RENEWABLE HOUSING-VN:
BAMBOO POTENTIALS

by

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ABSTRACT

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Life at water’s edge is idyllic when nature is calm. But how can shelter, a basic human need, adapt and respond in situations of natural disaster and post-disaster? The state of how we live with water – with various phases of stability, interference, and transition – repeat and intermingle and demonstrate nature’s cyclical ways.

By studying a third world site that seasonally floods (the Mekong River Delta region in southern Viet Nam), this thesis proposal investigates the extra small scale of alluvial semi-permanent housing. Structural lightness, material flexibility, and renewability are key, hence the choice of bamboo as a construction material. Another consideration would be assemblage and construction for rapid deployment in post-disaster/emergency/temporary situations such as refugee housing, construction worker housing, etc.

Coupled with this investigation are the various implications of economic, environmental, geopolitical and cultural factors affecting those whose livelihoods are intricately tied to living at water’s edge.
ACKNOWLEDGEMENTS

[In honor of my mother and to the memory of my father]

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My family

H

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TABLE OF CONTENTS

[0] INTRODUCTION V
[1] BACKGROUND 1
[2] DESIGN 21
[3] BIBLIOGRAPHY 29
INTRODUCTION

This thesis project emerged from reflections and deep impressions made after a trip to Southern Vietnam with Sunflower Mission to build schools in the economically impoverished Mekong Delta region in summer 2006 after my first year of architecture school.

Visiting this part of the world intrigued and undoubtedly provoked my initial interest in the way a war-torn country has rebuilt itself, but not just any country -- the country where my parents and family fled after the fall of Saigon in 1975.

After further investigation, the many layers of factors affecting the built environment gave way to a focus on flooding and how this constant cycle of stability, interference, and then transition back to stability resonates in this delta region. Through this initial trip, the seed for this project was planted to delve into interdisciplinary research about this site, as well as probing through design experimentation for a new way to see what means architecture has to respond to such conditions. Examining a site “off-the-grid” with such cyclical fluctuations is challenging because limitations are inherent, yet also revealing. As Samuel Mockbee, the founder of Rural Studio at Auburn University, once said:

"In creating architecture, and ultimately community, it should make no difference which economic or social type is served, as long as the status quo of the actual world is transformed by an imagination that creates a proper harmony
for both the affluent and the disadvantaged...Also, the most valuable thing I have learned in working with these extremes, both the very rich and very poor, is that what appears to be a disparity disappears into an honesty of spirit. It is their honest lifestyle that raises their status above the ordinary."  

BACKGROUND
After Hurricane Ike, Hardship and Hope in Galveston (3-08)

Texas Leaders Blast FEMA for Hurricane Ike Response (10-08)

Bosnia Grave Had More Than 600 Victims (11-07)

New York Manhole Covers Forged Barefoot in India (11-07)

Inflation Delivers Blow to Vietnam's Spirits (8-08)

Unprepared Gov't Strands Returning Iraqi Refugees (12-07)

Young Israelis Resist Challenges to Settlements (12-07)

UN Says Wealthy Failing the Poor (New York 9-08)

A Boy Living in a Car (Hatl 4-09)

Homeless Struggle to Cope in Italy Quake Zone (04-09)

At White House, Pope Lauds Americans' Faith (4-08)

Thousands Cross Gaza Wall to Egypt (1-08)

International

Economics

Tata Unveils World's Cheapest Car (p.1-08)

The Prince and his Paloma 6,400-Square-Foot Galaxway Test Film (Paris 11-08)

The Devil Wears Hermes (He Bought It at the Ocean's Palace Mall in Las Vegas 1-08)

Faith (4-08)

Weather

Myanmar Death Toll Reported at Nearly 4,000 (9-08)

Young Israelis Resist Challenges to Settlements (12-07)

New York Manhole Covers Forged Barefoot in India (11-07)

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Vietnam is a country in Southeast Asia located along the eastern margin of the Indochina peninsula bounded by Cambodia, Laos, China and the South China Sea. Its climate is warm, humid, and tropical with two monsoon seasons: the northeastern winter monsoon and the southwestern summer monsoon. In the Mekong Delta, the summer monsoon brings 5-6 months of rainfall above 100 mm/mo. October is the wettest month of the year.

The International Rice Research Institute accounts for 80% of the population as rural and concentrated in the two rice-growing deltas: the Red River Delta in the north and the Mekong River Delta in the south. Not only is the Mekong Delta the country’s rice bowl, it could arguably be considered one of the world’s rice bowl since Vietnam is the second largest exporter of rice globally after Thailand. The IRRI also states Vietnam is home to 7.7 million hectares of rice fields with the Mekong region producing more than 50% of the country’s most important crop. The region does have flood control measures, drainage and short duration rice varieties, hence it is an irrigated ecosystem.
SGN/HCMC
metro area population:
9,000,000
The Mekong is the 12th biggest longest river in the world and is the biggest river in Southeast Asia. Its physical geography is described as a "low gradient large river flowing through a basin filled with alluvium ... In the highlands of China, Laos, Myanmar and Thailand, the slopes are generally either in forests or under shifting cultivation. Wet rice is grown in the alluvial plains of the lower Mekong Delta in Cambodia and Viet Nam, the delta being the most fertile region." ²

While this deltaic region is richly fertile naturally and able to sustain the production of the country’s cash crop, it is an extremely economically impoverished area where farmers make a couple of dollars per day and infrastructure is minimal. The main means of transportation is by boat through the river and its smaller arteries. Among the many issues facing the country and region are: environmental concerns about slash and burn agricultural practices; deforestation; soil degradation; water pollution; overfishing; urban densities degrading the environment in Hanoi and Saigon/HCMC; high risks of food and water-bourne diseases; and a growing chasm between the economic classes of the rich and poor living on less than $1 a day.

The United States coastline, including Alaska and Hawaii (19,924 km / 12,380 mi) is about 6 times longer than Vietnam (3,444 km / 2,140 mi).
Vietnam is a densely populated developing country that in the last 30 years has had to recover from the ravages of war, the loss of financial support from the old Soviet Bloc, and the rigidity of a centrally planned economy.

- GDP 553.61 billion
- Per capita income $2,600
- Country pop. 85 million
The map on page 4 shows the locations of various hamlets/towns in the southern part of the country with the former capital, Saigon, boasting a population of more than 9 million people. Many of the country's citizens were born after 1975, after the fall of Saigon, and thus do not have memories of the war. Life has returned to normal daily routines, although evidence of war-scarred buildings do remain in the city. In the Mekong Delta region, it is a pastoral and peaceful existence without glaring reminders of warfare. And for the hundreds of thousands who fled the country as refugees, they have been absorbed into adoptive countries. The diagram on page 12 shows the journey of the Bui family, who escaped the country shortly after the fall of Saigon, and their encounters and experiences with Thai pirates, living in a refugee camp, moving to Canada, the death of the family patriarch, fall from wealth to poverty, and their eventual resettlement into normal daily life.

Just as this family has readjusted to life post the interference of war, the country's present condition could also be described as being in the stability phase with some residue of the transition phase.
rice farmers working in Vietnam

flooding victims in southern Viet Nam are forced to abandon their homes
As war is historical interference, flooding is cyclical interference that is naturally induced and brings with it a host of positive and negative issues. According to the Department on Environmental and Water Resources Engineering School at Can Tho University in Viet Nam and the United Nations University Institute for Environment and Human Security, some of the favorable outcomes are sediment supplementation, flushing of toxicity from the acid sulphate soils, reduction of salinity intrusion, termination of rodents and insects from the rice fields, and addition to the groundwater storage/water table. Some of the negative consequences are: death, disease, infrastructural damage and loss of homes. This flooding, while cyclical and necessary, affects more than the rice industry and human population sustained in the region. The delta area also supplies more than 60% of the country's fish and shrimp production and 80% of the country's fruit production. This interference stage disrupts the balance yet is essential for life.
various river housing in the delta region
aspects of daily life for those living in the Mekong Delta region
[DOMESTIC LIFE: TEMPERATURE STUDY]

[DOMESTIC LIFE: SMELLS STUDY]

[DOMESTIC LIFE: HUMIDITY STUDY]
After examining the region’s conditions, it became clear that a housing solution for this area would need to have an adaptive response to its fluctuating environment, be constructed of lightweight material that could easily be transported thru the region’s waterways, and be able to be disassembled/ assembled and deployed with rapidity in the event of flooding disaster. Since Vietnam is one of the most “disaster prone countries in the world” this housing prototype, one refined, could be adapted and applied to locations with similar conditions and needs in regards to flooding, tropical storms, storm surges, and flash floods.

Bamboo, a grass indigenous to tropical zones of the world, is a lightweight rod historically used in the vernacular for home and bridge construction, as well as skyscraper scaffolding throughout Asia. It is a highly versatile vegetal rod and has high resistance to tension, compression and deflection. Furthermore, it is relatively inexpensive, can reach cane maturity in 20-30 days (within a year at the latest), is abundant and accessible, and is easily processed and ecological.

As more awareness of sustainable and renewable building practices comes to the forefront for housing, bamboo as a construction material will surely surface and gain mass popularity as a traditional option with an historic track record that can be applied with modern architectural sensibilities.

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5 Ibid.
where bamboo typically flourishes
bamboo joints commonly used for rafters and joists; fences and walls
DESIGN

[a] porosity gradient
[b] permeable membrane
[c] open/closed plan
[d] flexibility
scheme 1: layered basket
scheme 2: twisted dome
scheme 3: splice
scheme 4: ridges
scheme 5: bundled arches
BIBLIOGRAPHY


Tran, Dinh V. “Hue: My City, Myself.” **National Geographic.** Nov. 1989: 594-603.


