

Mitigating Floods : Reconstructing Lives : Rehabilitating Thatta

by

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Bachelor of Architecture
National College of Arts, 2007

Submitted to the Department of Architecture
in partial fulfillment of the requirements for the degree of

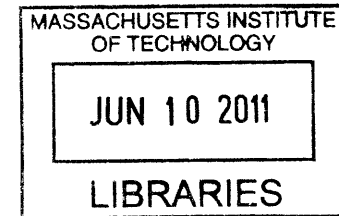
Master of Science in Architecture Studies

at the

Massachusetts Institute of Technology

June 2011

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Villagers displaced by floods, travel through flood waters on August 29,2010 in Thatta in the province of Sindh, Pakistan.

Image courtesy: Getty Images

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ABSTRACT

Pakistan was struck by floods in July 2010, the effects of which left 20.36 million people affected and 1.9 million homes damaged or destroyed¹. In the province of Sindh in Pakistan, most of the affected population of the historic city of Thatta took refuge by fleeing to Makli Hill, a necropolis with mausoleums dating as far back as 1352A.D. The capital of three successive dynasties Thatta is famed for its cultural heritage and Makli Hill. Some four hundred thousand flood victims camped out on the hill most lacking any form of shelter.

This thesis develops a framework for refugee camps and resettlement strategies that respond to and integrate the migratory trends of deltaic communities in the case of a flood event in an area with great cultural heritage. Taking into account different scenarios of flood disasters and recovery it aims to present an incremental, sustainable and transitional shelter program that local populations residing in flood prone areas of the Indus deltaic region of Thatta District can adopt in order to mitigate the effect of floods and hence reduce risk and vulnerability. The case of the Indus delta is particularly interesting because it requires a combined design strategy for the local phenomena of natural hazards and the global issue of climate change.

The geographical importance of the site has been analyzed with respect to surrounding communities and primarily areas of relatively higher elevation, heterogeneous soil and water resources, and concentrated cultural heritage. The urban development of Makli Hill because of its geographic location and topographical characteristics is a highly likely and viable one as can be concluded from the transformation of Makli Hill to a site of refuge when floods affected the region. The thesis concludes with the proposal of the developmental growth of villages through small scale local productive landscapes so that communities can be partially self-sufficient and sustainable especially in times of flooding. The project is conceptualized in Thatta as a model approach that is transitional in nature and may be adapted by low-income communities residing in vulnerable locations in other deltaic/coastal regions in Pakistan, and wherever there is a conjunction of natural hazards, cultural heritage, and safe building opportunities worldwide.

Thesis Advisor: James Wescoat

Title: Aga Khan Professor

1 USAID, DCHA Pakistan Floods, Fact Sheet#18, 2010.

ACKNOWLEDGEMENTS

.....
I would like to express gratitude to my advisor, James Wescoat, whose expertise, vast knowledge, understanding, and patience, added considerably to my graduate experience. As an academic advisor, professor and thesis advisor, every class, lecture and discussion with James has been insightful, motivating and inspirational. Many thanks to my other thesis committee member, Reinhard Goethert, for valuable critique and comments provided at all levels of the research project and for being a wonderful educator.

I would also like to thank and appreciate the cooperation of Muhammad Tahir Qureshi - Senior Advisor, Coastal Ecosystem, IUCN and Faisal F.Khan - Chief Executive Officer, Aga Khan Planning and Building Services, Pakistan for taking out time to meet with me, discuss my thesis project and provide meaningful insight.

A special thanks to Fahad Asadullah for taking me to Thatta and briefing me about the relief efforts undertaken by Karachi Relief Trust as well as to my father, Gul Zaman Malik, and sisters, Seemab Gul and Samar Gul, for accompanying me on site visits. My mother, Mussarat Zaman's selflessness, commitment to help those in need, determination to make a positive difference and her praiseworthy social work efforts have been a great source of inspiration for this thesis.

Thanks to all my friends - close, far and wide - for their support and encouragement through the stressful times in graduate school. Lastly, I would like to thank my parents for their love, support and prayers that have kept me going and because of which I have managed to get this far.

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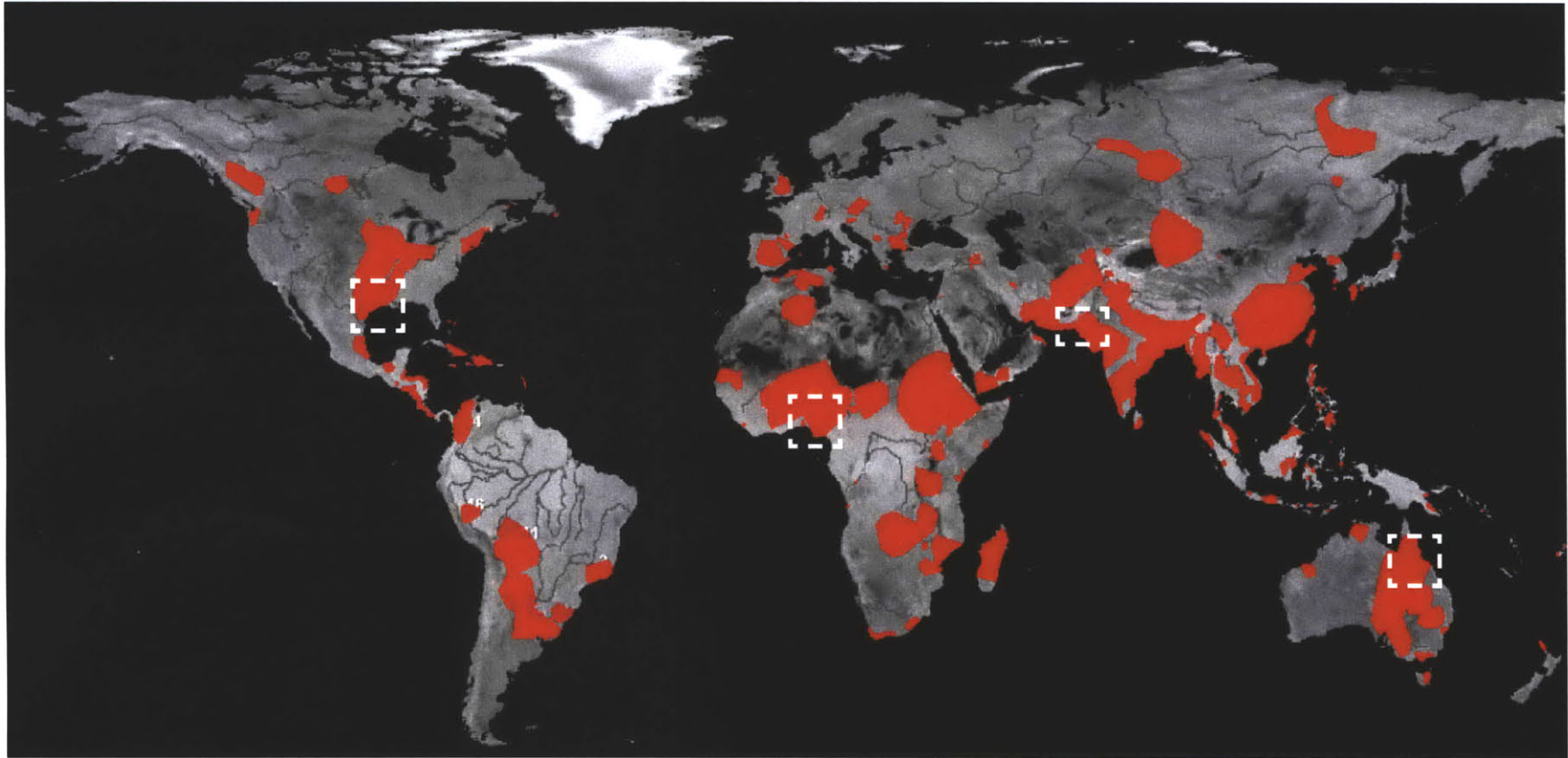
INTRODUCTION

Global Context

Problem Statement

GLOBAL FLOOD HAZARDS

The lack of an organized well planned flood relief program in many low lying flood plain inhabited regions of the world is an issue that needs to be addressed.



Major floods reported by news services and satellite data observations in 2007.

Image courtesy: 2007 Global Flood Archive. Dartmouth Flood Observatory

GLOBAL CONTEXT

.....

The problem of shelter relief for flood victims and the lack of organized well planned flood relief programs that address timely evacuation of populated areas is an issue in many low lying flood plain inhabited regions. The increased frequency of floods occurring worldwide and the large numbers of populations affected by them requires the need for planning and reconstruction strategies that take into account flood hazards. According to the UNESCO World Water Development Report, floods accounted for fifty percent of water-related disasters between the years 1990 and 2001 with Asia and Africa as the most affected continents¹. As a result a high percentage of flood affected populations are low-income hence the devastation caused is of a much larger scale. The adjacent map indicates the major floods reported in 2007 with some low lying floodplain regions marked out that were affected.

There are many examples of floods that have occurred in the recent past worldwide that have devastated communities and sites of cultural heritage. Some occur in highlands for example the Jamia Masjid in Khaplu, Pakistan which was damaged by the flooding of a tributary of the River Indus. Yet others affect cultural sites in low-lying areas for example in Thailand where many of the country's historical sites are located in the lowlands. Other examples of cultural heritage affected by deltaic flooding as a consequence of being located in low lying deltas are those of Egypt and New Orleans - both of which are located on deltaic sites and have similar terrain as that of Thatta district in southern Pakistan but possess different abilities to deal with disaster with respect to economic, social and environmental conditions.

¹ Executive Summary of the World Water Development report. CRED (Centre for Research on the Epidemiology of Disasters). The OFDA/CRED International Disaster Database. Brussels, Universite Catholique de Louvain. 2002.



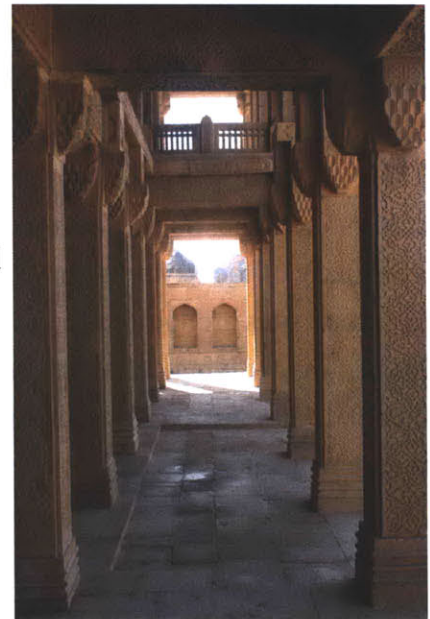
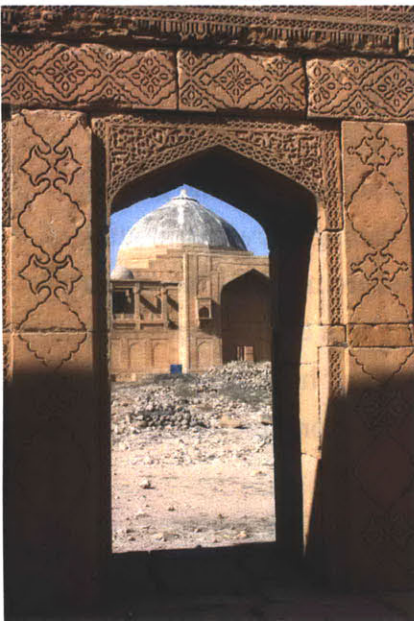
THE GREAT NECROPOLIS OF MAKLI HILL

UNESCO World Heritage Site

About half a million tombs over an area of 6 sq.miles

Tombs from Mughal, Tarkhun & Arghun and Summa period

Building material - dark red bricks, stone with lace-work carving and colored enamel tiles



Flood refugees camping on Makli Hill Necropolis.

Image Courtest: Getty Images, 2010



“A property in the 100-year floodplain has a 96 percent chance of being flooded in the next hundred years without global warming. The fact that several years go by without a flood does not change that probability.”

Earl Blumenauer, Congressional Record-House Vol.152, Pt.9, June 27, 2006, 962pp.

PROBLEM STATEMENT

.....
My interest in floods was instigated by the 2010 floods that devastated Pakistan and impacted several million people across the country. The populations most affected were low and extremely low-income residents whose vulnerability was primarily a result of the combination of two factors:

- being located on high-risk floodplains along the river Indus, and
- residing in shelters that lacked structural and material flood-resistance

This national disaster provided the basis for my research and inquiry into the territorial and global aspect of flood-resistance design practices and vulnerable low-income populations.

Within the Indus floodplain, this thesis chose to focus on the district of Thatta, in southern Pakistan through which the Indus river cuts from north before flowing into the Arabian Sea in the south. Thatta district’s floodplains get flooded year in and year out due to excess rainfall caused by the torrential monsoon rains forcing low-income communities settled on the floodplains to migrate to safer ground, including Makli Hill, a medieval necropolis on top of a ridge west of the city. In the event of a 100 year flood (like the one that occurred in 2010) the floodwaters affect livelihoods severely destroying shelters, crops, livestock and infrastructure.

The residents of the historic and culturally rich city of Thatta were victims of the floodwaters that devastated the region in the summer of 2010. Since the city of Thatta/ Makli are on top of a hill over looking the Sujawal district water had not risen that far up. But a major portion of the entire district comprising of almost 700 villages was inundated. On 28th August, 2010 a little over 1 million people fled to Thatta city, overwhelming all rescue/relief operations in the district. Most of the affected population took refuge by fleeing to Makli, a hill to the west of Thatta city that contains a vast historic graveyard. About half a million flood victims camped out on the hill most lacking any form of shelter.

The relief efforts though numerous did not promote or support a program that would prove to be sustainable for the affected communities. Local and international non-governmental organizations provided temporary relief to villages. Once the floodwaters receded they also provided further relief by reconstructing some of their homes for them. The locals welcomed this goodwill gesture as a majority lacked the funds and/or resources to build such structures themselves. The built structures however lacked sensitivity to the local environment, were not economically viable or flood-resistant and did not support much needed livelihood regeneration for the residents.

The problem this thesis aims to address is to devise a sustainable transitional shelter program that the locals of the Thatta region can adopt in order to mitigate the effect of future floods and hence reduce risk and vulnerability - a program that may be sustained by the locals themselves and help to promote their local cultural heritage. This thesis offers a proposal that is aimed towards the economic and social welfare of the residents of the region by establishing and promoting community development by the people, for the people.

Thatta district has been in the past affected by cyclones, precipitation based flooding and sea intrusion which makes it a particularly interesting region faced with a multitude of flood problems.

Hazard	Year	Population Affected
Riverine Flood	1994	690,035
Cyclone	1999	597,482
Sea Intrusion	Ongoing	1,140,556

Past occurrence of flood hazards in Thatta district and populations affected¹

The site of Makli Hill adds the cultural heritage preservation component to the joint issue of flooding, poverty and the lack of a cohesive shelter rehabilitative program for communities that are affected by floods regularly. The problem of shelter relief for flood victims in Thatta and the lack of general shelter/housing for many squatter populations in the region is an issue that needs to be addressed. This situation coupled with pilgrims and visitors to Makli Hill necropolis can benefit greatly from an integrated approach that is initiated by the onslaught of floods. Post-flood this approach will evolve from being a basis of shelter for a community to a thriving self-sufficient settlement by the promotion of local crafts and small scale agrarian practices and hence a system that is sustainable and

¹ Centre for Research and Epidemiology of Disaster (CRED)

locally managed. The settled community will in turn take over responsibility of the provision of shelter and management of relief for flood victims during succeeding flood events and also the provision of short term shelter to tourists and pilgrims visiting the necropolis.

The thesis is divided into three segments of site selection, program analysis and the integration of site analysis and program.

The **Impact Area** chapter highlights the specific conditions of the site and addresses the territorial aspects of floods in the Thatta region. It includes an introduction to the region, its significance, the impact of the 2010 flooding, associated problems and concludes with considerations to be taken into account for developing strategies to mitigate the impact of floods on low-income settlements.

Program Analysis then highlights the site specific groups, their needs and requirements which helps to develop the required program of the site.

The final chapter, **Proposal**, integrates site analysis and program into a coherent cohesive system which is developed in three stages with respect to the three stakeholder groups so as to get a clear understanding of the problem as it occurs in the Lower Indus Valley.

RESEARCH METHODOLOGY

The focus of the research was to identify the main stakeholder groups and by conducting a site analysis, integrate both site and program in order to present a proposal that would cater to the stakeholder groups needs and requirements as well as respond to the needs of the site and environment.

The order of research followed was:

- Site selection

This was based on a set of criteria that helped determine an ideal site for the intended thesis that involved all three stakeholder groups.

- Site analysis

An analysis of the site conditions, its immediate surroundings as well as other features such as housing, construction styles, vegetation and employment were assessed that would help inform the program of the proposal.

- Program analysis

Based on the site analysis and the needs of the stakeholder groups, the program for the site was analysed.

- Integration of both program and site

This is the key aspect of the thesis proposal - integration of both site and program determined the development of a program that is justified with respect to context and user group needs.

- Long term development

The practicality and sustainability of the the proposal lies in it being able develop a system that is able to sustain itself in the long term and also has potential to be replicated with required adjustments that respond to that particular context.

Data was collected through official statistics and reports as well as by conducting interviews and informational meetings when visiting the site by interacting with the affected populations and NGO's working there. Relief camps and reconstruction sites were also visited during the research process.

The research method adopted was in line with the ‘Core Standards’ of humanitarian response of The Sphere Project which include:¹

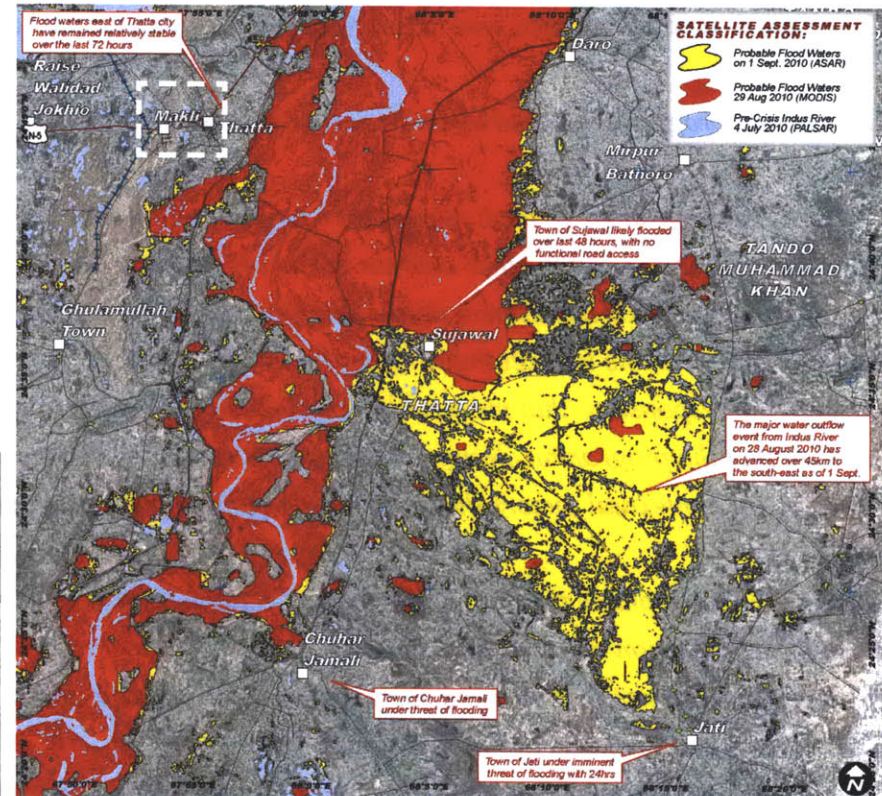
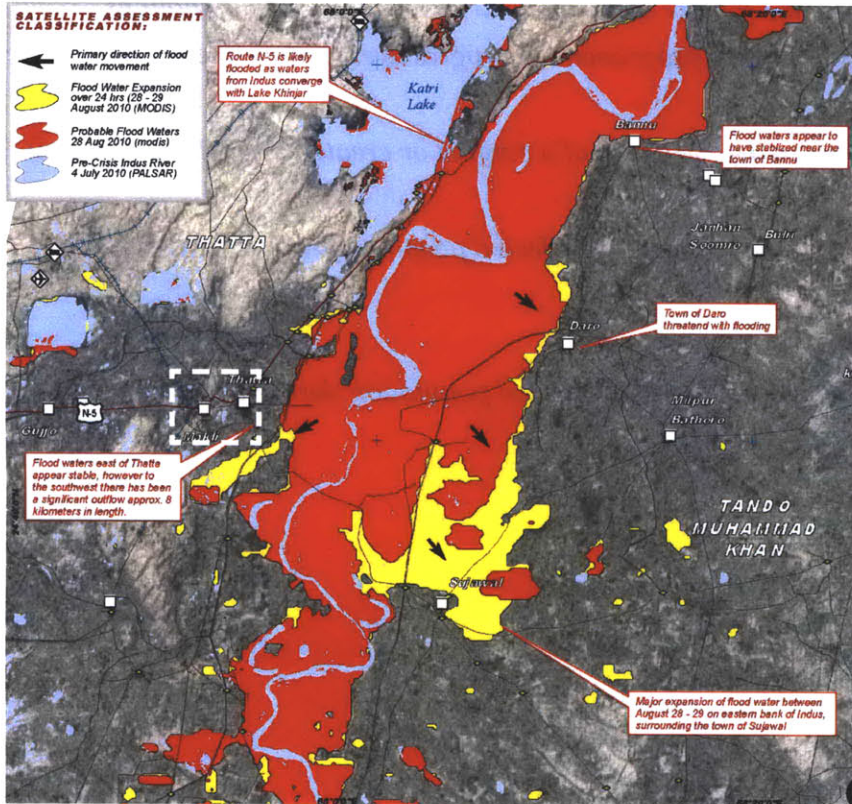
- *Design the programme based on an impartial assessment of needs, context, the risks faced and the capacity of the affected population.*
- *Design the programme to meet needs that cannot or will not be met by the state or the affected people.*
Prioritise life-saving actions that address basic, urgent survival needs in the immediate aftermath of a disaster.
- *Using disaggregated assessment data, analyse the ways in which the disaster has affected different individuals and populations, and design the programme to meet their particular needs.*
- *Design the response so that vulnerable people have full access to assistance and protection services.*
- *Ensure that the programme design and approach supports all aspects of the dignity of the affected individuals and populations.*
- *Analyse all contextual factors that increase people’s vulnerability, designing the programme to progressively reduce their vulnerability.*
- *Design the programme to minimise the risk of endangering people, worsen the dynamics of a conflict or create insecurity or opportunities for exploitation and abuse*
- *Design programmes that promote early recovery, reduce risk and enhance the capacity of affected people to prevent, minimise or better cope with the effects of future hazards.*
- *Continually adapt the programme to maintain relevance and appropriateness.*
- *Enhance sustained recovery by planning for and communicating exit strategies with the affected population during the early stages of programme implementation.*

1 The Sphere Project, Humanitarian Charter and Minimum Standards in Humanitarian Response. 2011. 65-66pp.

IMPACT AREA

THATTA DISTRICT AFFECTED BY THE 100 YEAR FLOOD

Impact area as of August, 2010.
Image courtesy: Reliefweb



Impact area as of September, 2010.
Image courtesy: Reliefweb

Floodwaters rapidly moved towards the east due to the ground being at a lower elevation whilst Makli Hill and the old city of Thatta were not affected.

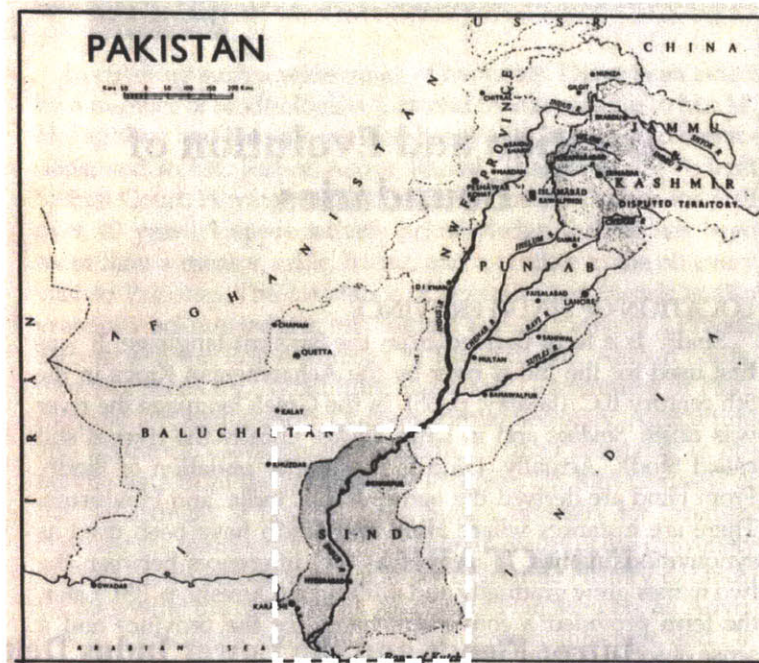
IMPACT AREA

Intro: Floods and the Lower Indus Delta

Thatta District

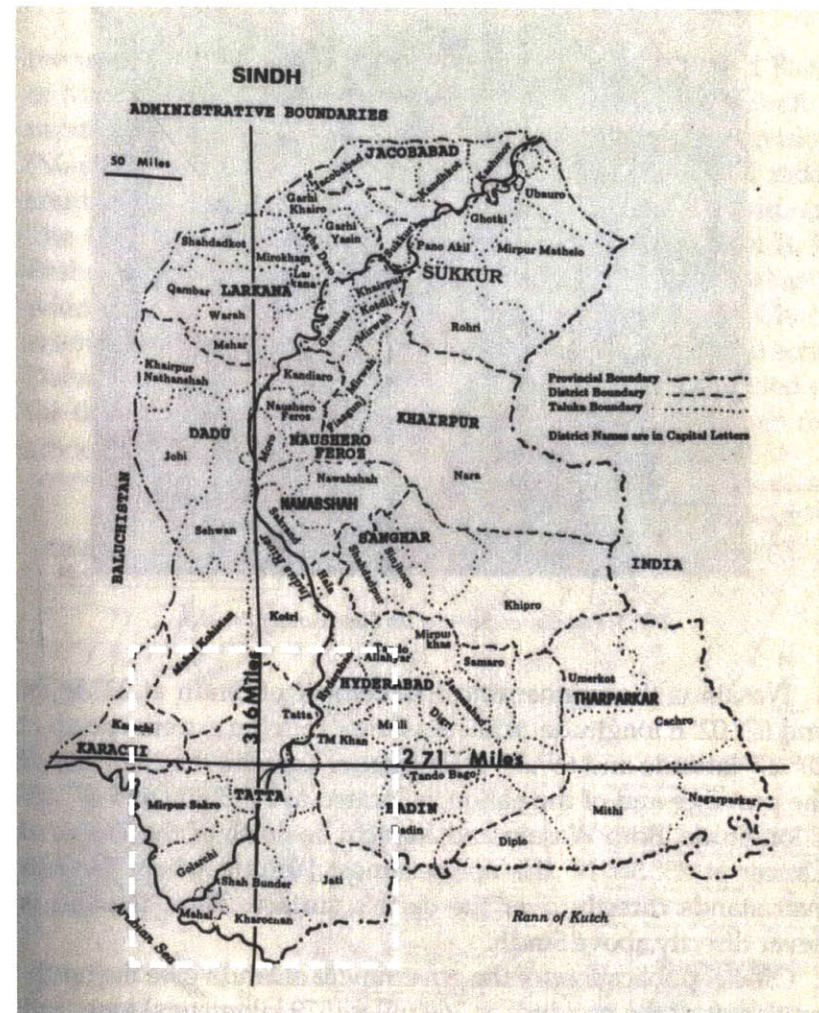
Makli Hill

Site: Selection and Analysis



Map of Pakistan indicating the River Indus with Province Sindh marked out.

Image courtesy: 'Land and Life of Sindh', (Rahman, 1993)



Map of Sindh province with District Thatta marked out.

Image courtesy: 'Land and Life of Sindh', (Rahman, 1993)

INTRO: FLOODS AND THE LOWER INDUS DELTA

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The Indus River

“The Indus River originates at Lake Ngangla Rinco on the Tibetan Plateau and flows 3,000 km through mountains, plains of the Thar Desert and deltaic ecosystems to the Arabian Sea. It is the primary source of water for Pakistan. The Indus Delta covers an area of some 5,000 square kilometers, of which 2,000 is a protected area. The fan-shaped Delta is the sixth largest in the world and supports a population of over 130,000 people, whose livelihoods are directly or indirectly dependent on the Indus River.”

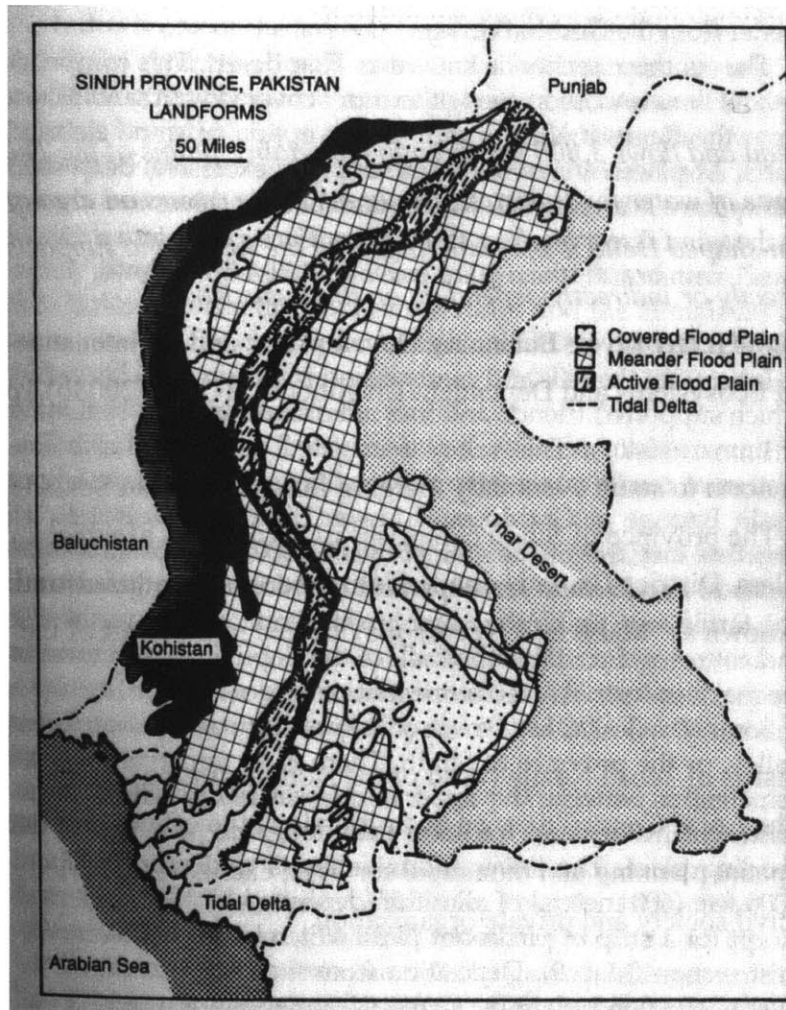
The Lower Indus River: Balancing Development and Maintenance of Wetland Ecosystems and Dependent Livelihoods. IUCN (2003b) 1pp.

The River Indus in Pakistan flows through the length of the country from north to south eventually merging into the Arabian Sea after passing through Sindh, which is dotted with many cultural heritage sites. The province of Sindh comprises of 23 districts of which Thatta district in the southern most through which the Indus river passes last. District Thatta is divided into nine smaller administrative divisions called ‘Tehsils’ or ‘Talukas’ with a prime cultural heritage site known as ‘Makli Hill Necropolis’ located in the heart of the district.

A tehsil is a municipal administration which is “a body corporate and consists of Tehsil Nazim (head of the Administration), Tehsil Municipal Offices, Tehsil Officers, Chief Officers, and other officials of the Local Council Service and officials of the offices entrusted to the Tehsil Municipal Administration (TMA). TMA is responsible for spatial planning and municipal services, exclusively working closely with Union Councils, Village/Neighborhood Councils and other civil society and private organization.”¹

A distinct feature of Thatta district is its varying landscape that ranges from mountaineous terrain to flat lowlands and floodplains. The populations most affected by the 2010 floods were low and extremely low income residents whose vulnerability was primarily a result of being settled on the active and meander floodplains.

1 National Reconstruction Bureau. Government of Pakistan. http://www.nrb.gov.pk/local_government/tehsil_mucipal_admin.htm. Retrieved May 10,2011.



Map of landforms of Sindh indicating the various types of floodplains.

Image courtesy: 'Land and Life of Sindh', (Rahman, 1993)

Lower Indus Valley and Floodplains

Along the tidal delta in Sindh province there are floodplains that can be categorized as:

- covered flood plain
- meander flood plain
- active flood plain

The active floodplains get flooded annually during the summer monsoons to an extent that forces inhabitants to move to higher ground temporarily until the flood waters recede. The complexity of the delta is added to by the shifting of the river and its distributaries, along with earthquakes, crustal movements, and tidal waves¹. In addition, the Indus Delta faces a multitude of problems that curb from the flow of the River Indus downstream or the lack thereof. Displaced communities residing on active floodplains and affected annually are the primary target group for this research proposal.

¹ Rahman, M. Land and Life in Sindh, Pakistan. 1993. 38pp.

Flood Risk Factors

There are several factors that cause inhabitants residing on the floodplains of the Indus Delta to be vulnerable to risk. These include political factors whereby the flow of water downstream is blocked by authorities or as a result of the construction of dams and barrages upstream thus “robbing the delta in the south of its richest soil, and in effect raising the riverbed and making swathes of previously dry land part of the floodplain”¹. Decrease in the flow of water has also resulted in the reduction in frequency and duration of floods which has adversely affected the deltaic regions agricultural practice and output.

Sea water intrusion

Subsequently, the reduction in fresh water flow downstream results in sea water intrusion in the delta downstream.

“It is estimated that the sea water intrusion has taken place up to 67 km resulting in not only damaging terrestrial ecosystem in the deltaic region but also adversely affecting the agricultural fields and other habitats.”²

This negatively affects the communities residing there who are dependent on agriculture for sustaining their livelihoods making their lands unfit for agricultural practises.

Sea level rise

“It is reported that over the last 100 years the sea level near Karachi has been rising at a rate of 1.1 mm. per year and this may increase with global warming.”³ It is estimated that a land loss of about 1,700 square kilometers has occurred in the Indus Delta due to sea encroachment over the last half century⁴.

Poor use of materials and construction methods

The inadequate use of materials in construction as well as the lack of proper construction methods results in structures that are prone

1 Report – Middle East Research and Information Project. Pakistan: Disaster strikes the Indus River Valley. August 17, 2010. <http://reliefweb.int/node/364523> Retrieved May 1, 2011.

2 Shah, A. et al., Degradation of Indus Delta Mangroves in Pakistan. International Journal of Geology, Issue 3, Vol.1, 2007.

3 Shah, A. et al., Degradation of Indus Delta Mangroves in Pakistan. International Journal of Geology, Issue 3, Vol.1, 2007.

4 Qureshi, T.M and Khan, D. Experimental Plantation for Rehabilitation of Mangrove Forest in Pakistan. First Report UNDP/UNESCO Reg. Proj. for Res. and Training Prog. on Mangrove Ecosyst. in Asia and the Pacific (RAS/86/002). Sindh Forest Department, Government of Sindh, Karachi Pakistan. 1988.

to be at risk from flood hazards. The factors that contribute to this are varied and include the lack of skilled labour, resources, construction knowledge or expertise or the mere ignorance of building on a floodplain and not acknowledging the risk associated with the area.

Location of residential community

The Indus Delta has had a sporadic growth of settlements over the years because of a number of reasons such as fertile soil, flat easily inhabitable land and the river as a resource. In the instance of the occurrence of floods, however, all floodwater must flow through the low-lying delta of the Indus River to reach the sea. Thus, the Indus delta was amongst the severely affected regions in the 2010 monsoon floods and a number of relief camps had been set up in the district providing temporary shelter to a large number of the affected population.

Lack of flood resilience knowledge/understanding

Many of the residents living in the deltaic region expect floods to come within the limited capacity that they experience year in and year out. Most of the time they fail to acknowledge the threat of the flood that could possibly occur like the one that struck the Indus Delta in 2010. Also there is a lack of flood resilient knowledge and understanding.

Vulnerability of Poor Rural Households

Residents of the deltaic floodplains are mostly poor rural households that reside there due to factors which include:

- lack of home ownership or land title: preventing them from living on flood safe ground
- unemployment: results in squatting on the floodplains - temporary squatting over a time period develops into a squatter settlement comprising of a cluster of households
- poverty: causes increase in vulnerability due to not being able to afford building and construction material in order to build stronger and safer
- lack of job opportunities and resources to enrich livelihood and improve living standards

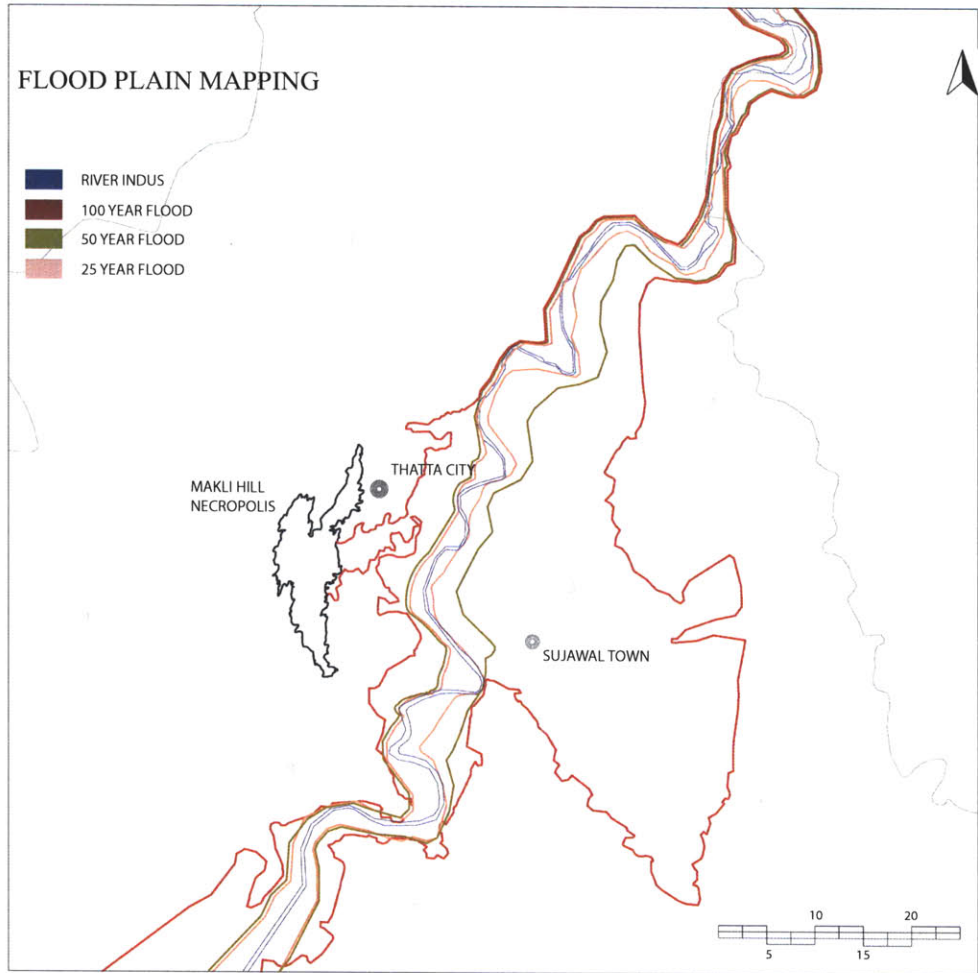
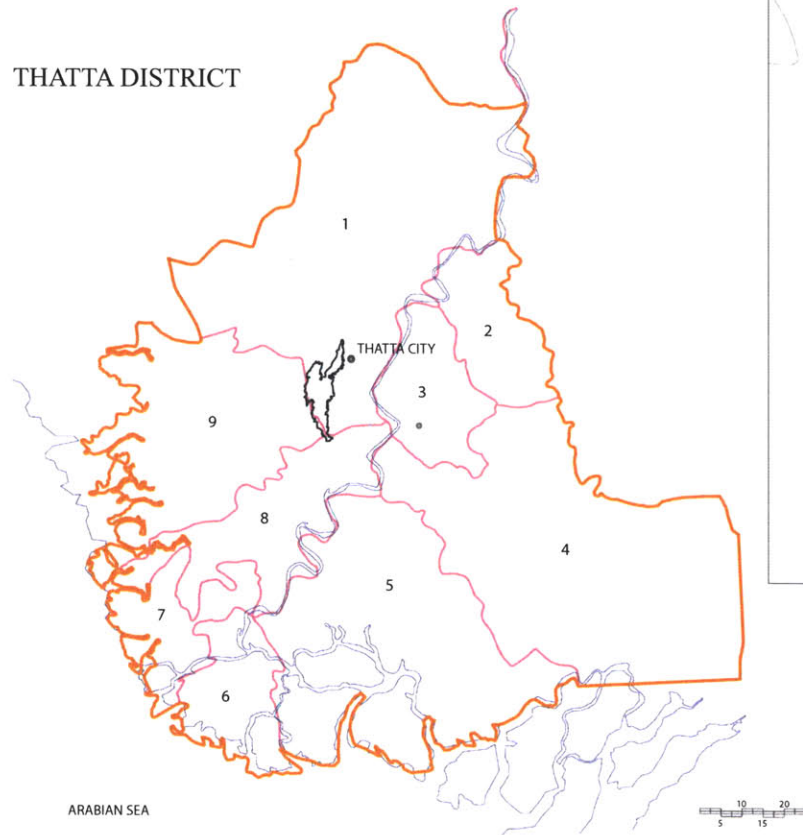
In conclusion, even if vulnerable communities settled on the floodplains were to (or even if they already do) understand the associated risks of residing there, many of them do not have the option of moving elsewhere. Constrained by their individual situations and circumstances, comprising of either any one or, as in many cases, several of the factors mentioned above, they are forced to continue residing on vulnerable sites and exposing themselves and their families to risk.

There is an obvious need for an alternative housing solution for such vulnerable communities providing them with an option that has the potential to sustain livelihoods, improve living conditions and standards, and reduce risk and vulnerability to floods. Therefore, one of the key stakeholder groups in this thesis proposal are these vulnerable households and communities.

INDUS DELTA FLOODING



THATTA DISTRICT



- | | | |
|---|-----------------------|--------------------------|
| 1 | THATTA TALUKA | THATTA DISTRICT BOUNDARY |
| 2 | MIRPUR BATHORO TALUKA | TEHSIL BOUNDARY |
| 3 | SUJAWAL TALUKA | RIVER INDUS |
| 4 | JATI TALUKA | MAKLI HILL |
| 5 | SHAH BUNDER TALUKA | WATER BODY |
| 6 | KHARO CHAN TALUKA | |
| 7 | KETI BUNDER TALUKA | |
| 8 | GHORABARI TALUKA | |
| 9 | MIRPUR SAKRO TALUKA | |

THATTA DISTRICT

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Thatta district is included in the Hyderabad division of the southern province of Sindh. The district's natural features include a delta and hilly area which make it a distinct regional entity¹. Other factors that add to the importance of the district are:

- it's historical significance with respect to the lower Indus valley
- the presence of a necropolis on Makli hill (a UN World Heritage site), and
- it's diverse cultural population of locals and migrants

Presently the region is rather neglected and undeveloped but because of its extensive irrigation system, rich cultural heritage and fertile floodplains, the district has potential for developmental growth and progress. However, for any development to take place there are a multitude of issues that need to be addressed and overcome through proper analysis, assessment and planning so as to ascertain productive development in the interest of the local population, respecting their needs and requirements.

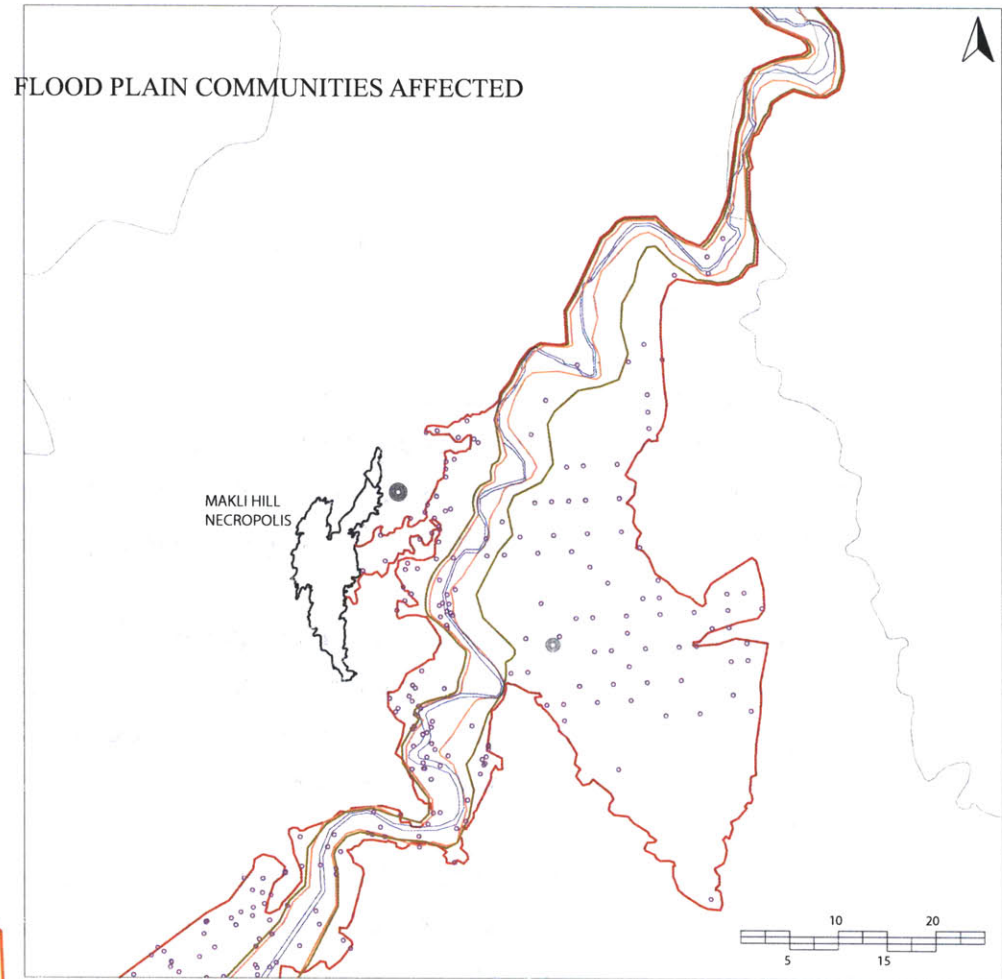
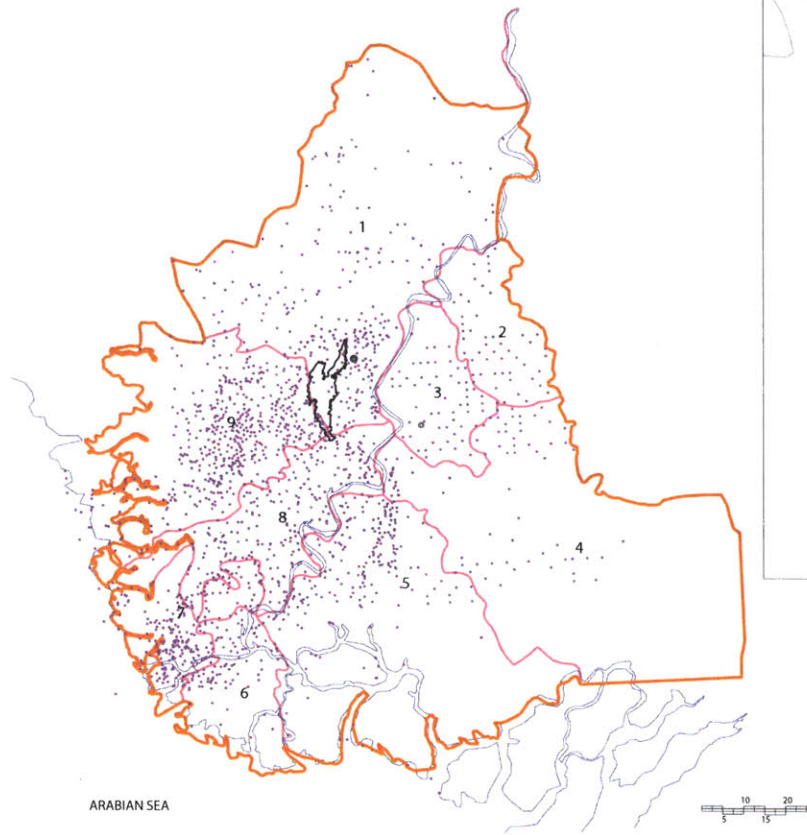
Thatta districts floodplains get flooded year in and year out due to excess rainfall caused by torrential monsoon rains forcing low-income communities settled on the floodplain to migrate to safer ground. The adjacent map is a mapping of the 25, 50 and 100 year flood zone in the region. In the event of the 100 year flood (of the scale that occurred in 2010) the floodwaters affect livelihoods, severely destroying shelters, crops, livestock and infrastructure.

There are more than seven hundred settlements ranging from cities to towns to squatter-settlements spread across Thatta district. Amongst them more than 200 were affected by the 2010 floods. As a result a large number of affected communities sought refuge by evacuating to higher ground on Makli Hill.

1 Rahman, M. Land and Life in Sindh, Pakistan. 1993. 31pp.

FLOOD VULNERABILITY

SETTLEMENTS IN THATA DISTRICT



- | | | | |
|---|-----------------------|---|-------------------------|
| 1 | THATA TALUKA | ■ | SETTLEMENTS |
| 2 | MIRPUR BATHORO TALUKA | ■ | THATA DISTRICT BOUNDARY |
| 3 | SUJAWAL TALUKA | ■ | TEHSIL BOUNDARY |
| 4 | JATI TALUKA | ■ | RIVER INDUS |
| 5 | SHAH BUNDER TALUKA | ■ | MAKLI HILL |
| 6 | KHARO CHAN TALUKA | ■ | WATER BODY |
| 7 | KETI BUNDER TALUKA | | |
| 8 | GHORABARI TALUKA | | |
| 9 | MIRPUR SAKRO TALUKA | | |

Regional Analysis

Society

The extremely low-income population lacks means and resources to enrich their livelihoods. They live in squatter settlements many of which are situated along the Indus river exposing them to flood vulnerability and risk. This risk was exemplified during the 2010 floods when entire settlements and towns were evacuated in search of refuge on elevated ground.

The housing situation is rather desperate because of high poverty levels. Households resort to squatter settlements as a result of being at the bottom of most socio-economic indicators. A majority of villages comprise of about 50-60 households that form a community and cluster together. The shelters they build for themselves vary in accordance to their financial situation and resources available to them.

Thatta district faces a multitude of problems which include poverty, high rate of unemployment at 17.72% and homelessness, a lack of proper sanitation and clean water supply with only 14.67% of the population of the entire district have piped water facility and 13.45% use hand pumps as well as a low literacy ratio of just 22.14%.¹

The adjacent map indicates settlements across the Thatta district that range from a city, town to a hamlet (gothoro). The settlements that are most affected by the yearly monsoon rains and any flooding of the river Indus are the ones that are settled on the low-lying floodplains within the flood zone. The marked out area on the map indicates the target area shown in subsequent maps.

1 Memon, A.N. *Sindh Development Thoughts*. Sindh Development Institute. 2007.

Environment

In its history, Sindh has been a victim to contrasting climates ranging from floods to droughts. Interestingly, historical analysis shows that change in climate had an impact on social behavior and economic growth which ultimately, depending on the situation, caused social unrest/disruption leading to political upheaval. In case climate improved, so did irrigation which in effect enhanced economic stability and resulted in social and developmental progress (Panhwar, 2005).

M.H.Panhwar's book 'Six thousand years of history of Sindh' gives an account of how the Indus plains were first inhabited and how inhabitation and climate affected the floodplains. Water diversion dams known as 'gabarbunds' were built by settlers of Dadu and Larkana districts on the Indus plains to divert water into fields from rain fed streams during dry spells. These gabarbunds allowed water to seep down to a depth of 2.5 meters and on soil with preserved moisture, winter crops were raised.

Practices by early settlers of the Indus plains were

- During a dry spell and shortage of water diversion dams were built
- When there was a shortage of land and they needed to settle on the flood plains they cut down forests
- During periods of surplus rain in the summer some winter crops were grown for e.g. fodder crops
- During periods of reduced rainfall and aridity, summer irrigation was introduced

Locals managed to adjust to local environmental conditions by assessing their needs and managing environmental conditions to meet their requirements. A valuable lesson can be learnt from this approach to inform current trends in the region.

Major local occupation is still agriculture but because of a lack of precipitation and extreme weather conditions they are faced with limitations in irrigation and agricultural output.

Economy

According to a socioeconomic study for livelihood improvements in Badin and Thatta districts conducted by the World Bank, in the past most villages had multiple sources of income which included subsistence farming and livestock ownership to meet household consumption needs. But as a result of decreased water availability and increase in salinity there has been a decrease in these practices resulting in the households reduced means to support their livelihood in a sustainable manner.¹

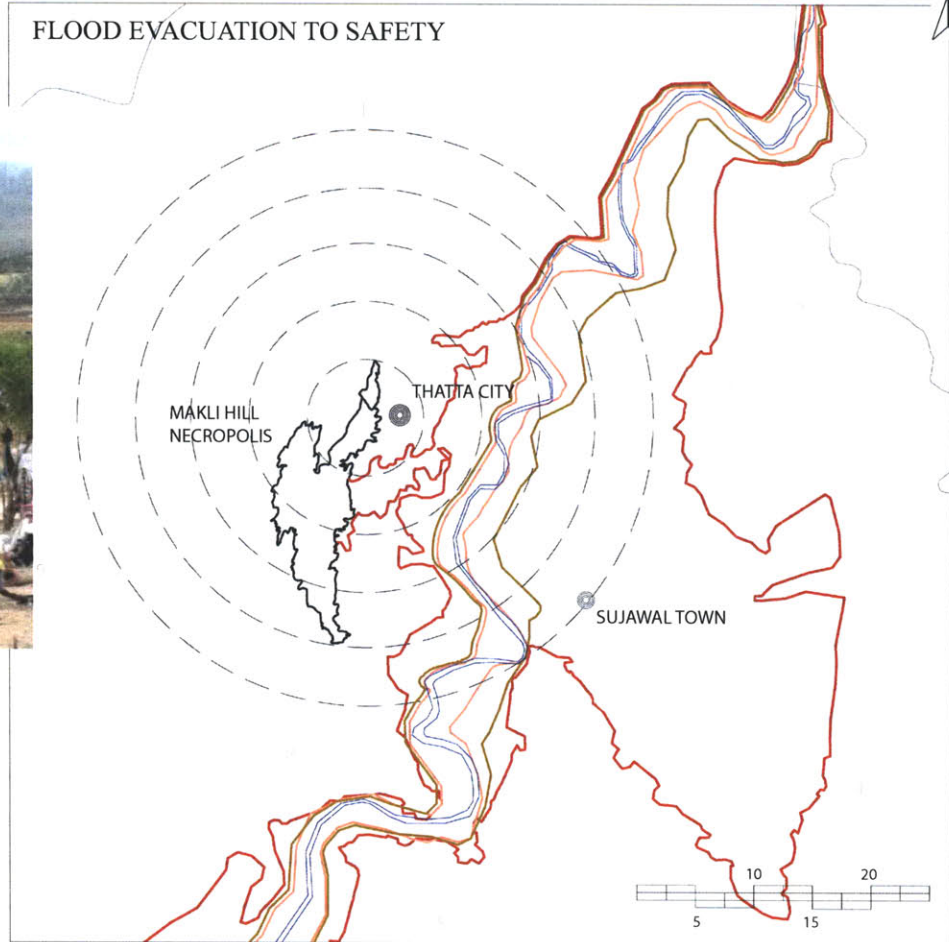
Main Occupation of Surveyed Households		
Profession	Number	Percentage
Unemployed	11	3.7
Fishing	195	65
Crop and Livestock Farming	59	19.7
Regular Employment	19	6.3
Daily Wage Labor	16	5.3
Secondary Occupation		
Profession	Number	Percentage
None	185	61.7
Wood Cutting	35	11.7
Labour	31	10.3
Shopkeepers	7	2.3
Livestock	6	2
Farming	26	8.7
Others	10	3.3

Main and Secondary Occupation of Surveyed Households - Source: Household Survey Data – January, 2005

This survey indicates fishing as the main occupation of majority households because it focused on fishing communities in the south of the districts. The occupation of households in the north of the district replaces fishing with farming, and due to inadequate supply of water, there is thus an increase in unemployment.

¹ Socioeconomic study and Proposal for Livelihood Improvements: Badin and Thatta Districts, Sindh, Pakistan. April 25, 2005. Agriculture and Rural Development Sector Unit South Asia Region. World Bank Document.

MAKLI HILL NECROPOLIS - A SITE OF REFUGE FOR THE LIVING



Refugees covered as much as 25km on foot to reach from flooded settlements to seek refuge on higher ground at makli hill necropolis.

uninhabited land
existing infrastructure
large open space

Floods in Thatta District

The 2010 floods in Pakistan began after a spell of heavy monsoon rains occurred from July 27 to 30 in the regions of NWFP and Punjab. In early August, the heavy flooding moved southward along the River Indus from the northern regions to western Punjab and subsequently to the southern province of Sindh.

The effects of the floods in the north was different to that in the south by way of magnitude and intensity and also because of the difference in topographical terrain between the regions. The floods in the north were abrupt and violent; providing no time or chance for people to move to higher ground and resulting in the loss of land and property. Whereas, the effect of the floods in the south lowlands was different – displacing entire communities at large scales and but not destroying land just damaging it¹. According to the OCHA, Sindh hosted the largest number of flood-displaced people, in addition to experiencing the worst of the flooding. Of the 21 million people affected by the 2010 floods in the country, Sindh was home to about 7 million of them². As of ICRC reports dated September 16, 2010, more than one million people displaced by floodwaters in Sindh were living in camps, with host families, or along areas of high ground.

Of District Thatta's nine Tehsils³, five were most affected namely Thatta, Mirpur Batharo, Sujawal, Ghorabani and Jati. In these five Tehsils 34 refugee camps were set up providing shelter and sustenance for 12,969 individuals in 2,218 households⁴. The camps were set up by international as well as local non-governmental organizations (NGO's).

The distance travelled by refugees to get to a site of refuge varied depending on circumstances and flood situation from location to location. A Karachi Relief Trust (KRT) representative who had been on the ground during relief efforts informed me that talking to many people that were directly affected by the floods, the first flash flood of 5 feet, made people move a few kms to relatively higher ground.

1 Interview of Regional Technical Advisor for water, sanitation and hygiene in Asia. Pakistan Floods Ravage North and South. Catholic Relief Services. <http://crs.org/pakistan/pakistan-floods-ravage-north-and-south/>. Retrieved May 1, 2011.

2 Pakistan Monsoon Flood, Situation Report 26

3 Tehsil (aka Taluka or Mandal) is an administrative division generally consisting of a town or city that serves as its headquarters and possibly additional towns and a number of villages

4 NRSP report on 'Flood Affectees Rapid Assessment. Displaced Flood Affectees in the Camps at District Thatta', Sukaar Foundation. 22 August 2010.

Then the second round came in early morning, which was another 3 feet of water so people travelled on foot, another 4 kms-5kms to reach even higher ground. Then the following day, when the water did not stop rising it created panic. Rescue attempts were made by boat and hovercraft in order to reach out to people stranded in far out places. Many of those stranded even when reached out to, refused to leave behind their cattle for safer/higher ground. The extent of their dependency on livestock rearing for their livelihood is exemplified by this.

Residents of the town of Sujawal walked through flooded streets, communities and villages to get to the KRT camp. One group of families had walked 48 kms to come to high ground. Even in other flooded areas like DG Khan, in the province of Punjab, people had walked 12 kms to get to safer ground. In Kashmore/ Guddu the worst hit area in upper Sindh, residents of Thull waited 4 days for an opening in the flow of water to walk 6 kms to come to the other side of the river.

According to a KRT relief aid volunteer, the right and left banks of the Manchar Lake broke to inundate more than 200 villages in and around that area. The army settlement there had more than 480,000 people in their camps. They had 7 sectors, each with a hospital, school, nursery, canteen etc in it. Some refugees travelled an entire day to get to the camp, in the case they were not rescued by boat or hover craft.

NGO's worked to provide relief to affected communities and set up camps for them. Camp refuge was provided as long as the flood-waters remained and once the waters began to recede most refugees began moving back to their lands and begin reconstructing their homes and livelihoods. Many of them returned to areas they had previously squatted and established informal settlements on. Flood-waters remained in some places for as long as 50 days.

However, there were some refugees who continued to take refuge in the camps even after the flood waters had receded. This was partly due to them wanting to accumulate maximum ration provided by the camps and partly due to the lack of any sort of formal and/or informal housing prior to the floods.

The situation of Makli was described as ‘desperate’ whilst the security situation deteriorated rapidly because no registration of the IDP’s (Internally Displaced Persons) had been conducted.¹

Relief Efforts Observations

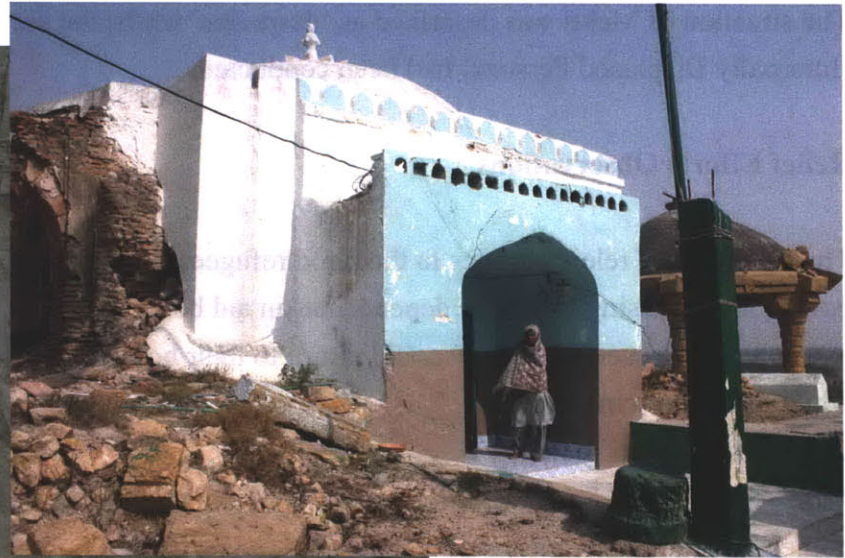
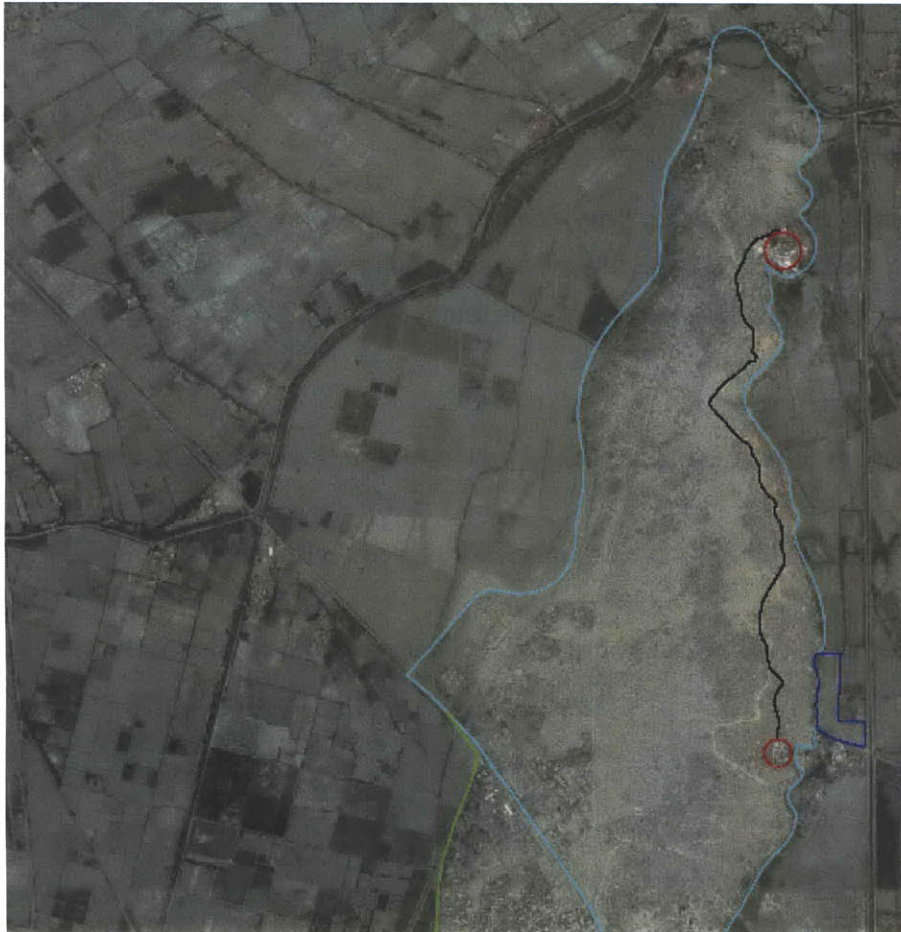
The provision of relief supplies to the flood refugees created a reliance on things being provided to and for resulting in households having an increasingly passive dependence on aid being provided to them. This was highlighted by the fact that some families did not leave the camp even when they could return to their homes because they wanted to accumulate as much ration as they possibly could while the camp remained.

Other observations include:

- The relief efforts did not support the refugees in a sustainable manner – once the camp packed up the refugees were once again homeless without any means of livelihood.
- Organizations constructed homes for the refugees in their camps without any input or responsibility placed on the residents themselves.
- The constructed homes costs were too high for the residents to ever be able to afford in order to replicate or build for themselves.

1 Meier et al., *Assessment of the city of Makli (Thatta)*. UNDAC, August 29, 2010.

ANALYSIS: SUFI SHRINES



Two shrines in the necropolis have annual 3 day festivities in honor of the saints birthdays known as 'Urs'.

Some 4000 pilgrims travel to the necropolis bi-annually to take part in the celebrations.

A site between the two shrines is used as a camp ground for the pilgrims with the funding aid of Auqaaf Foundation.

MAKLI HILL

.....

The higher ground that the inhabitants of some towns, namely Thatta city and Sujawal, migrated to during the 2010 floods was Makli hill. This hill is detached from the Kirthar Mountain range that exists to the west of the province and occur in the delta area of Thatta district. The cuesta shaped hills are made of fossiliferous Tertiary limestone and are surrounded by alluvium on all sides (Panhwar, 1993).

The significance of the this hill lies in the fact that an ancient necropolis dating back to the 15th century is situated on it. Although the site has been named a World Heritage Site there is obvious evidence of decay, progressive deterioration and collapse of walls of some of the monuments. The necropolis is in dire need of a conservation plan and improvement of site presentation as well as tourist facilities.

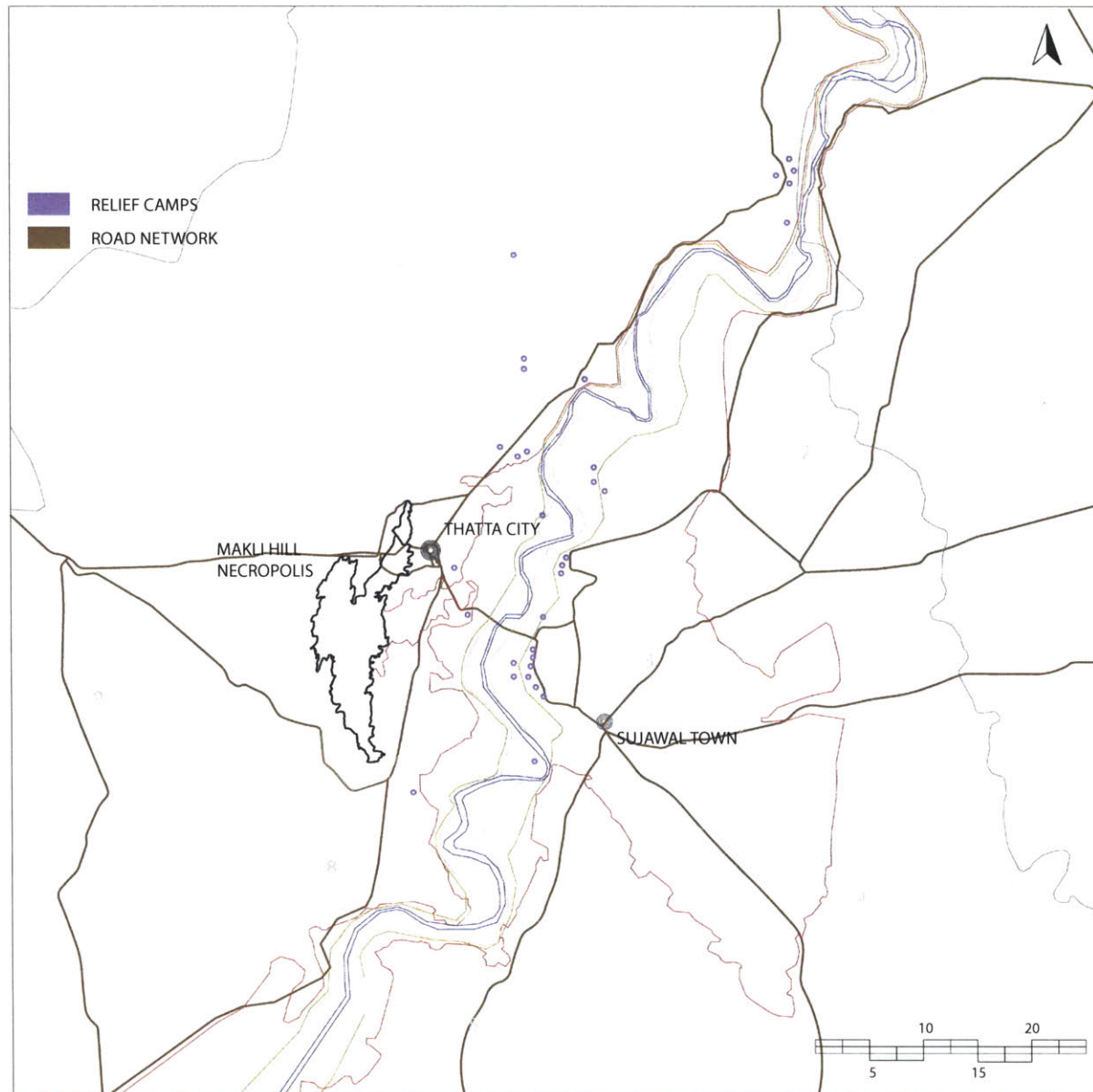
The inhabitation of the heritage site by some a large number of flood refugees in 2010 was a hazard to the conservation of the historical monuments. A UNESCO World Heritage Expert Mission that visited the site post-floods recommended an urgent development of a risk management plan and proposed a number of conservation measures.

While conducting research in the area I learnt that there are two major shrines in the Necropolis each of which attracts some 4000 pilgrims annually to celebrate the ‘Urs’ (death anniversary) of the saint. As celebrations occur for three consecutive days a camping ground is set up for pilgrims by the Sindh Auqaaf Department (established in 1970) whose prime objectives are “to maintain and regulate prominent shrines and provide maximum facilities to visitors of shrines.”¹

The third stakeholder group considered for this proposal are the pilgrims and the camping ground that is used for the pilgrims bi-annually is the site that has been selected for this thesis.

1 Auqaaf Department, Government of Sindh. <http://www.sindh.gov.pk/dpt/Usharzakaat/index.htm>. Retrieved May 10, 2011

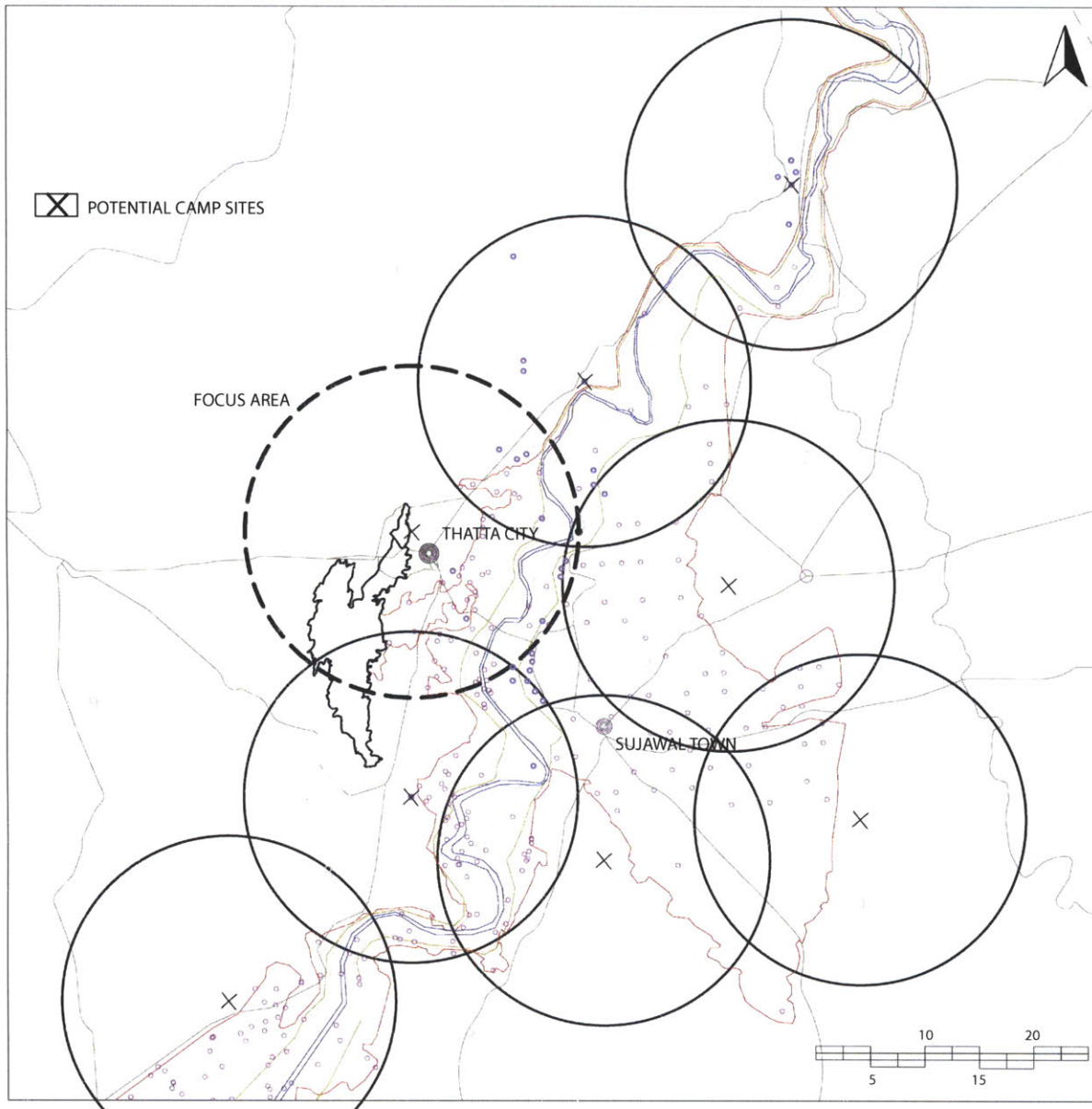
ACCESS TO CAMP SITES + HERITAGE



Camp Sites

Mapping out the location relief camps were set up in the region clearly indicates that camps were set up on sites that had convenient road access for ease and convenience of the provision of supplies and services to the camps. However, the lack of a predated approach to relief efforts is also evident from the map. As can be seen, many camps were located in the floodzone causing disruption in relief efforts and the overwhelming of camps by refugees who shifted from flood risk camps to those situated clear out of the flood zone.

FLOOD RELIEF PLANNING + SITE SELECTION CRITERIA



Floods in the region are a recurring phenomena

An evacuation plan is utmost needed which will allow for communities to move to flood safe zones in a systematic manner allowing for effective and efficient management of relief efforts.

Camp location criteria

- levees
- 20 km = 2 hr travel time
- existing services
- convenient accessibility

Potential Sites

The adjacent map identifying the spatial adjacencies of:

- camps set up during the 2010 floods
- existing settlements and

The interrelationships of these two with respect to the accepted distance refugees can be expected to travel to reach a place of refuge results in the identification of potential sites where the design proposal may be implemented. This map is key in chalking out of a planned flood management system whereby vulnerable populations are assigned particular camp site locations to evacuate to in case of a flood event. This will help in determining that flood relief efforts are not disrupted by having to cater to mass populations of flood refuges at any one location or camp site.

As floods in the region are a recurring phenomena, at a macro scale, there is an urgency for the establishment of an evacuation plan for vulnerable communities to move to flood safe zones in a systematic manner allowing for effective management of relief efforts in the future. The adjacent map depicts the basis of an evacuation plan, whereby vulnerable communities within a 20km radius are preassigned flood safe camp sites to evacuate to. If planned so, the entire process of the provision, mangement and organization of relief efforts will be positively effected.

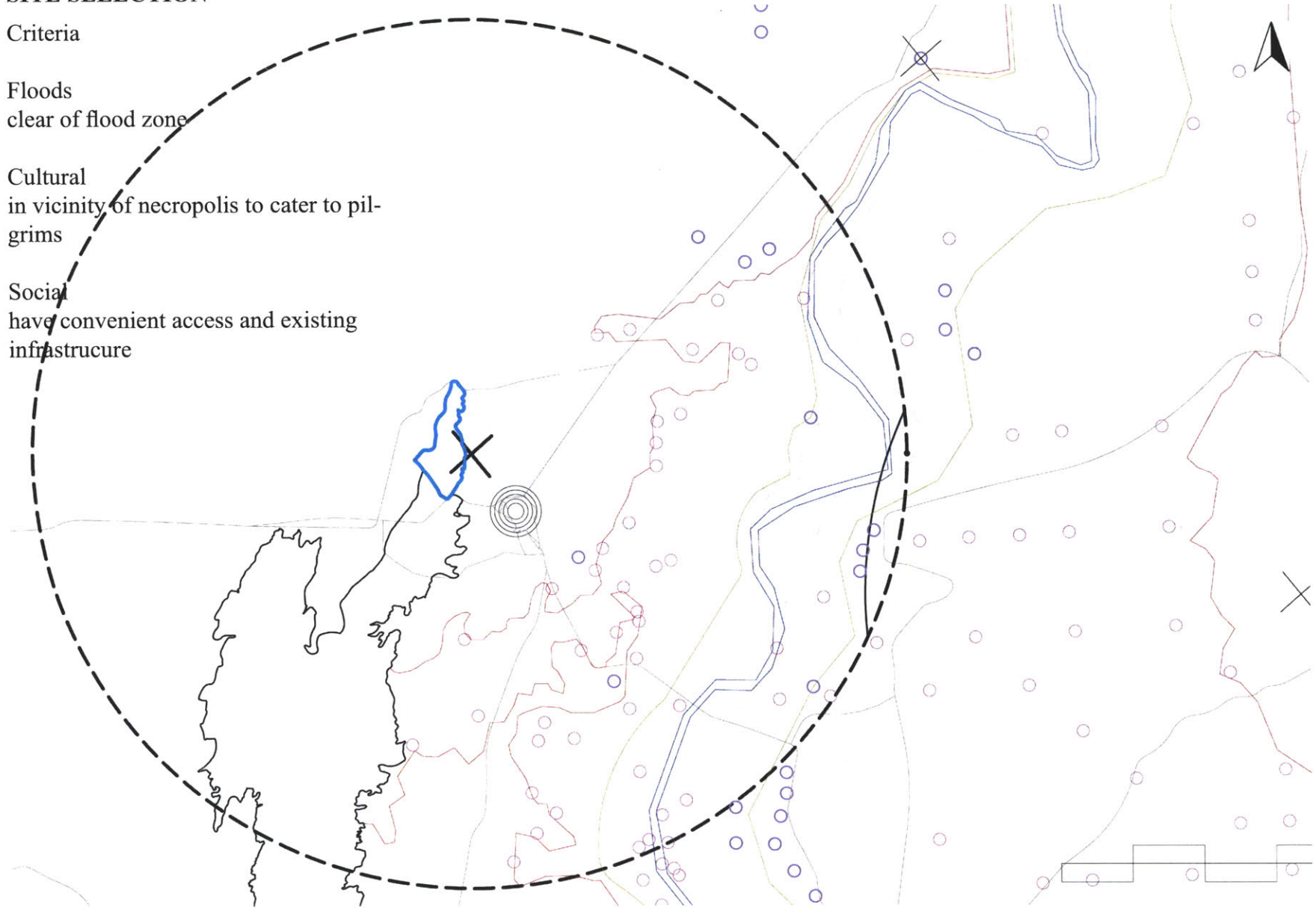
SITE SELECTION

Criteria

Floods
clear of flood zone

Cultural
in vicinity of necropolis to cater to pilgrims

Social
have convenient access and existing infrastructure



SITE: SELECTION AND ANALYSIS

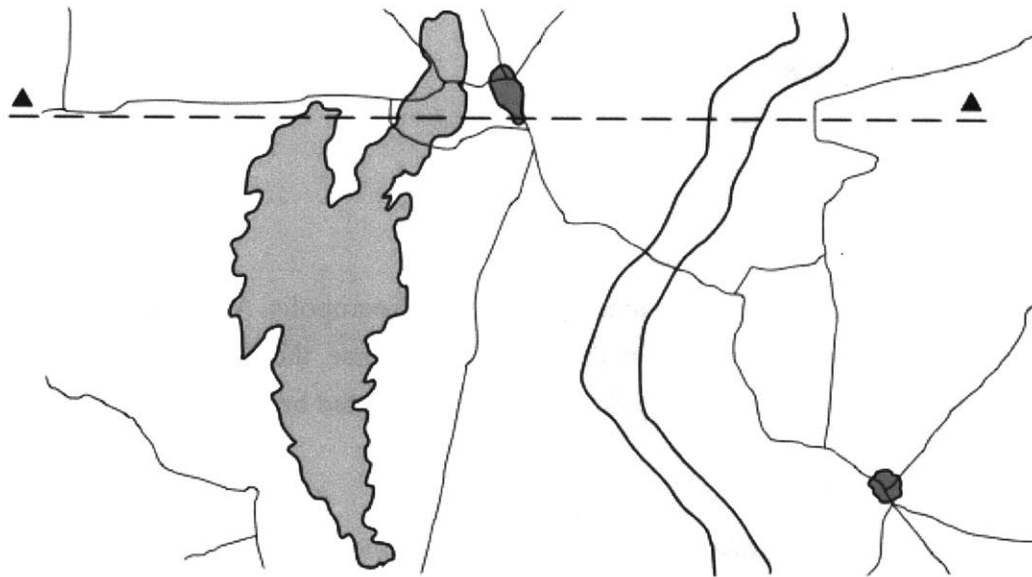
The site selected for this thesis is located in the immediate vicinity of Makli Hill Necropolis.

Criteria for site selection was based on three main factors that the site was

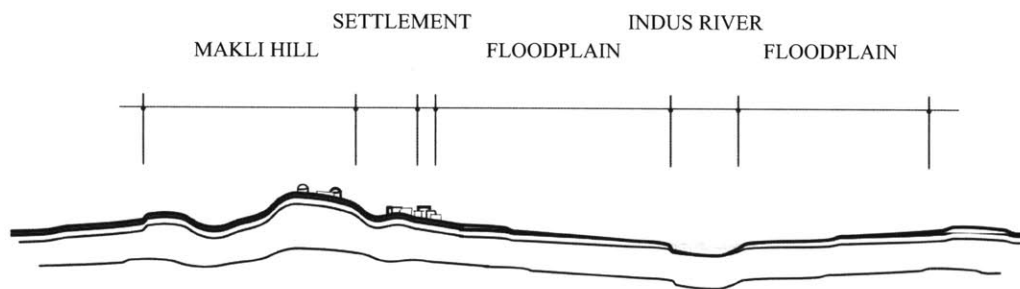
- clear of the flood zone
- in the vicinity of cultural heritage, and
- has convenient access and existing infrastructure

The area marked X in the map is the site selected while the marked out highlighted area is Makli Hill Necropolis. Also, there are historic sites located in the ancient city of Thatta just a couple of kilometers away from the necropolis. Hence, there is great interest of tourists to come and visit heritage sites. But due to the lack of tourist facilities only day tours are conducted bringing many visitors from Karachi and Hyderabad usually on weekends.

The tourists visiting cultural heritage sites are the second stakeholder group taken into account in this proposal.



Plan of Makli Hill in relation to River Indus and cities of Thatta and Sujawal.



Section

Proposed flood impact measures:

“Designation and establishment and marking of the property and the buffer zone and installation of fencing around critical areas of the Makli World Heritage Site

Preparation of a Disaster Risk Management Plan for protection of the site, including an emergency programme identifying alternative areas with adequate infrastructure for refugees.”¹

An emergency programme is along the lines of what this thesis entails and identification of alternative areas with adequate infrastructure for refugees is a key factor in determining that the necropolis is not inhabited by locals seeking refuge from floods in the future.

¹ UNESCO World Heritage Centre Expert Mission to Pakistan in response to Flood Emergency, Mission Report – Post Floods Assessment Mission to Pakistan 8-16 October 2010



Housing

Shelters of the low-income population are mostly shanties, usually made by inexpensive materials that they have easy access to or are naturally available to them.

The images are of shelters located between Thatta city and the town of Sujawal. Sticks, straw bale and mud is used for construction. The washed away mud in the top picture indicates the height the floodwaters rose (approx. three feet).



Employment

The presence of numerous shrines in the area results in a high demand of customary items to lay on tombs whilst paying homage to the revered buried saints. The locals also possess skills of making everyday items such as baskets and embroidery. The girl in the picture is weaving a belt.

Roadside markets are sporadically located throughout the area ranging from selling clothes to cooked food and refreshments to fresh fish.





Toilets on Makli Hill



Waterwell at shrine

Water Infrastructure

With temperatures soaring to as high as 40 degrees celcius provision of water is essential.

Wells are located in the shrines of the necropolis for the provision of water to pilgrims and visitors.

The availability of water in the necropolis is perhaps one of the key reasons flood affected popula-tions migrated to the necropolis in particular as opposed to any other part of Makli Hill.

Vegetation

Many lush green agricultural fields can be spotted along canals in the district indicating the existence of a vast irrigation network. Shrubs are widespread with the most plantation existing on and near the floodplains. The further away one travels or the higher up (Makli Hill) the vegetation grow more sparse and less green.



Views of agricultural land and green area around site



PRE & POST FLOOD SHELTERS



Pre-flood construction
Mud and straw homes
Exposed structure reveals height
of water level during flood

Karachi Port Trust

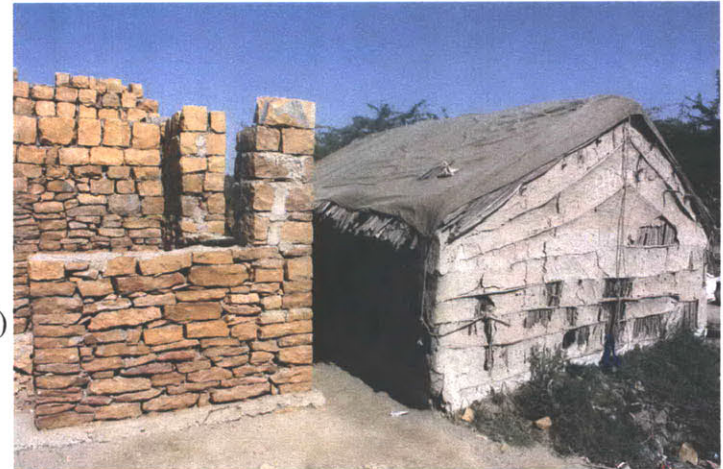
Project Location: Southern Flood Affected Areas of Pakistan.

Date: 2010 onwards

User client: Flood Affectees

Description and number of beneficiaries/users: 6/7 persons per household

Construction cost (clay/cement) = PKR 75000 + 25000 = 100,000 (USD 1,163)



'Improved' construction

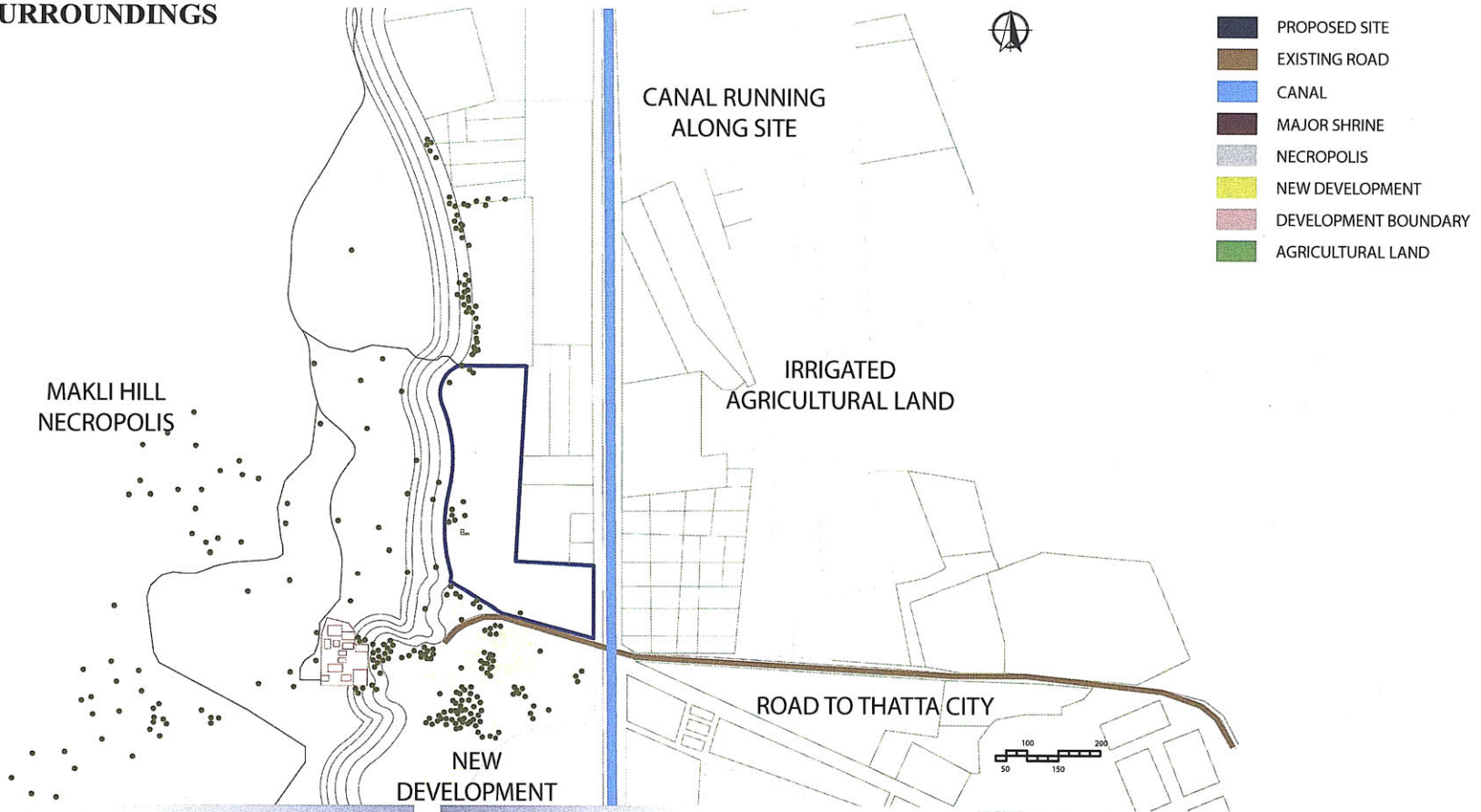
Too expensive

Not sustainable

Does not generate a means of livelihood for residents

Residents dependent on NGO to construct shelters for them

SITE SURROUNDINGS



Site Analysis

Analysis of the site surroundings was done by visiting the site and its neighboring surroundings in order to assess access to and from site, services needed and those that already existed and in order to develop a site zoning plan.

There site is situated between the two shrines where pilgrims set up camp hosted by the Auqaaf Foundation. As a result of this land being occupied bi-annually there are a couple of roadside restaurants that are set up to cater to the pilgrim population during the Urs days and to tourists and locals the rest of the year round. It was interesting to note that the floods did not affect this plot of land and hence it appeared to be an ideal site location for a sustainable shelter program which would cater to all three stakeholder groups: the flood population, the tourists and the pilgrims.

The site is located adjacent to Makli Hill with the Necropolis due west and with road access to the old historic city of Thatta at its southern end. To the north and east of the site are agricultural fields and a canal runs parallel to the site along its eastern edge. There is a new sporadically growing development across the road from the site to the south. Multiple access points exist from the site up to the necropolis to get to both the prominent shrines.

SITE ZONING: INTEGRATION OF SITE AND PROGRAM



View of site from southeast corner looking towards Makli Hill



Site Zoning

The proposed site lies along the east side of Makli Hill at an elevation of +23'0" above sea level with the northern end of the site rising to +32'0".

Makli Hill adjacent to the site is some 40 feet higher at an elevation of +65'0".

The site was selected based on the following analysis and observations:

lies outside the 100 yr flood zone

is in close proximity to heritage sites such as the ancient city of Thatta and Makli Hill necropolis

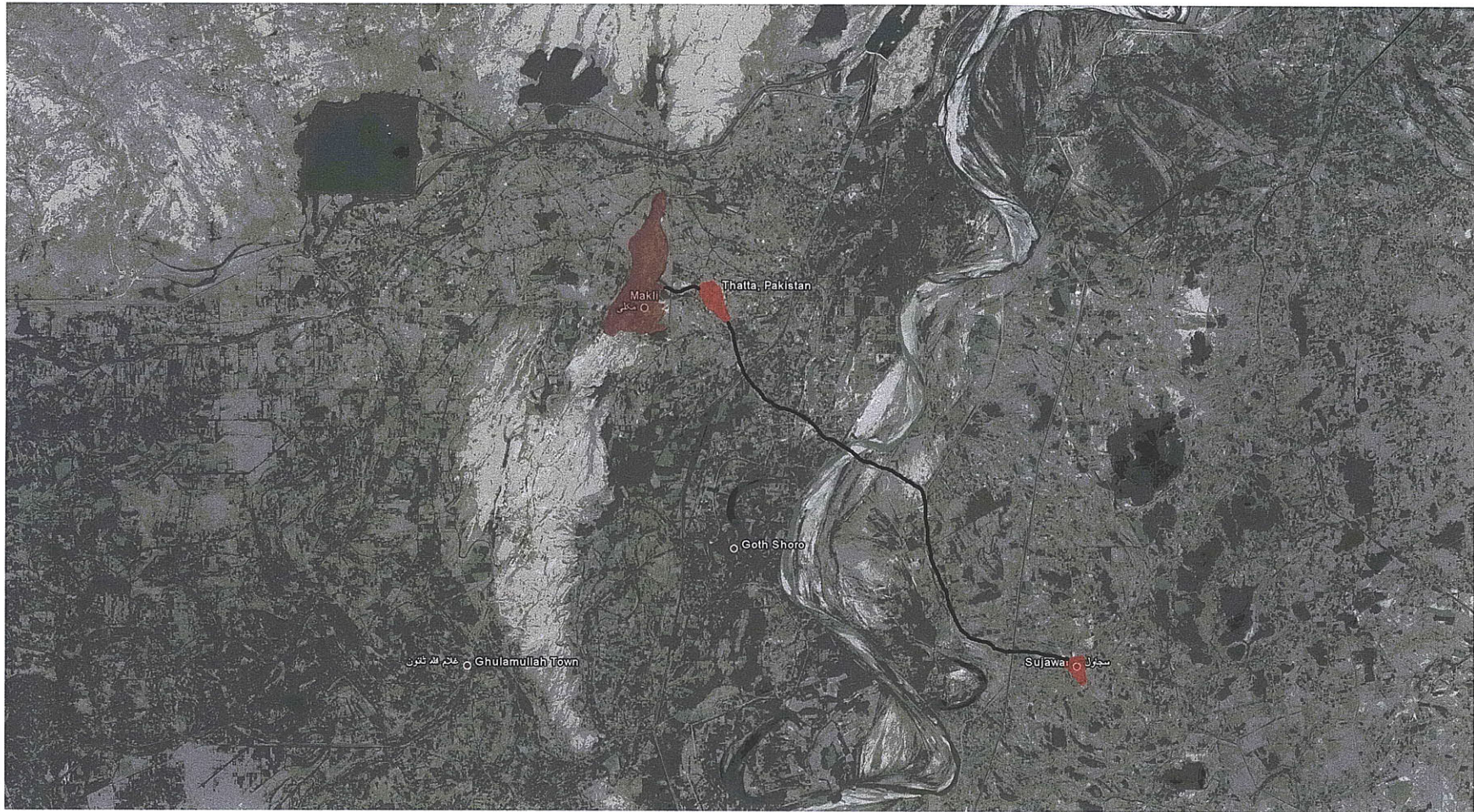
road access to the site ensure convenient access for both vehicles and pedestrians

the canal running parallel to the site will be useful for drainage and water run-off to be discharged

agricultural lands around the site suggest that an irrigation system is already in place that can be tapped into or built upon by the settling community to support their subsistence farming

water and electric infrastructure already exists on site

because of its location between both the major shrines that are visited by pilgrims, the site is used by the Auqaaf Foundation as a camp site for pilgrims



-  ELEVATED GROUND
-  DISPLACED TOWNS
-  MIGRATORY PATH

Aerial view indicating the migratory path taken by the residents of Thatta city and Sujawal to seek refuge on elevated ground on Makli Hill.

Image courtesy - Google Earth

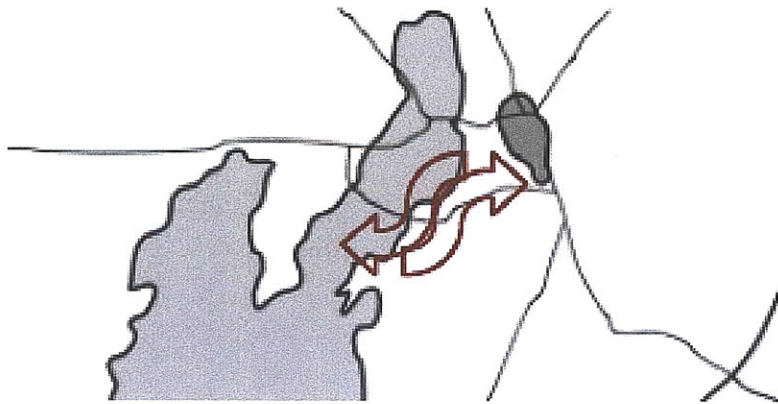
Implications for Thatta

Allocated funds for relief aid should and need to be used in a more productive, effective and sustainable manner that will ensure that the refugee population are able to sustain their livelihoods post-flood as well as post-relief aid.

Refugees should be made part and parcel of the construction of shelters so as to provide them a skill set that they can use later on as well as to invoke a sense of responsibility and ownership of the built structures and earnings.

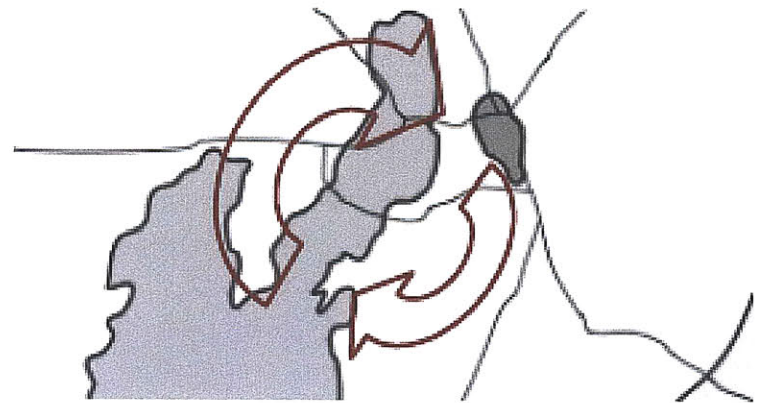
A planned and structured flood management program needs to be in place in such areas where flooding is a recurring phenomena by taking into account populations of settled communities in the region and determining potential sites of refuge that those communities can evacuate to.

In camp shelters, refugees should be encouraged to contribute to the co-existence of the community as a whole with the help of the organizations and aid to initiate the process of the establishment of a self-sufficient sustainable co-operative community.



TRANSITIONAL SETTLEMENT?

OR



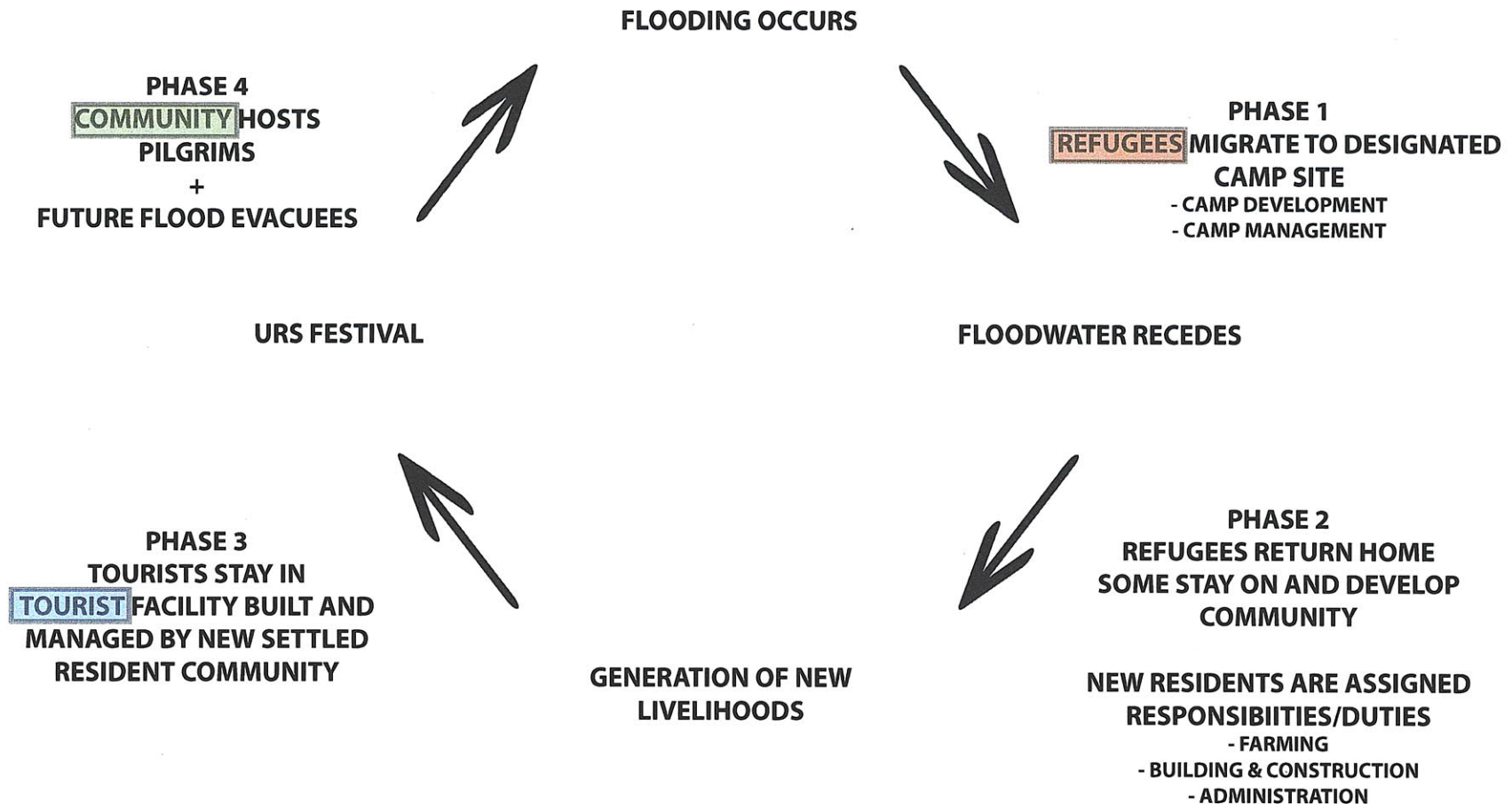
SUSTAINABLE SETTLEMENT!

PROGRAM ANALYSIS

Stakeholder Groups

Program Inventory

DISASTER PLANNING AND RESPONSE CYCLE: THE MODEL



The disaster planning and response cycle involves the stakeholder groups to benefit from each others needs and hence establish a sustainable system whereby local communities highly benefit in terms of not only becoming self-sufficient but in turn taking on the role of the responsible host to the other three transitional groups of tourists, pilgrims and flood refugees.

PROGRAM ANALYSIS

This chapter covers the scope and structure of program inventory analysis. It states the stakeholder groups and addresses the needs of each of these three groups - tourists, pilgrims and flood vulnerable populations - and considers design requirements in general at the site level. This is followed by the breakdown of what is needed as a whole during the first, second and third phases of development of the program.

Local and community participation is a key component in conservation and developmental projects.

There is the question of settlement typology - whether it should be permanent or transitional? Based on textual and contextual analysis, here the idea is to develop a settlement that can sustain itself – be used and reused - something that will not only provide refuge to flood affected populations but also benefit communities in the region and promote cultural heritage.

STAKEHOLDER GROUPS REQUIREMENTS

REFUGEES

ESTIMATED NUMBER OF HOUSEHOLDS IN A SETTLEMENT = 50-70

NUMBER OF SETTLEMENTS IN FLOOD ZONE WITHIN 20KM RADIUS OF SITE = 44

ESTIMATED NUMBER OF HOUSEHOLDS REQUIRING SHELTER ON SITE = 44x70 = 3080

STAY DURATION = 55 DAYS MAX.

FREQUENCY OF OCCUPANCY = YEARLY

-
- CAMPING GROUND
 - PIT LATRINES
 - STORAGE AREA FOR SHELTER, FOOD, MEDICAL SUPPLIES AND DONATIONS
 - CONVENIENT ACCESS TO SITE
 - PROVISION OF WATER AND ELECTRICITY
 - ADMIN OFFICE
 - CLINIC/SICK BAY
-

PILGRIMS

ESTIMATED NUMBER = 4000

STAY DURATION = 3 DAYS

FREQUENCY OF OCCUPANCY = BI-ANNUALLY

-
- CAMP SITE
 - PIT LATRINES
 - STORAGE AREA FOR SHELTER SUPPLIES
 - CONVENIENT ACCESS TO SITE
 - ACCESS TO SHRINES FROM SITE
 - PROVISION OF WATER AND ELECTRICITY
 - ADMIN OFFICE
 - CLINIC/SICK BAY
-

TOURISTS

ESTIMATED NUMBER = GROUPS OF 20-40

STAY DURATION = 1-2 NIGHTS

FREQUENCY OF OCCUPANCY = WEEKENDS

-
- RESTHOUSE
 - RESTAURANTS
 - TOURIST INFO CENTER
 - GUIDED TOURS
 - PROVISION OF WATER AND ELECTRICITY
 - PARKING SPACE
 - LOCAL GOODS/HANDICRAFT SHOP
 - CONVENIENT ACCESS TO SITE
-

STAKEHOLDER GROUPS

Identifying the stakeholders

It is necessary to identify the stakeholders for the program development of the site to be socially inclusive. Identifying who they are, what resources they have and how they will be affected by the design and program proposal of the site has been considered. There are three main stakeholders at large:

Vulnerable Group

These are the populations settled in the lowlands and floodplains near and around Makli Hill that are affected by floods on a regular basis caused by the annual monsoon rains. This stakeholder group needs shelter the least frequently but for the longest duration of time at a stretch. Being natives of the region it is important to keep in consideration that the proposed plan for the site does not transform the environment to have an adverse effect on this group.

Pilgrims

This is the population of visitors to the site who come to pay homage to departed sufis and saints buried on Makli Hill. The pilgrims are the most frequent visitors to the site but their duration of stay is expected to range from a few days to perhaps a week at the most. The pilgrims that visit Makli Hill in large numbers during the bi-annual festivities need shelter for their few days stay there.

Visitors

These are the tourists and explorers who venture out to the area because of the historical value the site holds. This group needs shelter more in the form of a rest house in the case of a day trip or at the most perhaps just a few of days.

PROGRAM INVENTORY

SHELTERS

The program inventory for flood victims is primarily based on the reports of camps and camp conditions from the 2010 floods and site analysis.

Stakeholders	Stay Duration	Shelter	Site Location of Interest	Numbers
Refugees	55 days	Camp	Flood Safe	3080
Pilgrims	3 days (bi-annually)	Camp	Necropolis	4000
Tourists	1-2 days	Resthouse	Heritage Sites	20-40/day

How many?

Population of Settlements within 10km radius of selected Site

Within 20 km of the proposed site there are 44 existing settlements with an approximate maximum population of 3080 people.

Refugees

According to a Karachi Relief Trust (KRT) representative, camps set up in Thatta ranged from as small as 20 tents to some as large as 400 tents. Majority of the organizations had made tent cities. KRT's tent city had roughly 35,000 housing in it. Almost 30 or more organizations had camps housing people in the thousands and more than a 100, housing people in the hundreds.

Pilgrims About 4000 pilgrims attend the bi-annual festivities at the two prominent shrines on Makli Hill.

Tourists

Tourists come in small numbers of approximately groups ranging from 20-40 people during weekends usually.

Based on the above information and the fact that the selected site has an area of 11.5 acres, the initial phase one of the program will cater to sheltering all the residents of the settlements within 20km radius.

HOUSEHOLDS

Depending on the size of the tent city/housing project organizations were catering to different numbers of people.

Number of Family Members	Number	Percentage
0-5	66	22
6-8	171	57
9-11	58	19.3
12-15	5	1.7

Average Size of Household in Badin and Thatta¹

The idea of the development of a community settlement during the second phase of the program is not to merely provide shelter for the residents but to enrich their lives and livelihoods by promoting agrarian practices and initiating small businesses that will enable the residents to improve their living conditions.

How many?

Percentage of people who stayed back in camps even after flood waters had receded (squatter population)

For the sake of this thesis 70 households will be assumed to want to settle as a community on the site after flood waters have receded and refugees move back to their homes.

Type of Construction

The idea is to have a sustainable development project with indigenous products with a next to zero carbon footprint, which we teach the locals to make for themselves. This creates a sense of belonging to the locals and also teaching them another means of income. The residents will be encouraged to build structures in standard local ways using thatch, sticks and mud/earth.

¹ Socioeconomic Study and Proposal for Livelihood Improvements: Badin and Thatta Districts, Sindh, Pakistan. Document of World Bank. April 25, 2005. Page 5.

WATER SUPPLY AND SANITATION

The camp site will need storage space to keep basic shelter and relief items such as:

Basic Items and Needs	
10-20 litre water container	One per household
Total basic water survival needs (intake, hygiene and cooking)	7.5-15 litres per day
Maximum number of people per water source	
Tap	250 people
Hand pump	500 people
Single-user open well	400 people

Minimum standards in Water Supply, Sanitation and Hygiene Promotion¹

Safe excreta disposal type	Application
Demarcated defecation area	First phase: The first few days when a huge number of people need immediate facilities
Trench latrines	First phase: Upto two months
Simple pit-latrines	Plan from the start through to long-term use

Safe Excreta Disposal²

How many toilets?

When the camp is initially set up pit latrines will be used by the refugees. One toilet facility needs to be provided for every 50 people.³

Toilets will be built by the community once they have the financial means to build them.

For the pilgrims pit latrines will be used which will be recycled by the commune every 6 months to a year and used to fertilize their farm lands.

¹ The Sphere Project, Humanitarian Charter and Minimum Standards in Humanitarian Response. Minimum Standards in Water Supply, Sanitation and Hygiene Promotion. 2011. 78-104pp.

² The Sphere Project, Humanitarian Charter and Minimum Standards in Humanitarian Response. Minimum Standards in Water Supply, Sanitation and Hygiene Promotion. 2011. 105-123pp.

³ The Sphere Project, Minimum Standards in Water Supply, Sanitation and Hygiene Promotion. 2011. 109pp.

CONCLUSIONS

The regular occurrence of floods as a result of the annual monsoon rains is a clear indication that the local communities are in need of

- a resettlement plan that they can adopt in order to decrease their risk and vulnerability to floods

Culturally and historically significant, the region has the potential to thrive with a

- structured and sustainable flood shelter program.

The migration of the local population to Makli Hill in order to seek refuge from the oncoming flood is a clear indication that the

- locals need to be settled in locations that are safe from flood threat.

The annual festivities at the shrines on Makli Hill require for

- visitors to the site to have a place to stay during their visits to the shrines

PROPOSAL

Design Concept

Development

INTEGRATION OF SITE AND PROGRAM

The scope of this chapter is to integrate the stakeholders with site conditions and program needs. The intersection of needs of different stakeholder groups clearly emphasizes the potential of the proposal as an effective solution for the problems pertaining to and requirements of all three respective groups. The integration creates a platform for the design of components that help to pull the program together and make it feasible.

DESIGN CONCEPT

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This thesis proposes a flood emergency relief program whereby vulnerable communities in Thatta district evacuate and migrate to flood safe sites whilst maintaining their livelihoods by contributing to the establishment of a co-operative community.

The proposed program for the site is such that the need of refugee camps is met in a systematic and planned manner for vulnerable populations in the case of a flood event, which are a clearly a recurring phenomenon in the region. The planned establishment of camps will result in an effective, efficient and timely evacuation of settlements that are threatened by floods hence reducing the loss of lives and livestock.

DEVELOPMENT

The development of the proposal is envisioned in three stages.

Phase One

A flood threat occurs and settlements evacuate to designated camp sites.

Phase Two

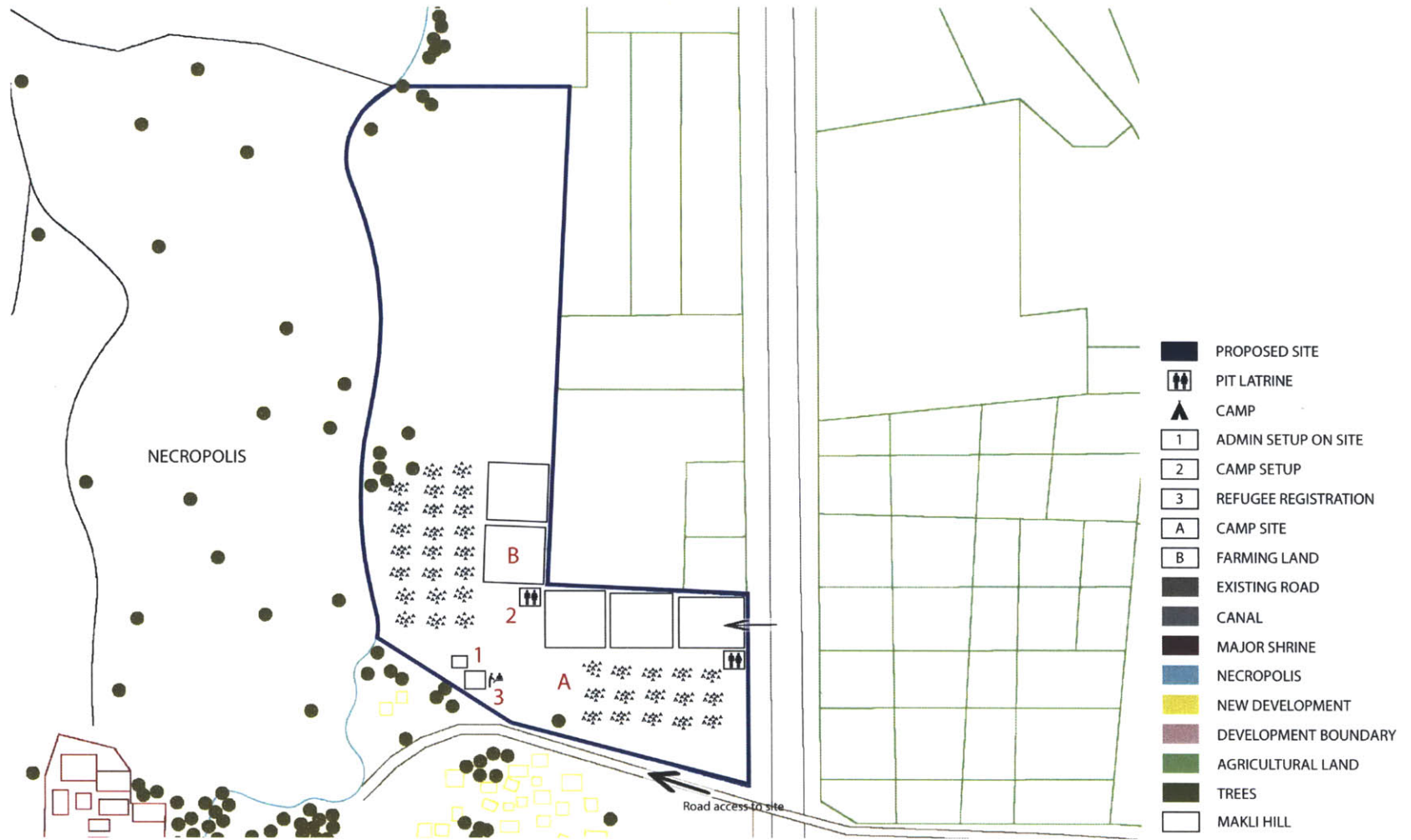
Flood waters recede and refugees leave camp except for the registered residents who opted to stay on site and develop community settlement. Building and construction occurs of settlement in an incremental manner. These households that remain on site have the incentive of staying on the land and working with local authorities in developing the site.

The planning and development of the site accomodates both pilgrims and tourists which provide a means for ensuring the upkeep of the services and facilities provided on site to all three transitory groups – refugees, pilgrims and tourists.

Phase Three

This final stage highlights the sustainble aspect of the entire program whereby the settled community takes administrative charge of the refugee camp when a subsequent flood occurs. Hence the loop is repeated except that from now on there is a flood management program in place whereby the settled community is able to manage the camp site and the refugees without any reliance or dependence on aid and support from outside the local community.

PROPOSAL: PHASE ONE - CAMP LAYOUT



PHASE ONE

Phase One occurs at the onslaught of the flood where communities evacuate to the site. The occurrence of a flood causes vulnerable populations living in low lying floodplains to seek refuge by migrating to higher ground. Here the basic necessities of the camp are prepared by the relief team and organization. Camp management and camp development are the main aspects of this phase.

Farm land is marked out on site and developed for the purpose of the new resident community that will remain on site once the flood waters recede. This land will be used to practice subsistence farming for communal consumption and benefit such as livestock rearing vegetables and fruits, flowers (for shrines). The canal irrigated farming will cater to the community's needs and when the need arises also to the needs of transitional groups by providing to the local market and restaurants.

To avoid the deterioration of the flood situation as was seen on Makli Hill, the registration of refugees settling in the camp is important. This will enable systematic distribution of ration and a smooth transition from camp site to community development.

Primary access to the site is from the south and therefore serves as the main access route for relief camp organizers as well as flood evacuees to approach the site. An ideal situation would be for the relief camp to be set up before the refugees arrive on site - and this can be achieved efficiently with camp sites preassigned to communities. With the organizers knowing the estimated number of refugees they will be catering to the immediate sanitation facilities (pit latrines) and basic camp set up can begin prior to refugees arrival.

Area on Plan:

- 1 – Administrative setup on site: Set up of assistance shelters (Medical supplies, food supplies, shelter stock and donations)
 - 2 – Pit latrines prepared in anticipation of refugee settlers
 - 3 – Refugees arrive on site and register themselves and their families in order to receive aid
- A – 385 tents set up on site to shelter 3080 people
B – Agricultural fields prepared by registered 70 households who have opted to stay on site post-flood

PROPOSAL: PHASE TWO - COMMUNITY LAYOUT CAMP CENTERED



PHASE TWO - CAMP CENTERED

Phase Two occurs once flood waters have receded and the number of households stay on to develop a community. It correlates with the evacuation of the refugee camp by all except the households who opted to remain on the site after floodwaters have receded. Different options of layout were considered for this phase based on the site analysis whereby the site is divided into three zones - for the community, the camp site that will shelter pilgrims and future flood evacuees and tourists.

Areas on Plan:

C - A communal space for a community centre, mosque etc. that is primarily developed by and for the community.

D - Space for market and restaurants that have already set up temporary shelters as a result of catering to pilgrims.

E - For the development of art and crafts by the community but merchandise that is marketable and hence a means of income generation.

The tourist facility is also built and upkept by the new resident community.

This layout was developed with the idea that the community would want to settle away from the tourists facility and camp site in order to maintain privacy. However there are a few reasons this is not a viable option:

- Community distance to tourist facility and market is too much (250m)
- The tourist facility is located too near the camp site which would be problematic during the Urs festival period
- During the rest of the year other than flood time and Urs period, the camp site will be negative space between the service providers (resident community) and the services (farm land, tourist resthouse, marketplace)

PROPOSAL: PHASE TWO - COMMUNITY LAYOUT COMMUNITY CENTERED



PHASE TWO - COMMUNITY CENTERED

A second option of layout where the community becomes a buffer between the tourist and camp site. This option seems to work best with the given site conditions and for the following reasons:

The tourists are located at the prime location of the site with direct road access to and from site. The area is considered prime because of direct access, good views of surrounding area and necropolis, access to necropolis as well as being located near the marketplace and restaurants of the development.

The community is centered which will enable the effective and efficient carrying out of duties and responsibilities by the residents for the management and upkeep of the site. Also, locating the community at the centre works well for the management of all activities on site when during the Urs period there will potentially be tourists as well as campers on site.

The camp site is pushed far back towards the north of the site. Being slightly elevated this is an ideal location for the pilgrims to settle as it decreases their climb up to the necropolis. Road access will, however, need to be provided in order for convenient access to the camp site for both flood evacuees and pilgrims.

PROPOSAL: PHASE THREE & FOUR - A SUSTAINABLE COMMUNITY



PHASE THREE & FOUR

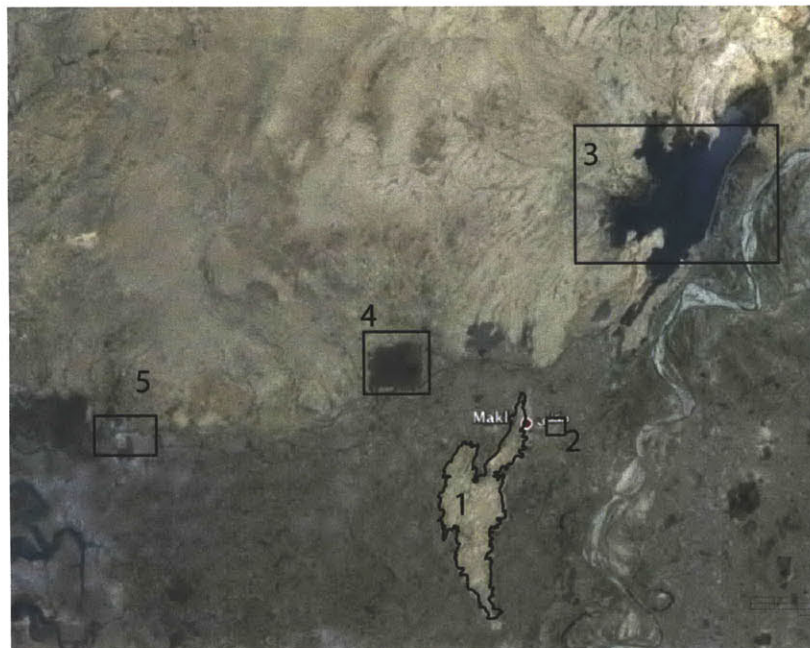
The development of the site in essence generates give and take between the stakeholder groups where some vulnerable groups need an opportunity to reduce risk of living on floodplains and that opportunity is provided to them on the basis of their taking on the management of the site. Managing, building and construction on site helps in gaining of new skills and taking ownership of their homes and community. The community caters to transitional settlers needs of a place to stay and in turn by temporarily staying there and paying for the services provided to them the transitional settlers give back to the community.

The community being the only resident group on the site, the remaining groups are all transitional settlers who will come and go. The peak of the programme will be at any given time during the Urs festival when the site will potentially be inhabited by all three stakeholder groups - the resident community, the tourists and the pilgrims. However, during the time of flood threat it is not expected that tourists will be visiting or want to visit the area so during that time, the tourist facility can be transformed into a clinic and storage space. At any other time of the year, the resident community and tourists will potentially be present and the camping ground can be used for multiple purposes such as arts & craft market, heritage promotional events or even for temporary farming by the resident community where visitors and tourists can also get hand-on experience of farming with the locals.

REPLICATIONS + IMPLICATIONS

Apart from Makli Hill there are other heritage sites located nearby that tourists usually come to visit in small groups on weekends.

Tours are organized by the sidnh tourism corporation and bring city dwellers from karachi and hyderabad on day tours to visit the heritage sites in the region.



- | | |
|---|---------------|
| 1 | MAKLI HILL |
| 2 | THATTA CITY |
| 3 | KEENJHAR LAKE |
| 4 | HALEJI LAKE |
| 5 | BHAMBORE |

CONCLUSION

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The three phases of the proposal constitute a program that incorporates the needs and requirements of all three stakeholder groups. In providing systematic shelter to flood refugees it is 'resilient' in nature. In providing an organized camp site for pilgrims to celebrate the heritage of Sufi saints it is 'cultural' in nature and.. in providing a basis for the provision of shelter to the shelterless it is 'social' in nature.

The socio-cultural resilience that the proposal possesses is a result of the integration of the site and program analysis where program elements and site characteristics are fused together completing each other as one whole.

The importance of this approach lies in that it addresses multiple issues of heritage, economic livelihoods and flood vulnerability at a local scale and present a solution that incorporates and responds to all three effectively. This also helps to highlight that it is possible to integrate cultural heritage within society without having to isolate it from present day social and economic problems.

The potential of this thesis lies in discovery through process at the site scale and the wider implications the findings have on the outcome and final product. It is a dramatic example of best case conditions as a result of which replicability is not completely possible. But the importance lies more so in the proposal's applicability to other sites in other regions.

This thesis is also a representative example of the significance of cultural heritage sites and iconic places. Incorporating heritage into the program determines that there will be interest in the presented solution as a result of the establishment of a tourist facility within the program ensuring that people will travel to the site even though the area may or may not be nationally and internationally recognized.

This thesis is also highly relevant for students in design schools that can use the knowledge of 'socio-cultural resilience' in providing for society, generating livelihoods, alleviating poverty and promoting the revival of cultural heritage that is on the verge of being lost and forgotten.

PRACTICAL IMPLEMENTATION & LONG-TERM DEVELOPMENT

The practicality of the proposal may be enhanced by going over the conclusions with each stakeholder group and getting their input and feedback on the development process and functionality of the system.

The further development of the community settlement begins with the local authorities or the administrative organization providing basic support to the community. For example, organizations such as:

- Auqaaf Foundation
- Sindh Tourism Development Corporation
- Archaeological Department
- Irrigation Department

Support must be provided in terms of:

- construction material for the structures
- materials needed to initiate farming
- payment for construction of tourist facilities
- the option of provision of microcredit loans to the households

The implementation of this proposal is possible by the initiative of an organization such as the Auqaaf Department. Considering that the primary objectives of the Auqaaf Department of protecting and promoting heritage sites as well as that it is a Charitable Trust and State owned, there is much incentive for the Auqaaf Department to be interested in this proposal. Likewise other potential organizations that could be interested in contributing towards the implementation and monitoring of the proposed programme include those listed above. The fact that the programme involves and addresses society, culture and disaster resilience makes for multi-layered benefits for these organizations as the agencies have a direct incentive to contribute.

The primary need for an organization to initiate the programme is for the purpose of managing revenues on site. The Department can

act as the main funding body until the programme is developed in Phase Two when the community begins generating income from tourist facilities, restaurants, arts & crafts and other such activities. The design of the programme is such that it will be sustained during as well as after its phased developments.

Once the community is settled and all building and construction is completed the community can begin to improve farming techniques and increase crop production as well as build stronger shelters. The growth and development of the community will prove to be a great example and basis for not only sheltering low-income populations residing on vulnerable sites but also can act as a model for the development of general planned urban neighbourhoods and communities in the region. Thatta is a region that is developing but rather slowly. As the proposed programme addresses many of the limiting factors that hold back Thatta from progressive urbanization, it can serve as a model in order to bring about the much needed change that Thatta and its residents deserve.

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