settlement on tropical climate had a big influence on traditional construction, form, and technique, particularly in Thai traditional design.

The adaptable design strategy was tested to discover its confinement on the specific site. It aimed to act as a community asset. It achieved the aim to minimise the building footprint on the paddy fields. As a further development from the preliminary stage, the existing stalls acted as the main structure that allowed spaces to be expanded vertically and/or horizontally, while supported by the structural braces and folding structural system. The methodology of stretching and expanding allowed adaptability, thus the residential units can be used when required, especially during flooding.

This set of iterations aimed to embrace the sense of community in the way that allowed participation and mutual interests to create the community bonding. The final iteration was designed for four households to share one courtyard, two bathrooms, and one kitchen. This development was designed to be adaptable by having the mechanism that allows each unit to be foldable and expandable horizontally. This approach allowed the community to occupy the units when needed. Ramp was the main circulation that circulated around the shared courtyard to connect the household units.
7.2.3.1 Case Study

“To dwell in a house, amongst the dense urbanity of small houses and structures can be associated to living within a tree.”

The concept of ‘habiting a tree, not resembling a tree’ suggests the adaptable design strategy of ‘lack in width, make up in height’. Instead, Fujimoto created ‘a vertical corridor’ by stratifying floor plates in a furniture-like manner to act as stairs and interlink rooms that allow the residents to occupy upwards. It also has different types of functions within the structure: circulation, seating, and working spaces (fig. ). This strategy informs the use of stairs and platforms in traditional Thai residential design. Furthermore, this design tests a principle of overlapping of parallel lives’ which encourages the idea of having people to live together. This is a great example in preparation for the predicted issues that may happen in the future, especially climate change.

Project: House NA
Architect: Sou Fujimoto Architects
Location: Tokyo, Japan

The design intends to keep the harmony between the design and the surrounding context. Two structures-like boxes contain private zones which are connected by the public zone that sits in the middle. The private and public zones are stitched by allowing the wind and sunlight to mitigate through the public zone, where natural wood is used. This allows a sense of nature, easiness, and spaciousness to be evoked.

Project: Mascara House
By: MA-style architects
Location: Japan
7.2.3.2 Adaptive Residential

Amphibious system is integrated in the LIFT House design as a preparation for the constant threat of flooding in unregulated flood zones as Prosun aims to allow the design to negotiate the pending shifts in the ecologies of our future. Lifting and floating up on buoyant foundations are the two amphibious structures that enable people to adapt to rising water levels.

The design adapts the uses of indigenous material and local skills to include all basic services, without having to connect to the city infrastructure. Backyard or front yard of a house is considered to be a valuable space to connect people and their livelihoods. Hence, a communal courtyard for 8 households is designed to be raised by using the soil from excavation. It purposes to provide shared amenities, especially water and sanitation. The service spine contains accesses to service lines, water cistern, and composting tanks, allowing washrooms, toilets, and showers to be provided on both levels. The spine is designed to be the only section of the house that is static on ground. During flooding, it acts as the vertical guide and the top of the spine also becomes an elevated pathway and safe exterior space for community interaction.

The water system purely depends on recycling rainwater through non-mechanised systems by providing catchment area. In the first cistern, the roof and the top flood slab of the service spine collect rainwater then pass through filtration. In terms of the primary source of water for activities, such as bathing, washing clothes, and cooking, comes from the hand pump on the top of the service spine. For drinking water, the water from the first cistern is then further boiled and passes through bio-sand filtration pipe.

The design idea of creating system with a permanent separation from ground, independently allows the occupants to provide the human capitals. It informs the community and flood resilience. Indigenous materials, such as bamboo and water bottles, and the water treatment system convey a strategy to improve the water resource.

Figure 84. Mixed media illustrates the amphibious system in response to flood. Author’s design

Project: The LIFT House
(Low Income Flood-proof Technology)
By: Prithula Prosun
Location: Dhaka, Bangladesh
7.3 Design Iterations

The research solutions were divided into two main focuses; one aimed to provide permanent solution for the community and one purposed to prepare for emergency. Water as Blood (designed for the urban), Thai Monastery as Spiritual Anchor (designed for the community’s mothership), and emergency residential (designed for the community’s assets) aimed to help the community in recovering from the 2011 flood and preparing the community for the future floods.

The design iterations, subjected to the mothership and community's needs, intended to build the community and flood resilience in order to strengthen the lacking aspects of the Nimitmai 40 Road community recovery which were the cultural and psychosocial aspects.

Design iterations of the Emergency Residential as Community Assets (designed for the community to reside during flooding) integrated Thai traditional residential design and the adaptable systems in order to inform the research issue in allowing the residential design to offer both the basic facilities and the sense of community to be built in a short time frame by the community.
Initially, assessment of environmental study in different seasons of the year examined the sun directions, the surrounding context, land use, and the relationship between the urban surrounding and the existing architecture were significantly considered throughout the design iterations. The site is where three major zones intersected, water resource, paddy fields, and residential area. The relationship between the existing housing and the surrounding was analysed to see the difference in land height. These analyses, especially the sun analysis, help form the design decision.

7.3.1 Water as Blood

Initially, assessment of environmental study in different seasons of the year examined the sun directions, the surrounding context, land use, and the relationship between the urban surrounding and the existing architecture were significantly considered throughout the design iterations. The site is where three major zones intersected, water resource, paddy fields, and residential area. The relationship between the existing housing and the surrounding was analysed to see the difference in land height. These analyses, especially the sun analysis, help form the design decision.
An intersection of the community movement daily held the most important area by adopting the sense of hierarchy. Nimmitmai 40 Road represented a body and the community movement in their daily lives occurring on the streets which acted as the ‘spines’. People and flood were the energy sources which were like the blood in our body.
The theory grounded the design iterations in the sense of hierarchy in space planning was the root of Thai architecture, Hindu-Buddhist cosmology. This cosmology represented the taxonomy which was the nature of Thai culture and society. The most significant space was located in the centre and the highest of all, similar to Mount Meru concept. This cosmology represented Buddhism which played the main role in the recovery strategy. Buddhism was the core philosophy for Thai people, in terms of how to live one’s life (see Figure 87, 90).
Along the spine, the intersection of the four main zones which is fulfilled with necessary resources, allocated the Thai Monastery. It expressed where the most important place, embracing the spirit of the community. The diagram articulated the placement decision that echoed the sense of anchoring the community and the place.
Illustration showed the assessment of the existing site context that was overlapped by a demonstration of how the urban context with the conceptual designed environment and the conceptual architectural design were designed to respond the floods.

In testing the potential roles for the urban fabric in building flood and community resilience, the urban context required to be subdivided into a storage area, a filtration area, an integration area, and a defence area. The urban design decisions also considered the architectural design concepts and their functions in responding to the floods. As a mechanism to stitch the community and place, Thai Monastery targeted to offer a main prayer hall, a meditation area, an educational area, and Monk cells. In providing both facilities and knowledge, such as books, resource room, workshop, and planting area, a conceptual library design was iterated to allow an integrated role as an educational place and a centre for the community. Emergency residential design iteration simply offered bedrooms and living rooms. Additionally, shared programmes, such as bathrooms, terrace, and storage, were included in all of the conceptual design ideas.
Figure 90 (opposite). Illustration shows the developed design process in locating the Thai monastery. Author's image.
Programmes and requirements

Residential: (Approx. 360 households)
- Bedroom +2 (x90)
- Livingroom +1 (x90)

Shared space:
- Kitchen +1 (x90)
- Bathroom +1 (x90)
- Terrace +1 (x90)

Thai Monastery:
- Main Prayer Hall +2
- Terrace +1
- Storage

Monk Cells:
- Bedroom +4
- Living room +4
- Terrace +4

Shared space:
- Kitchen +1 (x4)
- Bathroom +1 (x4)
- Terrace +1 (x4)
- Storage

Library as Community Centre:
- Books
- Resource Room +5
- Study/work area +5
- Workshop +5
- Planting Area
- Festival Area
- Storage
- Bathroom +10
- Kitchenette +4
- Health-care +5
- Storage
- Bathroom +10
- Changing room +10
7.3.2 Thai Monastery as Spiritual Anchor

To live peacefully, it involved with the spiritual aspect, in terms of both tangible and intangible elements. Thai monastery aimed to act as the mothership, where the community can feel secured and less vulnerable. As a result from the study of Thai monastery’s spatial zoning, the main prayer hall centralised the community and the place as it was prioritised as the most spiritual space. It was surrounded by terrace which functioned as a circulation route for both the monks and the community. Monk cells design was allocated by the four corners of the prayer hall as a protection of the mothership. The design iteration articulated the rain as a mechanism to offer privacy and to cool the temperature. At the same time, the roof design also allowed the architecture to be the mechanism in allowing the storm water to be filtered, stored under the new ground level, and recycled for the community’s use.

These fundamental elements of Thai traditional architecture, such as stilts structural system, roof form, terrace, spatial layout, and circulation, were integrated as a response to the research objectives. The relationship between water and Thai traditional architecture was encapsulated. This set of design iteration offered an opportunity to allow the community to be encouraged to live harmoniously with the flood.
A vernacular feature of Thai architecture, Fah Lai, is a natural ventilation-controlling system that is normally used in Thai traditional wooden residential design. Fah Lai system is adjustable wooden slates. The ability of operable and closable slates allows the occupant to control the ventilation flow in order to control the room temperature. On the other hand, Fah Lai also functions as a mechanism that controls people’s perception.
Looking ahead of now, an estimated calculation proves that, if the emergency residential can be repeated in the surrounding paddy fields, all of the households in Nimitmai 40 Road community will have a shelter during an inundation.

Estimated calculation:
- Approximately 80 households per 1 street = 720 households.
- Approximately 100 households per 1 street = 700 households.
- In total, approx. 1,420 households.
- Average number of people in 1 household = 4 people/1 household
- Approximately 1,420 x 4 = 5,600 people in total
- Allowing 6 people per 1 household
  - 5,600 / 6 = 947 people
  - 1,420 households / 6 = 237 households
- Area #01 = 90 core
  - (Allowing 1 core per 4 households)
  - 90 x 4 = 360 households
Similarly, the emergency residential design reminisced Fah Lai. It adopted an innovative foldable system. The design intended to sit on paddy fields, hence the research aimed to minimise building footprint on the paddy fields (see Figure 97).

This design intervention aimed to embrace the sense of sharing. The design iteration examined the idea of accommodating four households (2 bedrooms and 1 living room per one household) which was connected by a main ramping circulation route, providing two shared bathrooms and one shared kitchen. The ramp circulated around a water storage which was designed to collect the rainwater. Water pipes from the water catchment area, bathroom, and kitchen were to be filtered and reused (see Figure 95, 98).
7.4 Second Review: Development Design Evaluation

7.4.1 Overview

The outcome of these developed iterations could not be the answer to all affected communities in flood prone context. It was rather a site-specific solution that was an example, capturing the cultural and psychological aspects, to offer the community a peace of mind for them to hold onto during flooding.

7.4.2 Critical Reflection

The knowledge gained from the pro-active methodologies during the field study has shaped this design research into a realisation of the nature of my neighbourhood. This design intervention depicted the research aims in balancing crisis preparedness and disaster resilience to encourage the community to consider disaster risk in their broader planning and to take action to reduce risk as a reflection from the interviews with the experts.

7.4.2.1 Strength

The community's coping and recovery phases, achieving the cultural and psychosocial aspects, were also informed in the design. The theoretical framework of community resilience was met by including the basic needs, qualities, access to external resources, ownership, control of assets, and capacities.

7.4.2.2 Weakness

In aiming to activate the 'suburban core', this design could have developed to become a mechanism that allowed the community to not just live harmoniously with the flood, but also further considered reducing risk and vulnerability. In nurturing the research aims, the research issue was necessary to be distinguished as either disaster or ecological. This brought into the questions in investigating how to survive, settle, and feed people. The challenge pinpointed was how the vernacular architecture and the spiritual aspect can be integrated in the design to activate the role of architecture for the community in responding to the unexpected floods.

7.4.2.3 Conclusion

In developing to the ‘suburban core’, the interviews with the experts during the field study revealed the new knowledge which had a significant impact on the research development and became the guidance for the design decisions. The research issues were initially unlocked by interlocking the community and the place setting by this design intervention. It generated a place representing the 'heart' of the community and developed the emergency residential offering shared households. The iterations explored the purposes of being resilience. This illustrated the further understanding of the community's vulnerability as an outcome from assessing the previous analyses. In particularly, the field study has set the new comprehensive purpose to embrace the spiritual aspect. However, further development of this research was required to consider resilience in the way that allowed the community livelihood to adapt to change, to cope, to recover, and to reduce risk and vulnerability in the future.
“How to facilitate the community’s needs and accommodate the community’s livelihood during the normal time and during unexpected inundation? How to hold the community together? How can the design offer them peacefulness?” thought the author.

Chapter 8 Design Response Discussion: Final Architectural Design
– Design Iteration III

8.1 Concept III: Yoo Hai Yen, Yoo Hai Pen Suk
8.1.1 Water as Blood
8.1.2 Merging Thai Monastery, Library, and Community Centre
8.1.3 Emergency Residential As Community Assets
8.2 Final Review: Development Design Evaluation
8.2.1 Overview
8.2.2 Critical Reflection
  8.2.2.1 Strength
  8.2.2.2 Weakness
8.2.3 Conclusion
Figure 100. Peaceful environment of Nimitmai 40 Road. Author's image.
The previous development encapsulated the cultural and psychosocial aspects. This final set of design interventions aimed to capture the spiritual elements of the community livelihood in order to further inform the research purposes in achieving flood and community resilience and heartening the sense of place and community. This aimed to be addressed by improving the vulnerable aspects of the water and sanitation, community ritual, mental health, and well-being.

This design iteration was specifically centered on the idea of 'yoo hai yen, yoo hai pen suk.' It integrated the purposes behind the concepts of 'community as generator' and 'suburban core.' This final concept explicitly embraced the peacefulness and harmoniousness of the community livelihood. The power of Buddhism was further incorporated through these design iterations by cultivating this significant integral part of Thai culture and community. The final design aimed to perform as a 'mechanism' that enhanced both the community and flood resilience. It also intended to preserve the sense of place and to allow for preparation, coping, and recovery in a way that activates the spiritual value and belief of the community.

Consequently, this design intervention developed into an outcome by differentiating into a long term and a short term solutions. This final design was dedicated to the long term solution. It merged with three main elements; 'water as blood' (the urban), 'Thai Monastery as spiritual anchor' (the mothership), and 'library as community centre' (the facilities). The 'emergency residential as community assets' became the short term solution for the community which was not focused in this final stage.
8.1 Concept III: Yoo Hai Yen, Yoo Hai Pen Suk

'Yoo Hai Yen, Yoo Hai Pen Suk' heartened the design intervention of Thai monastery to perform as the mothership of the community. As a result from the issues arose from the previous interventions, this development merged with Thai monastery, library, and community centre. It evoked with the notion of integrating 'the water as blood' concept into both the urban and architectural designs to adopt the role of maximising the opportunity from the flood threat. This intended to reduce the risk and vulnerability in the future.

"The community must not settle for a return to the past but instead adapt and actively improve conditions both for this generation and for those to come, to become beyond resilient" (Rosenfield, 2013).

Therefore, the design of the timber lotus-like structural skeletons of Thai monastery, sheltering in an umbrella-like manner above the point of intersection, offered a sense of cordiality and protection to the community. Simultaneously, it supported the roof that was designed to allow the rain to fall into the catchments like a curtain, providing a sense of tranquillity. The community's unpreparedness, struggle to cope, and incapacity to recover were initiated by their lack of knowledge, inexperience, and underestimation accumulated anxiety. Hence, the sense of place and community were lost during the inundation. In responding to the issue, the location of the 'mothership' was decided to be allocated before the existing food distribution point. The spiritual design solution integrated with the library, the community centre, and other facilities to enable the community to rely on this new 'mothership', it set apart from the traditional solution of evacuation centre. The 'mothership' also sustained the sense of place through the articulation of the people and water circulation designs. It was designed to stitch and hold the community and the place together. It incorporated the community resilient design by integrating Water management strategy and facilities with the articulation of Thai traditional architectural quality and spiritual aspects. This aimed to result in a decrease in anxiety, the stress of restoration, and recovery.
In terms of building community-wide resiliency, comprehensive strategy was applied to control the flood flow on site, similar to the blood flow in our body. Soft landscape strategy was deployed to enable the urban fabric to resist, to delay, to store, and to discharge the flood. As a result, the urban fabric design approaches were permeable, 'park bio-swales as defence', 'canal as storage', and 'soft edges as defence'. Dike landscape strategy with the purpose of creating an accessible park and promenade were explored. As well as, a strategy to reduce water levels involved with allowing storm surges to be stored in a marsh. Eco-edge strategy, in regards to the parcels at the water edge, involved with providing raised, placed on stilts, and elevated circulation routes. The concept of splitting the circulation route into different platform; ankle height, knee height, head height, and 'the new ground height' was the key drive to the final design iterations. The urban design incorporated an intention to improve the water resource. As a result, discharging water surpluses by buffering rainwater and new (closable) outlets were effective strategies. It involved with drainage storm water catchment which was designed to carry the storm water filtration process through the people circulation routes. The water storages beneath the 'new ground floor', which is 2 metres above the existing ground level, were designed to be the destination of the routes. As an outcome, the filtered water was purposed for the monks and community to use. The storm water was also designed to flow from the roofs to be collected in the courtyards which were designed for water catchments. Thai traditional architectural techniques were employed, especially in collecting storm water, acts similarly as the 'blood vessels' in our body.

Figure 102 (opposite). Mixed media enhances the final design with an immense integration of the storm water to allow the water to become the opportunity for the community, instead. Author’s image.
Figure 104 (top). Section proves the research final design can sustain the community livelihood during the inundation. Author's image.

Figure 103 (bottom). Section evidences the integration of the water catchment and Thai traditional architectural qualities in the final design to embrace the opportunity from the flood threat. Author's image.
Peace of heart, peace of soul, and peace of conscience.

Rather than being seen as a replacement of the traditional Thai monastery, instead, this merging design was a site-specific solution which had a role in anchoring the community, by embedding the community's spiritual aspects and the platform concept. This achieved the research purposes in building both community and flood resilience in the way that enhances the preparation, protection, and recovery.

“Resilience also considered critical to community’s ability to reduce long recovery periods after an emergency” (Chandra et al., 2011).

This merging approach was the key element to activate this ‘mechanism’ as it incorporated the strategy for disaster readiness. Therefore, cultural and psychosocial aspects were accentuated which also helped retain the sense of place and community. As the mothership, this further developed the intervention merged with Thai monastery, library, and community centre by articulating the axis, form design, integral of water management, Lotus-like structural skeleton, platforms, occupant circulation, water flow circulation, and materiality.
Affiliated to the Mount Meru design strategy, Buddhist monastery architectural design has an obvious and clear axis. It was separated into vertical and horizontal axis, where the 'mothership' was located on the intersection point. The four starting points of the walking meditation along the platforms that are circulated the mothership are plotted (see Figure 107). The destinations of the meditated circulations are the four entrances to the Thai monastery, located in the centre (see Figure 106).
Form Design

Fundamental understanding of the Buddha teachings involved with sustaining simple life, less consuming, possessing nothing, and harmonising life with nature. This was used as a foundation for this development stage and was articulated into a grand dismantled form with a focused eye view. The arrangement system of the design communicated a sense of protection. The prayer hall was enclosed with water catchments at the four corners, where surrounded by the monk’s cells, library, and community centre.
Platform & Circulation

The research issue was articulated into the concept of platforms: ankle height, knee height, head height, and 'the new ground floor level'. Through the act of circulating the community and storm water around the 'mothership', the emphasis of one's body was concentrated as one is ascending and circulating onto a higher ground with their mind on the Prayer hall as their destinations.
"Protecting water sources from contamination or ensuring post-disaster access to water supplies" (Cosgrave, 2014, p. 17).

In replacing the current poor water management, paving over gardens, construction over floodplains, and a Top-Down approach to flood prevention strategy were tested to ease load on drainage after a storm and to act as a temporary storage of water. Water catchment was the key integral in the design intervention, where it allowed the storm water to be filtered and stored in order to facilitate the bathrooms and other facilities. This achieved the purposes of rebuilding the community livelihood and social capital.
Figure 112. Mixed media perspective from the monk cells’ shared terrace enhances the final design with integrals of the water catchment, materiality, and Thai traditional architectural qualities. Author’s image.
Lotus-like Structural Skeleton Design

In allowing the community to perceive 'the spine' of Nimitma 40 Road, the structural skeleton of Thai monastery was designed to be exposed. This lotus-like form enabled the Thai monastery to express the idea of securing the community and the place, while offering the sense of calmness and at peace.

Figure 114. Hand modelled structural skeleton design testing on the 3-D computer generated final design. Author's image.

Figure 115. Hand sketches shows the final iteration of the structural skeleton design. Author's image.

Figure 113. Mixed media of the nature of the Lotus flower. Author's image.

Figure 116 (Next Page). Interior perspective emphasizes the structural skeleton design articulation of the spiritual element of the community livelihood. Author's image.
Two architectural systems, reinforced concrete, and wooden structure, co-existed. Characteristic use of wood and concrete corresponded to the land-based and water-based cultural background of Thailand. The reinforced concrete was used for the structural elements that had the potential to be exposed to flood, such as the round columns which were chosen to offer a sense of harmony. While wood was used as the structure on the ‘new ground floor’ and for the structural lotus-like skeleton frames supporting the prayer hall to convey a sense of integration with the nature. Bamboo on walls and roof were used to reminisce Thai local’s skills and to encourage the storm water flow into the catchment areas.
Figure 117. Exterior perspective enhances the role of the final design in the normal time. Author's image.

Figure 118. Exterior perspective enhances the mothership role of the final design for the community during the flooding. Author's image.
"The only thing left... that doesn't want either your soul or your wallet" (Kimmelman, 2013).

Library aimed to function as a platform for the community to gather and as a 'think tank' for the community to rely on during normal time and time of disaster. It wished to provide a co-working space, where adults are able to work and children are able to study. The design development was based on Thai traditional architectural quality in preserving educational resources and furniture from termites and offering a cross ventilation to provide comfortable atmosphere. This concept was an articulation of simplicity, yet elegant in a peaceful surrounding served well atmosphere for the monks to study Buddha Teachings.

"Education can be used to improve effective risk communication, engagement and sufficiency are needed to build social connectedness" (Chandra et al., 2011, p. 9).
Figure 139. Perspective view from the platform showing that the final design encourages the accessibility to the facilities, such as the library. Author's image.
Figure 1: Illustration perspective emphasizes the role of thefinal design during the normal time (left) and in the time of inundation (right). Author's image.
8.1.3 Emergency Residential As Community Assets

Ideally, the next stage of this research would be to integrate and to develop the emergency residential, a short term solution, into the ‘mothership’. As mentioned earlier, the existing surrounding houses were constructed using concrete with brick infill as influenced by the westernisation. The existing stalls are a good example of the local’s construction skills. It would be appropriate to imitate the language and skill of the existing craft and construction into this further residential design. This would allow the community to be able to build the design by themselves within their short time frame, achieving the short term aims.
8.2 Final Review: Development Design Evaluation

8.2.1 Overview

In building the flood and community resilience for a suburban Thai community, this design intervention as a `mechanism` proved to serve as a long term solution in preparation, coping, and recovery plans. Spiritual aspect in the cultural and psychosocial elements of the community's livelihood was embarked by the merging design of Thai monastery, library, and community centre, encapsulating the `Yoo Hai Yen, Yoo Hai Pen Suk` concept.

8.2.2 Critical Reflection

The design process involving with axis, building form, platform and circulation, water management, Lotus-like structural skeleton, and materiality were used in the design to activate the `mechanism`. This allowed the community to adapt to live with the flood and to perceive the storm water as an opportunity. This final design intervention demonstrated that it adopted the strategy of corrective risk reduction as it aimed to correct or reduce disaster risks. The community's livelihood activities impact on natural capital were managed to minimise their regular impacts on the environment by serving the affected community with an efficient preparation, response, and recovery plans. This crisis preparedness strategy enhanced the idea of designing for the extreme as it increased the early warning and awareness and established contingency and emergency planning. Reduction in vulnerability was also enhanced as the design also acted as the `coping mechanism`. The design achieved the aim to endure the sense of community and livelihood by integrating the library and community centre. The cultural and psychosocial recoveries were approached with the spiritual embracement.

8.2.2.1 Strength

"Relocation is not only about rehousing people, but also about reviving livelihoods and rebuilding the community, the environment, and social capital" (Davis & Alexander, 2015).

The design achieved the research aims to revive the community's livelihood and to rebuild the community and social capital as they relocate in time of inundation. Vulnerability was addressed by significantly considering the diversity and security of the community's livelihood and preparing for the future uncertainty. This design portrayed resilience as the ability to adapt to change, to cope, and recover, involving with flood and community resilience. Therefore, the thriving aim in building crisis preparedness was addressed by managing to achieve orderly transitions from response to recovery and reconstruction.

8.2.2.2 Weakness

To construct the long term plan was expected to take a longer time frame. This design also lacked of community participation, in terms of encouraging the locals to engage in the craft and construction to reduce their emotional attachment.

8.2.3 Conclusion

The realisation of the power of Buddhism in offering a peace of mind to suburban Thai community from the previous field study was significantly acknowledged and articulated in the merging design of Thai monastery, library, and community centre. Furthermore, this design research would preferably to be developed the short term solution, the emergency residential design. The community's local craft, construction techniques, and language would be embedded in the design in order to contribute to the coping strategy by encouraging the community to utilise available skills and resources to manage the adverse conditions brought on by flood. However, this research helped promote the integrated approach to a suburban Thai community's livelihood, unexpected deluge, and sense of place which highlighted the resilience framework. This design intervention with the new embarkation in spiritual aspect, capturing the `Yoo Hai Yen, Yoo Hai Pen Suk` concept, proposed their mothership roles in offering a peace of mind and conscience and building buoyancy for the community. It encouraged the community to learn to adapt to the future uncertainty and to be able to live harmoniously with the unexpected floods.
“I’ve learnt that site and community investigations are critical, if you look carefully, the solution may be found within,” thought the author.
9 Conclusions

The Nimitmai 40 Road community struggled to cope with the unexpected inundation of severe flooding. The 2011 flooding catastrophe resulted from the current mind-set of protecting this area. Specifically for the peri-urban areas of Bangkok, this failure included:

- The inability of flood planning to protect the area.
- The inability of land planning
- The inability of early warning systems
- Disaster risk information and communication

The capability of a community design focuses on replacing what can be interpreted as a formulaic approach. This study suggests an approach that emerged from a community based design one together with my perceptions as a member of this community. The approach supports the fundamental idea that both the resolution and the problem reside in the community, rather than in any external organisation or technical strategies.
9.1 Critical reflections

The initial concept, ‘community as generator’, explored the potential to build resilience for the community during flooding events by enhancing the role of residential design. It achieved the preliminary aim of improving the community’s livelihood and preserving the place and community through incorporations of flood resilient systems.

The employed research methods; Thailand field study, interviews with design and humanitarian experts, and site investigation have contributed to the realisation of the key to the Nimitmai 40 Road community resilience that I sincerely knew at heart. These realisations have resulted in a significant shift into the new design development strategy, ‘suburban core’. The strategy encompassed the community’s spiritual traits in the cultural and psychosocial aspects of the community’s livelihood.

In providing long-term solutions, the idea of maximising outcome opportunities from the flood threat by improving the water resource, influences of Donald Watson and Michele Adams were emphasised. The ‘Water as blood’ concept was applied to the urban fabric to incorporate the water management design in mitigating the inundation. It also generated a sense of stability for the community, including the monks. It enabled the Monks to rely on the ‘mothership’ design of merging Thai Monastery, library, and community centre.

Moreover, embodied in the design development, ‘Yoo Hai Yen, Yoo Hai Pen Suk’ proposed the aim of building community resilience to significantly focus on the preparation, protection, ability to respond, and recovery plans that were evoked by Anita Chandra (et al). The theory of disaster preparedness in this research helped build capacity to reduce vulnerabilities and to minimise the negative consequences of the disaster in the site-specific community. The research iterations encouraged the early warning and awareness and established contingency and emergency planning.

In unravelling of Sepe’s theory of the attachment between people and place, culture, tradition, and materials were focused on as local scale elements, in an effort to capture the sense of place. Hence, the design encouraged the community involvement in order to recall the community’s routine, to build engagement with the place, and, according to Speer and Hughey’s view, to create the community bonding. This developed design revived the sense of community by creating emotional ties as a recovery strategy.

As a result of the initial progressive study of the Thai water-based and land-based architectural techniques from the early days until the present, ‘Thai cultural background and context were taken into account. The early investigation conveyed the use of tensile material and stilts structural system in the emergency residential design. While the studies of both the traditional Thai residential design in terms of the modular system-like concept of ‘extended households’ and the present innovative adaptable system were also acknowledged. These aspects were carried to the final phases of design exploration that implemented the community’s peace of mind and performed as the ‘mechanism’ that the community can be dependent on.

The design solution implementing the concept of ‘Yoo Hai Yen, Yoo Hai Pen Suk’ sets apart from other solutions responding to the flooding. The sense of co-existing harmoniously from the case study on Thai monastery design, with the embrace in Buddhist teachings and the case study on the flooding tactics in the urban scale, with both conceptual and practical uses, were employed in the water management strategies of the urban fabric and the Thai monastery design.

The scope of this research circulated around the findings from the methods; Thailand field study, interviews with experts, and Auckland University Resilience Tool. As a result, the role of architecture extended to centralise on the spiritual aspect as the cultural-therapeutic design approach to acknowledge Nimitmai 40 Road community’s livelihood, ritual, and belief.

9.2 Conclusion

The new approach to the flooding crisis, ‘Yoo Hai Yen, Yoo Hai Pen Suk’ is an architectural concept that corresponds with the urban fabric. It resulted as the ‘mechanism’ for the community in the time of deluge by embodying the flood resilience and the community resilience and preserving the sense of place throughout this research. It informed the flood as an opportunity rather than a threat and offered a peace of mind as it reassesses the lacking aspects of the community’s struggle to prepare, inability to cope, and lack of recovery plan. As a result, this research approached the issue by focusing on the spiritual values of the cultural and psychosocial aspects in terms of preparation, coping, and recovery plans. This is an improvement on the traditional solution to flooding. The research consisted of iterative studies and developments that addressed the issues at different stages of the investigations.

This site-specific driven solution triggered a disciplinary question in terms of the role of architecture in response to urban flooding event in the suburban Bangkok. This design research addresses the future uncertainty and captures the adaptive capacity of the community. It helps to improve the understanding of the local impacts, to ensure access to relevant information, and to community and flood resilience for it to adapt. It introduces an integration of livelihoods, spiritual belief, and climate change response through a community-based design approach that was otherwise seemingly unobtainable. This must be the take home point of this study.
This design research consisted of iterations that resulted in an example of preparation, coping, and recovery plan for the suburban Thai community in time for inundation by seizing the cultural and psychosocial aspects. It was designed to offer the human capital the fundamental needs such as water and sanitation, communication, and access to resources.

The on-going research and literature review, the knowledge gained and iterations developed in this research led to an opportunity to extend beyond the original scope. The cultural therapeutic architectural design concept of “Yoo Hai Yen, Yoo Hai Pen Suk” can be developed in other contexts and programmes on an international scale:

- Using the cultural and spiritual context of townships to provide architectural design paths as alternatives to technical solutions.

- Unifying communities through hierarchy of communal building structures, in preparation, response and recovery of devastating environmental events.

- Designing for resilience based on the values of unique community groups.

- Integrating religious building functions with those designed to accommodate fluctuations in residents and the needs of those people.

Unexpected floods and the devastations caused, are environmental disasters that occur globally, far beyond the scope of Bangkok’s suburbs. If design does not account for preparation, response, recovery, and stability of a community livelihood, these disasters become housing catastrophes. While there is similar research being done, this research combines the focus of spiritual values with cultural and psychosocial aspects of the community’s livelihood and flood resilience.

This design research is in ambition to help the future, place identity, and livelihoods of people that I care for. It offers knowledge to apply architecture as a response to inundated housing environments globally and to strengthen their associated communities. The intentions of this research were to evoke thought and awareness in the reader. I hope to offer new insights for the architectural industry and related disciplines to grow from.
“You can't save the world; but you can set it an example.”
by Alvar Aalto
(Zevi, 1950)
9.4 List of Figures

All figures not attributed are author’s own.

Chapter 4:

Figure 31.

Figure 32.
Amphibious system tested in Thailand. Adapted from LAND8, by L.Qy, retrieved from https://land8.com/what-is-amphibious-architecture-and-how-will-it-help-cities-adapt-to-climate-change/. Copyright 2017 by Land8 Media, LLC.

Figure 33.

Figure 34.
Plan view shows the rain flowing from the surrounding roof public area that can function as a reservoir. Adapted from Waterplein Rotterdam Netherlands De Urbanisten, by World Landscape Architect, March 30 2017, retrieved from http://worldlandscapearchitect.com/waterplein-rotterdam-netherlands-de-urbanisten/#Wptk-PmWaUk. Copyright 2007-2017 Landscape Architecture.

Chapter 7:

Figure 73.

Figure 74.

Figure 79.

Figure 80.
MEMORANDUM

TO
Sasathorn Inthasuwan

COPY TO
Regan Potangaroa

FROM
AProf Susan Corbett, Convener, Human Ethics Committee

DATE
27 April 2017

PAGES
1

SUBJECT
Ethics Approval: 24428

Unfortunate Fortunate; Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

Thank you for your application for ethical approval, which has now been considered by the Standing Committee of the Human Ethics Committee.

Your application has been approved from the above date and this approval continues until 28 February 2018. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Kind regards

Susan Corbett
Convener, Victoria University Human Ethics Committee

COEXISTENCE; Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

CONSENT TO INTERVIEW - HOUSEHOLD

This consent form will be held for 2 years.

Researcher: Sasathorn Inthasuwan,
Architecture and Design School,
Victoria University of Wellington.

- I have read the Information Sheet and the project has been explained to me. My questions have been answered to my satisfaction. I understand that I can ask further questions at any time.
- I agree to take part in an audio recorded interview. I will be given an electronic copy of the interview.

I understand that:
- I may withdraw from this study at any point before 23rd June 2017, without giving any reason, and any information that I have provided will be returned to me or destroyed.
- The information I have provided will be destroyed 2 years after the research is finished.
- Any information I provide will be kept confidential to the researcher and the supervisor. I understand that the results will be used for a Masters report and a summary of the results may be used in academic reports and/or presented at conferences.
- My name will not be used in reports, nor will any information that would identify me.
- I would like to receive a copy of the final report and have added my email address below.

Yes    ☐  No ☐
We would like to arrange a feedback meeting once we have preliminary results for research. This may via electronic communication, such as SKYPE, E-mail, and phone.

Signature of participant: ________________________________
Name of participant:  ________________________________
Date:    ________________________________
Contact details:  ________________________________

COEXISTENCE; การพัฒนาพื้นที่ที่ไม่มั่นคงให้เป็นโอกาสในการอยู่ร่วมกันของชีวิตคนชานเมืองใน กรุงเทพมหานคร

แบบฟอร์มยินยอมให้สัมภาษณ์ – ประเภทผู้อยู่อาศัย

แบบฟอร์มยินยอมให้สัมภาษณ์นี้จะเก็บไว้ ๒ ปี

นักวิจัย: ศศธร อินทสุวรรณ
คณะสถาปัตยกรรมและการออกแบบ
มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน

• ที่ข้างต้นได้อ่านเอกสารข้อมูลและงานวิจัยนี้ได้เขียนอธิบายให้ข้าพเจ้าได้เข้าใจ ข้อสงสัยของข้าพเจ้าได้รับการสื่อสารเป็นที่ดีโดยเจ้าหน้าที่ ข้าพเจ้าเห็นว่าข้าพเจ้าสามารถที่จะตอบข้อสงสัยได้โดยที่ไม่ต้องให้ข้อมูลใด
• ข้าพเจ้ากลมกลืนยอมให้สัมภาษณ์ข้อบันทึกสอบถาม ข้าพเจ้าจะได้รับสำเนาการสัมภาษณ์แบบอิเล็กทรอนิกส์

ข้าพเจ้าเข้าใจว่า:
• ข้าพเจ้าจะต้องส่งเอกสารหลักฐานให้ทั้งหมดเมื่อวันที่ ๒๓ มิถุนายน พ.ศ. ๒๕๖๐ โดยไม่ต้องให้เหตุผลใดๆ
• ข้าพเจ้าจะได้รับข้อมูลดังกล่าวนับวันแน่นอนหรือไม่ใช้ข้อมูลเหล่านี้แล้วก็ตาม
• ข้อมูลที่ข้าพเจ้าได้ใช้จะถูกกำหนดระยะเวลา ๒ ปีหลังจากวันวิจัยนี้สิ้นสุด
• ข้อมูลใดๆ ที่ข้าพเจ้าได้ใช้จะถูกเก็บเป็นความลับสำหรับนักวิจัยและผู้ดูแลงาน ข้าพเจ้าเข้าใจว่าผลลัพธ์จากข้อมูลนี้จะถูกนำไปใช้ในวิทยานิพนธ์ (ปริญญาโท) และข้อมูลแสดงผลลัพธ์นี้จะนำไปใช้ในรายงานทางวิชาการ/หรือจัดให้ไปในเอกสารที่ประชุมต่างๆ
• ข้อมูลของข้าพเจ้าจะไม่ถูกนำไปใช้ในรายงานหรือเอกสารใดๆในข้อมูลใดๆที่เก็บ
• ข้าพเจ้ายินยอมที่จะได้รับสำเนางานสุดท้ายและข้าพเจ้าได้รับข้อมูลที่ข้าพเจ้าได้รับล่าสุด ไม่ใช่ ใช่

A.3 - Research Household Consent to Interview Form (Thai)
COEXISTENCE; Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

CONSENT TO INTERVIEW - ORGANISATION & PROFESSIONAL

This consent form will be held for 2 years.

Researcher: Sasathorn Inthasuwan,
Architecture and Design School,
Victoria University of Wellington.

• I have read the Information Sheet and the project has been explained to me. My questions have been answered to my satisfaction. I understand that I can ask further questions at any time.
• I agree to take part in an audio recorded interview. I will be given an electronic copy of the interview.

I understand that:
• I may withdraw from this study at any point before 23rd June 2017, without giving any reason, and any information that I have provided will be returned to me or destroyed.
• The information I have provided will be destroyed 2 years after the research is finished.
• Any information I provide will be kept confidential to the researcher and the supervisor. I understand that the results will be used for a Masters report and a summary of the results may be used in academic reports and/or presented at conferences.
• I consent to information or opinions which I have given being attributed to [me/my organisation] in any reports on this research: Me My organisation
• I would like to receive a copy of the final report and have added my email address below.

Yes No

A.4 - Research Organisation & Professional Consent to Interview Form (English)
We would like to arrange a feedback meeting once we have preliminary results for research. This may via electronic communication, such as SKYPE, E-mail, and phone.

Signature of participant: ________________________________
Name of participant:  ________________________________
Date:    ________________________________
Contact details:  ________________________________

COEXISTENCE; การพัฒนาพื้นที่ที่ไม่มั่นคงให้เป็นโอกาสในการอยู่ร่วมกันของชีวิตคนชานเมืองในกรุงเทพมหานคร
แบบฟอร์มยินยอมให้สัมภาษณ์ – ประเภทองค์กรและนักวิชาชีพ
แบบฟอร์มยินยอมให้สัมภาษณ์นี้จะเก็บไว้ ๒ ปี

นักวิจัย: ศศธร อินทสุวรรณ
คณะสถาปัตยกรรมและการออกแบบ
มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน

• ข้าพเจ้าได้อ่านเอกสารข้อมูลและงานวิจัยนี้ได้เขียนอธิบายให้ข้าพเจ้าได้เข้าใจ ข้อมูลส่วนของข้าพเจ้าได้รับการสืบเนื่องเป็นที่พึงพอใจของข้าพเจ้าแล้ว ข้าพเจ้ามั่นใจข้าพเจ้าจะให้ข้อมูลที่ตามแบบรูปแบบข้อสงสัยในไปเพิ่มเติมได้ทุกเมื่อ
• ข้าพเจ้าจะยินยอมให้สัมภาษณ์ด้วยการบันทึกเสียง ข้าพเจ้าจะได้รับสำเนาการสัมภาษณ์แบบอิเล็กทรอนิกส์

ข้าพเจ้ายินยอมว่า:
• ข้าพเจ้าจะยินยอมให้สัมภาษณ์ก่อนวันที่ ๒๓ มิถุนายน พ.ศ. ๒๕๖๐ โดยไม่ต้องให้เหตุผลใดๆ
• ข้าพเจ้าจะได้รับการยินยอมให้สัมภาษณ์กลับคืนหรือให้ข้อมูลถูกทำลาย
• ข้อมูลที่ข้าพเจ้ายินยอมให้สัมภาษณ์ถูกทำลายในระยะเวลา ๒ ปีหลังการวิจัยนี้สิ้นสุด
• ข้อมูลใดๆที่ข้าพเจ้ายินยอมให้สัมภาษณ์จะไม่ถูกเก็บข้อมูลเดียวกับข้อมูลของผู้ดูแลงาน ข้าพเจ้าจะยินยอมถอดหลักฐานข้อมูลนั้นในช่วงระยะเวลาไม่เกินไม่เกินสิ้นสุด

ข้าพเจ้ายินยอมให้ข้อมูลหรือความเห็นต่างๆที่ข้าพเจ้าได้ให้ไว้กับองค์กรของข้าพเจ้าซึ่งได้รับมานั้นจะถูกนำไปใช้ในรายงานทางวิชาการในสิ่งต่างๆได้ ไม่ได้ใช้

A.5 - Research Organisation & Professional Consent to Interview Form (Thai)
COEXISTENCE: Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

INFORMATION SHEET FOR PARTICIPANTS - HOUSEHOLD

Thank you for your interest in this project. Please read this information before deciding whether or not to take part. If you decide to participate, thank you. If you decide not to take part, thank you for considering my request.

Who am I?

My name is Sasathorn Inthasuwan and I am a Masters student in Master of Architecture (Professional) at Victoria University of Wellington. This can be readily checked via my Student ID Card from Victoria University.

What is the aim of the project?

This project seeks to understand the role of architects and architecture in post disaster (flooding in 2011) of Nimitmai 40 Road, particularly how both of these areas engage with the affected community. This project also aims to enhance understanding of how opportunities can be created through social enterprise by the method of participatory approach with the Nimitmai 40 Road community, architectural firm, local authorities, respective Government departments, and subject expert. It has been approved by the Victoria University of Wellington Human Ethics Committee Ethics Approval: 24428.

What does it involve?

It involves an interview at your private residence. It will be a semi structured interview related to the flooding in 2011 and what you have done subsequently. The interview will take an hour. It will be recorded in audiotapes and possibly transcribed for research purposes. It also involves with my observation and analysis over affected participants in Nimitmai 40 Road.

You can stop the interview at any time, without giving a reason. You can withdraw from the study by contacting me at any point before 23rd June 2017. If you withdraw, the information you provided will be destroyed or returned to you.

What will happen to the information you give?

This research is confidential. This means that the researchers named below will be aware of your identity but the research data will be aggregated and your identity will
not be disclosed in any reports, presentations, or public documentation. However, you should be aware that in small projects your identity might be obvious to others in your community.

Only my supervisors and I will read the notes or transcript of the interview. The interview transcripts, summaries and any recordings will be kept securely and destroyed 2 years after the research ends.

What will the project produce?
The information from my research will be used in my Masters thesis.

If you accept this invitation, what are your rights as a research participant?
You do not have to accept this invitation if you don’t want to. If you do decide to participate, you have the right to:
• choose not to answer any question;
• ask for the recorder to be turned off at any time during the interview;
• withdraw from the study at any point;
• ask any questions about the study at any time;
• receive a copy of your interview recording;
• read over and comment on a written summary of your interview;
• be able to read any reports of this research by emailing the researcher to request a copy.

If you have any questions or problems, who can you contact?
If you have any questions, either now or in the future, please feel free to contact either:

Student:
Name: Sasathorn Inthasuwan
University email address: inthassas@myvuw.ac.nz

Supervisor:
Name: Prof. Regan Potangaroa
Role: Supervisor
School: Victoria University of Wellington
Phone: +64 4 463 9530
regan.potangaroa@vuw.ac.nz

COEXISTENCE; การพัฒนาพื้นที่ที่ไม่มั่นคงให้เป็นโอกาสในการอยู่ร่วมกันของชีวิตข้างเคียงในกรุงเทพมหานคร

เอกสารข้อมูลสําหรับผู้เข้าร่วม - ประกาศผู้เข้าร่วม

งานวิจัยนี้มุ่งเน้นที่จะได้รับข้อมูลเกี่ยวกับผู้อยู่อาศัยในชุมชนที่ได้รับผลกระทบจากภัยพิบัติ (ภัยน้ำท่วม ในปี พ.ศ. ๒๕๕๔) ที่บริเวณถนนนิมิตใหม่ ๔๐ โดยเฉพาะที่เกี่ยวกับบทบาทของสถาปนิกและสถาปัตยกรรมหลังภัยพิบัติที่มีส่วนร่วมกับชุมชนที่ได้รับผลกระทบอย่างไร งานวิจัยนี้มีวัตถุประสงค์เพื่อเพิ่มความเข้าใจเกี่ยวกับการสร้างโอกาสทางสังคมโดยใช้วิธีการวิจัยทางสังคมศาสตร์ การสังเกตการณ์และการวิเคราะห์ข้อมูลที่เกี่ยวกับผู้เข้าร่วมที่ได้รับผลกระทบในบริเวณถนนนิมิตใหม่ ๔๐ ผู้เชี่ยวชาญที่เกี่ยวข้องและผู้ที่เกี่ยวข้องทั้งที่เกี่ยวข้องทางทางการสังคมศาสตร์ วิทยาการมนุษยศาสตร์และสังคมศาสตร์ ที่เกี่ยวข้องกับการวิจัยได้ร่วมมือในการให้ข้อมูลและนโยบายการวิจัยและแนวทางการวิจัยที่เกี่ยวกับผู้เข้าร่วมที่ได้รับผลกระทบในบริเวณถนนนิมิตใหม่ ๔๐ ที่มุ่งเน้นที่จะมีผลต่อการสืบเนื่องไปยังวิทยานิพนธ์
ท่านอาจขอหยุดการสนทนาได้ทุกเมื่อโดยไม่ต้องมีเหตุผล ท่านอาจถอนตัวออกจากการเข้าร่วมในงานวิจัยนี้ได้ก่อนวันที่ 23 มิถุนายน 2560 ท่านมีสิทธิที่จะไม่zelที่จะไม่ส่งข้อมูลส่วนตัวของท่านกับผู้วิจัยหรือสิ่งที่เป็นลายลักษณ์อักษรที่ไม่เสียผลในระยะ 2 ปีหลังจากการวิจัยสิ้นสุด

งานวิจัยนี้มีเป้าหมาย เท่าที่ท่านมีความประสงค์จะร่วมช่วยให้เราสามารถรวบรวมข้อมูลที่จำเป็นจึงจะมีการวิจัยที่ดี แต่ข้อมูลการวิจัยนี้จะเป็นไปตามหลักนี้ท่านอาจมีผลสำรวจ หรือสิ่งที่จะส่งข้อมูลที่ไม่ได้รับอนุญาตให้ใช้โดยไม่ได้รับการอนุญาตจากท่าน เหล่านี้ข้อมูลที่ท่านมีเป็นข้อมูลส่วนตัวของท่านที่จะถูกทำลายท่านจะไม่ได้รับการติดต่อจากท่าน

ท่านไม่จำเป็นต้องรับค่าเชิญนี้หากท่านไม่ต้องการเข้าร่วม ท่านมีสิทธิ์ที่จะ:

• เลือกที่จะไม่ตอบคำถามใด ๆ ที่ท่านไม่ต้องการตอบ
• ขอให้หยุดการบันทึกเสียงชั่วคราวเมื่อใดก็ได้ในระหว่างการสัมภาษณ์
• ถอนตัวออกจากงานวิจัยนี้เมื่อใดก็ได้ที่ท่านต้องการ
• ขอให้ส่งสำนวนการสัมภาษณ์ของท่าน
• ขอให้ส่งสำนวนการสัมภาษณ์ของท่าน
• ขอให้ส่งสำนวนการสัมภาษณ์ของท่าน

หากท่านมีข้อสงสัยเกี่ยวกับการสัมภาษณ์ ท่านสามารถติดต่อ ผู้ดูแลงาน สถาบัน มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน ที่หมายเลขโทรศัพท์รับสายโทรศัพท์ของท่านได้ที่:

ผู้ติดต่อ: ชื่อ: ศาสตราจารย์ รีแกนน์ โพทางาโรว
              อีเมล์: regan.potangaroa@vuw.ac.nz
              หมายเลขโทรศัพท์: +64 4 4639530

ข้อมูลเกี่ยวกับคณะกรรมการบริหารแผ่นดิน

หากท่านมีข้อสงสัยเกี่ยวกับจริยธรรมในการเข้าร่วมท่านสามารถติดต่อ ผู้ดูแลงาน สถาบัน มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน ที่หมายเลขโทรศัพท์รับสายโทรศัพท์ของท่านได้ที่:

ผู้ติดต่อ: ชื่อ: ศาสตราจารย์ ริชาร์ด คอร์เนียร์
              อีเมล์: susan.corbett@vuw.ac.nz
              หมายเลขโทรศัพท์: +64 4 463 5480
COEXISTENCE; Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

INFORMATION SHEET FOR PARTICIPANTS – ORGANISATION & PROFESSIONAL

Thank you for your interest in this project. Please read this information before deciding whether or not to take part. If you decide to participate, thank you. If you decide not to take part, thank you for considering my request.

Who am I?
My name is Sasathorn Inthasuwan and I am a Masters student in Master of Architecture (Professional) at Victoria University of Wellington. This can be readily checked via my Student ID Card from Victoria University.

What is the aim of the project?
This project seeks to understand the role of architects and architecture in post disaster (flood in 2011) of Nimitmai 40 Road, particularly how both of these areas engage with the affected community. This project also aims to enhance understanding of how opportunities can be created through social enterprise through the method of participatory approach with the Nimitmai 40 Road community, architectural firm, local authorities, respective Government departments, and subject expert. It has been approved by the Victoria University of Wellington Human Ethics Committee Ethics Approval: 24428.

What does it involve?
It involves an interview at your office. It will be a semi structured interview related to the flooding in 2011 and what you have done subsequently. The interview will take an hour. It will be recorded in audiotapes and possibly transcribed for research purposes. It also involves with my observation and analysis over affected participants in Nimitmai 40 Road.

You can stop the interview at any time, without giving a reason. You can withdraw from the study by contacting me at any point before 23rd June 2017. If you withdraw, the information you provided will be destroyed or returned to you.

What will happen to the information you give?
This research is confidential. This means that the researchers named below will be aware of your identity but the research data will be aggregated and your identity will not be disclosed in any reports, presentations, or public documentation. However, you should be aware that in small projects your identity might be obvious to others in your community.

Only my supervisors and I will read the notes or transcript of the interview. The interview transcripts, summaries and any recordings will be kept securely and destroyed 2 years after the research ends.

What will the project produce?
The information from my research will be used in my Masters thesis.

If you accept this invitation, what are your rights as a research participant?
You do not have to accept this invitation if you don’t want to. If you do decide to participate, you have the right to:
• choose not to answer any question;
• ask for the recorder to be turned off at any time during the interview;
• withdraw from the study at any point;
• ask any questions about the study at any time;
• receive a copy of your interview recording;
• read over and comment on a written summary of your interview;
• be able to read any reports of this research by emailing the researcher to request a copy.

If you have any questions or complaints, who can you contact?
If you have any questions, or complaints either now or in the future, please feel free to contact either:

Student:
Name: Sasathorn Inthasuwan
University email address: inthassasa@myvuw.ac.nz

Supervisor:
Name: Prof. Regan Potangaroa
Role: Supervisor
School: Victoria University of Wellington
Phone: +64 4 4639530
regan.potangaroa@vuw.ac.nz
We would like to arrange a feedback meeting once we have preliminary results for research. This may via electronic communication, such as SKYPE, E-mail, and phone.

Human Ethics Committee information
If you have any concerns about the ethical conduct of the research you may contact the Victoria University HEC Convener: Associate Professor Susan Corbett. Email susan.corbett@vuw.ac.nz or telephone +64-4-463 5480.

COEXISTENCE;
การพัฒนาพื้นที่ที่ไม่มั่นคงให้เป็นโอกาสในการอยู่ร่วมกันของชีวิตชานเมืองในกรุงเทพมหานคร

เอกสารข้อมูลสำหรับผู้มีส่วนร่วม - ประเภทองค์กรและนักวิชาชีพ

กราบขอบพระคุณที่ให้ความสนใจในงานวิจัยนี้ ข้าพเจ้าชื่อ นางสาว ศศธร อินทสุวรรณ ข้าพเจ้าเป็นนักศึกษาปริญญาโทสาขาสถาปัตยกรรมศาสตร์ (Master of Architecture (Professional)) ของมหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน ท่านสามารถตรวจสอบบัตรประจำตัวนักศึกษาของข้าพเจ้าจากร้านขายของมหาวิทยาลัยวิกตอเรียแห่งเวลลิงตันได้

จุดมุ่งหมายของงานวิจัยนี้คืออะไร

งานวิจัยนี้มีจุดมุ่งหมายที่จะหาความรู้เกี่ยวกับผลกระทบของภัยพิบัติ (ภัยน้ำท่วม ในปี พ.ศ. 2554) ที่บริเวณถนนนิมิตใหม่ ๔๐ โดยเฉพาะเกี่ยวกับบทบาทของสถาปนิกและสถาปัตยกรรมหลังเกิดเหตุ การวิจัยนี้มีวัตถุประสงค์เพื่อเพิ่มความเข้าใจเกี่ยวกับการสร้างโอกาสทางสังคมที่จะสร้างให้ชุมชนที่ได้รับผลกระทบได้รับการขับเคลื่อนอย่างเพียงพอ สิ่งที่ท่านได้ทำหลังจากภัยพิบัติ งานวิจัยนี้ได้รับการอนุมัติจากคณะกรรมการจริยธรรมของมหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน หมายเลขอนุมัติ 24428

งานวิจัยนี้เกี่ยวข้องกับอะไรบ้าง

งานวิจัยนี้เกี่ยวข้องกับการสัมภาษณ์องค์กรและนักวิชาชีพ สถานที่การสัมภาษณ์คือที่สำนักงานของท่าน รูปแบบการสัมภาษณ์คือเป็นลักษณะที่เป็นโครงสร้าง เกี่ยวกับข้อมูลจากทุกอย่างที่ท่านได้ทำหลังจากภัยพิบัติ การสัมภาษณ์จะใช้เวลาประมาณ ๑ ชั่วโมง และจะถูกบันทึกเสียงด้วยเครื่องบันทึกเสียง เพื่อวัตถุประสงค์ในการวิจัย การสัมภาษณ์จะเกี่ยวข้องกับองค์กรสังคมและภารกิจของชีวิตที่เกี่ยวกับข้อมูลที่ท่านได้ทำหลังจากภัยพิบัติ ๐ ดังกล่าว

A.9 - Research Organisation & Professional Participant Information Sheet (Thai)
ท่านมีสิทธิ์ต่อการปฏิเสธความยินยอมได้ทุกเมื่อ โดยไม่ต้องมีเหตุผลท่านสามารถบอกท่านต่อการเข้าร่วมในงานวิจัยนี้ได้โดย
เมื่อถึงวันที่ ๒๓ มิถุนายน ๒๕๖๐ หากท่านต้องการ ข้อมูลที่ท่านให้ไว้จะถูกรักษาอย่างเคร่งครัด หรือ ถูกเลิกให้แก่ท่าน

จะมีการเก็บข้อมูลจากท่านโดยมีวัตถุประสงค์ในเรื่องหวังที่จะจัดทำสำหรับท่าน แต่ข้อมูลการวิจัย
จะถูกรวบรวมและข้อมูลตัวของท่านจะไม่ถูกเปิดเผยไปในงานวิจัย หรือ เอกสารทางสาธารณะ หรือวัตถุประสงค์
อย่างไรก็ตาม หากท่านต้องการนำข้อมูลที่ท่านให้ไว้ไปใช้เพื่อประโยชน์ที่ยิ่งใหญ่ใน
ชุมชนของท่าน เลขานุการงานวิจัยอาจขอข้อมูลที่มีอยู่ในฐานข้อมูลนี้ หรือ ทำการวิจัย
อย่างไรก็ตาม หากท่านต้องการที่จะขอข้อมูลที่มีอยู่ในฐานข้อมูลนี้ หรือ ทำการวิจัย
ทางเราประสงค์ที่จะจัดให้มีการประชุมเพื่อรับฟังความคิดเห็นโดยเร็วหลังจากที่ทางเราได้ผลลัพธ์เบื้องต้นส าหรับงานวิจัย
นี้ การประชุมดังกล่าวอาจจัดให้มีขึ้น โดยทางการสื่อสารอีเล็กทรอนิกส์ เช่น SKYPE อีเมล์ หรือ โทรศัพท์

ข้อมูลที่มีผลต่อการจัดการบริการและติดต่อ

หากท่านมีข้อสงสัยเกี่ยวกับการดำเนินงานวิจัยนี้ ท่านสามารถติดต่อฝ่ายประชาสัมพันธ์ ของคณะกรรมการ
จริยธรรมแห่งมนุษย์ของมหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน หรือ ของ คุณ แซนน์ คอร์เบตท์
ผู้ประสานงาน:
ชื่อ: ศาสตราจารย์ รีแกนน์ โพทางาโรว
บทบาท: ผู้ดูแลงาน
สถาบัน: มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน
ติดต่อ: +64 4 463 9530

ผู้ประสานงาน:
ชื่อ: ศาสตราจารย์ รีแกนน์ โพทางาโรว
บทบาท: ผู้ดูแลงาน
สถาบัน: มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน
ติดต่อ: +64 4 463 9530

เพื่อให้การวิจัยนี้ที่ท่านเข้าร่วมได้มีประสิทธิภาพที่สูงสุด ท่านสามารถติดต่อท่านผ่านอีเมล์:
itthassara@myvuw.ac.nz

หรือ นัดหมายผ่าน SKYPE

ผู้ประสานงาน:
ชื่อ: ศาสตราจารย์ รีแกนน์ โพทางาโรว
บทบาท: ผู้ดูแลงาน
สถาบัน: มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน
ติดต่อ: +64 4 463 9530

ผู้ประสานงาน:
ชื่อ: ศาสตราจารย์ รีแกนน์ โพทางาโรว
บทบาท: ผู้ดูแลงาน
สถาบัน: มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน
ติดต่อ: +64 4 463 9530

ทางเราจะติดต่อท่านเพื่อรับฟังความคิดเห็นโดยเร็วหลังจากที่ทางเราได้ผลลัพธ์เบื้องต้นส าหรับงานวิจัย
นี้ การประชุมดังกล่าวอาจจัดให้มีขึ้น โดยทางการสื่อสารอีเล็กทรอนิกส์ เช่น SKYPE อีเมล์ หรือ โทรศัพท์
Unfortunate Fortunate; Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

HOUSEHOLD INTERVIEW SHEET

Researcher: Sasathorn Inthasuwan,
Architecture and Design School,
Victoria University of Wellington.

To be conducted with the written consent of the participant.

Interview Date:
Location:
Full Name:
Address:

Participant Response

1) Generally about flood events in Bangkok, Thailand:
   1.1 Any impacts on Thai economic wellness?

   1.2 Any impacts on the community wellness?

   1.3 What are the effective means to connect with the public and the rest of the community?

   1.4 What are the effective preparation, in terms of a household, a community, and etc.?

2) Specifically about the flood event in 2011 (Bangkok, Thailand):
   2.1 What happened? How did you respond to the situation?

   2.2 What caused the 2011 flood event in Bangkok, Thailand?

2.3 Any preparation plans? Are they effective?

2.4 Impacts (e.g., financial, well-being):

2.5 Any post disaster plans? How have you responded to the recent flood in 2011 and its effects? Were they effective?

2.6 What do you know now that you wished you knew then?

3) Role of Architecture:
   3.1 What role has the architecture and the built environment been in all of this?

   3.2 Messages would you have for others?

   3.3 How could this have been more effectively planned from your perspective?
Unfortunate Fortunate;
การพัฒนาพื้นที่ไม่สม่ำเสมอให้เป็นโอกาสในการอยู่ร่วมกันของชีวิตคนชานเมืองในกรุงเทพมหานคร

เอกสารการสัมภาษณ์ - ประเภทผู้อยู่อาศัย

นักวิจัยงาน: ศศธร อินทสุวรรณ
คณะสถาปัตยกรรมและการออกแบบ
มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน

งานวิจัยดังนี้ดำเนินการร่วมกับแบบฟอร์มยินยอมให้สัมภาษณ์เป็นลายลักษณ์อักษรจากผู้เข้าร่วม

วันที่สัมภาษณ์:
สถานที่:
ชื่อ-นามสกุล:
ที่อยู่:

คำถามของผู้เข้าร่วม

1) เกี่ยวกับเหตุการณ์น้ำท่วมในกรุงเทพมหานครทั่วไป:
   1.1 ผลกระทบต่อเศรษฐกิจไทย

2) เกี่ยวกับเหตุการณ์น้ำท่วมในปี ๒๕๕๔ (กรุงเทพมหานคร, ประเทศไทย):
   2.1 ผลกระทบต่อชีวิตรายบ้าน
   2.2 ผลกระทบที่ทำให้เกิดเหตุการณ์น้ำท่วมในกรุงเทพมหานครในปี ๒๕๕๔
   2.3 มีแผนการเตรียมตัวอย่างไร และแผนการเตรียมตัวนั้นๆมีประสิทธิภาพไหม
   2.4 ส่งผลกระทบอย่างไรบ้าง (เช่น การเงิน, ความเป็นอยู่ และอื่นๆ):
   2.5 มีแผนการหลังภัยพิบัติอย่างไรบ้างที่ท่านได้ตอบสนองต่อเหตุการณ์อุทกภัยครั้งล่าสุดในปี ๒๕๕๔ และมีประสิทธิภาพสิ้น
   2.6 ทานได้เรียนรู้อะไรบ้างที่พื้นที่ประสบภัยพิบัติ

3) บทบาทของสถาปัตยกรรม:
   3.1 สถาปัตยกรรมและสภาพแวดล้อมที่สร้างขึ้นมีประสิทธิภาพในสถานการณ์นั้น
   3.2 ทานได้เรียนรู้อะไรบ้างที่พื้นที่ประสบภัยพิบัติ
   3.3 ในมุมมองของท่าน มีวิธีการอย่างไรบ้างที่น่าจะทำให้การตอบสนองในเหตุการณ์น้ำท่วมในปี ๒๕๕๔ มีประสิทธิภาพมากขึ้น
Unfortunate Fortunate; Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

ORGANISATION & PROFESSIONAL INTERVIEW SHEET

Researcher: Sasathorn Inthasuwan,
Architecture and Design School,
Victoria University of Wellington.

To be conducted with the written consent of the participant.

Interview Date:
Location:

Organisation:
Address:
Interviewee’s Name:
Phone:

Participant Response

1. History of flood events in Bangkok, Thailand:
   1.1 What is the history of flood event occurring in Bangkok, Thailand? -
       Why did it occur?

   1.2 Financial issues? - Values that were destroyed and costs to recover and
       to rebuild.

   1.3 What preparation plans have people had? Were they effective?

   1.4 What preparation plans have any organisation had? Were they
       effective?

   1.5 What post disaster plans have been done? Were they effective?

2. About the flood event in 2011 (Bangkok, Thailand):
   2.1 What caused the 2011 flood event in Bangkok, Thailand?

   2.2 Effects:

   2.3 Any preparation plans? Are they effective?

   2.4 Any Post Disaster plans? Are they effective?

3. Role of Architecture:
   3.1 What role has the architecture and the building been in all of this?

   3.2 Messages would they have for others?

   3.3 How could this have been more effectively planned from your
       perspective?
Unfortunate Fortunate; การพัฒนาพื้นที่ที่ไม่แน่นอนให้เป็นโอกาสในการอยู่ร่วมกันของชีวิตคนชานเมืองในกรุงเทพมหานคร

เอกสารการสัมภาษณ์ – ประเภทองค์กรและนักวิชาชีพ

นักวิจัย: ศศธร อินทสุวรรณ
คณะสถาปัตยกรรมและการออกแบบ
มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน

วันที่สัมภาษณ์: ได้รับแบบฟอร์มยินยอมให้สัมภาษณ์เป็นลายลักษณ์อักษรจากผู้เข้าร่วม
สถานที่:
ชื่อองค์กร:
ที่อยู่:
ชื่อผู้ให้สัมภาษณ์:
ติดต่อ:

คำถามของผู้เข้าร่วม

1. ประวัติความเป็นมาของเหตุการณ์น้ำท่วมในกรุงเทพมหานครที่ประเทศไทย
   1.1 ประวัติความเป็นมาของเหตุการณ์น้ำท่วมในกรุงเทพมหานครในปี ๒๕๕๔ อย่างไรบ้าง และมีประสิทธิภาพแค่ไหน
   1.2 การเตรียมตัวอย่างไรบ้าง และมีประสิทธิภาพแค่ไหน
   1.3 มีแผนการตอบสนองหลังภัยพิบัติต่อเหตุการณ์อุทกภัยในทุกๆครั้งอย่างไรบ้าง และมีประสิทธิภาพแค่ไหน
   1.4 ท่านได้เรียนรู้อะไรบ้างที่ท่านปรารถนาที่จะรู้ก่อนหน้านี้

2. เกี่ยวกับเหตุการณ์น้ำท่วมในปี ๒๕๕๔ (กรุงเทพมหานคร, ประเทศไทย):
   2.1 เหตุใดจึงทำให้เกิดเหตุการณ์น้ำท่วมในกรุงเทพมหานครในปี ๒๕๕๔
   2.2 ส่งผลกระทบอย่างไรบ้าง
   2.3 มีวิธีการเตรียมตัวอย่างไรบ้าง มีประสิทธิภาพแค่ไหน
   2.4 มีแผนการตอบสนองหลังภัยพิบัติต่อเหตุการณ์อุทกภัยครั้งล่าสุดในปี ๒๕๕๔ อย่างไรบ้าง และมีประสิทธิภาพแค่ไหน

3. บทบาทของสถาปัตยกรรม:
   3.1 สถาปัตยกรรมและสภาพแวดล้อมที่สร้างขึ้นในสถานการณ์นี้มีบทบาทอย่างไรบ้าง
   3.2 ผู้คนมีอะไรที่ปรารถนาที่จะบอกต่อให้คนอื่นๆอย่างไรบ้าง
   3.3 ในมุมมองของท่านวิธีการอย่างไรบ้างที่จะทำให้การตอบสนองในเหตุการณ์น้ำท่วมในปี ๒๕๕๔ มีประสิทธิภาพมากขึ้น
Unfortunate Fortune: Turning the Vulnerable Site into Opportunities for Coexisting Bangkok’s Suburban Life.

ARCHITECTURE FIRM INTERVIEW SHEET

Researcher: Sasathorn Inthasuwan, Architecture and Design School, Victoria University of Wellington.

To be conducted with the written consent of the participant.

Interview Date: Location:

Office Name: Address: Interviewee’s Name: Phone:

Participant Response

1. History of flood events in Bangkok, Thailand:
   1.1 What is the history of flood event occurring in Bangkok, Thailand? - Why did it occur?
   1.2 Financial issues? - Values that were destroyed and costs to recover and to rebuild.
   1.3 What preparation plans have people had? Were they effective?
   1.4 What preparation plans have any organisation had? Were they effective?
   1.5 What post disaster plans have been done? Were they effective?

1.6 What do you know now that you wished you knew then?

2 About the flood event in 2011 (Bangkok, Thailand):
   2.1 What caused the 2011 flood event in Bangkok, Thailand?
   2.2 Effects:
   2.3 Any preparation plans? Are they effective?
   2.4 Any Post Disaster plans? Are they effective?
   2.5 How would you design in respond to the recent flood in 2011, its causes and its effects:

3 Role of Architecture:
   3.1 What role has the architecture and the building been in all of this?
   3.2 Messages would they have for others?
   3.3 How could this have been more effectively planned from your perspective?
Unfortunate Fortunate;
การพัฒนาที่ไม่แน่นอนไปเป็นโอกาสในการอยู่ร่วมกันของชีวิตคนชานเมืองในกรุงเทพมหานคร

เอกสารการสัมภาษณ์ – ประเภทสานักงานสถาปนิก

ผู้วิจัย:
ศศธร อินทสุวรรณ
คณะสถาปัตยกรรมและการออกแบบ
มหาวิทยาลัยวิกตอเรียแห่งเวลลิงตัน

งานวิจัยนี้ดำเนินการร่วมกับแบบฟอร์มยินยอมให้สัมภาษณ์เป็นลายลักษณ์อักษรจากผู้เข้าร่วม

วันที่สัมภาษณ์:
สถานที่:
ชื่อที่อยู่:
ติดต่อ:

คำถามของชั้นร่าง:

1. ประวัติความเป็นมาของการเกิดเหตุการณ์น้ำท่วมในกรุงเทพมหานครที่มีประสิทธิภาพ
   1.1 ประวัติความเป็นมาของการเกิดเหตุการณ์น้ำท่วมในกรุงเทพมหานครที่มีประสิทธิภาพ

2. ส่งผลกระทบอย่างไรบ้าง
   2.1 เหตุใดจึงทำให้เกิดเหตุการณ์น้ำท่วมในกรุงเทพมหานครในปี ๒๕๕๔

3. บทบาทของสถาปัตยกรรม:
   3.1 สถาปัตยกรรมและสภาพแวดล้อมที่สร้างขึ้นในสถานการณ์นี้

1.5 มีแผนการตอบสนองหลังภัยพิบัติเพื่อหลีกเลี่ยงเหตุการณ์อุทกภัยในทุกๆครั้ง อย่างไรบ้าง และ
   มีประสิทธิภาพแค่ไหน

1.6 ผู้ใต้ชื่อผู้ที่มีส่วนร่วมในการอยู่ร่วมกันที่จะรู้ก่อนหน้านี้

2. เหตุการณ์น้ำท่วมในปี ๒๕๕๔ (กรุงเทพมหานคร, ประเทศไทย):
   2.1 เกิดเหตุการณ์น้ำท่วมในกรุงเทพมหานครในปี ๒๕๕๔

2.2 ส่งผลกระทบอย่างไรบ้าง

2.3 วิธีการเตรียมตัวอย่างไรบ้าง มีประสิทธิภาพแค่ไหน

2.4 มีแผนการตอบสนองหลังภัยพิบัติเพื่อหลีกเลี่ยงเหตุการณ์อุทกภัยครั้งล่าสุดในปี ๒๕๕๔ อย่างไรบ้าง และ
   มีประสิทธิภาพแค่ไหน

2.5 ติดตามการประเมินที่จะออกแบบอย่างไรเพื่อหลีกเลี่ยงเหตุการณ์อุทกภัยครั้งล่าสุดในปี ๒๕๕๔

3. บทบาทของสถาปัตยกรรม:
   3.1 สถาปัตยกรรมและสภาพแวดล้อมที่สร้างขึ้นในสถานการณ์นี้
3.2 ท่านมีอะไรที่จะบอกต่อให้แก่คนอื่นๆ อย่างไรบ้าง

3.3 ในมุมมองของท่านมีวิธีการอย่างไรที่จะทำให้การตอบสนองในเหตุการณ์นั้นๆน่าจะทําให้มีประสิทธิภาพมากขึ้น

9.6 Bibliography


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THANK YOU