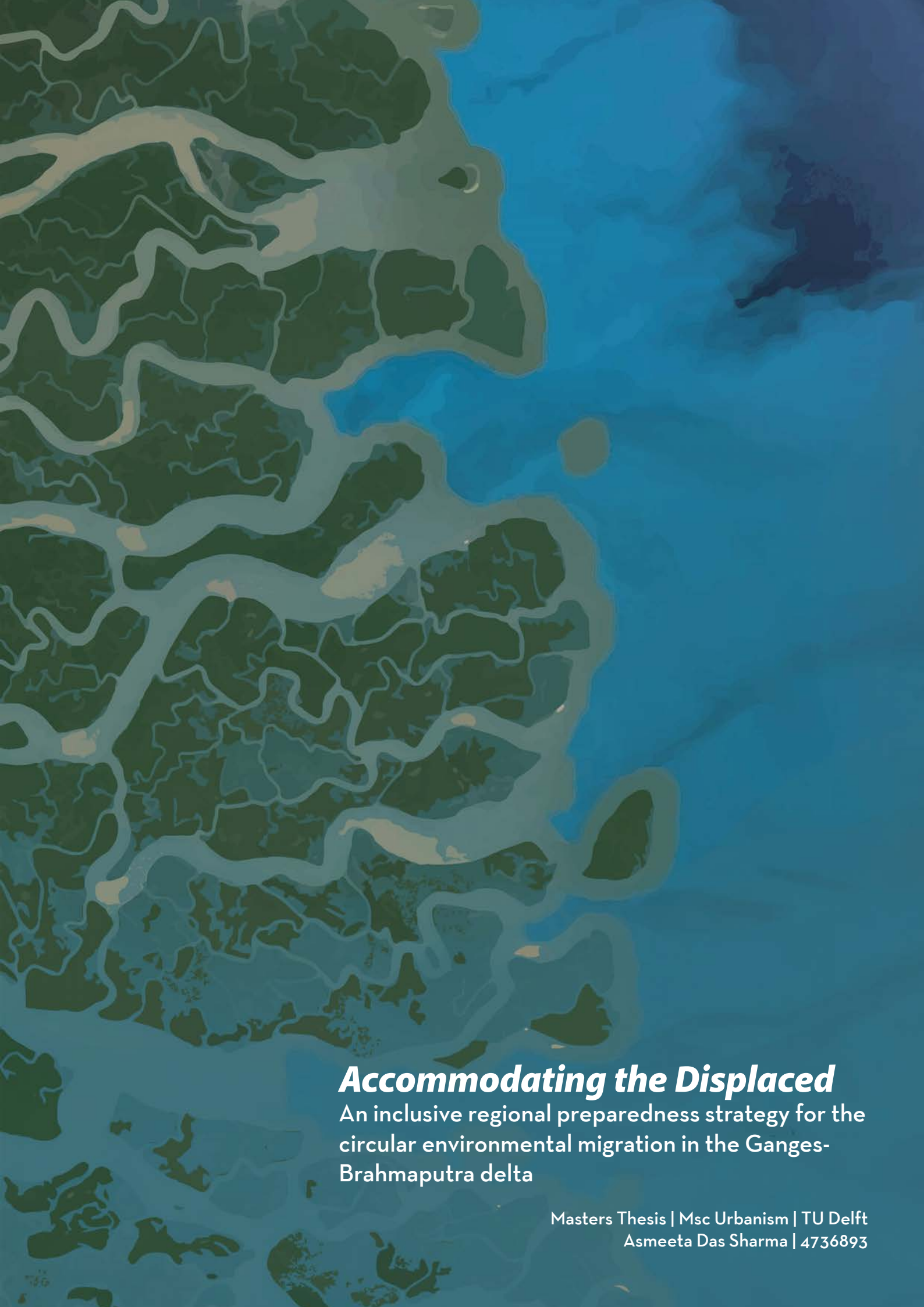

Accommodating the Displaced

An inclusive regional preparedness strategy for the circular environmental migration in the Ganges-Brahmaputra delta

Masters Thesis | Msc Urbanism | TU Delft
Asmeeta Das Sharma | 4736893

“Migration is very emotional,” he says. “It makes an emptiness in the heart of the village and the people”

Research Guidance

Research Funding

COLOPHON

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An inclusive regional preparedness strategy for the circular environmental migration in the Ganges-Brahmaputra delta

Masters Graduation Thesis 2018-19
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The past year has been full of challenges, immense learning and a deep sense of realisation of ones privileges. Working on the issue of climate migration was not only a professional choice but also a social and emotional journey through the plight of the people residing in my ancestral roots. It brought me closer to home. However, this journey was made possible by a robust support system which kept on track all along.

To begin with, as we traditionally do in India, I want to start with thanking my parents. This adventurous masters, so far away from home, would not have been possible without their love, sacrifice and the drive to constantly inspire their children to aim higher than the sky. Further, for ensuring that my site visit was conducted with utmost rigour! It has always been a bliss watching my mother take interviews on my behalf.

Next, I would like to thank my mentors, Gregory Bracken and Verena Balz for their constant support and encouragement. I am grateful for their valuable inputs along the way, always given at the right time to steer me through difficult waters. Most of all showing constant interest and ensuring that the project matched the standards and requirements of the university. I have truly gained much more than academic knowledge from them and hope to have made a small space in their hearts!

My third unofficial guiding light was my aunt, Aparna Das. I would like to thank her for hearing me out and giving me critical feedback in the initial stages of the project which was very essential for it to be achievable. Further, I would also like to thank Mr. Amalendu Pal, without whom organizing the site visit would not have been possible. The warmth with which he received us was phenomenal. With this it is also imperative to thank all the respondents who gave me their valuable time and showed enthusiasm towards my project.

In every journey friends always help you survive through the daily struggles and I am blessed with a host of them in Delft and in India alike. I am thankful to them for pulling me through my lows and applauding my highs throughout the year.

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Source : © 2013 Sumon Yusuf, Courtesy of Photoshare from https://www.publichealthpost.org/research/climate-refugees-understanding-environmental-health-displaced-populations/

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PREFACE

This report is the final product of a thesis conducted as a part of the Masters in Architecture and the Built Environment (Urbanism Track) programme at the Faculty of Architecture and the Built Environment, TU Delft. The research lies at an overlap of the themes explored at the Department of Urbanism and was pursued under the Complex Cities Studio. It uses the expertise of the department as a platform to address the issue of climate-induced migration. The topic stems from the researchers' interest to explore the role of urbanists in developing socially relevant responses to humanitarian challenges.

Environmental disasters have been displacing people from their homestead for centuries. However, the increase in the intensity and frequency of disaster events in the light of climate change, has scaled-up the impact of the disaster. This has triggered a renewed wave of population movement from environmentally vulnerable zones to safer abodes. Posing a challenge of providing adequate quality of life and services to the migrants in the already resource scarce receiving areas. This research explores this challenge through a spatial planning and governance lens.

An outcome of eight months of dedicated exploration, the research was a process intensive, deductive research with a phenomenological approach. The key methodologies used were theoretical review, comparative policy analysis and empirical site analysis. It highlights the humanitarian crisis and subsequent developmental challenges caused by climate-migration patterns, through the case of the Ganges-Brahmaputra Delta. It presents a regional development strategy and supporting policies to include the temporary circular migration from the coastal areas of the Delta region. This report comprehensively elaborates on the issue, research methodology and the design response. By making a significant contribution to the upcoming and urgent Climate migration discourse, it aims to stimulate further discussion and actions to mitigate and avert the human rights violations of the migrants. Further it uses the Sustainable Development Goals as targets for the region, with an emphasis on goals 1, 10, 11 and 17.

The research has been conducted under the supervision of Dr. Gregory Bracken and Ir. Verena Balz. Their constant guidance and support was imperative for the success of the project. Further the researcher acknowledges the support of the organisations and professors who assisted the researcher during the field visit, exclusively the non-governmental organisations. The research would have been impossible to conduct without the financial support provided by EFL-Stitching and Delft Global Initiative.

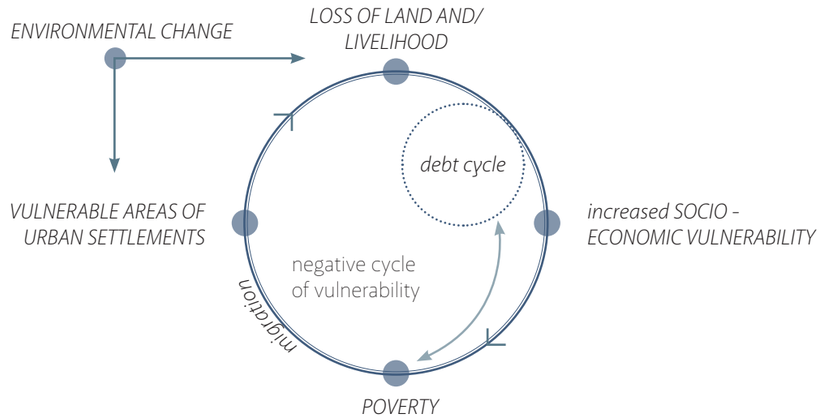
The scope and depth of analysis is limited by the time frame of the thesis and the expertise of the researcher. The issue is highly multidisciplinary in nature and could further use the expertise of professionals from across the sociology, anthropology, law and other physical and social sciences.

ABSTRACT

Climate change is the defining crisis of the 21st century. While increasingly there are efforts being made globally to spread awareness about the impact of human activities on the natural environment, the talks on the direct impact of the change on the human are still nascent. There are an increasing number of people who are losing their land, livelihoods and basic access to food and potable water due to the adverse effects of climate change. In an attempt to survive these people have no option but to seek sanctuary in nearby settlements (Myers, 1997). A rough prediction of 200 million climate induced migrants by the end of the century has brought this issue to the forefront and is being termed as the 'human face of climate change' (Myers, 1997).

Caught in a 'negative vulnerability cycle' (illustrated in Figure 1) the displaced population lacks visibility, recognition and even a basic definitive category which makes it impossible for them to seek refuge or get national or international aid. Their migration is usually termed as 'economic' in nature and classified as an act of desire rather than survival. This research aims to establish this definitive category through a review of scientific literature. Further it highlights the social, economic and spatial injustice faced by the environmentally displaced people and investigates the role of spatial planning, strategy and good governance as a tool to address the issue. Using methodologies like case studies, field trip, deductive mapping, data and comparative policy analysis, the research presents a strategic framework to socio-spatially and economically accommodate the EDP's. The strategy uses the ongoing and future migration for the socio-economic benefit of the sending and receiving regions. It aims to generate a sustainable livelihood pattern for the affected to enhance their climate-resilience as well as trigger their growth. It presents migration as an adaptive strategy for the affected population and focuses on community-based initiatives and self-organisation as central concepts.

The research constructs and tests this framework in the context of the cross-border region of the Ganges-Brahmaputra Delta (GBD). Being the largest and one of the most densely populated deltas in the world, it has been experiencing the impact of climate induced migration for decades. Further, the displacement of 40 million people by 2050, has been estimated.



Definitions

Refugees : A refugee is someone who has been forced to flee his or her country because of persecution, war or violence.

Environmental Refugees : The population which migrates to survive from sudden onset or unmanageable slow onset disasters due to the lack of time or coping mechanisms can be classified as refugees.

Environmental Migrant : populations affected by environmental change and slow onset disasters who make a voluntary decision to migrate as a pre-emptive measure to cope with the predicted disaster.

Environmentally displaced people: Migration which is an outcome of slow onset or frequent disasters in combination with the absence of institutional support and coping mechanisms. In this case the people are forced to move out of their original habitat

Pre-emptive : In anticipation of an event

Preventive : In self-defence on the surety of the happening of an event

Governance : Principles + Roles and Responsibilities of the relevant stakeholders

Spatial Planning : Co-ordination of practices and policies affecting spatial organisation. Actions for the Collective Management of Local Environments

Policy : a 'Policy' is identified as a set of guidance for addressing public issues and concerns, while, a 'Plan' is regarded as a framework or outline to achieve the policy goals in practice. (DECCMA, 2015))

Environmental Event : Disaster events which can be sudden-onset like cyclones, typhoons or flooding or slow-onset like droughts or water salinity which occur over weeks or months.

Environmental Change : Environmental processes which take a longer time to impact like sea level rise and desertification.

Panchayat : Rural Local Government
Nagar Panchayat : Town Local Government

Abbreviations

IPCC - Intergovernmental Panel for Climate Change
UN - United Nations
UNEP - United Nations Environment Program
UNDP - United Nations Development Program
UNHCR - United Nations High Commission for Refugees
IDP – Internally Displaced Person
IOM – International Organization for Migration
IPCC – Intergovernmental Panel on Climate Change
LDC – Least Developed Country
SIDS - Small Island Developing States
MDG – Millennium Development Goal
OECD – Organisation for Economic Cooperation and Development
SRES – Emission Scenarios of the IPCC Special Report on Emission Scenarios
UNFCCC – United Nations Framework Convention on Climate Change
UNHCR – The Office of the United Nations High Commissioner for Refugees
UN-IEHS – United Nations Institute for Environment and Human Security
UNEP - United Nations Environment Program
LAP : Local area Partnerships

Global temperatures are most likely to increase by more than 2 degrees Celsius above pre-industrial levels, unless extreme measures are taken to reduce emissions and resource exploitation (Intergovernmental Panel on Climate Change (IPCC), 2013). In addition to glacier melting and sea level rise caused by this change, natural disasters are predicted to occur more frequently and with increased intensity. An increasingly accepted impact of this change is the emigration of people, communities and even complete settlements from areas subject to constant environmental changes or events. The World Disasters Report (2012) highlighted that 25 million people have already been displaced due to environmental disasters while Myers predicts the displacement of 200 million by the year 2050. This would mean one in every forty people would have been displaced from their original habitat due to unusual climate events (Brown, 2007). Hence, despite the disagreement of some scholars, climate-induced migration has been termed as the 'human face of climate change' (Gemenne, 2010).

Further, the Climate Change Vulnerability Index (CCVI), released annually by the global risks advisory firm Maplecroft, has repeatedly highlighted the uneven distribution of the impact of climate change. As seen in the map (figure 3, Pg 14), densely populated, economically disadvantaged developing countries have been identified as the most vulnerable to climate risks. The developing countries in Latin America, Africa and South Asia are predicted to be at the forefront of this disaster. (Rigaud et al., 2018) Further, the Low Elevation Coastal Zones (LECZ's) host the highest densities and are susceptible to multiple climate hazards like sea level rise, land subsidence, typhoons, tsunamis and water contamination. The LECZ's lie below 10 meters above the sea level accounting for 2 percent of the total land area and 10% of the world's population. (Mcgranahan G, Balk D, 2007) Apart from the small island nations, a large share of the population of the Least Developed Countries (LDC) and the Developing Countries, also categorized as the Global South, resides in this zone. For example, 40% of the land and 46% of the population in Bangladesh resides in the LECZ (Mcgranahan G, Balk D, 2007).

These countries have low resilience towards gradual and sudden natural disasters, due to their poor coping capacity, under-developed infrastructure, high population densities and a wide lower socio-economic base population. The people under the poverty line, who are often socio-spatially marginalized, are the hardest hit in such situations (Kartiki, 2011). They inhabit the most vulnerable areas and are excluded from the institutional framework of the state. For example due to their geographical location they have limited access to services, education and healthcare, minimizing their coping capacities for natural disasters (Mcgranahan G, Balk D, 2007). The countries juggle with the challenges posed by the large population, mammoth scale of development, provision of basic amenities and the added climate risk. This leads to an uncontrolled forced emigration from areas under high climatic stress to the fringes of the relatively safer urban areas within the region and at times across country borders as in the case of the India-Bangladesh border which cuts through the evolving Ganges-Brahmaputra Delta (Anwer, 2012).

To gain a wider perspective, the research investigated the prevalence and responses to this 'climate-induced' migration in the world, to discover a lack of acknowledgement of its existence at the authoritative level and hence even in the migrants themselves. The absence of a basic universal definition diminishes the visibility of the affected population and pushes them into a negative tangent of moving illegally from one climatically vulnerable location to another with very limited institutional support and resources. The research on the discourse has picked up pace over the past decades and multiple transnational organisations have published predictions and reports. However, legal acknowledgement and acceptance of this phenomenon is still missing, putting the existence of the phenomena in question. (Klepp, 2017)

The lack of definition and visibility leads to the exclusion of the migrants from the spatial planning and governance strategies. This deprives them of their fair share of space, rights and societal inclusion. They are subject

to inhuman living conditions and exploitation at the hands of middlemen. Further, they experience a loss of tangible and intangible assets like their culture and identity due to the limited capacity and political will of the development and governing bodies. This in turn contributes to validating their 'invisibility' giving rise to an unseen humanitarian crisis.

This research places the spatial and social injustice faced by the migrants at its core. It explores the interrelations of the key concepts of migration, climate change and spatial planning and the definition of 'climate migrants' through relevant peer-reviewed literature and the opinion of experts working on the issue. Further it looks at a possible framework to use circular migration as an adaptive strategy for the migrants as well as a tool for development of the larger region. In an attempt to bridge the cyclic knowledge gap between the concepts, the research further proposes a regional spatial plan to guide the population movement and facilitate their inclusion in the society using their traditional knowledge and community identity as a catalyst. It explores this possibility through the concepts of economic clusters and community based self-organisation.

Photo : People from Bangladesh taking refuge on the embankment during high tide.
(Displacement Solutions, Switzerland, 2014)

Post NRC uprisings in the state of Assam.
Photo 1 (left) Cover of India Today magazine.
(indiatoday.in)
Photo 2 (right) : People holding up their proofs of citizenship on being excluded from the NRC
(https://www.indiatoday.in/india/story/40-lakh-left-out-of-assam-nrc-get-another-shot-at-citizenship-1348594-2018-09-25)
Photo 3 (below) : Protesters holding up signs against t Citizenship Bill proposed by the Government.
(Reuters, 2018)

This research is a result of a keen interest in the spatial consequence of unregulated human migration and the humanitarian crisis behind it as witnessed due to the large-scale migration during the Syrian war and the Rohingya ethnic cleansing in Myanmar. The events highlighted the human rights violations, spatial injustice and social segregation experienced by the victims, as a result of the forced displacement from their homestead.

Further, the exclusion of 4 million 'illegal Bangladeshi migrants' from the recent draft of the National Register of Citizens in the Indian border state of Assam was a trigger for the exploration. The following right-wing protest, demanding the deportation of the illegal 'migrants', highlighted the ethnic tensions between the host and migrant population. Further, fuel was added to the fire during the Rohingya Crisis when around 40,000 Rohingyas illegally crossed the border and settled in different parts of the country. Security concerns and the inability to control the migration forced India, despite the good diplomatic relations, to start fencing its borders with Bangladesh, which was the only unfenced land border of the country.

On the other hand, the Government of Bangladesh's denial of having any of its citizens in India, left the migrants in a political dilemma and rendered them 'stateless'. The Indian Government is faced with the possibility of having to legalize the illegal migrants, which is an added pressure on its limited resources and adds fuel the ongoing conflict.

A further investigation into the origins of this illegal migration not only unsurfaced a historically complex political and ethnic relationship within the larger Bengal Delta (the historical region of the Indian States of Assam, West Bengal and the country of Bangladesh) but also a strong yet underestimated reason for the migration today – ***environmental instability***. The area being a land of 700 rivers and a delta for the three mighty rivers of Ganges, Brahmaputra and Meghna, has been under environmental stress for decades. High internal as well as cross border mobility has been witnessed as a response to this stress. The negative impact of this can already be seen in the receiving areas with ethnic tensions, rapid informal urbanisation and rise in crime due to social segregation.

The spatial, economic and social injustice faced by the displaced population was the main motivation for this project. This lack of definition leads to the reduced visibility and legitimacy for this category of the displaced, further leading to an added loss of identity, culture and at times citizenship, rendering them to be 'stateless' (as cited in Klepp, 2017). The 1954 Convention relating to the Status of Stateless persons defines a stateless individual as 'a person who is not considered as a national by any State under the operation of its law (UNHCR, 1954). Further, if the state ceases to exist, like in the possible case of the Small Island Developing States (SIDS), the definition can be extended to incorporate the displaced population (Park, 2011). The plight of being stateless has led to degraded human conditions, ethnic conflicts and at times war for resources. This cyclical crisis is yet to be strongly addressed and resolved in the global and national policy frameworks.

An inquisitiveness to discover the possible role of urbanists in addressing such humanitarian issues has for long been a personal agenda for the researcher. Further, the low handling capacity and increased vulnerability to climate risk despite the limited contribution to the GHG emissions by the countries of the Global South is an added motivation. Using South Asia as a study case stems from the motivation to work for one's own country and to understand the socio-economic and governance ecosystem better.

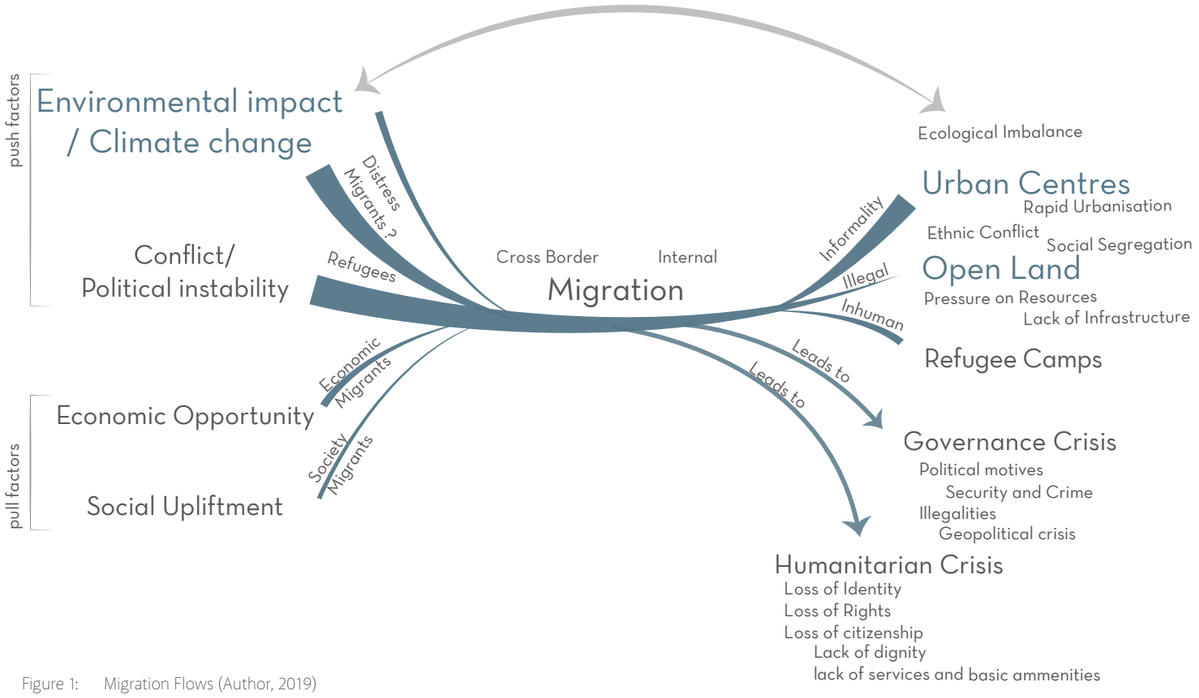


Figure 1: Migration Flows (Author, 2019)

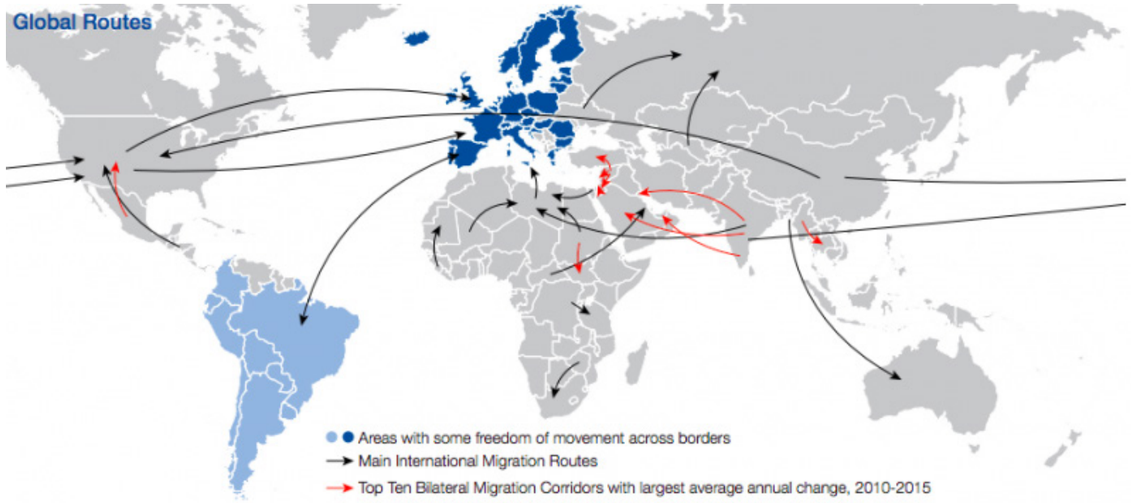


Figure 2: Global Migration Flows (World Economic Forum, 2017)

Human Migration

"the movement of a person or a group of persons, either across an international
border, or within a State. It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes; it includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification" (IOM, 2017)

Throughout history humans have been natural migrants, constantly moving from one place to another in search of food, shelter and resources. Sahlin (1972), Anthony (1990) and Ravenstien (1985), through their work across different disciplines, have highlighted economics and maximization of well-being as the primary motivations behind this historic phenomenon. (Ahsan, Karuppannan, & Kellett, 2011) Ravenstien, the father of migration theory in the nineteenth century, defined the process of migration in terms of the 'push and pull' theory, placing economics as the major pull factor for decision making. Further, neoclassical theories assume that decisions behind the movement are made purely on the basis of costs and benefits, in search for better socio-economic opportunities. However, anthropologists, historians, sociologists and geographers have argued that migrant behaviour is strongly influenced by social ties and cultural roots. This often forces them to keep family welfare and needs above individual benefit. (Ahsan et al., 2011)

With industrialization in the 1970's and 80's, migration in response to surplus employment opportunities was the new trend. This semi-permanent or permanent movement brought about the 'dependency' theory. The theory for the first time acknowledged regional/ internal migration in response to the establishment of multinational company in developing economies. In such economies, maximum migration was a rural to urban trend in search for alternate livelihoods, education or amenities. It is seen that individuals from medium or higher income families are more likely to travel longer, international distances while poor farmers or labourers prefer shorter distances with set earning targets. Once these targets are achieved they prefer to return to their place of origin (Ahsan et al., 2011).

Post-World War II, the forced displacement in Western Europe called for a definition of another sub category of migrants: the refugees. (Fiddian Qasmiyah E, Loescher G, Long K, 2014) The 1951 the UN convention (amended in 1967) legally defined them as people who 'owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion' are outside their country of origin due to the failure of the system of his own country to provide protection. (UNHCR,2002) Further multiple international organizations came up during this period to ensure protection for the refugees. Together, under the UNHCR umbrella, they defined the regulatory guidelines for the signatory nations who would receive the refugees. The coining of this new term essentially reinforced the 'economic' perception of the migrant and made a clear differentiation between the assistance allocated to the two categories. It also added political instability as a legitimate push factor to the existing list of economic, social and demographic factors. However, the most significant characteristic was the addition of 'forced' or involuntary nature of migration to the discourse. This concept forms the crux of this research and is defined further in the following sections.

The international discourse on migration has always under played a causal factor which is becoming increasingly relevant today – environmental change. The change in the built and natural environment due to natural disasters has long been a cause for mass movements of communities in search for alternate means of sustenance and shelter. In 1845 – 1846, a famine caused by crop failure in Ireland, pushed around a million people across international borders and seas. USA has also experienced internal movement due to mass crop failures in Texas, Oklahoma and Kansas. (Ahsan et al., 2011)These examples can be placed under the economic umbrella, considering the search for 'better opportunities' as the primary objective. However, it is important to note the role of environmental change as a key push factor for decision making. The changing climate due to global warming brings this factor to the forefront with the predicted increase in disasters and the possibility of many areas becoming unfit for human habitation in the near future. The next sections elaborate on the threats posed by climate change and on the relationship of these two concepts to establish the basis of this research.

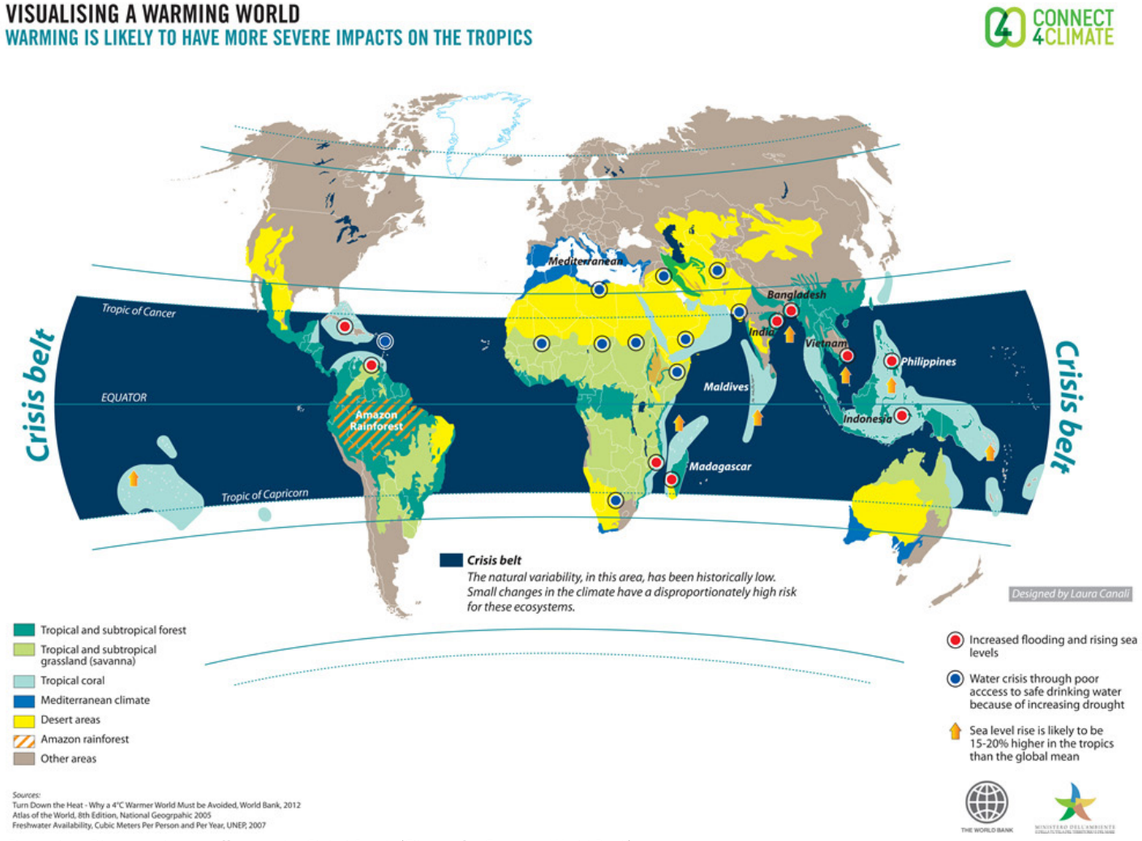


Figure 4: Disproportionate effect on the Global South (Climate for Connect, World Bank)

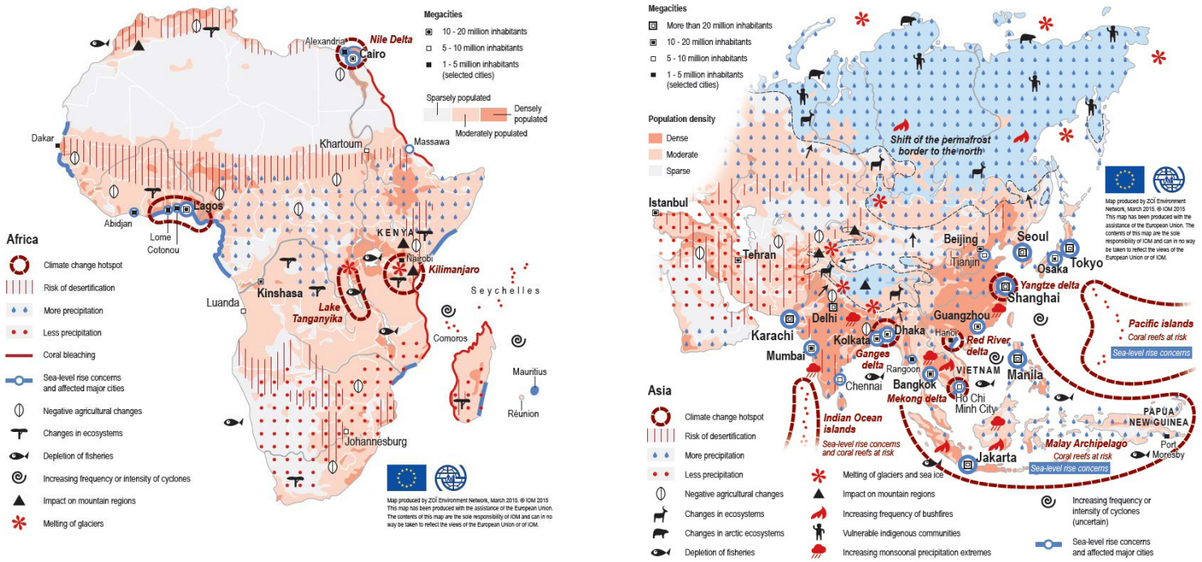


Figure 3: Climate change hotspots in Africa and South Asia (IOM, 2015)

Climate Change

The Fifth assessment report by the Intergovernmental Panel on Climate Change (IPCC) predicts a definite average rise of 1.5 degrees Celsius above pre-industrial levels by mid-21st century. (Rigaud et al., 2018) The absence of extreme measures to curb emission levels is predicted to cause a rise of above 2 degrees Celsius by the end of the century. In hindsight these numbers seem insignificant and seemingly unfelt in daily life. However, experts have identified profound repercussions which are already visible around the globe. Frequent natural disasters, rising sea levels, angrier rivers, heavier rains or drought in combination with extreme temperatures are only a few on the long list of effects.

"Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions." (Intergovernmental Panel on Climate Change (IPCC), 2013)

The climate analysis reports by different agencies, including IPCC and the World Bank, use scenario building as a key methodology to predict the future impact. Primarily three scenarios have been used – impact when drastic steps have been taken, when continued but insufficient efforts have been made and when no efforts are made to reduce the emissions. All three scenarios generally present a grim future, the Low Elevation Coastal Zones (LECZ's) are seen to be especially at risk. With an escalated impact of temperature rise on the flooding of the inland water systems and the current sea level, these zones face an existential challenge. The sea level is predicted to rise between 0.26-0.98 meters by the end of the century, depending on the intensity of the actions taken by the global community. (Intergovernmental Panel on Climate Change (IPCC), 2013) The LECZ's lie below 10 meters above the sea level accounting for 2 percent of the total land area and 10% of the world's population. (Mcgranahan G, Balk D, 2007) Apart from the small island nations, a large share of the population of the Least Developed Countries (LDC) and the Developing Countries, also categorized as the Global South, resides in this zone. These countries have densely populated delta regions which are vulnerable to multiple climate related risks due to their geographical locations. For example, 40% of the land and 46% of the population in Bangladesh resides in the LECZ. (Mcgranahan G, Balk D, 2007) Due to the high fertility and production capacity of the deltas, a large population in these areas is engaged in livelihoods which are directly dependent on the natural environment. Extreme changes in the environment puts them under cyclic economic stress in addition to the social and physical impacts depreciating their socio-economic status as well as coping capacities.

The Global South faces the challenge of limited capacities to tackle this environmental stress as well as large vulnerable populations. The spatial planning and governance strategies find it difficult to juggle between the massive task of development, provision of basic amenities, large populations and the increasing threat of climate change. Countries in the African subcontinent, Latin America, Indian Subcontinent and Indonesia are striving to manage this gap with their limited resources and expertise. Yet the socio-economically and spatially marginalized population is often the hardest hit due to the loss of lives, land and livelihood, with little access to institutional resources for support.

Global efforts through multi-lateral agreements like the Paris Agreement, under UNFCC, have considered the gravity of the situation and factored the inclusion of special assistance, like technology, voluntary funds and knowledge sharing, for these countries. Further, one of the intentions behind the New Urban Agenda (UNHABITAT) and the Sustainable Development Goals (SDG), is to guide and facilitate sustainable urban development and resilience in their growing cities. However, these efforts are not yet cohesive and press little accountability to the emission intensive countries, widening the climate change inequity which is currently prevalent. (Althor, Watson, & Fuller, 2016)

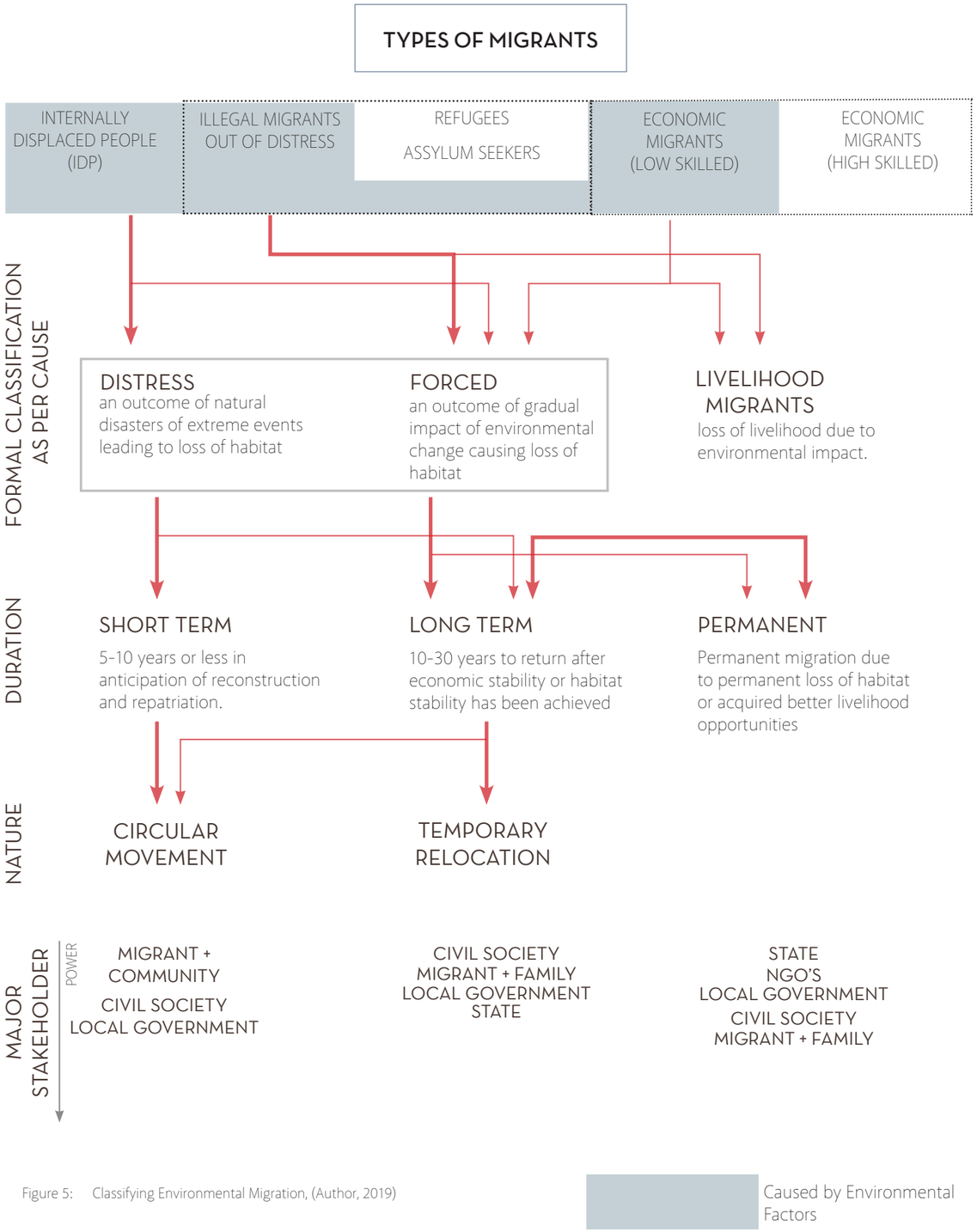


Figure 5: Classifying Environmental Migration, (Author, 2019)

Climate Induced Migration

In 1985, El Hinnawi in a United Nations Environment Program (UNEP) paper, for the first time formally placed human migration in the context of climate change and coined the term 'environmental refugees'. However, the Worldwatch Institute report by Jacobson (1988) was the first one to state a concrete number saying there were 10 million environmental refugees at that time. In agreement IPCC in its first report in 1990 stated that large scale migration could take place due to climate change leading to 'severe disruptions of settlement patterns and social instability in some areas'. (Klepp, 2017)

Further, the fourth and fifth assessment report established that the relationship between climate change and migration was a 'multi causal and complex' one, with multiple determinant factors making it difficult to quantify the actual movement caused by the phenomenon. (Intergovernmental Panel on Climate Change (IPCC), 2013) A UNESCO publication further added weight to the discussion by terming it as the 'human face of climate change'. (Gemenne, 2010) These terms are partly derived from Myers widely quoted prediction of 200 million environmentally displaced people by 2050. (Myers, 1997) However, three decades later a universally cohesive term and definition for the people displaced due to the change in climatic conditions is still missing, rendering them to be 'stateless'. (Klepp, 2017)

The year 2005 saw its first batch of acknowledged 'environmental refugees' when 1,000 residents of Carteret Island in Papua New Guinea were relocated due to storm warnings and salt water erosion. However, this type of movement has been seen across the Somalian - Kenyan border for decades as a consequence of the ongoing drought in Somalia. Similar effects have been seen around the world where people have lost their lives, land and most importantly identity due to gradual or extreme climatic conditions. Exclusively in the case of the Small Island State Nations and Lower Elevation Coastal Zones, the effects of this concept are present day reality. The prevalent focus on post disaster repair due to the ease of funding and a clear definition of the needs pushes the environmental refugees into a negative vulnerability tangent with no access to aid or institutional support due to their anonymity.

The scientific discourse on the topic has been asking for a clear definition and legal recognition for this category for decades. Additionally, the developing and least developed countries under high risk of climate change impact are demanding for a definition to be able to appeal for climate justice and international assistance to safeguard their populations. However, the UNHCR has been reluctant to include environmental refugees/displaced in the 1951 refugee definition due to the unclear link between environmental change and migration. Further, the agency along with some scholars like Black (2001) fear that the inclusion will dilute the essence and importance of the political refugees. (Klepp, 2017) In response, experts like Hermsmeyer (2005) and King (2006) have proposed the formation of transnational agencies and treaties exclusively addressing the environmental migrants.

Definitions

The UNEP, in sync with the neoclassical theories of migration, defines 'environmental migration' as follows:

"...those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life. By 'environmental disruption' in this definition is meant any physical, chemical, and/or biological changes in the ecosystem (or resource base) that render it, temporarily or permanently, unsuitable to support human life."

This definition has been often criticized for its ambiguity and failure to differentiate between migrants and refugees. (Bates, 2002) The overlap characterizes a 'voluntary' nature to the migration, making the change in environment only one of the push factors. This ambiguity makes it impossible for the displaced to claim a refugee - like status. (Klepp, 2017) Another working definition supported by the International Organization of Migration (IOM) was published in 2008:

"...persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living

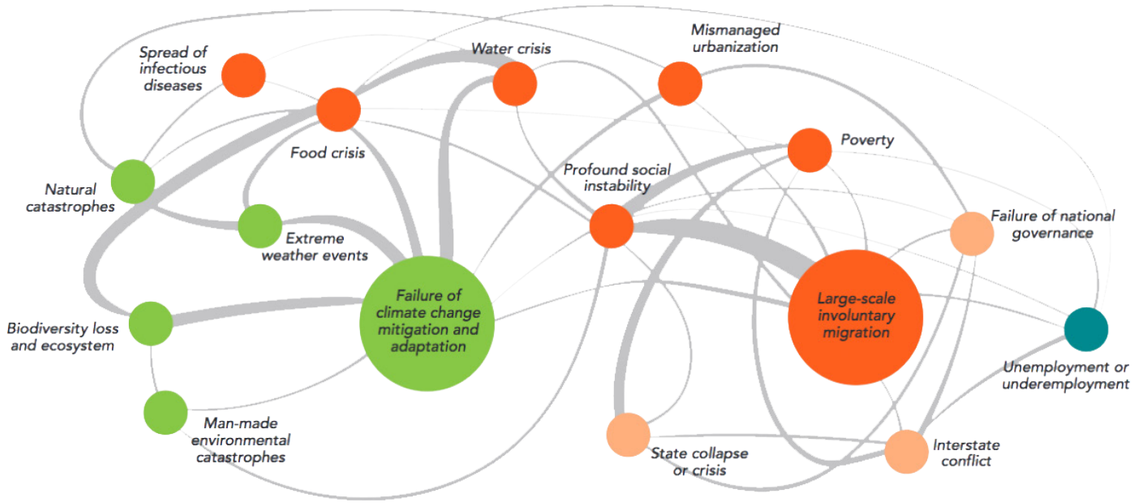


Figure 6: Network of causes for migration (Weadapt, Barrot, 2016) Green: Environmental Risks; red: Societal Risks, orange: Geopolitical Risks, blue: Economic Risks

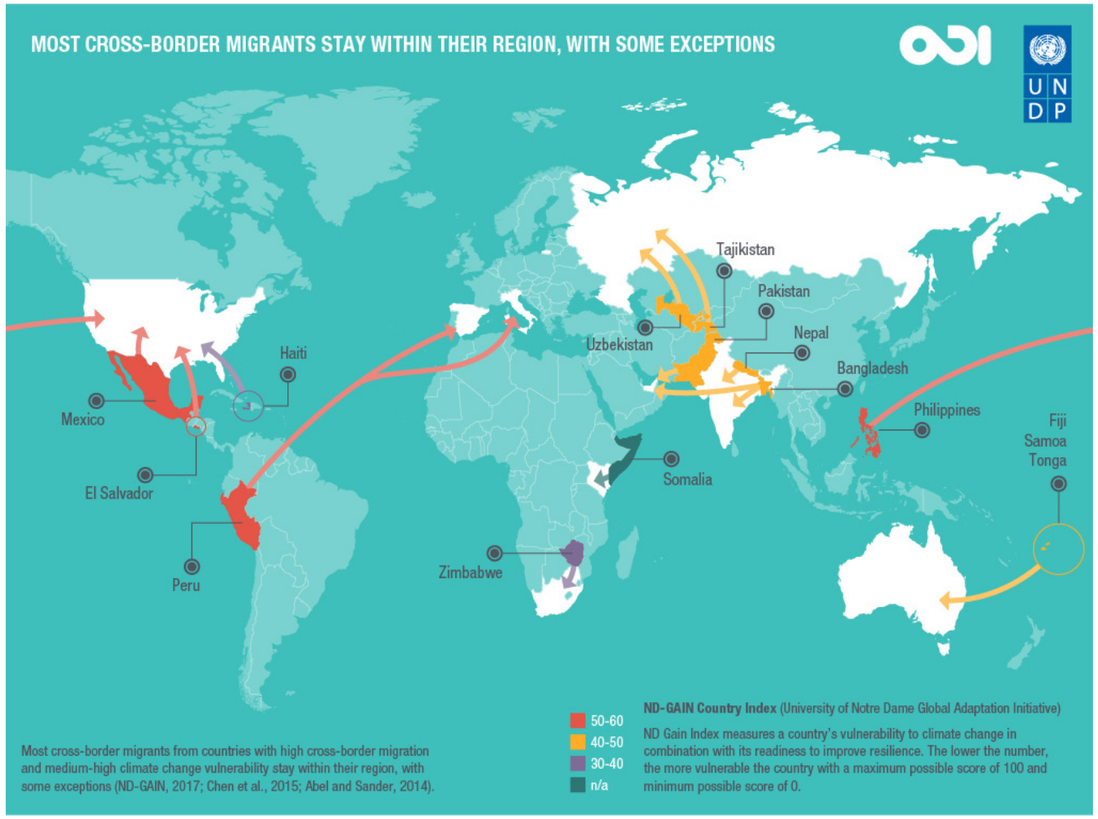


Figure 7: Climate Migration movement patterns (ODI, 2017)

Climate Induced Migration

conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad.."

While providing a clear definition for the environmentally displaced is out of the scope and expertise of this research, in-depth analysis of the ongoing discourse has revealed the major categories of this complex relationship that need immediate attention. These categories set the focus group and scope of the research and should be considered as recommendations for further research.

CLASSIFICATION OF ENVIRONMENTAL EVENTS AND CATEGORY

According to the IOM in the document for Planned Relocation for Communities in Vietnam (UNDP), environmental changes that can have a negative impact on human settlements can be classified as follows: (IOM, 2017)

1. Environmental events: disaster events which can be sudden-onset like cyclones, typhoons or flooding or slow-onset like droughts or water salinity which occur over weeks or months. For the purpose of this research disaster events which are a result of human actions are not considered.

2. Environmental change: processes which take a longer time to impact than the slow onset events like sea level rise and desertification.

Migration in the context of these types of environmental change can be defined as follows: (Ahsan et al., 2011)

1. Environmentally motivated migrants: populations affected by environmental change and slow onset disasters who make a voluntary decision to migrate as a pre-emptive measure to cope with the predicted disaster. This category is difficult to predict and can only be curbed by increased institutional support to encourage the population to stay. The environmental change in this case might be a deterrent for the current livelihood pattern and future threat to life.

2. Environmentally displaced people: Migration which is an outcome of slow onset or frequent disasters in combination with the absence of institutional support and coping mechanisms. In this case the people are forced to move out of their original habitat in search of alternate means of survival as a preventive measure from further damage. The environmental change in this case is a threat to mainly the livelihood and access to basic amenities.

3. Environmental refugees: The population which migrates to survive from sudden onset or unmanageable slow onset disasters due to the lack of time or coping mechanisms can be classified as refugees. This can be classified as a post impact measure i.e a consequence of the disaster. The environmental event/change in this case is a threat to life, land and leads to the loss of livelihood. For example, the small island state communities can be termed as refugees.

In the context of developing countries, the marginalized, deprived populations are often under the highest risk. Under the weak governance systems, the forced displacees and refugees are pushed in to a 'negative vulnerability tangent' and forced to inhabit vulnerable informal fringes of the urban areas within the country or illegally to neighbouring countries. The affected usually receive some initial aid from the local agencies but due to the insufficient support, the lower economic classes are forced to temporarily or permanently move. The destination in this context often is exploitative in nature and offers a lower quality of life, at times depreciating the socio-economic status of the migrants further. The trauma from the loss of land, tangible and intangible assets, cultural identity and social ties limits the growth and development of the population for decades with insufficient support from the institutional framework of the region.

Piecemeal 'soft law' approaches leading to individual and disconnected policy and development approaches have been adopted at various levels of governance. Countries which have faced this situation in the past or are currently under its direct impact have made policy and development interventions for different stages of disaster management – pre-emptive, preventive and/or post impact. The next section elaborates on the global spatial planning and governance responses observed across countries under immediate risk of climate change impact.

Climate Induced Migration

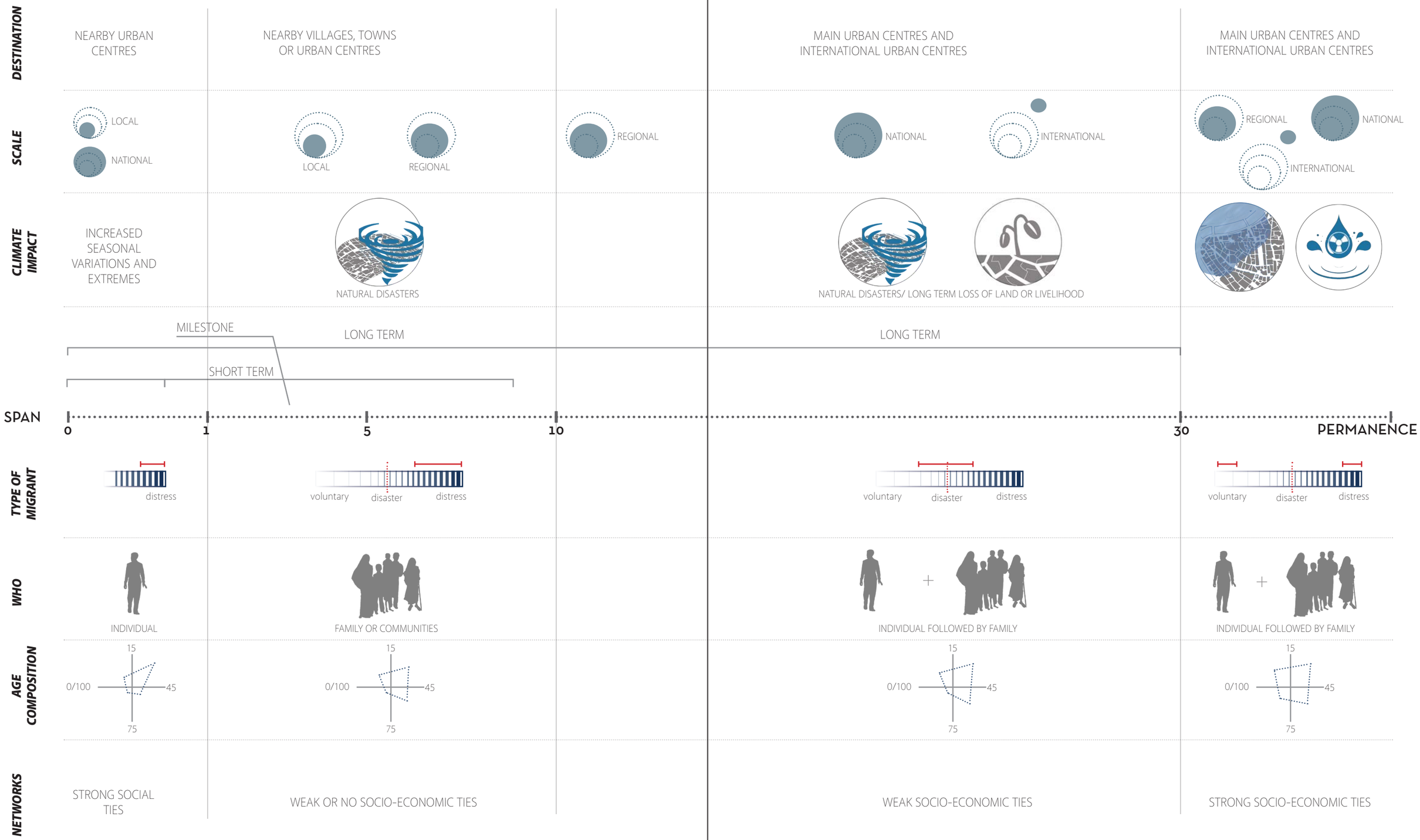


Figure 8: Classifying migration over time of stay (Author, 2019 Adapted from Literature)

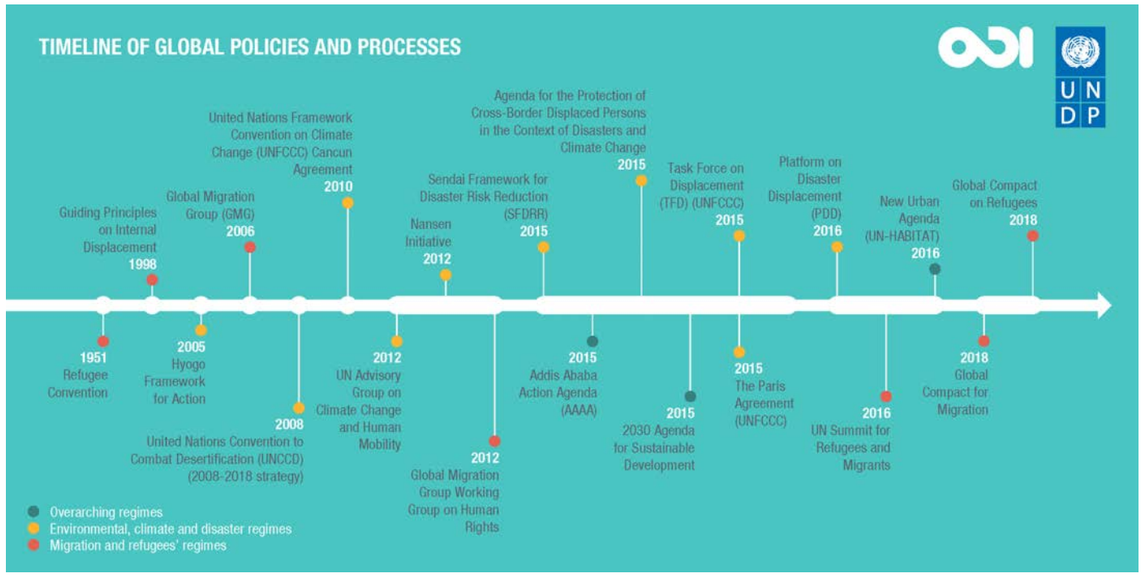


Figure 9: Time-line of Global Responses (ODI, 2017)

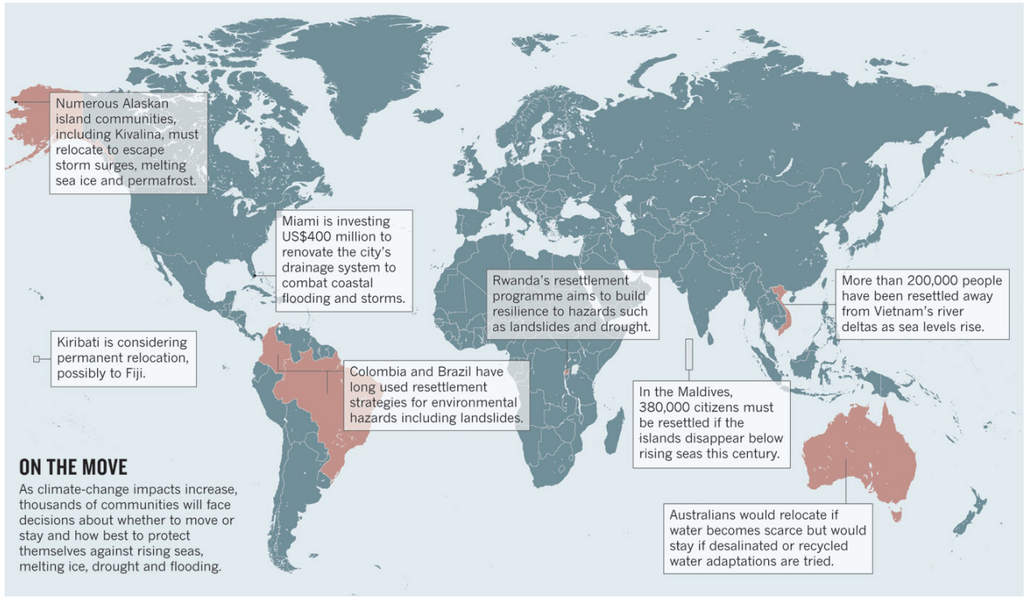


Figure 10: Existing responses mapped ; (https://www.nature.com/news/human-adaptation-manage-climate-induced-resettlement-1.16697)

Policy Response to climate induced migration

Global responses to the issue of environmental displacement have been slow and scarce. The soft law (non-binding guidelines) approach is seen as a common approach where the policy or intervention is not legally binding but is merely a rule of conduct. (Klepp, 2017) Different UN organizations respond differently to the issue and state led actors like UNHCR, IOM and UNICEF act independently. The Operational Guidelines on Human Rights and Natural Disasters (2006) is one of the relevant documents which proposes concrete protection policies for the well-being of the affected population. UN Guiding Principles of Internal Displacement (1998) and Peninsula Principles on Climate Change Displacement within States (2013), address the protection, dignity and security of the internally displaced population. They highlight the importance of citizen participation in the decision-making process and the shared responsibility of the global community and the state hit by disaster.

Further, the Nansen Initiative, a state-led consultative process led by the governments of Norway and Switzerland, launched a Protection Agenda to raise awareness and integrate the best practices field in their own institutional framework. It aims to provide better protection for the displacees through stakeholder involvement and providing consultation services to the affected areas to develop optimum responses. It was followed up by the Platform for Disaster Displacement. (Klepp, 2017)

However, it has been seen that most global policies consider sudden onset disaster events and post impact measures rather than pre-emptive measures to avoid the displacement. The conversation around slow onset and environmental change events has been largely disregarded, recently brought to the limelight in 2015 by UNFCCC's Task force on Displacement. For areas exposed to inevitable disasters like sea level rise, drought, river erosion and water contamination which diminish the possibility to retain original habitats, pre-emptive policies and planning initiatives for resettlement ensure the protection of dignity, socio-economic status and identity of the affected population. (Kartiki, 2011)

Few countries have been able to develop comprehensive and inclusive resettlement or migration policies. Spearheading this are the Pacific Islands who are experiencing the effects of climate change daily. With a contribution of only 0.006% to the global GHG emissions, the islands face the disproportionate impact with the constant threat of sinking and erosion. In response to this multi-lateral threat the Islands have proposed a framework for 'Pacific Regionalism'. (Leaders, 2014) It is a collaborative and cooperative regional approach to facilitate a safe and harmonious living for the pacific people. (Prabhakar, Rao, Fukuda, & Hayashi, 2013) Kiribati, a island nation which is at immediate risk of sea level rise, endorses the 'migrate with dignity' policy for it people. It proposes international dispersion of the communities for alternate livelihood opportunities but with consent. Since the communities have a strong land-embedded identity, they have chosen to stay and battle the effects of climate change. The adaptive policy of the government supports this emotion and facilitates the efforts to prevent disaster induced displacement by strengthening risk reduction infrastructure. (Emanuel, Ferris, Cernea, & Petz, 2011)

Another example of pre-emptive planning is Columbia's local resettlement policy in response to the risk of heavy rainfall and landslides. However, in contrast to the Kiribati's inclusive approach, the policy is a top down approach with the sole objective of providing safe housing. This often overlooked the other socio-economic networks of the migrant or resettled population. Four primary national approaches have been identified to disaster displacement in this research - Human Rights Based Approach (RBA), Community Based Approach (CBA), Development Based Approach and Climate Change Adaptation. These have been detailed in the Comparative Analysis section (5.2.3).

The following section presents a broad outline of the rights defined for the environmentally displaced by various transnational organisations and nations.

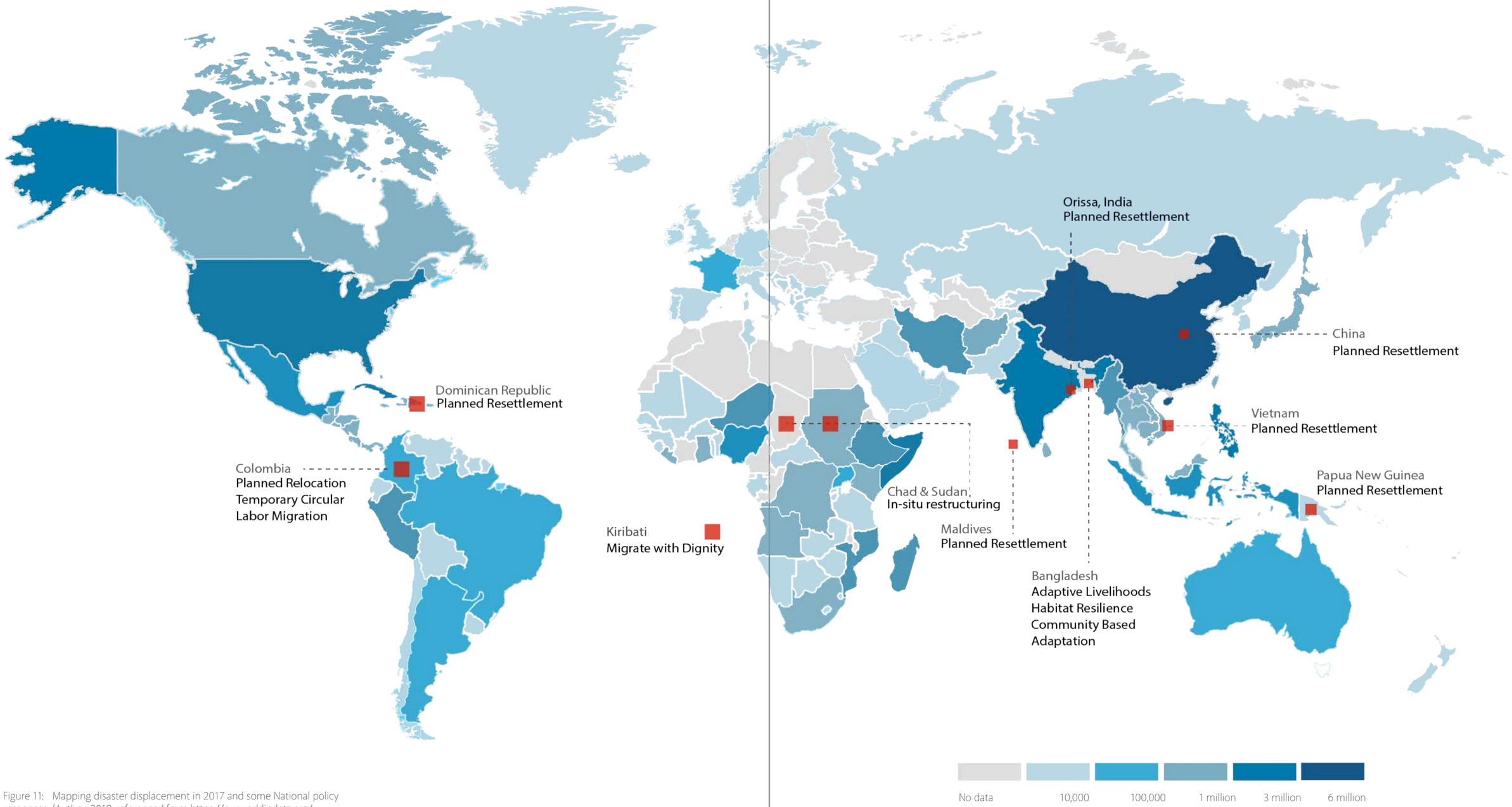


Figure 11: Mapping disaster displacement in 2017 and some National policy responses. (Author, 2019, referenced from https://ourworldindata.org/natural-disasters)

With the increasing visibility of the impacts of environmental change, the concept of environmental justice is becoming increasingly popular in academia as well as international human rights platforms. Countries and communities at the front-line of the disaster as well as future generations are increasingly demanding climate justice to be addressed seriously. The key principles behind these demands are based on existing refugee or human rights laws, presented in the context of the environmentally displaced. This section elaborates on these rights.

The basic rights highlighted by the Universal Declaration of Human Rights, is the right to life, food, shelter, movement and clean water (Klepp, 2017). The State is obliged to provide these as well as access to adequate health care facilities to all under its jurisdiction (UN Human Rights Council, 2018). However, when it comes to nation states which face the threat of extinction or the governance structure is unable to cope with the disaster, the shift of this responsibility remains undefined. Bell, in his analysis of international justice theories, asserts that global climate is not a territorial subject but is rather a 'global common' (Bell, 2004). Risse (2009) reinforces this notion by referring to human rights and 'a common ownership of the Earth' as a primary reason for the common responsibility to protect the migrants. (as cited in Klepp, 2017). Hence the territorial contributions to climate change which have led to the depletion of the global common should be held proportionately accountable for its adverse effects. This call for accountability, especially by SIDS, makes it a discussion between the rights of the affected, in this case the Developing and LDC's and the responsibility of the major contributors to greenhouse gas emissions, in this case the Developed countries (Klepp, 2017).

Bell further analyses Charles Beitz's 'Resource Redistribution Principle', which says that the material advancement of society is a combination of human cooperative activity and equal distribution of natural resources. Beitz enforces that "each person has an equal prima facie claim to a share of the total available resources"(as cited in Bell, n.d.). This entitles the environmentally displaced, especially the refugees, with an equal share of the leftover global resources, shifting the accountability from a local and national scale to a global subject. Another point to note here is that most of the SIDS and LECZ's value their social and natural environment more than just a resource. Their culture is embedded in their environment and forms the core of their identity (Bell, 2004). This claim can be well observed in the case of Kiribati, where many resident communities have chosen to stay on the sinking island despite offers to relocate to other locations on the pretext of their cultural and social needs.

In this context, Nine (2010) and Kohler (2012) propose a territorial approach by discussing the right to self determination and cultural preservation for the affected populations. Using the Lockean Proviso, Nine argues that in the event of the loss of complete nation states and prospective population relocation to lands unknown, the people should have the right to self-determine their functionality and form of governance appropriate to their native culture (Nine, 2010). The plight of the naturalization process in a new country not only leads to a loss of cultural identity but also impacts community life and socio-economic stability. They argue against the current 'individualistic' approach to refugee management and believe the only solution is to grant autonomous territories to the displaced nation states as a moral duty to protect their culture and community (Lister, 2014).

In response, Lister (2014) highlights the practical issues of this approach and says that it is almost impossible under international law to criminalize the polluting nations for their actions (Lister, 2014). Hence, there is a need for exploring a midway solution between the individualistic and territorial approach to climate migration. Arnall (2015), in his observation on the third wave of research on the climate migration, mentioned the increasing relevance of 'hearing out the experiences of the affected people' as a key tool to address the problem. This can be derived from the right to voluntary relocation under the right to adequate housing (Anwer, 2012). The freedom to choose the place of resettlement directly places the displaced as active participants of the process. Black, McLeman and Oliver-Smith reinforce this need for participation by revealing the 'importance of socioeconomic context and historic experiences' for achieving successful adaptation strategies. (Klepp, 2017)

There is also an increasing consensus on the need to include the affected population in the global and national decision-making processes which directly concern or affect them (Klepp, 2017). Participation is seen to be most effective with communities bound together with socio-cultural ties, especially in disaster situations. Many studies highlight that increased resilience is achieved through working in communities, as they are the key actors and the primary beneficiaries (Abedin, 2013).

Lastly, economic inclusion of the displaced and refugees is an upcoming solution under research. The Refugee Economies Programme believes and has empirically proven, that the right to work and mobility is the most essential for the reconstruction of the affected society. This right not only allows them to regain their autonomy and financial independence, it also allows them to communicate with the host community and contribute to the host economy. This smoothens their integration in the host society. Constructive occupation was observed to be an effective way to overcome mental trauma and control radicalization in the camps in Uganda. (Betts, 2018)

In comparison to the political refugees, the environmentally displaced are faced with an increasingly complex situation. The ambiguous definition of responsibility and accountability due to the interdependent drivers for migration leads to the abandonment of the displaced and classifies them as economic migrants. The movement is a result of multiple failures to cope with disaster events or environmental changes, which deprives the population of all possible resources and assets. There is also a disproportional impact across the economic scales. Further, in contrast to the refugees, there is often no hope for returning home. This highlights the need for independent and exclusive protection for the displaced, disjointed from the refugee framework.
Experts like Hermsmeyer (2005) and King (2006) have proposed the formation of transnational agencies and treaties exclusively addressing the environmental migrants is an urgent first response (Klepp, 2017).

Rights and Obligations of the Climate-Induced migrants

Box 1

Maslow's (1943) heirarchy of needs is a five tier model of human needs in psychology. The first 4 layers are referred to as deficiency needs and the top level is known as growth or being needs. The deprivation of the deficiency needs is said to motivate people when they are unmet, while these needs need to be achieved to achieve for personal development. Environmentally displaced often lack the provision of the 1st layer of needs forcing them to migrate. The migration often leads to a loss of the third and fourth layers of the pyramid, pushing the migrant into a continuous negative cycle. This makes it impossible to achieve self-actualization and socio-economically grow, often for generations together.

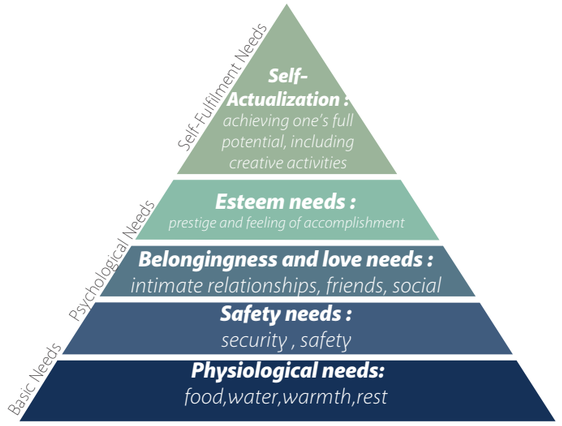


Figure 12: Maslow's Pyramid of Needs ; (Representation of the Original Pyramid from https://www.simplypsychology.org/maslow.html)

The Ganges-Brahmaputra Delta : 100,000 sq. km

The Netherlands : 42,508 sq. km

Area of Intervention : 22,260 sq km

ON CONTEXT

- The Ganges Brahmaputra Delta
- History of Migration in the Delta
- Predictions for the Future

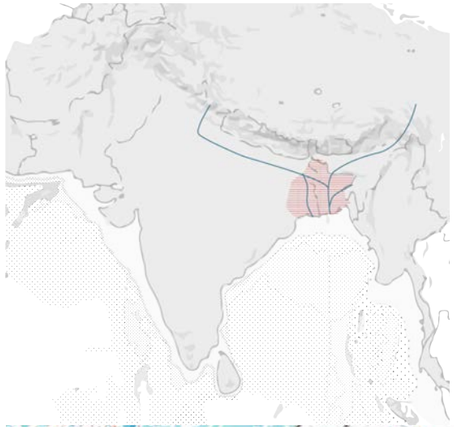


Figure 13: Ganges Basin and the Ganges-Brahmaputra Delta : one of the most densely populated region in South-Asia ; (Author, 2019)

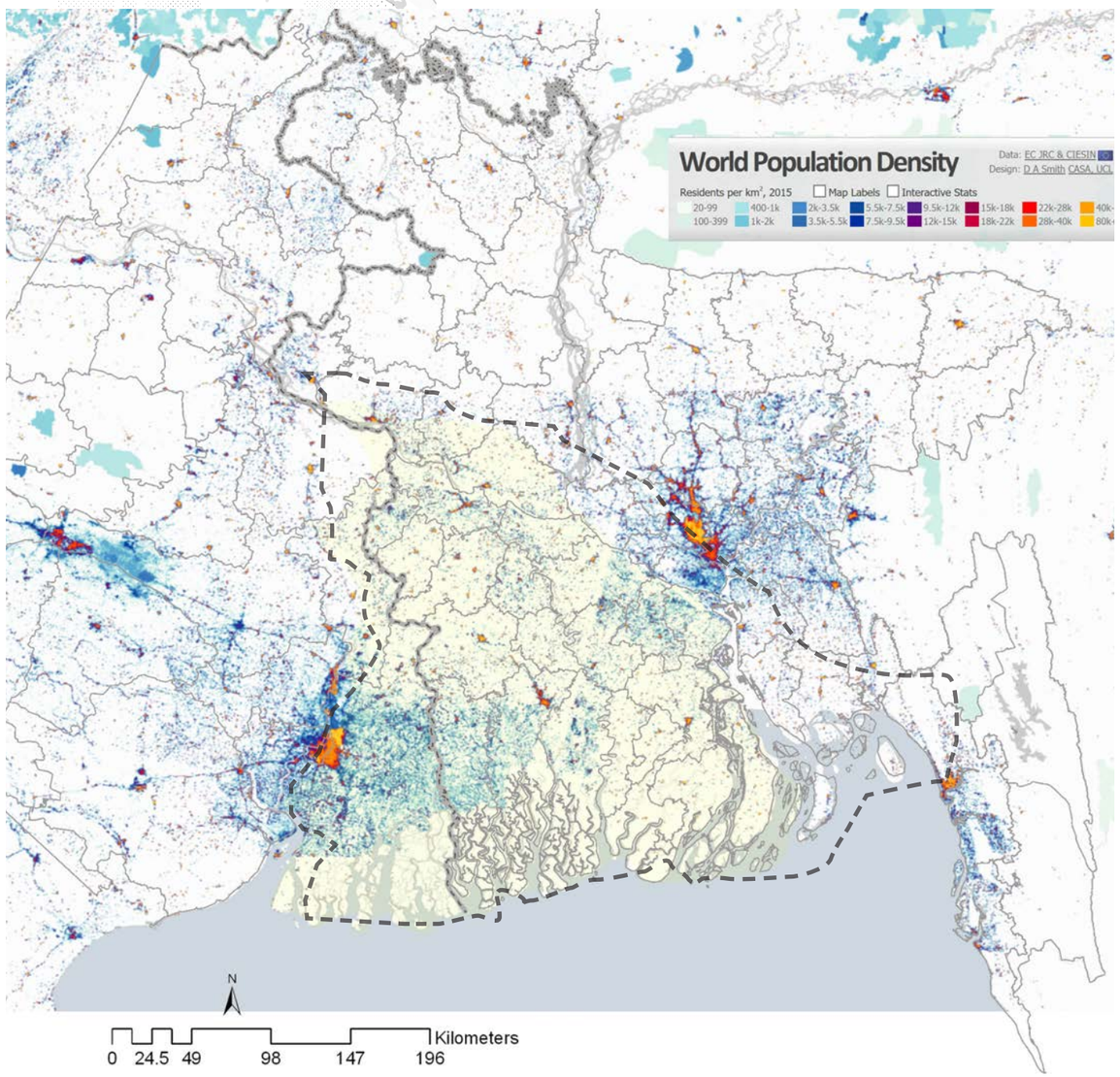


Figure 14:
Population Density in the Ganga Brahmaputra Delta Source : LuminoCity3D.org

Context

The delta of the mighty rivers of Ganges, Brahmaputra and Meghna, which covers 2/3rds of Bangladesh and a part of the Indian state of West Bengal, is at the forefront of multiple climate threats in the region. River erosion, flooding, sea level rise and subsidence are some of the immediate effects which are currently being felt by the residents of the region. The World Risk Index ranks Bangladesh as 5th most vulnerable country in the world to natural disasters, with 18% of its land at less than 1 m above sea level. The World Bank predicts that the area will have 40 million internally displaced people by the year 2050 as a consequence of climate change (Rigaud et al., 2018).

The trans-boundary geological region of the Ganga-Brahmaputra Delta is the largest delta in the world. It stretches from the Hooghly River on the west to the Meghna river on the east. Also known as the Bengal Basin, the delta is divided by a dense network of hundreds of small tributaries and streams. With an area of more than 105,000 square kilometres, 60% of the delta lies in Bangladesh and 40% in West Bengal. The basin was historically called the Bengal Presidency and is home to communities with very similar ethnicities, languages and lifestyles.

The delta region is one of the most densely populated Low Elevation Coastal Zones (LECZs) in the world, with two dense mega metropolitan regions of Kolkata (WB) and Dhaka (Bangladesh) at its fringes. The delta is the economic hub for the two states, with an average density of more than 200 people per kilometre square. The high population density of the region is partly responsible for the inadequate infrastructure, limited access to amenities and institutions.

The region lies mostly in the tropical wet climatic zone and hosts 3 different terrestrial eco regions. One of the regions is the Sundarbans freshwater swamps and mangroves. The largest mangrove forest in the world, it stretches across the border and hosts a unique variety of flora and fauna over a chain of 54 islands. The history of this relationship between the natural environment and the spatial development of the region has been a very complex one. The dynamic nature of the delta and disaster events have been a great challenge for the development of the delta. Further, agriculture is the primary occupation for 60% of the population, making the regions food security, economy and social structure highly dependent on its physical environment.

Climate Threats

Due to its geographical location, the region has been constantly under the threat of natural disasters like cyclones and earthquakes. Climate change has exacerbated this threat significantly through tidal inundation. rising sea levels, heavier rainfalls, river erosion, water salination and increased cyclonic activity. This highlights the area as one of the most vulnerable areas to climate risk in the world. (Rigaud et al., 2018)

With an average emission of 0.4 tonnes per person, Bangladesh ranks 175th for carbon dioxide emissions. However, it is facing the impacts of other nation's large carbon footprints. The mix of the socio-economic and spatial effects of climate change are a predominant cause for people to move away from the high-risk areas in search of alternate means of sustenance. Sea level rise, flooding and water salination have affected the existing livelihoods considerably. In response to the increasing salinity of the water, the Government of Bangladesh started funding and promoting shrimp farming. While this step was a great boost to the economy due to the high value of the produce, it also increased the water salinity and caused irreversible damage to the soil. Additionally, the reduction of the diversity of agricultural produce has led to an issue of food security and malnutrition, forcing many farmers to migrate to the cities. This also forces them into a negative debt cycle, which is an economic burden for generations to come. (World Bank, 2016)

This migration is a major contributor to the increase in population and population density in the cities of the region, with a major impact on Dhaka and Kolkata. The

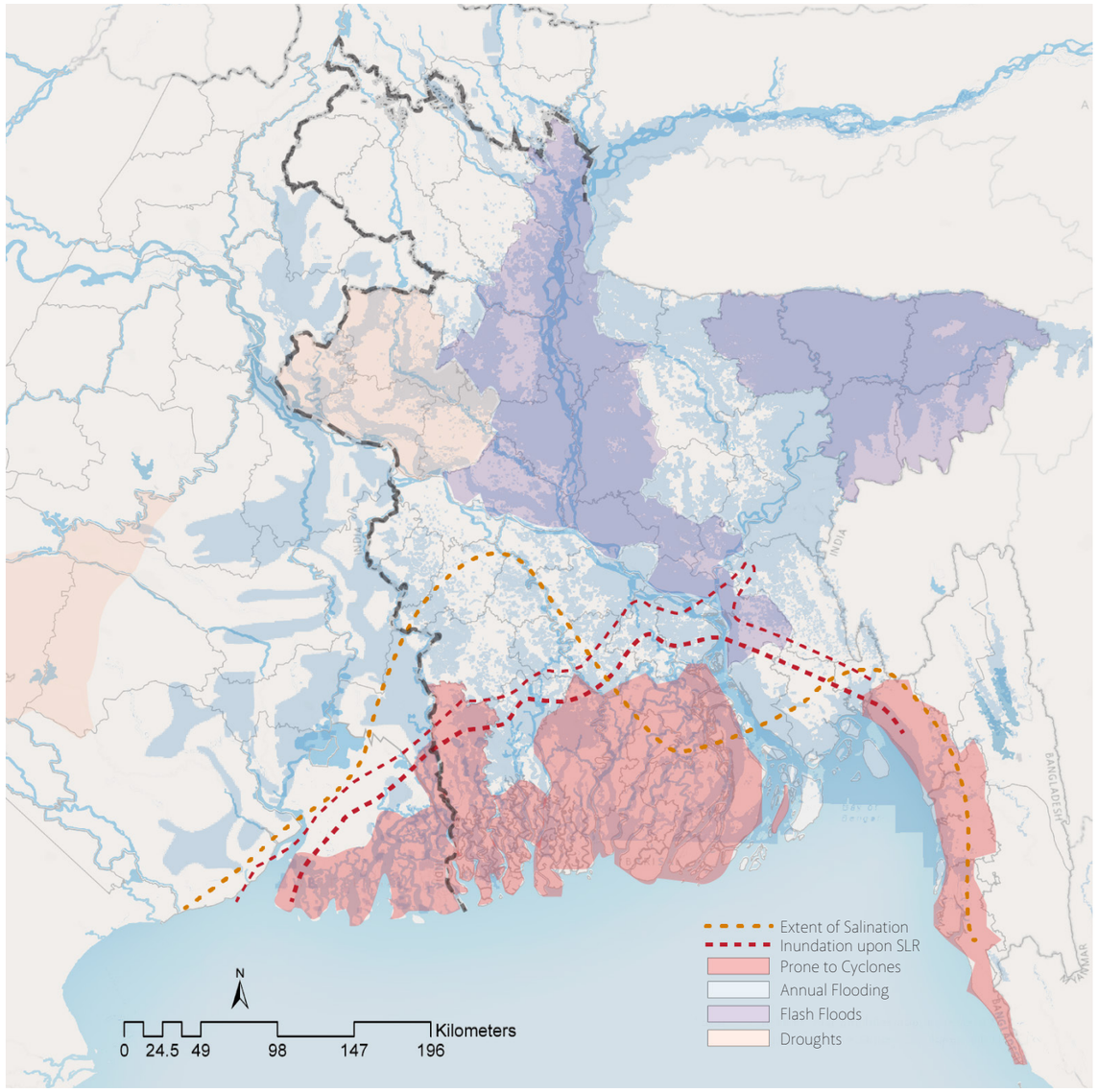


Figure 15: Map of combined climate threats in the region; (Author, 2019)

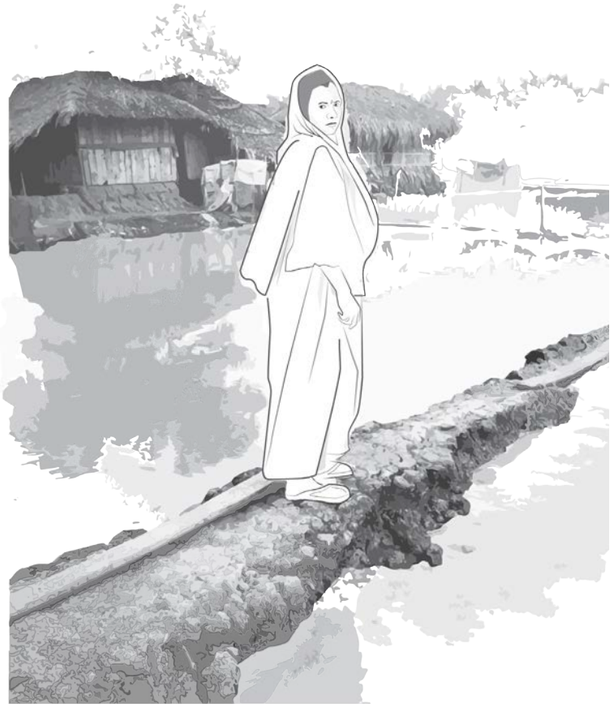
Context

migrants use ethnic and social networks to find houses in the slum areas of the cities. The slums offer poor living conditions, no access to amenities and services and are further the most vulnerable parts of the city to frequent flooding. According to the City Alliance report, 40% of the population of Dhaka lives in slums, out of which 70% moved to the city due to environmentally unstable conditions.

The migration is often hopping in nature, with a regional city as a pit stop for the final international destination. The informal settlements of the transition and destination cities not only depreciate the socio-economic status of the migrants, they also add to the trauma they have faced during displacement. The saturated low skilled job markets do not allow the migrants to create an economic base for themselves and create a breeding ground for crime and radicalization by religious groups. This poses a great security threat to the region as well as the global community.

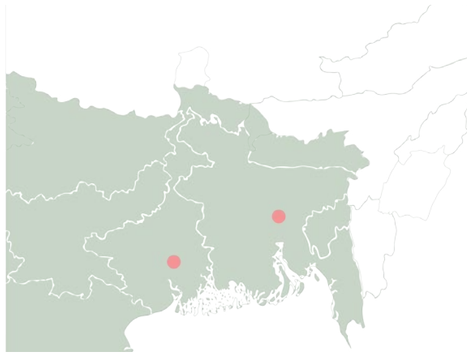
The delta experiences two different governance approaches in response to the impending disasters, due to its cross-border nature. Bangladesh being a lower-middle income country and India being a fast-developing nation have very different approaches and perceived threats of this migration. Through its state policies, India focuses more on economic stability of the marginalized population and social benefit schemes to enable socio-economic resilience. While Bangladesh focuses more on disaster risk reduction techniques and infrastructural investment as adaptation and safeguard measures. The non-governmental organizations have an essential role to play in both areas as they work locally with the communities under risk to capacitate them to cope with the disaster. An in-depth analysis of the ongoing actions to address the challenge of environmental migration in the region has been conducted under the Analytical Framework section of this report. However, a review of the existing development plans have been conducted for the area of West Bengal only due to logistical and time limitations.

This research looks at a method to prevent this consequence of environmental displacement.. It begins with identifying areas which are under high risk and would be at the front line of the disaster events or changes as well as the ones which are likely to be the receiving areas. The following section elaborates on the history of forced migration in the Bengal region to understand the nature of migration happening today.



| Forida Khatun stands behind her house in Gabura, Bangladesh, in November. Two of her sons migrated to Dhaka after the family home was destroyed by storms multiple times and agricultural jobs were lost due to salinity intrusion. “Only Allah can save us,” she says. “We don’t have any power to save our children.” |

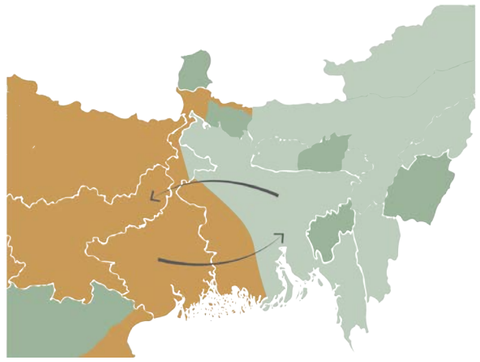
Photo credits : Tim Mcdonnell
Story : https://www.nationalgeographic.com/environment/2019/01/climate-change-drives-migration-crisis-in-bangladesh-from-dhaka-sundabans/#/04-bangladesh-climate-migrant-crisis.jpg



1707

Mughal Empire

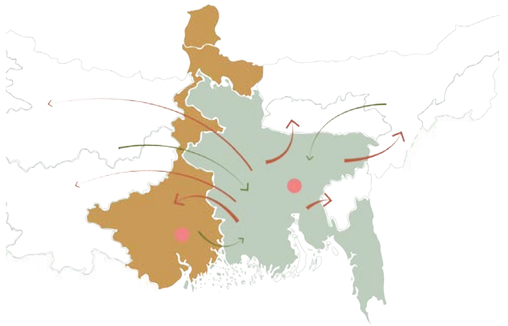
The Bengal Region was a part of the Mughal Empire till the arrival of the British in the 17th Century. It then consisted of present day Bangladesh, West Bengal, Bihar and parts of North East India.
Calcutta and Dhaka were prominent trading centres, making Bangladesh a socio-economically thriving region.



1905

Divide and Rule

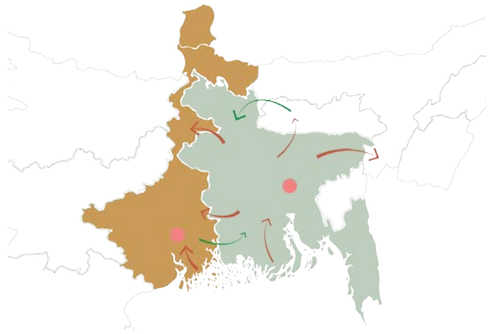
The first attempt to 'divide and rule' the region was made in 1905 by Lord Curzon. With the excuse that the region was too large to be governed efficiently, Curzon, proposed to split it on the basis of religious majorities. This caused an initial movement of muslims from the west to the eastern part of the region and the Hindus towards present day India (west).



1947

Partition

The 1947 Partition was one of the most violent times recorded in human history. The Bengal Province was split into two on the basis of religion and West Bengal was formed for the Hindus and East Pakistan for the Muslims. The years to follow saw mass refugee movements across the borders, with around 2.1 million refugees in India by the end of 1950. This flow continued till both countries introduced the passport and visa regime in 1952.



1974

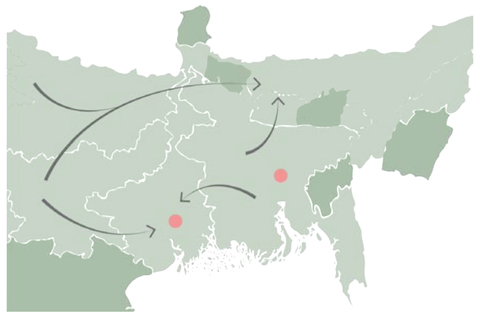
Famine

Subsequent years saw multiple instances of migration from Bangladesh to West Bengal and other bordering states due to famines (1974-75), flooding (1988) and cyclones (2009). However, regular migration and cross border activities were also common due to the porosity of the borders and the strong socio-economic ties of the larger Bengali ethnic group of the region.

1858

British Era (17th-18th Century)

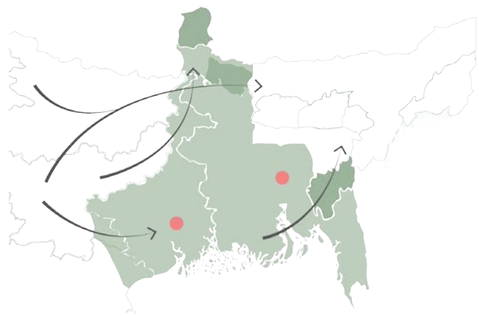
The ecological richness and vast lands of the Bengal Region, original inhabited by small tribal groups, were taken over by the British in the 17th Century. They shifted the administrative centre of South Asia to Calcutta, stripping Dhaka of its economic importance. Their aim was to reap maximum benefits from the land and resettled more than a hundred thousand labourers and farmers from the Bihar and Central regions of India in the Delta and the valleys of Assam.



1912

The Bengal Province

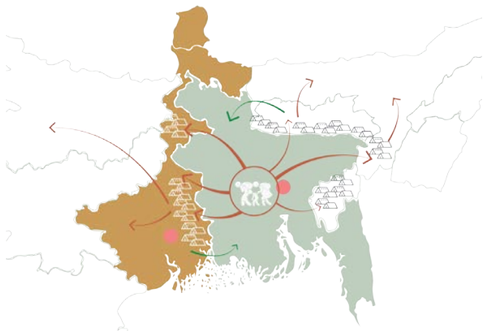
Curzon's proposal was finally implemented in 1912 and led to the formation of three distinct provinces - the Bengal Province, Bihar and Assam and Eastern Bengal. However these administrative boundaries had no effect on the labour migration taking place from the surrounding regions to the low density, high fertile lands of the Delta. The Jute mills in the region were an added attraction for the labourers.



1960-1971

War of Independence

Post-partition, East Pakistan suffered due to the separation from the economic centre Calcutta, and the distance from the main administration in Pakistan. Its war for independence was an outcome of the suffering of the Bengalis of the region and led to a decade long violent civil war between Pakistan and the Bengali Nationalists. The war ended in the formation of a separate nation state-Bangladesh. It also led to the exodus of 10 million refugees who were housed in refugee camps along the borders in India.



1983-Now

Fencing of Borders

As a result of the continuous illegal cross-border migration, 1983 saw violent ethnic conflicts in Assam (India) led by the Assamese who were demanding the repatriation of the Bangladeshis. The massacre took the lives of more than 10,000 muslims, most of whom had settled in the area before partition. The Indian government started the construction of an 8 foot high barbed wire fence along the 4.097 Km long porous border. However since the border runs through riverine and marshy land in areas, it is impossible to make it water-tight and stop the cross border activity.
In 2015, 3,026 Km of the fence had been sanctioned by the Central Government.

Socio-economic Centres

Bengal Region / Muslim Dominated Regions

Native States (under independent tribal groups)

Bengal Region / Hindu Dominated Regions

Population Movement

Migration into India

Repatriation to Bangladesh

The depicted boundaries are the current political boundaries of the region

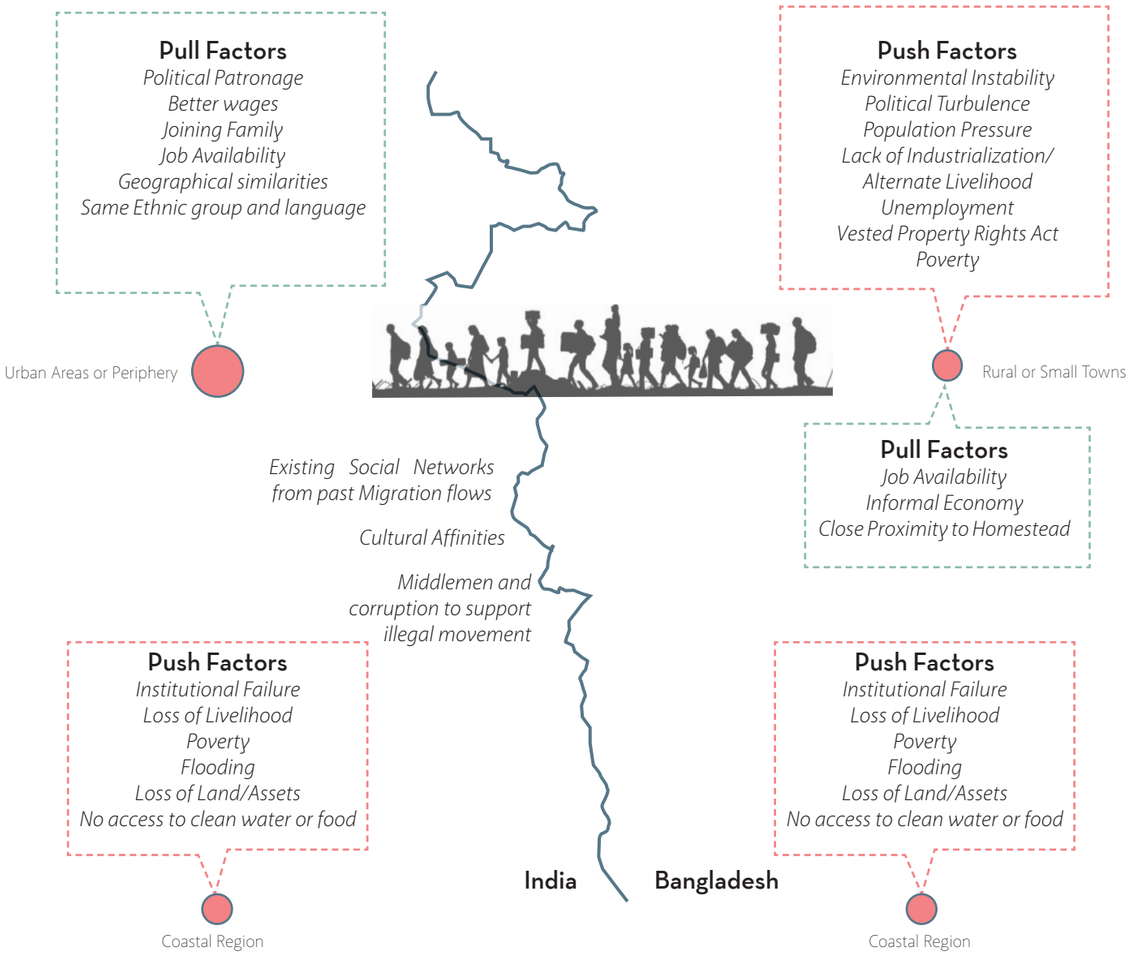


Figure 16: Multi Causal reasons for Migration explained through the Push-Pull Factor Theory (Author,2019)

Migration Today

Post-partition it took a few decades for the people of the two countries to acknowledge the existence of the border drawn by the British. With their shared ethnicity, language and lifestyle, it was almost impossible for them to cut-off their cross-border social, emotional and economic ties. However, after increasing resistance from the local resident population, the establishment of the National Register for Citizens of India and the fencing of the borders, cross-border movement became a subject of international attention. These factors have succeeded in seemingly reducing the flow of the illegal movement but have been unable to stop it. Further, the flat lands and riverine along the border enable the people to move unnoticed.

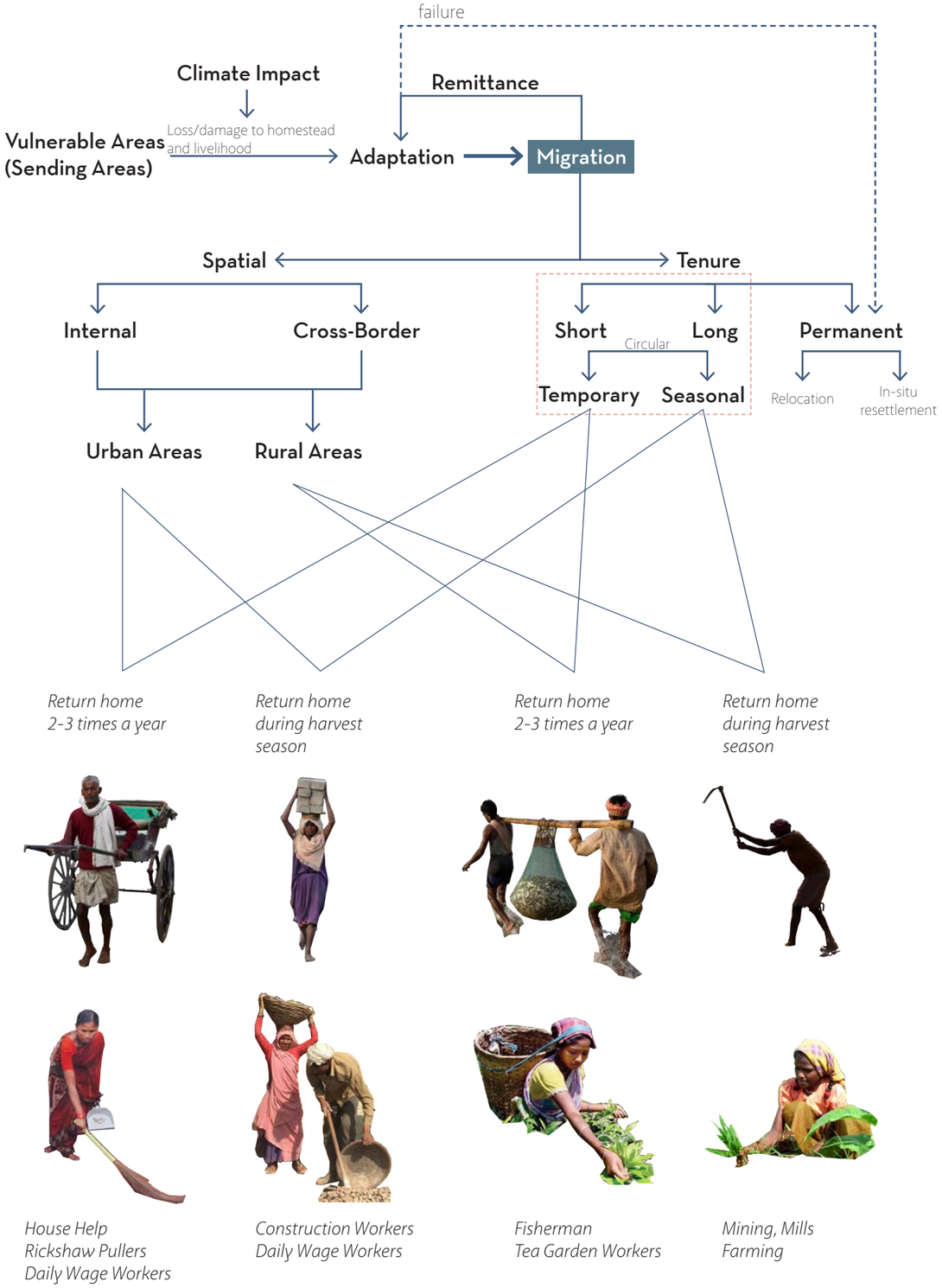
The time-line (Page 36) reveals a varied set of evolving reasons or push factors which have forced the people to migrate over the years. Starting from economic to political to persecution and today increasingly environmental, the complex history has sabotaged the pressing issues of today. The coastal region of the dynamically changing geological region of the Ganges-Brahmaputra Delta houses one-third of the 163 million population of Bangladesh and a significant population of West Bengal, India. This population struggles to cope with a host of environmental hazards (elaborated in section 5.2.1), which are being increasingly reinforced by climate change. The combination of this environmental stress with the regions poor economic condition, population pressure and political turbulence is predicted to sustain the illegal flow of migrants from Bangladesh to India (Joseph, Jolin Narendran, 2013) (Samling, C.L., Das, S. and Hazra, 2015). In addition, there is also environmental displacement in the coastal regions of West Bengal, triggering intra and inter-state movement. While the primary motive for the movement remains economic in nature, it is carried out as an adaptation to the changing environment in the region. These regions are estimated to generate 9-20 million forced migrants as a result of the climate stress (Samling, C.L., Das, S. and Hazra, 2015).

In 1966, Everett Lee proposed the comprehensive 'Push and Pull theory' of population migration. He proposed that the decision to migrate is made by an individual upon assessing the negative factors of the place of residence termed as the sending area and the incentives of the destination, termed as the receiving area. The negative factors were called the Push factors and the incentives as the Pull factors. Figure 16 lists the primary push and pull factors responsible for the migration in the Delta. It highlights a unidirectional movement towards the urban areas of West Bengal and beyond (refer to the Analytical Framework, section 5.2.2). This has created an economic and development imbalance in the region, with a mono-centric focus on the larger metropolitan region of Kolkata.

Many anthropologists and sociologists term this form of migration as 'economic' in nature as higher income is a major pull factor in the equation. However, this research highlights the underlying environmental reasons and further characterises the movement as a cyclical over time. Multiple studies that have been conducted on circular migration patterns highlight the transitional nature of the pattern and its value for the survival for the climate affected population.

Box 2

The Deltas, vulnerability and Climate Change: Migration and Adaptation project (DECCMA) was carried out under the Collaborative Adaptation Research initiative in Africa and Asia (CARIAA) programme, to study the nature and success rate of the climate-induced migration across three delta regions – Ganges- Brahmaputra, Mahanadi (Orissa, India) and Volta Delta (Ghana, Africa). This research builds upon the findings of this 5 year research project and takes note of the empirical data collected for it.



Migration Today

The DECCMA Project approaches the issue from a different perspective. It terms the ongoing migration as an 'adaptation strategy' by the locals to cope with the changing environment. The 5-year research analyses the connection between the environmental stress and the migration and the success of this migration in stabilizing the affected population. On-ground surveys of 5000 households in the sending regions and 2500 households in the receiving regions were conducted for the research. It was found that the out-migration from the coastal regions was higher than the rest of the country. Economically weaker populations, characterised by low per capita income GDP and high poverty levels, were found to have a tendency to migrate internally while comparatively richer people were choosing to move to international destinations. The research establishes that migration is a result of the combination of environmental hazard and socio-economic vulnerability as dominant push factors.

The nature of this migration can be categorized according to time and space. While the spatially people either move within their administrative region or nation, or cross an international border in search for better opportunities.

Further, the tenure of the migrant in the receiving region is either short-term, long term and permanent. While these are independent categories, the short and long term tenures can also be an intermediate (transition) phase towards permanent settlement either at the destination or the origin. Further, in the Ganges-Brahmaputra region, due to the presence of strong social ties and land ownership, short and long term migrations are cyclical movement between the receiving and the sending regions.

Temporary Migrants are migrants which maintain social ties with their homestead. They often have family in the village whom they visit 3-4 times a year, usually during festivals or special occasions. This category of migrants prefers to be temporarily employed through short-term contracts to enjoy the flexibility of travelling as per their will. They contribute to the economy of the receiving region through their work and to the sending region by remitting their earnings.

Figure 17: Migrant Classification and occupations in the Delta ; (Author, 2019)

Seasonal Migrants retain their social and economic ties with their homestead. They return home for the harvest and transplanting seasons, while working as daily labour or short-contract labours in the receiving areas during the lean seasons. They develop and maintain trans-local livelihoods which enhances their capacity to cope with natural disasters. They contribute to both economies through their work and produce.

Temporary and Seasonal migrants can be clubbed under the concept of Circular Migration. (Refer to Theoretical framework) This type of migration is considered to be a win-win-win situation for the receiving and sending regions as well as the migrant.

Permanent Migration, as aforementioned, is the permanent movement of individuals or families to destinations with better economic opportunities. This category is dominated by the educated and economically stronger section. The climate refugees who are forced to migrate permanently are usually assisted by the authorities through planned relocation schemes. However, the majority if the economically weaker section which is displaced is observed to be using circular migration as an adaptation strategy. (Bird & Deshingkar, 2009)

This research focuses on the circular nature of climate migration in the coastal regions of the Ganges Brahmaputra Delta. It investigates the benefits and exploitation faced by the migrants when they are in this phase of migration. Further, it presents ways to use this migration as an adaptation strategy rather than a distressful negative cycle.

The next chapter details the research framework constructed for this research, setting the scope, aim, questions and methodology used for the investigation.

METHODOLOGY

CHAPTER ABSTRACT

The quest to validate the relationship between the multi-disciplinary concepts of climate change, migration and urban development is an exploratory and deductive one. The subjective nature of this research called for a phenomenological approach to be able to see beyond the obvious facts and critically asses the humanitarian crisis at hand.

The design of the research responds to the lack of data and resources on the subject and in the chosen context. It proposes a data collection process called the 3C's - compilation, comparison and cognition, to ensure a degree of reliability of the data represented.

Further, it uses this process for 3 key explorations: Review of relevant phenomena, socio-spatial analysis and a review of the current policy responses to the issue.

It started with establishing key conceptual links through scientific literature and discussions with experts working on the issue from across various fields. This was further informed by documentaries and existing empirical research. Gaps in the current regime were identified through a comparative analysis of the actions taken in response to the ongoing and predicted migration across the world. Finally, the concepts were represented in space to reveal the prevalent trends of the region. Mapping in a resource scarce context required overlapping of information from literature, satellite imagery and perception. Reference studies were taken into consideration for every proposed strategy.

This chapter elaborates on these approaches and dynamics in an attempt to logically explain 'how' the research was conducted and the outcomes achieved.

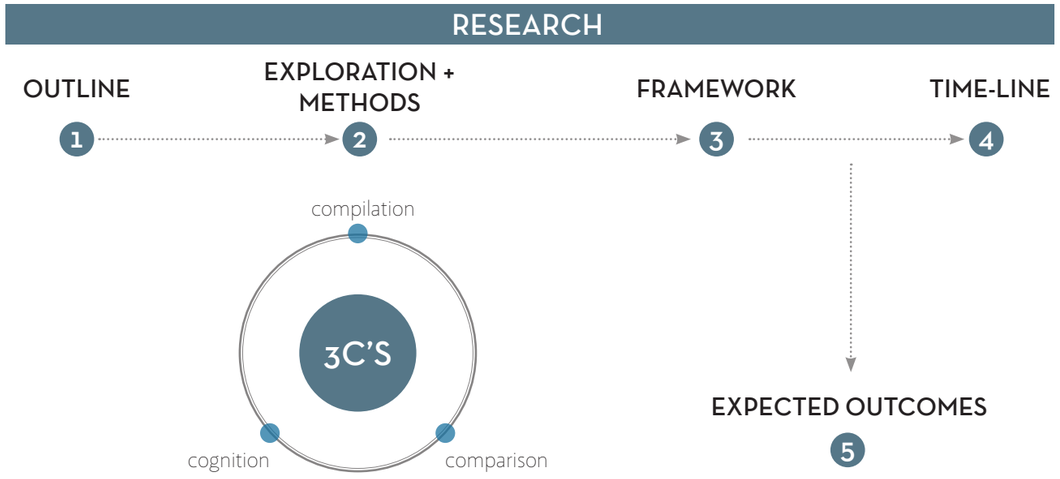
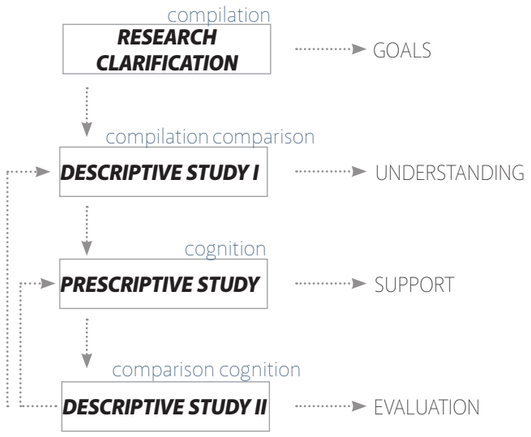


Figure 18 : Methodology Chapter Overview ; (Author, 2019)



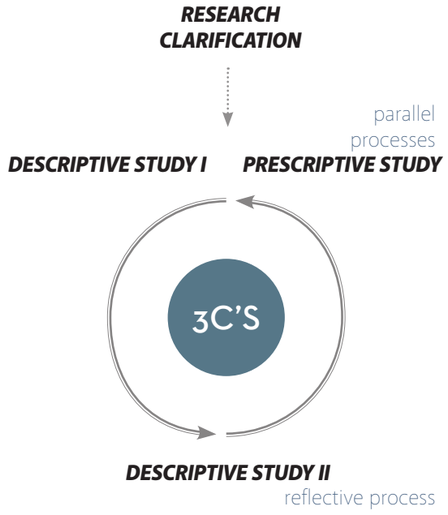


Figure 18: Adapting the Design Research Methodology by Amaresh Chakrabarti, Lucienne Blessing (2001)

CHAPTER SUMMARY

The key issue addressed in this research is climate-induced displacement and its ramification on the human rights of the displaced and on the development of the larger region. The research has been designed to explore and answer 1 main research question and 4 sub questions in the context of the Ganges-Brahmaputra Delta region. Interdisciplinary in nature, the research questions investigate the hypotheses proposed. The questions have been explored through 3 key trajectories - Exploring and defining key Phenomena, Analysing Socio-spatial processes related to the phenomena and Comparative analysis of the responses to the phenomena. Each question has been addressed with an overlapping use of the trajectories. Further, each of these has been explored through the 3C process. This begins with the compilation of the available data, comparison of the data for validation and logically analysing and placing the data in the research cognitively. Figure XX shows this method as an circular adaptation of the Design Research Methodology (DRM) by Amaresh Chakrabarti and Lucienne Blessing.

The scope of the 3 trajectories used is as follows:
Phenomena: The understanding and analysis of the key phenomena associated with the concepts of Climate change, migration and regional development.
Socio-spatial processes: Revealing the socio-spatial aspects of climate-induced migration through literature and analytical methods
Comparative Analysis: A detailed study of the policy framework and action plans in response to the issue

This chapter explains the research design by defining its outline, elaborating on the mentioned trajectories, presenting the research methods used and finally presenting the expected outcomes of the research. It closes with the points of reflection considered to make the research more relevant on the ethical, societal and scientific grounds.

The research methodology can be followed in three broad steps.
Step 1: A scientific paper outlining the definition of climate-induced migration. This was written by indepth analysis of existing literature and obtaining expert opinion.
Step 2: Analytical overview of the current response mechanisms to the issues from across the world. This was done through a careful review of the policy documents and existing studies.

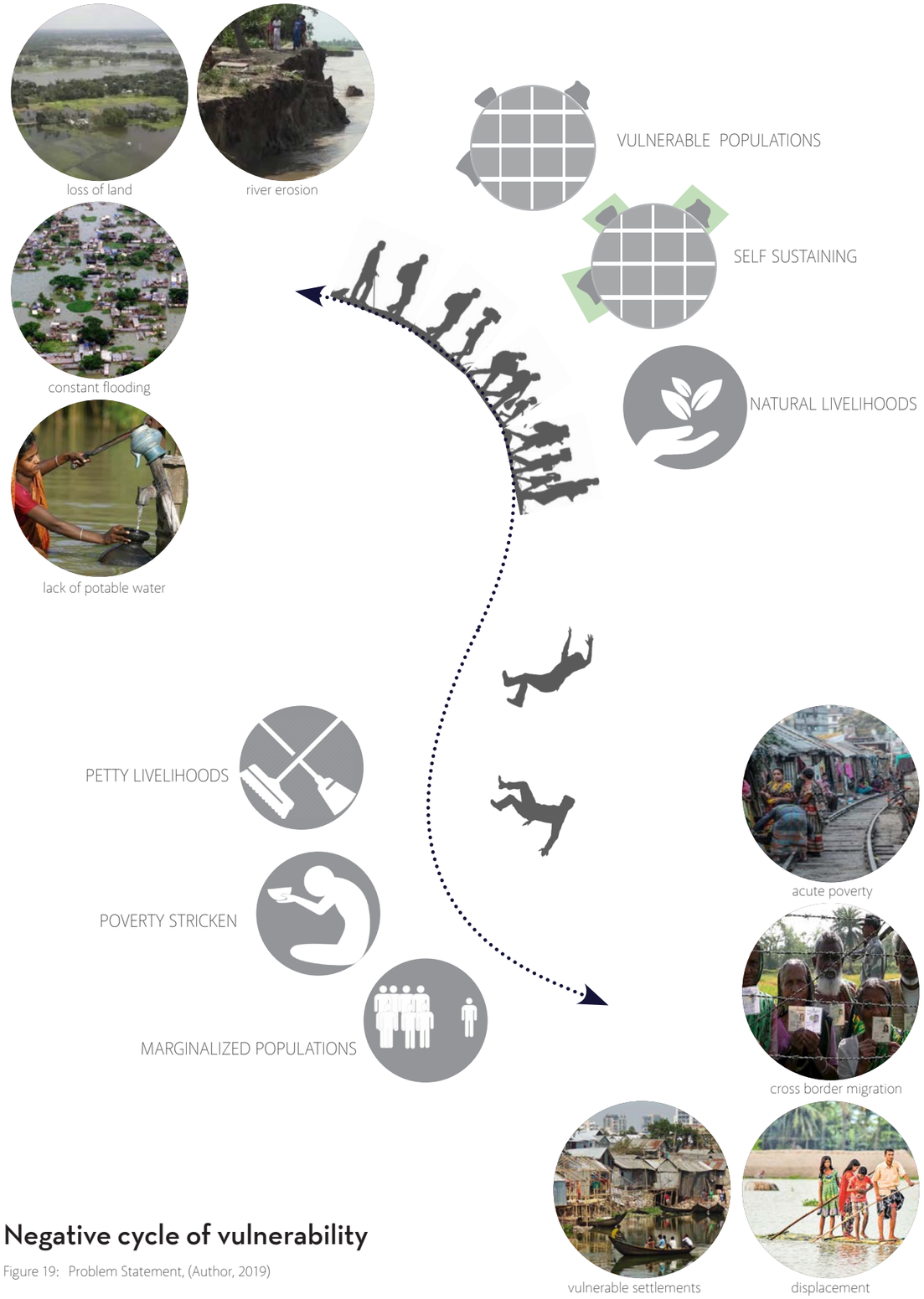
Step 3: Collection and analysis of the existing patterns and situations in the chosen case - the Ganges-Brahmaputra Delta. Spatial mapping of this data to reveal the spatial consequences and patterns of the process. The data was collected primarily through a field visit and secondarily through literature and existing policy and planning documents.

The conclusions of the above steps were used to develop a strategy for the region. The strategies had a design and a policy component. These were further tested against the ethical, societal and scientific considerations, defined at the beginning of the process.

Here, it is important to note the complexity and multi-causal nature of climate-induced displacement. This complexity calls for a continuous reflective mechanism to be inbuilt in the research process. This requires re-looking at the questions with respect to the new findings in the research. Further, the comparative and cognitive processes needed to be constantly worked through the scales to understand the repercussions of the findings. The iterative reflection was also essential to generate a realistic design proposal.

Box 3

The methodology design generated for this research is one of its key transferable elements. It can be used to conduct similar studies in resource scarce regions, often found in the Global South. The predominant in such regions is the absence of reliable data, which makes it difficult to produce real design proposals. This methodology emphasizes on gathering existing knowledge as much as possible and then focussing on the process rather than the product for a successful intervention.



Negative cycle of vulnerability

Figure 19: Problem Statement, (Author, 2019)

1 PROBLEM STATEMENT

Climate change is having an increasing impact on the historical phenomenon of human migration. The past decade has seen sudden and gradual *mass movements* across regions and borders due to the forced displacement caused by adverse environmental conditions or events, especially in the Global South. However, the scientific discourse still lacks a **universal definition for the migration taking place in the context of climate change.**

Considering the current efforts to mitigate global warming, millions of people are predicted to be trapped * or displaced* due to the 1.5 degree Celsius temperature rise by 2050. (Rigaud et al., 2018). There is an urgent need to *define and safeguard the rights of these new category of 'forcibly displaced'*.*

The Ganges- Brahmaputra Delta, being the largest and one of the most vulnerable delta regions to climate change, faces an overarching threat of the displacement of 40 million inhabitants by 2050. (Rigaud et al., 2018) Insufficient support, poor economic conditions and loss of livelihood and land forces people to *migrate or at times flee* in search for sustenance, most often to the vulnerable areas of urban agglomerations. The movement from one vulnerable zone to another traps the migrants in a ***negative cycle*** in which they are often exploited at the hands of the informal middlemen. They lose their culture, identity and at times citizenship in the process. The plight of being *stateless* in ones own country or by illegally crossing a border, is not only a discourse about livelihood but also of basic human rights. This further has a detrimental effect on the ***overall development of the region.***

* Trapped : Affected populations which are unable to migrate or escape the disaster situation due to insufficient resources or support.
* Displaced : Affected populations who have to voluntarily or involuntarily move from their homes due to a disaster situation.
* Forcibly Displaced : Affected populations which have to involuntarily move for survival as a consequence of a disaster.

HYPOTHESIS 1

This research is based on 3 main hypotheses. It attempts to test these hypotheses through a series of research questions.

1. Rapid and slow-onset disasters are a primary or secondary cause of livelihood loss and displacement in the Delta region Ganges-Brahmaputra rivers.

2. The displacement causes outmigration in search of alternate livelihoods and stunted development of the larger Bengal Region.

3. Inclusion of this migration in the spatial planning and policy instruments can lead to better socio-economic development of the migrants and the region.

To investigate the relationship between climate change, migration and urban development. Further to develop a spatial and governance response to assist in reinstating or upholding the socio-economic dignity and rights of the environmentally displaced.

Socio-Spatial Inclusion

Livelihood management

Protect Cultural Identity

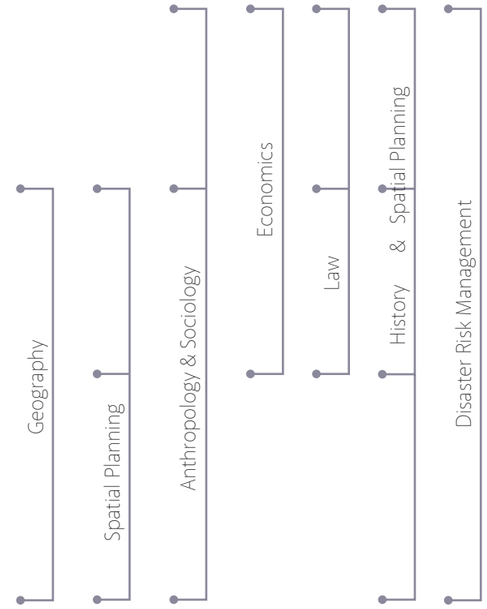
Enable Community Self Organisation

Research Goals

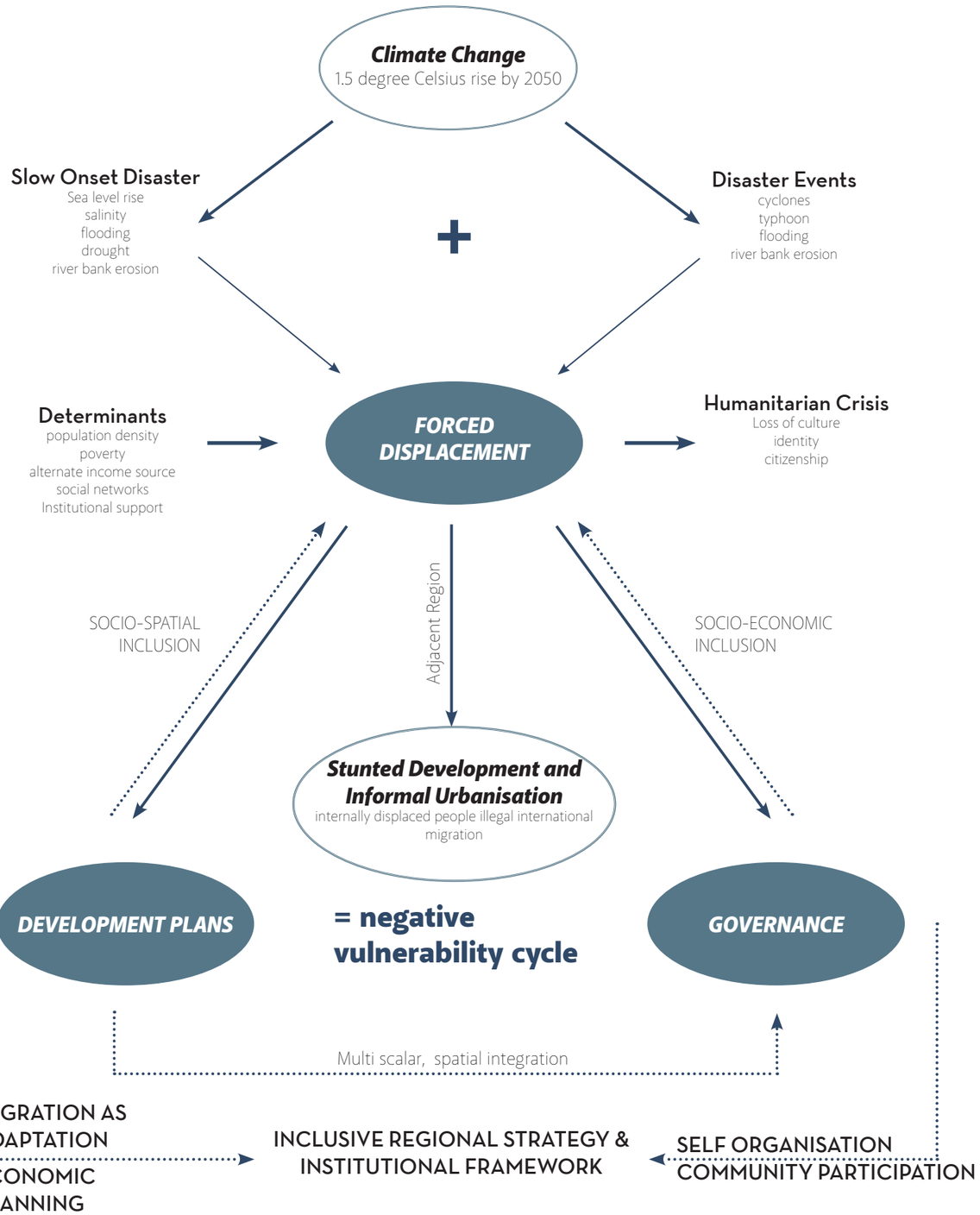
1 RESEARCH QUESTIONS

How can spatial planning and good governance be used as a tool to facilitate the use of climate-induced MIGRATION AS an adaptation strategy for the sending regions AND for the development of the SURROUNDING REGION?

- What are the gaps and trends in the prevalent institutional responses by the transnational agencies, nations at the front-line of the disaster and communities currently faced with the disaster, to climate-induced displacement?
- What are the climate induced migratory patterns and climate related threats in the Ganges Brahmaputra Delta? How can the sending and receiving areas be identified?
- What are the current spatial and policy instruments for development in the region? How can these be altered to flexibly plan for the socio-spatial and economic inclusion of the circular nature of the migration?
- How can circular migration be used as a successful adaptive strategy to climate change for the vulnerable population? Can regional economic planning accelerate growth and climate resilience?



Multi Disciplinary Challenge

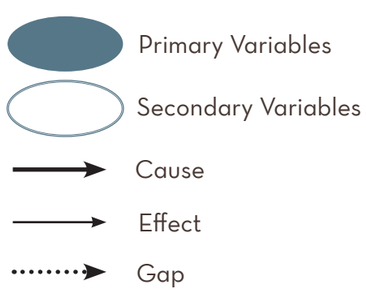


1 CONCEPTUAL FRAMEWORK

This research builds a relationship between the primary variables - climate-induced displacement and spatial planning and governance. It first builds the currently ambiguous relationship between climate change and displacement through scientific review of the global discourse and mapping the phenomena in the context of the Ganges-Brahmaputra Delta. Then, further justifies the urgency of the issue by highlighting the developmental consequences of climate-induced migration. It brings forward the issues of human rights violations, informal urbanisation and the stunted growth of the affected regions in the Developing countries through the case in hand.

The core focus of this research lies in the ramifications of the slow-onset disasters, *exclusively sea level rise, subsidence and increased water salinity.* This limits the scope of the research to responding to circular migration undertaken as a coping mechanism to the long-term impact of the disaster. The conceptual framework is built upon and reflects on the hypothesis of this thesis.

Figure 20: Conceptual Framework ; (Author, 2019)



RESEARCH AIM

This project aims to generate a spatial plan and strategy to *accommodate circular migration undertaken as a result of climate adversities*. The goal of the methodology is to mitigate the harsh effects of distress migration by using migration as an adaptive strategy through provisions to pre-emptively accommodate the movement in the plans of the region.

As a theoretical addition to the discourse of forced displacement due to climate change, the project aims to define the term *'environmentally displaced' and to chart out their basic rights.* Further, through a spatial strategy it aims to manage their movement in the cross border region of the Ganges-Brahmaputra Delta. It looks at the support policies and implementation framework required to implement the strategy. The approach used for building the strategy is the main transferable element of the research.

The next section elaborates on the trajectories taken to answer the research questions and achieve this aim.

REFLECTION LOOP

	PHENOMENA	SOCIO-SPATIAL ANALYSIS	COMPARATIVE ANALYSIS
1 What are the gaps and trends in the prevalent institutional responses by the transnational agencies, nations at the front-line of the disaster and communities currently faced with the disaster, to climate-induced displacement?	- Climate Impact on LECZs in Developing Countries - Urbanisation in the Delta - Livelihoods in the Delta	- Socio-economic reasons for migration - Eligibility criteria for areas addressed - Impact of response on Socio-economic status	- Local adaptation and disaster risk reduction strategies - Task Force on Displacement, UNHCR documents - National Adaptation Plans and policies - Cross-sectoral nature of the response - Government Implemented Actions - Areas of maximum global, national and local focus
2 What are the climate induced migratory patterns and climate related threats in the Ganges Brahmaputra Delta? How can the sending and receiving areas be identified?	- Push & Pull Theory of migration - Vulnerability Analysis - Circular Migration - Maslow's pyramid of need	- Adaptive Planning - Development Impacts of migration - Spatial capacity of Receiving areas - Cross Border Movement - Sending and receiving areas - urbanisation patterns	- Livelihood management - EU, UN index for vulnerability - Existing migratory patterns and categories - Historic migratory patterns
3 What are the current spatial and policy instruments for development in the region? How can these be altered to flexibly plan for the socio-spatial and economic inclusion of the circular nature of the migration?	- Social exclusion theory and mutual benefit - Conflict and Ethnic compositions - Value of existing knowledge in planning	- Clustering and Self Organisation - Existing Structural / Master-plans of receiving areas - Livelihood patterns of existing migrants - Gaps in regional development	- Global Compact for Safe and Orderly Migration - Planning and Policy instruments in West Bengal
4 How can this circular migration be used as a successful adaptive strategy to climate change for the vulnerable population? Can the economic planning of the larger functional and ecological region accelerate growth and climate resilience?	- Community Participation and mobilisation - Economic clusters and planning - Symbiotic functional relationships - Economic contribution of Migrants	- Mapping Community initiatives - Development issues in receiving areas - Skill Development	- Immigrant laws and refugee policies in India - Citizenship and rights - Disaster responses in the Delta
REFERENCE STUDIES	Regional Planning Instruments	East Kolkata Wetlands	African Union Kampala Convention

The primary research tool for this research is the investigation of the key phenomena. The word 'phenomena' here refers to situations or processes which are observed to exist but whose causes and definitions are subjective to perception. (Oxford, 2018) The hypotheses, mentioned in the previous section, are partially validated through an exploration of the following: Climate Change, Migration and Forced Displacement, Regional Development and Migration.

Climate Change: In this research climate change has been explored from a livelihood and sustenance perspective in the Low Elevation Coastal Zones. The long-term ramifications of sea level rise, subsidence and increased salinity on the livelihoods and basic means of obtaining clean water, food and shelter have been identified and assessed. This has been done through a review of the studies conducted by IPCC, World Bank and IOM. Predictions made by these studies have been considered to set a time-frame for the expected outcomes of this research. Further, mapping exercises to highlight the climate risks in the Ganges-Brahmaputra Delta, were used to identify the vulnerable or sending areas of the region.

Migration and Forced Displacement: Migration theories, elaborating on the decision-making process and the key push and pull factors influencing the migrant, were explored through scientific literature to understand the role of environmental change on the process. Further, forced displacement was defined in the domain of slow-onset disasters, in addition to its current definition in the context of sudden-onset disasters. This migration and its consequences on the spatial configuration of the receiving areas and the human rights of the migrants was then mapped. The key findings from this mapping was used to define the areas for further study and intervention.

Regional Development and Migration: A prequel to this research involved understanding the urbanisation trends of the LECZ's and the importance of nature-based livelihood opportunities in the development plans of these regions. Development plans and the response of governance institutes play two major roles in this research. One, to understand the responses of nations with climate-induced displacement on their National Action Plans, through a study of their development plans and implemented actions. Two, is to study the instruments used for these plans in the Ganges-Brahmaputra Delta which lies in India, namely the state of West Bengal.

Circular Migration

The study of these phenomena revealed their complex relationship and interdependency. They were explored through a mix of research methods where scientific literature review, discussions with field experts and observation through documentary films took precedence. These have been further elaborated in the next section.

Migration is inherently a spatial phenomenon which involves migrants to move from sending areas to receiving or host areas, due to a range of economic, social, political and environmental drivers. In this research, considering the environmentally driven migration, an attempt has been made to spatially represent the movement by extracting data from written accounts, empirical data, expert discussion, previous research and documentaries. Further, societal processes linked to the migration have been identified and mapped in a logical sequence. The following are some of the key processes considered.

Demographic changes: Demographic analysis was the first step to validate that migration was a prevalent trend in the Delta region. The changes in population and population density were mapped to trace the spatial movement of the affected population. Further identifying the out-migration and in-migration hotspots in the region. The study of the demographics will be revisited through empirical data and written accounts collected during the field work, to reveal the categories of the displaced or migrants in the region.

Climate Impact: An existing and future scenario analysis was done of the impact of the changing climate in the region. The areas impacted by water salinity, sea level rise, subsidence and frequent tidal flooding were mapped for both the scenarios to locate the most climatically vulnerable areas. Some of these areas will be visited during the field visit to understand the ground reality of the situation.

Economics: The poverty levels and gross domestic product (GDP) of the areas within the region were mapped at a sub-district level. This overlapped with the climate impact maps helped in locating the most vulnerable zones. Further, an analysis of the livelihood patterns also revealed the extent to which climate has an impact on the outmigration of working individuals or families. This analysis will be validated on the field visit through conversations with researchers and the migrants.

Historical analysis: A spatial analysis of the region through the past 2 decades reveals the impact of migration on the spatial configuration and development of the region. Further investigation into the mechanisms used by the receiving regions in response to this migration will be conducted to understand the prevalent gaps. Since the area has had a long history of migration driven by political and societal factors, it will be useful to trace the mechanisms adopted in response to the previous situations.

Research and action focus: Given the Delta's vulnerable condition, multiple initiatives form transnational agencies and national schemes as well as research projects have been carried out in the region. Mapping these initiatives will be useful to identify the pressing problems, current focus and the distressed areas to locate a site for the research.

Existing spatial planning and policy instruments: A parallel approach to the research is to understand and analyse the current plans for development in the receiving areas identified. This will be instrumental in identifying the gaps and the future provisions required to accommodate the displaced population.

A comparative analysis of all the responses reviewed throughout the research was used as a tool to constantly inform the proposed framework. The analysis was conducted on three scales – global, national and local. The global comparison focuses on the initiatives taken by the transnational climate action and humanitarian agencies like the UNFCCC, the UNHCR and the Nansen Initiative. While the national scale focuses on actions and policies formulated by nation states or a group of nation states in response to the visible displacement in their regions. This analysis was conducted to identify case studies for in-depth analysis and further inform the outcome. Finally, local adaptive strategies were identified in India and Bangladesh to compare and extract the best practices or models which are currently successful in the context. Each scale of analysis has a common set of criteria which will in the end be used to conduct a cross analysis across the scale.

Scale and Scope: The scale defines the spatial scale at which the policy is implemented. In this case global, national or local. While the scope defines the overarching theme behind the policy. This can range from climate change to orderly migration or more depending on the agenda of the organization steering the actions.

Objective: This criterion defines the core objective of the response or policy in the context of climate-induced displacement.

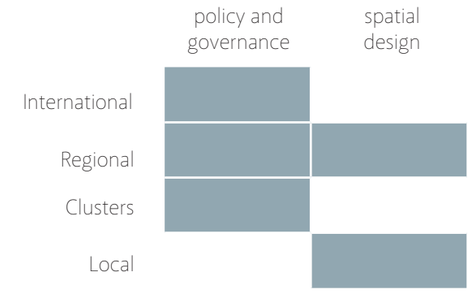
Expected Results: The quantitative achievements expected out of the implementation of the policy. For example: to alleviate 100,000 people from poverty (as defined by the UN standards) in the coastal areas of Bangladesh by 2050.

Actors/sectors involved: A list of the resources and their corresponding agencies behind the policy formation and implementation. This is done to understand the diversity of sectoral contributions to the responses and highlight the need for multi-sectoral collaboration.

Policy instrument: The instrument used to implement the policy is listed and analysed for its effectiveness. These instruments range from laws, master-plans and spatial strategies to national incentive schemes. This analysis will reveal the instruments which have proven to be most effective during implementation.

Phase of Displacement: This criterion highlights the position of the policy in the complete process of climate-induced displacement. The process can be divided into 3 phases: pre-displacement, during displacement and post-displacement. The actions taken to avert the crisis address the pre-displacement phase. While the actions taken to mitigate and to recover belong to the during and post-displacement phases respectively. This analysis will reveal the emphasis of the majority of policies on each scale.

A set of reference studies across different scales were used to inform the process and outcome of the research. The research terms them 'reference' instead of case studies as each project or policy was studied only for a particular aspect relevant to the project. In depth analysis of each study was not conducted as usually done for the case study method. Each study gives an overview of the project or policy, highlights the key relevant features and then presents analytical conclusions for the research and context at hand. Some of the most relevant studies have been highlighted in chapter 6.



REFERENCE STUDY	***SCALE OF STUDY***	***PROJECTED LEARNING***
African Kampala Convention	International	Cross-border treaty with standard definition for the displaced and roles and responsibilities of the states
Western Ghats Regional Planning	Regional	Planning on the basis of Ecological Regions
United Kingdom : Local Economic Partnerships	Regional	Governance model for Economic growth
East Kolkata Wetlands	Local	Community-driven waste treatment and wetland conservation

2 METHODS

PHENOMENA

SOCIO SPATIAL PROCESSES

COMPARATIVE ANALYSIS

QUALITATIVE METHODS

VISUAL LEARNING : Documentaries and films were an essential part of the initial exploration for this research. The content provided a insight into the existing situation as well as helped establish contacts with people who are already working with this issue across fields.

PEER DISCUSSIONS : Regular peer discussions with colleagues from the urbanism field were used as a feedback method to steer the research and test the findings throughout the process.

INTERVIEWS : Formal and informal interviews were used to gain expert opinion and approaches for the issue. The interviews were carried out with people from across the fields of sociology, anthropology, development sciences, governance and non profit agencies.

GROUP DISCUSSIONS : The group discussions were held within the Complex cities studio group. The discussions made one reflect on their own research and place it in the defined structure or outcome. A comparison of these outcomes revealed the gaps in the research and were instrumental in improving the approach.

DOCUMENTATION / OBSERVATION : The field visit will be used to document empirical data through surveys and expert interviews. Further, keen observation of the surrounding environment will be done to understand the spatial consequences of the phenomena explored.

QUANTITATIVE METHODS

MAPPING : Mapping is an essential method for understanding and analysing the socio-spatial processes related to climate-induced displacement. GIS and raster mapping were used to accumulate essential data and represent it in a comprehensive manner. Further, essential data was also extracted from written accounts, interviews and documentaries.

DATA ANALYSIS / DESK RESEARCH : Due to the unfamiliarity of the context and the topic and geographical and time constraints, desk research was the main tool for initial exploration. As a part of the desk research, data analysis was used to explore and validate the hypotheses spatially and statistically.

QUANTITATIVE +QUANTITATIVE METHODS

LITERATURE REVIEW : The critical review of scientific literature, policy documents and newspaper and magazine articles was an intrinsic part of this research. Readings were constantly used to reflect on the findings and to define the necessary terms and processes.

The scientific literature helped discover the theories behind adaptive and temporal planning, multi-disciplinary view on the reasons and consequences of migration and further the history of the relationship between climate change and migration.

On the other hand, policy documents and articles, informed the research with the ongoing discourse and future plans of the humanitarian agencies and governments. They were also a source of valuable data and contacts for the development of the research.

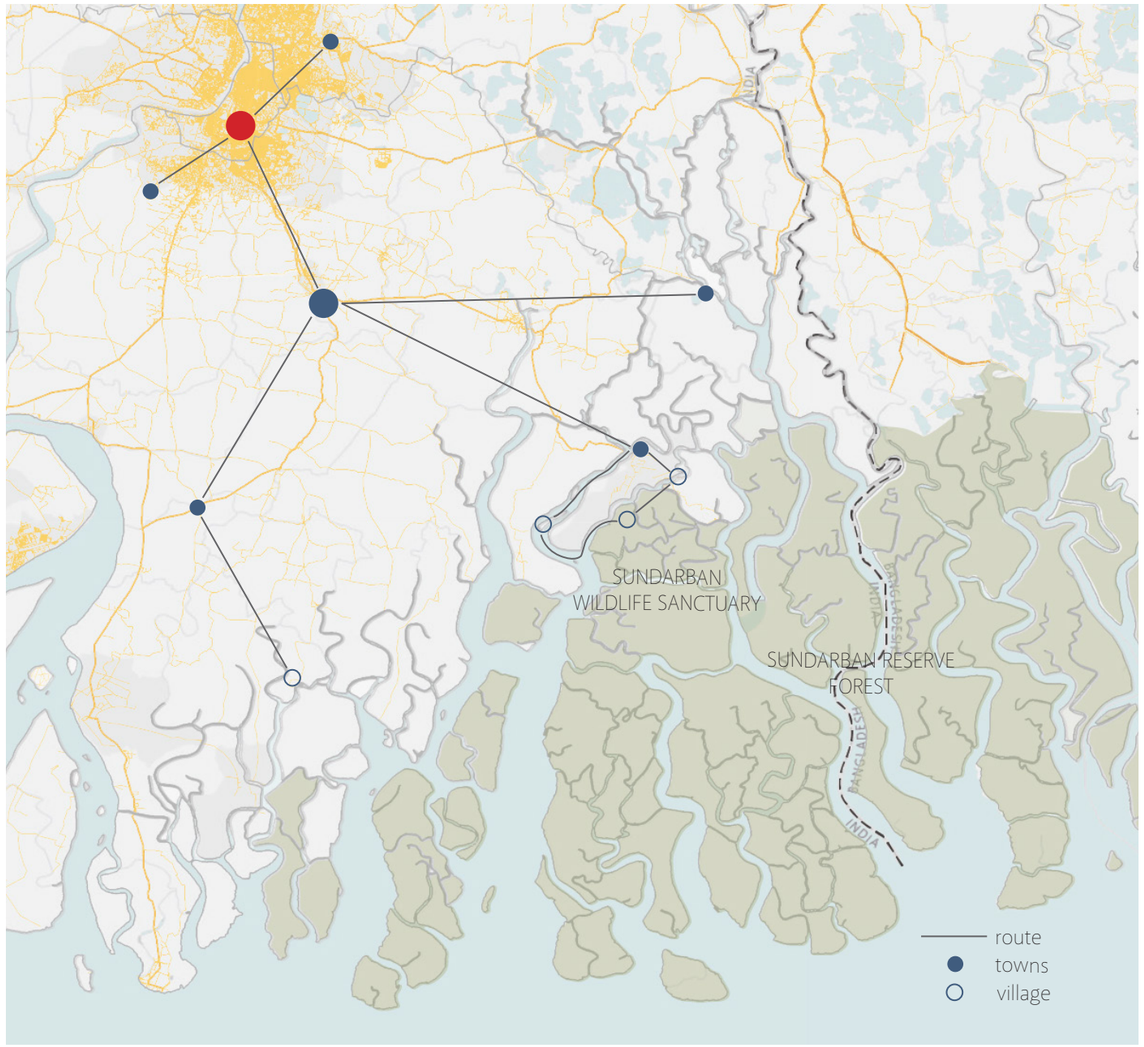
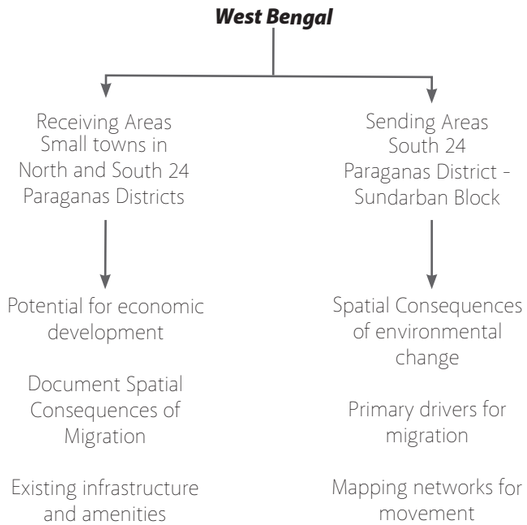


Figure 21: Field Visit map (Author, 2019)

Field Visit



A 3 week field trip was conducted in the months of January and February to validate the collected data, preliminary conclusions and collect empirical data. For practical and time related reasons, the study was conducted in the West Bengal part of the Delta. The aim of the visit was to understand the ground situation and collect expert opinion from researchers, experts, climate affected and civil society organisations on ground. It is essential to note the lack of awareness in the authorities and their limited availability, restricting the choice of opinion to the academicians and practicing professionals. Structured interviews were conducted with the professionals and NGO's in informal environments.

3 sending regions including 2 island villages were visited to understand the plight of the people. 3 small towns were visited with one town as a anchor point for the complete travel. The key methods used for the sending regions were informal interviews and observation. While for the small towns general observation and documentation through mapping and photographs were used.

The small towns or receiving areas were surveyed to understand the spatial consequences of the migration and urbanisation, prevalent character, potential needs of the areas and to capture the emotion of the migrant and resident populations.

Figure 21 maps the areas visited.

MOTIVATION

ILLEGAL CROSS-BORDER MIGRATION FROM BANGLADESH TO EAST INDIA

PROBLEM STATEMENT

DEVELOPING NATIONS HAVE LARGE POPULATIONS UNDER THE THREAT OF DISPLACEMENT DUE TO CLIMATE RELATED ADVERSITIES. THE UNACCOUNTABILITY OF THIS DISPLACED POPULATION CAUSES THE VIOLATION OF THE HUMAN RIGHTS OF THE MIGRANTS..

HYPOTHESIS

THERE IS A NEED TO SOCIO-SPATIALLY INCLUDE THE CURRENT AND POTENTIAL DISPLACED POPULATIONS IN THE REGIONAL POLICY AND SPATIAL PLANNING INSTRUMENTS FOR IMPROVED REGIONAL DEVELOPMENT AND SAFEGUARDING HUMAN RIGHTS.

RESEARCH QUESTIONS

How can spatial planning and good governance be used as a tool to facilitate the use of climate-induced MIGRATION AS an adaptation strategy for the sending regions AND for the development of the NEIGHBOURING REGION?

SUB RESEARCH QUESTIONS

1 2 3 4

METHODOLOGY

RESEARCH TRAJECTORIES

PHENOMENA

SOCIO-SPATIAL PROCESSES

COMPARATIVE ANALYSIS

ANALYTICAL FRAMEWORK

QUANTITATIVE METHODS

QUALITATIVE METHODS

REFERENCE STUDY

FIELD TRIP

THEORETICAL FRAMEWORK

INVESTIGATIVE THEORIES
PUSH AND PULL THEORY
RAVENSTEIN'S LAWS OF MIGRATION
CIRCULAR MIGRATION

INFORMATIVE THEORIES
FUNCTIONAL RELATIONSHIPS
TRADITIONAL KNOWLEDGE
COMMUNITY BASED DEVELOPMENT
SUSTAINABLE LIVELIHOOD FRAMEWORK

REFLECTION

EXPECTED OUTCOMES

INCLUSIVE REGIONAL SPATIAL STRATEGY

REGION : *DEFINING A NEW REGION BASED ON ECOLOGICAL AND ECONOMIC PARAMETERS FOR FREE MOBILITY*

MESO : *DEFINING THE FUNCTIONAL RELATIONSHIP BETWEEN THE SENDING AND RECEIVING AREAS BASED ON TRADITIONAL KNOWLEDGE AND COMMUNITY BASED INITIATIVES*

LOCAL : *LAND-USE GUIDELINES TO REGULATE THE GROWTH OF THE RECEIVING AREAS AND CLIMATE SENSITIVE PLANNING OF THE SENDING AREAS*

SUPPORTING POLICY FRAMEWORK

REGION : *BILATERAL RECOGNITION OF CLIMATE MIGRATION PATTERNS. INTERNATIONAL TREATY DEFINING THE RIGHTS OF THE POPULATION AND THE ROLE AND RESPONSIBILITY OF THE STATES.*

MESO : *ECONOMIC COOPERATION OF LOCAL GOVERNMENTS IN A PARTICIPATORY PROCESS*

LOCAL : *LOCAL GOVERNANCE STRUCTURE COOPERATE WITH THE COMMUNITY BASED GROUPS TO DETERMINE AN ADAPTATION STRATEGY. PROVIDE GENDER SENSITIVE SUPPORT.*

REFLECTION

PROCESS

LIST OF ACTIONS

PROBLEM DEFINITION

METHODOLOGY

THEORETICAL INVESTIGATION
Literature Review
Investigative + Informative

PHENOMENA
Defining Key Concepts (Theory Paper)
Investigating Theories and Context (Desk)

COMPARATIVE ANALYSIS
Policy Identification
Policy Review
Policy Analysis

SOCIO-SPATIAL ANALYSIS
Mapping Analysis
Field Visit
Sending-Receiving area Analysis

STAKEHOLDER ANALYSIS

STRATEGY AND DESIGN
Strategic Themes
Strategic Framework
Policy Design
Spatial design

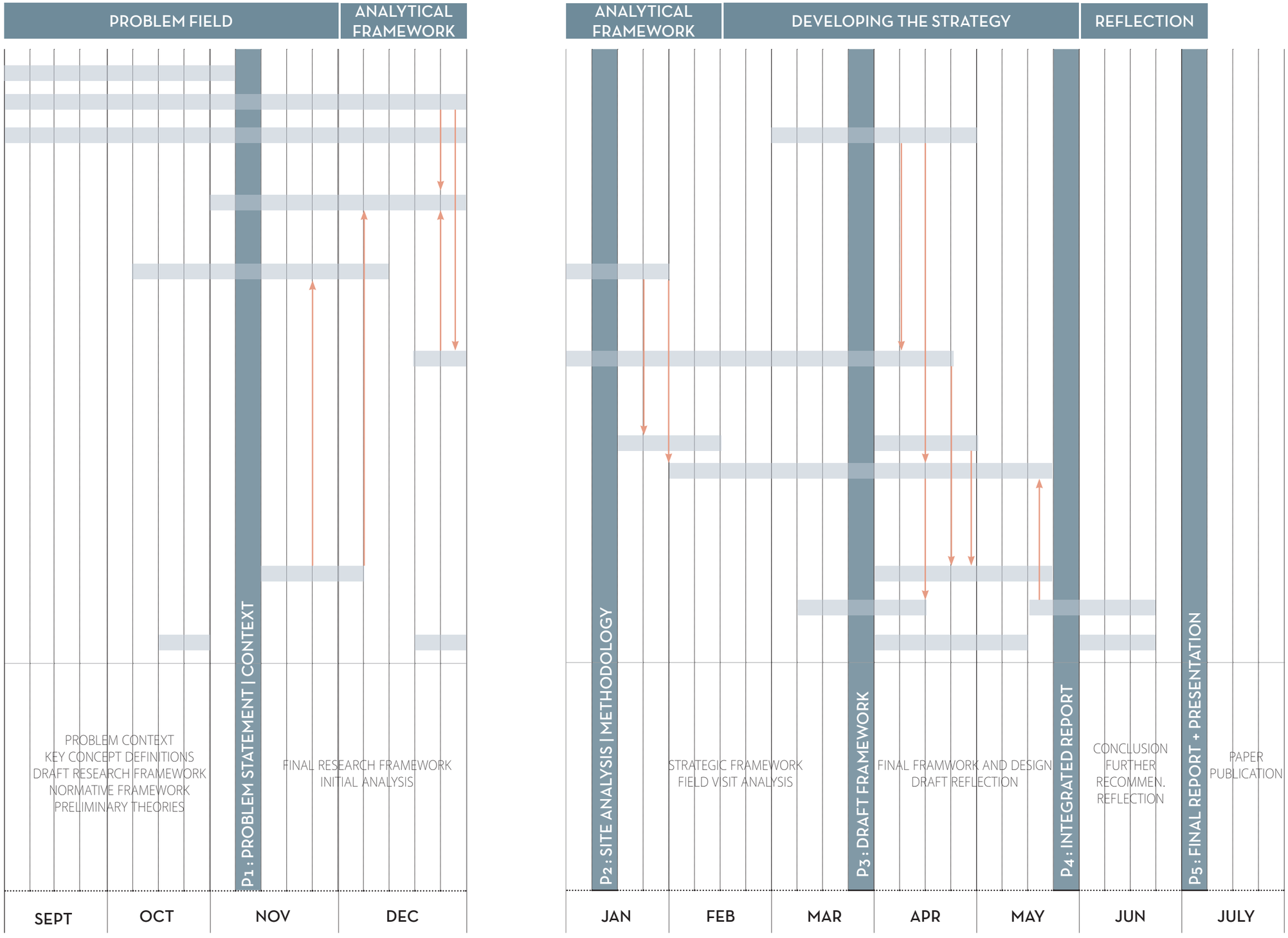
REFERENCE STUDIES

REFLECTION

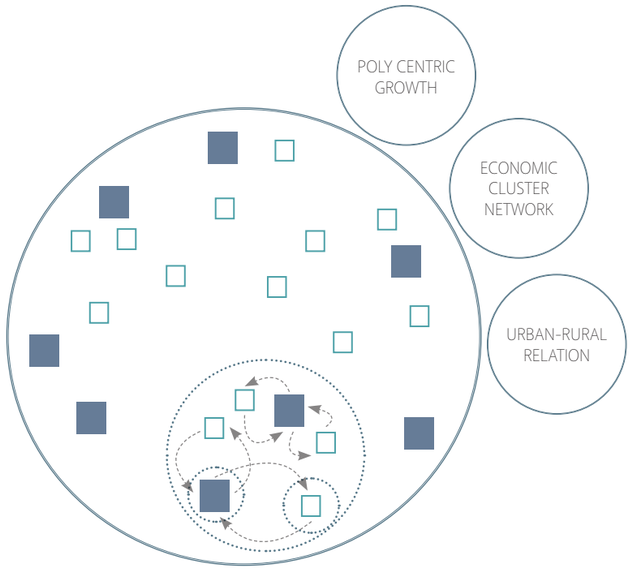
REPORT WRITING

DELIVERABLES

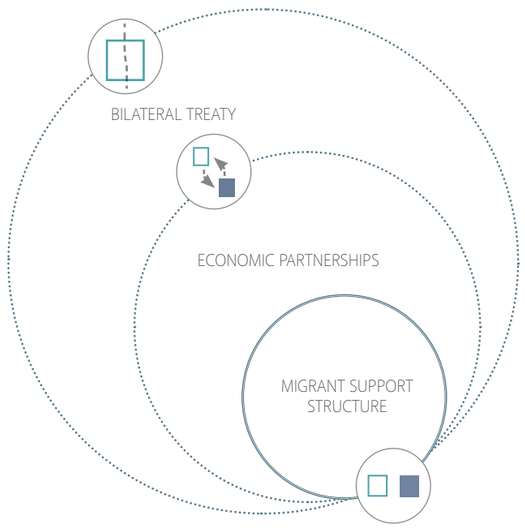
FEEDBACK LOOPS



5 APPROACH



Defining a new cross-border region which supports free economic mobility for climate affected communities.



A governance model to support the regional strategy to define roles for the different levels and stakeholders in the decision making process.

Figure 22: Expected Outcomes

POLYCENTRIC REGION

Essentially a mono-centric region with the metropolitan city at its core, the region is experiencing a rise in new small towns. This indicates the increasing need and ongoing shift towards poly-centricity in the region. The regional strategy will focus on the underdeveloped class V and VI towns and use the knowledge and labour of the migrants for their development.

URBAN-RURAL RELATIONS

A reorganisation of the region will be proposed by defining new economic clusters for regional development. The clusters redefine the relation between the sending and receiving regions (rural-urban).

COMMUNITY PARTICIPATION

Ensure acknowledgement of the community unit by introducing provisions and support in the civil society and local municipalities. The institutions will encourage the formation of community networks across the region and ensure greater participation.

SELF ORGANISATION

Increased emphasis on the local community groups to achieve increased resilience. Forming networks of these initiatives will upscale the impact of their success and contribute to the development of the communities.

MULTI LAYER STAKEHOLDER COLLABORATION

Cross-sectoral and multi-scalar collaboration to make the current approach more cohesive and locally rooted. Roles and responsibilities of the stakeholders at every level of decision-making will be defined through policy recommendations.

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- Livelihoods and Climate Change

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- Livelihoods and Refugees

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1. Temporal Adaptive Planning

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2. Urban Expansion and renewal

Murillo, F. (2017). Migrants and Rapid Urbanization: A New Agenda for Humanitarian and Development Urban Planning? Population Division Department of Economic and Social Affairs United Nations, UN/POP/EGM(September), 1–12.

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3. Clustering and self-organisation

4. Planned Relocation

5. Migration as Adaptive Strategy

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Fiddian Qasmiyah E, Loescher G, Long K, S. N. (2014). The Oxford Handbool of Refugee and Forced Migration Studies. oxford (Vol. 12).

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Figure 23: Standing atop an 18-foot embankment, Badruddin Sarkar pointed to the horizon - to his previous home , engulfed by a rising sea ; (Author, 2019)

"the first step to solving a problem is to recognize that it does exist"

- Zig Ziglar

The deductive approach of this research required the exploration of multiple perspectives on issue of environmental displacement. The following chapter is a representation of the investigation conducted for this research over three chapters : Phenomena, Socio-spatial analysis and Comparative Analysis.

The first chapter lays the foundation by elaborating on the key concepts explored in the research. Highlighting the climate risks in the region, defining the dominant types of migration and finally development and policy responses to the migration in the delta region. It defines the aspects to be explored and mapped in the socio-spatial analysis.

The socio-spatial analysis focuses on the Ganges-Brahmaputra Delta. It locates the sending areas (risk zones) and receiving areas of the region on the basis of the indicators defined. It then zooms in to the dominant receiving region, further analysing the physical, spatial and socio-economic aspects of the region. This analysis combined with the field work is meant to inform the study with the potential sectors for intervention and the loopholes in the current development model.

Finally, the comparative analysis forms an essential part of the analysis. As mentioned in the methodology, it is meant to inform the intervention through a focussed review of global, national and local responses to environmental displacement. While the global responses are used to highlight the best practices and gaps in the discourse, the national scale focuses on the responses by individual nations and the instruments applied. Lastly, the local analysis focuses on the local adaptation techniques adopted in the delta and the prevalent stakeholders of the process.

Since the context is a resource scarce site, a majority of the information has been extracted from existing literature and research projects.

^Source: Photo by Joydeep Gupta, Account cited from the India Climate Dialogue. https://indiaclimatedialogue.net/2018/01/15/rising-sea-swamps-island-along-bengal-coast/

EXPLORATION

- THEORETICAL BASE
- ANALYSIS
- COMPARATIVE ANALYSIS
- PHENOMENA
- SOCIO-SPATIAL PROCESSES

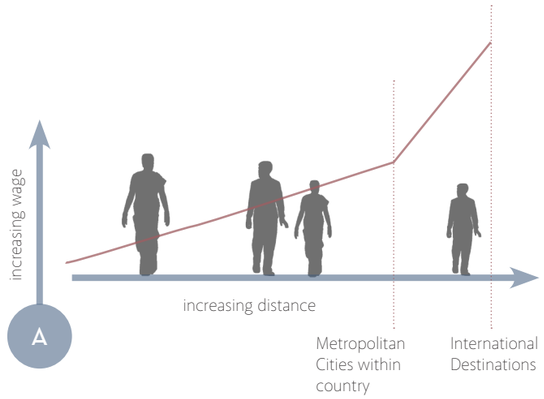
The theoretical base for this research has been classified into two sets of theories. One is a set which has been used to investigate the phenomena of migration and climate-induced migration. These theories provide an insight into the socio-economic and behavioural reasons behind human migration in general.
The second set of theories are termed as the 'informative theories' have been used to inform the design response for the research. They have been derived from existing responses to environmental displacement and literature.

Ravenstein's Laws of Migration

Ravenstein released a set of laws of migration, in the 1880's, based on his observations of the migration in United Kingdom. Some of his laws were seen to be in sync with the migration trends in the case of the Ganges-Brahmaputra Delta.
Out of the list of 11 laws, the following are the most relevant to this research.
1. The majority of migrants move only a short distance in any one migration.
2. Females are more migratory than males within the county of their birth, but males more frequently venture beyond that county boundary.
3. Migrants moving long distances generally go by preference to the great centres of commerce or industry.

Lee's Push and Pull Theory of Migration

In 1966, Everett Lee proposed a comprehensive theory of migration. He argued that migration is a result of negative push factors at the place of origin, attractive pull factors are the place of destination and overcoming the intervening obstacles. The intervening obstacles are calculated by the migrants before making the choice of destination. These factors range from distance, migration laws and legality, cost of transportation to presence of social ties. Identifying these factors for the case in hand is key to inform the research with the prevalent trends and locate the sectors for intervention.



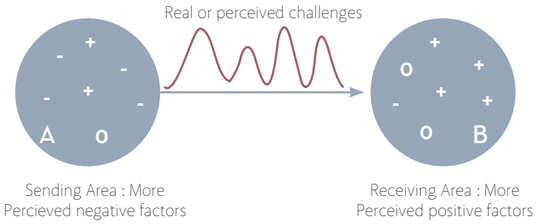


Figure 24: Representation of Ravienstein's Laws of Migration and Lee's
Figure 25: Push and Pull Theory ; (Author, 2019).

Investigative Theories

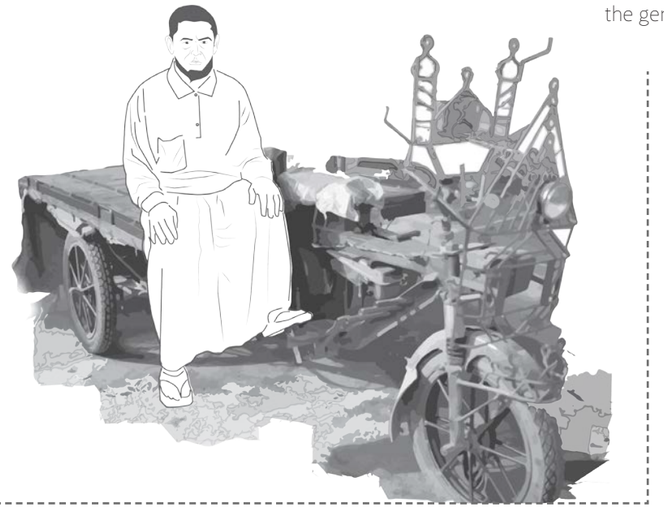
Circular Migration

"A process through which a migrant, legally or not, alternates his/her place of residence between origin or destination country, until eventually settling down in either of them due to age or family reunion." Based on the notion of a migrant's "migration career (history)" defined as a sequence of loops, complete or not."
- J. A. Bustamante (2002), Instituto de Investigaciones Juridicas, UNAM

Circular Migration is the predominant form of adaptation for the environmentally displaced, especially in South Asia. While the definitions focus on international migration, an increasing awareness for the presence of the concept for internal migration is also noticed. The concept as defined and measured by the United Nations Economic Commission for Europe (UNECE), is noted to create a 'tri-win' situation. This means that when carried out formally, it is known to be beneficial for the receiving region, sending region and the individual migrant (UNECE, 2016). The developmental impact of circular migration is noted to be largely beneficial. The migrants can alleviate labour shortages and contribute to the economic production in the receiving regions while provide unemployment relief and financial and human capital support to the sending regions. Further, it is a way for the individual to attain skills and opportunities to grow. However, these impacts are limited to the legality of the movement. Illegal movement and informal working exposes the migrants to a high risk of exploitation and trafficking and smaller financial gains. This movement is harder to document and can lead to the generation of bad elements in the society.

Mohammed Kabir Hossain, who drives a rickshaw, is one of many climate migrants who were attracted to Mongla as an alternative to Dhaka. "Because of salinity and flooding, there's not much opportunity in my village. But here, I can make good money," he says.
He returns home during cropping seasons and Ramadan.

Photo credits : Mahmud Hossain Opu
Story : https://www.nationalgeographic.com/environment/2019/01/climate-change-drives-migration-crisis-in-bangladesh-from-dhaka-sundabans/#/03-bangladesh-climate-migrant-crisis.jpg



Informative Theories

Symbiotic Cities
Symbiosis essentially means a relationship of mutual benefit and growth. In the field of urban planning this is used to establish relationships between cities or regions for growth and development of both stakeholders.

Economic Planning
Planning a region to activate economic processes and growth.

Seasonal Space Planning
Planning space as per the varied seasonal uses.

Community Based Development
This paragraph establishes the importance of a community-based approach to development, especially in the case of disaster planning. It highlights the importance of the community, particularly in the case of the global south.

Sustainable Livelihoods Framework
This theory is used to support the livelihoods approach to use migration as a way to diminish vulnerability and poverty in low income countries. Put forward by Frank Ellis in 2003, it analyses the relationship between population movement and livelihoods, forming a basis for national and international migration policies.

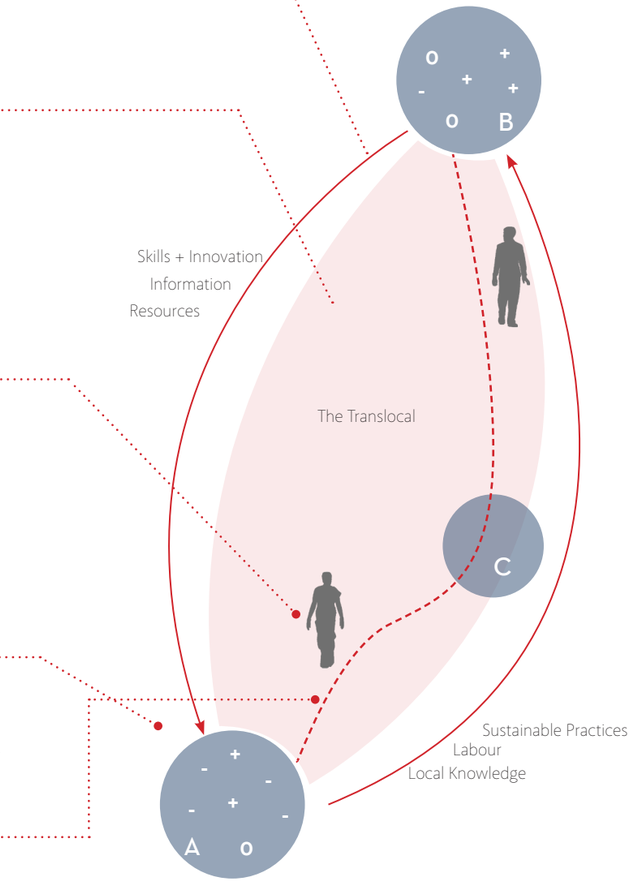


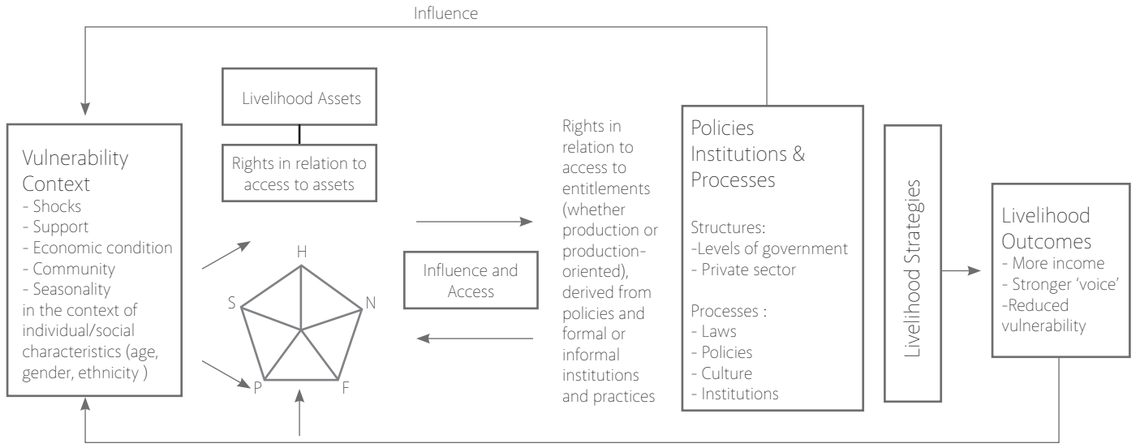
Figure 26: Trans-local livelihoods and relations ; (Author, 2019).

Traditional Knowledge

Traditional knowledge can be defined as the local, cultural or hereditary knowledge of the people of an area which has evolved out of their interactions and experiences with the natural and built surroundings. It is often a result of experimentation and adaptation techniques undertaken to extract value and survive in that context. Largely transmitted orally over generations, the knowledge is a holistic approach to coexisting with the environment. (as cited in (Subramanian & Pisupati, 2010)) The knowledge and subsequent innovation and practices of the local communities are embedded in the natural environment and directs the use of natural resources and the management of the environment. With the global shift towards sustainable practices and resource conservation, the value of this knowledge is being increasingly recognised. Transnational bodies like UNESCO are supporting initiatives like the Programme on Local and Indigenous Knowledge systems (LINKS) to research and capture local knowledge from across the world and further support their implementation for environmental management. However, the use of this knowledge beyond pure natural conservation purposes is also an upcoming topic of research. Incorporating it in economic and spatial plans may generate economic activities which contribute to conservation as well as strengthen local ownership of the identity and culture of an area. This in turn leads to the creation of economic clusters and plays a vital role in rural development strategies at a regional level. (Subramanian & Pisupati, 2010) For example, historically the Bengal region (before partition), was the largest Jute producing region in the world. It cultivated, processed and manufactured jute products likes gunny bags which are eco-friendly and sustainable packaging alternatives. However due to partition and the flooding of the market with plastic products, the industry declined.

However, the use of traditional knowledge in its purest form has also been widely criticised. Icamina (1993), MA (2003) and Warren et al. (1995) highlight that to achieve sustainable development, combining traditional and modern scientific knowledge systems is imperative. This has been reinforced by transnational agencies like the International Union for Conservation of Nature (IUCN) and the World commission on Environment and Development (WCDE). They emphasize the need to respect the value of the two sets of knowledge and extract their strengths to address contemporary challenges. (Subramanian & Pisupati, 2010) For this it is first essential to capture and compile all the traditional knowledge from the source before it is lost. However, Boedhihartono (2010) argues that this needs to be done beyond the purpose of cultural documentation. The practices need to be looked at from an operational lens rather than an archival asset. Knowledge integration needs to be promoted through research and management strategies which have been created using a mosaic of both the fields of knowledge. The application of this mosaic on the traditional economies like agriculture and fisheries and to create additional economies is instrumental in regional growth and sustained development. However, beyond these benefits the acknowledgement, documentation and harvest of this cultural knowledge gives an exclusive identity to the local population, making their knowledge an invaluable asset.

The value of the traditional practices and knowledge has rarely been acknowledged in the climate resilience dialogue. Most scientific publications portray the indigenous people and their knowledge as fragile artefacts. This is despite these people being at the front-line of the adversities of climate change and have been actively adapting for decades. Ethnic groups in the island of Borneo have developed agriculture systems which are highly adaptive to climate variability. In Tuvalu, communities use their traditional knowledge for preserving food, reading clouds to locate fish, and predict natural disasters to adapt to changing conditions. They also applied a traditional law to ban land cultivation and harvesting of marine resources in parts of the Island to ensure the resource recovery. The Development Fund report on Identifying Sustainable Pathways for Climate Adaptation and Poverty Reduction called More Than Rain (Ulsrud et al., 2008) documents many such instances where traditional knowledge in combination with modern techniques adapt to climate change. (Subramanian & Pisupati, 2010)



H : Human Capital N : Natural Capital
F : Financial Capital P : Physical Capital
S : Social Capital

Figure 27: Sustainable Livelihoods Framework; (Adapted from Frank Ellis, 2003)

Sustainable Livelihoods Framework

The Sustainable Livelihoods approach was developed by Chambers & Conway in 1991 and improvised and employed in planning practices for the livelihoods of the poor by the Department for International Development (DFID) in 1999. Figure 27 shows the Sustainable Livelihoods Framework (SLF) adapted from Chamber and Conway for the purpose of this research. (UNDP, 2017)

A livelihoods framework summarizes the approaches, skills and material and social assets used by individuals or communities to survive difficult situations, in this case disasters. The sustainability factor implies that these communities are resilient to moments of stress or crisis and are able to maintain and further improve their lives or skills without over exploiting natural resources. The figure presents livelihoods as a system which depends on the level of vulnerability, assets available and the institutional support and practices. Once assessed, an intervention strategy can be made to strengthen the weak links of the system. (UNDP, 2017)

An SLF can be generated with the following considerations

1. A clear understanding of the vulnerability (Done for this research through the exploration)
2. Strategic protection of livelihoods (By addressing the traditional knowledge economies)
3. Analysis of the different types of capital :

- *Human Capital* : Skill sets, abilities and health of the population to engage in different livelihood strategies.

- ***Social Capital*** : Social resources on which the population relies on in troubled time. Like community associations, NGO's, local officials etc.

- ***Natural Capital*** : Naturally occurring resources which can be used to sustain or support livelihoods

- ***Physical Capital*** : Basic infrastructure

- ***Financial resources*** : Assets or assistance that the populations employ to achieve livelihood objectives.

DFID in its initial use of the livelihoods framework for planning stressed on the importance of the people rather than the resources for successful livelihoods. They propose that the people and their skills should be considered as primary assets of the system. Further, it emphasizes that the strengths of all the actors in the system should be reviewed and strengthened to give a cohesive design. (GLOPP, 2008)

The design of the framework is required to be flexible and open to changes to make it adaptable to diverse local contexts. The SLF will then serve as an analytical tool to identify development priorities and new activities. Further, the framework can be used as a checklist for structuring ideas or employed as a form of livelihood analysis to assess how the new development activities impact the livelihoods of the poor. (GLOPP, 2008)

This research analysis and builds its strategy on the lines of the different types of capitals. However, it does not propose a detailed SLF for this research due to time limitations and complexity. (UNDP, 2017)

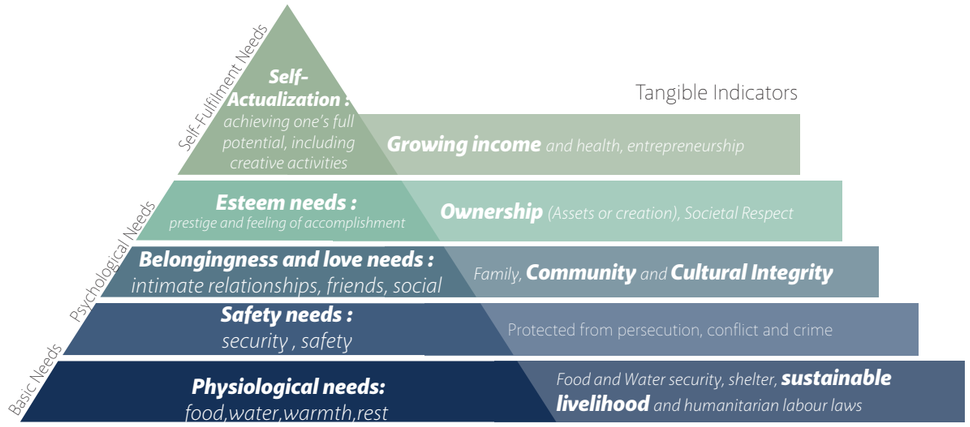


Figure 28: Extended Maslow's heirarchy of needs

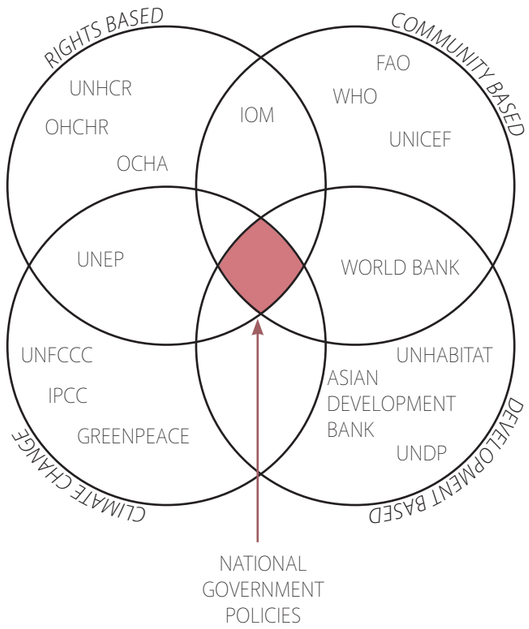


Figure 29: Defining the position of the State's approach to Environmental Displacement

4.2.1 COMPARATIVE ANALYSIS

Summary

This comparative analysis is a strategic attempt to gain an overview of the prevalent approaches to environmental displacement across scales of governance. Each scalar analysis aims to reinforce and validate the claims made in this report. To begin with the analysis of the responses by the transnational agencies looks at highlighting the lack of concrete action for the issue. The National policies and action plans highlight the various approaches being taken across states that directly affect environmental displacement. While taking stock of the local adaptation strategies in India and Bangladesh informs the strategy as well as highlights the essential role of the civil society organisations for effective on-ground results. Only official documents have been used for this analysis.

As mentioned in the Methodology chapter, a framework has been constructed for each scale of analysis to review all policies and action plans for the same categories. Starting with the basic scale, scope and objective (with respect to environmental-displacement), it further analyses the sectoral presence of the policy. Since the issue is a multi-disciplinary issue, it is essential to understand if the policies consider that aspect. Reviewing the instrument used for implementation by the policy reveals the degree of effectiveness. For example, a law is more effective and stricter in terms of implementation than suggestive guidelines. Lastly, a set of questions were asked during the review to categorize the policy as per the dominant approach taken. The approaches were defined during the review as follows :

1. Rights-Based Approach : The policy stems from the human-rights violation taking place due to environmental displacement. The implementation strategy primarily focuses on protecting these basic rights.

2. Community Based Approach : The involvement of the concerned community is central to the success of the policy. Participatory plans and vertical sectoral collaborations are essential for this approach.

3. Development Based Approach : The key aim of the policy is to facilitate development of the region. Supporting and main-streaming migration is strategy to achieve this development.

4. Climate Change Adaptation : Policies taking this route use migration as an adaptation strategy to mitigate the adverse effects of climate change. While this approach does address the human rights of the migrants, minimizing disaster impact lies at its core.

Figure 48 categorizes the prominent transnational agencies based on their primary objectives. The analysis also takes into account the Maslow's heirarchy of needs (Refer to Box 1) by assessing which needs are reinforced by the policy.

The research works on a combination of these approaches and draws the positive features from the comparative analysis. The analysis was conducted as an ongoing-continuous process throughout the thesis. It was updated as per new discoveries along the process.

Does this policy address...?

	Focus on Environmental Migration	Rights Based Approach	Urban Planning Inclusion	Livelihood Approach	Cultural Identity
2030 Agenda for Sustainable Development (2015)	No	Yes	Yes	No	No
The New Urban Agenda (2015)	No	Yes	Yes	No	No
Conference of Parties 21 : The Paris Agreement (2015)	Yes	Yes	No	No	No
Global Compact on for Safe, Regular and Orderly Migration(2018)	Yes	Yes	No	No	No
Sendai Framework for Disaster Risk Reduction (2015)	No	Yes	No	No	No
UN Framework Convention on Climate Change (2015)	No	Yes	No	No	Yes
Nansen Initiative Agenda for the Protection of Persons Displaced Across Borders in the Context of Disasters and Climate Change, October 2015 and the Platform on Disaster Displacement (2015)	Yes	Yes	No	Yes	Yes
Kampala Convention (2009)	Yes	Yes	No	No	No

Figure 30: Focus and Approaches of Global Policies Reviewed

No

Yes

Global Responses

Policies and action plans are fairly recent in the global discourse of environmental displacement. While initial attempts were still trying to establish the connection between environmental change and forced displacement, the increased visibility of the concept across the world has triggered efforts to finding contextual solutions. The more recent follow-ups and new initiatives attempt to assist states in forming policies and action plans in response to the three phases of displacement - pre displacement, during and post-displacement.

The New York Declaration by the UNHCR was the first official document to recognise the existence of climate-induced migrants or displacees. Reinforcing this belief, the Paris Agreement (2015) put forward principles for global governance of human mobility in the context of climate change, making it a milestone treaty in the discourse (IOM,2018). Further, under the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM Excom), it launched a Task force on Displacement to conduct topic specific research under the umbrella of UNFCCC. This data for the analysis of the global responses has been largely drawn from the research by IOM under this umbrella, called 'Mapping Human Mobility and Climate Change in International Processes, Policies and Legal Frameworks'.

As a follow up to the work delivered by the Task Force, the first negotiation Global Compact for Safe, Orderly and Regular Migration (GCM) was conducted in December 2018. This is the first migration centric compact to be negotiated by the governments of the UN Member States. The compact is a non-binding, comprehensive framework which articulates a common set of commitments, based on 23 objectives, to support the states to respond to the contemporary patterns of migration today. Even though this pact focuses on international migration of all natures. it addresses slow onset disasters, natural disasters and climate change impacts as legitimate drivers of migration. It puts forward "climate mitigation and adaptation measures in countries of origin, disaster preparedness, disaster risk reduction and facilitation of movements" as potential responses. (IOM, 2018)

In addition to these action based initiatives, there are organisations which solely focus on collecting data and assisting states to form cohesive migration policies, like the International Organisation for Migration and the Internal Displacement Monitoring Centre. They have been key contributors to the formation of all the policies reviewed here. While most of these policies/guidelines essential take the rights-based approach, some like the Protection Agenda by the Nansen Initiative, also focus on the provision of livelihoods and the cultural identity in the context. The Nansen Initiative was a bottom-up consultative process led by the Government of Norway and Sweden, to devise protection plans for national governments through a series of stakeholder workshops and review of the existing practices. It was a first of its kind attempt and successfully culminated in the formation of the Protection Agenda (2015) which presented a conceptual model based on the best practices recorded by the Initiative. The initiative was succeeded by the Platform for Disaster Displacement in 2015.

However, despite these commendable attempts there are some significant gaps in the global approach. As revealed in Figure 46, the agendas which focus on development acknowledge the crucial link between spatial development and environmental displacement, but the policies which focus on the latter, do not take this link into consideration. There is a need to include the displaced in the spatial plans in order to meet their needs for energy, land, food or water.

Further, there is still a gap in international law which doesn't have a definition for the environmentally displaced and lack specialized provisions for them. While this gap is filled temporarily by the organisations mentioned above and some national governments at a regional and sub-regional level, the global recognition is still absent.

Does this policy Address...?

	Participation	Livelihood management	Housing	Financial Assistance	Cultural Identity	Urban Planning Inclusion
Bangladesh : 2009 Climate Change Strategy and Action Plan	Yes	Yes	No	Yes	No	No
Bangladesh : 2015 National Strategy on the Management of Disaster and Climate Induced Internal Displacement	Yes	Yes	Yes	Yes	No	Yes
Pacific Islands : 2017 - 20130 Framework for Resilient Development in the Pacific	No	Yes	Yes	Yes	No	No
Kiribati : 2013 National Framework for Climate Change and Climate Change Adaptation	No	Yes	No	Yes	Yes	No
Ghana : 2016 National Migration Policy	No	Yes	Yes	No	No	Yes
Uganda : 2005 Internal Displacement Policy and 2018 Migration policy	No	Yes	Yes	No	No	No

No

Yes

Figure 31: Focus and Approaches of National Policies Reviewed

Responses by Nation States

This analysis was carried out by reviewing the National Migration Policies and Climate change policies of the countries listed. The analysis of national policies yielded more concrete outcomes. Since the nation-states at the front-line of the disaster, like the SIDS and LECZ's, are already experiencing of the adverse effects of this phenomenon, they have pro actively with international assistance, developed migration policies relevant to their context. However, it was interesting to note the variety of approaches taken and the specific needs targeted by the policies. While some countries have succeeded in main streaming the migration and climate change nexus in their national migration policies, some have only ad hoc or discretionary measures to support the affected.

The IOM, during its review for the Task Force for Displacement, found that only 35 of the 66 countries who had submitted their policies referred to environmental considerations in their migration legislations. While they noted the lack of comprehensive action by the majority, they also identified some good practices. Certain governments like Ghana and Uganda had dedicated sections on mitigating the impact of the displacement on the environment. Further, states like Nepal and Vanuatu progressively drafted specialized policies focused on the nexus (IOM, 2018).

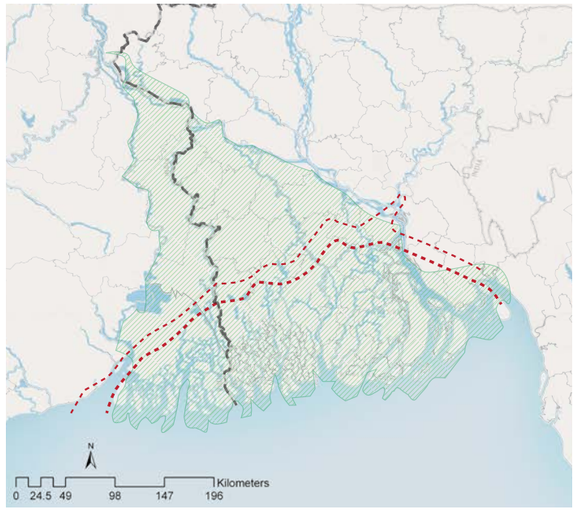
A key criteria for consideration was the sectoral collaborations behind the formation and implementation of the policies. It was noted that most countries considered ministries relevant to immigration, foreign affairs, home affairs, citizenship and labour for horizontal collaboration. While vertical collaboration between all levels of governance, the civil society and the communities was considered only at the time of implementation and that too by a handful of countries. This highlights the need for acknowledging the impact on other ministries like water, agriculture and most importantly the urban and rural development or planning ministries and include them in the formation process. Further, vertical integration is essential to achieve a cohesive on-ground impact.

The inclusion of the environmental migration in the urban planning and development regimes of the states has been exclusively mentioned in Bangladesh's policy brief National Strategy on the management of Disaster and Climate Induced Internal Displacement (2015). The policy endorses the use of migration as an adaptation strategy and facilitates the short-term labour migration from displacement hotspots to build resilience. It also looks at creating access to large industrial sectors for employment through programmatic actions by the employment and youth development ministries concerned. Another landmark provision is the creation of employment opportunities for the displaced by creating urban growth centres. These urban centres are to be selected regionally with respect to the displacement hotspot. Further, it needs to be connected efficiently with the hotspot to facilitate easy movement and reduce the pressure on the urban environment. (Ministry of Disaster Management and Relief, 2015, Pg 15)

In combination to the efforts being made for the receiving areas, the policy also attends to the needs of the sending regions or displacement hotspots. It proposes a comprehensive land policy and zoning regulations to enhance adaptation and risk reduction. Further, it calls for speedy procedures for remittance to the households from migrant working members during disasters to enable speedy recovery. (Ministry of Disaster Management and Relief, 2015, Pg 17)

A similar approach has been shown by Ghana through the call for including displacement in its national, regional and local spatial plans. Ghana and Uganda are the only two nations which consider migration as a tool for regional development rather than a threat (IOM, 2018, pg 8).

However, all these policies are fairly recent and haven't reached the implementation stage. It is therefore difficult to assess their effectiveness. Further, many countries still have a long way to go to even form such cohesive policies. With the Kampala Convention in action, cross-border treaties between neighbouring countries is also a possible response which is yet to be fully investigated and formulated.



2 M
1 M

Figure 32: Inundation due to 1m and 2m sea level rise

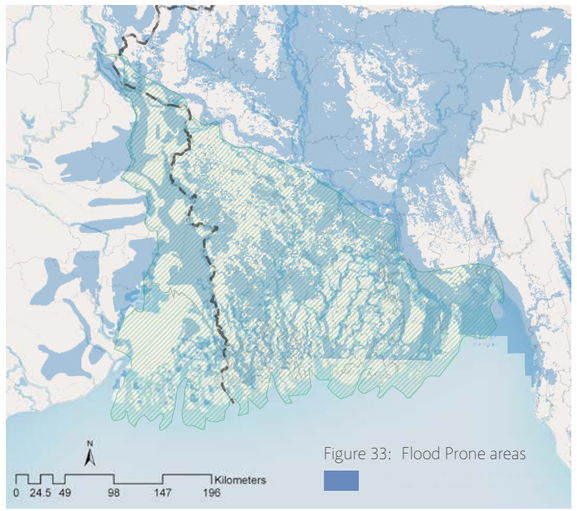


Figure 33: Flood Prone areas

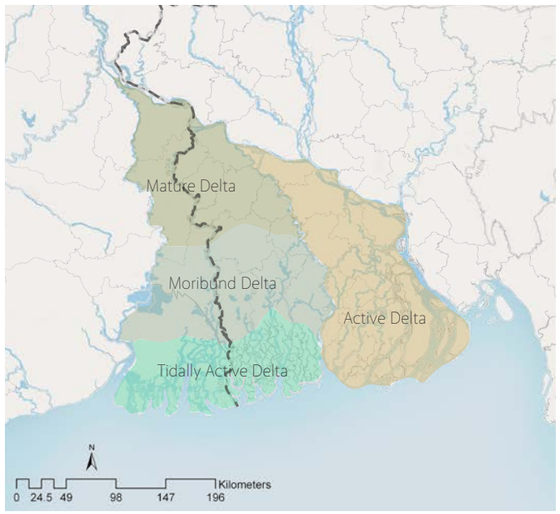


Figure 34: Geological classification of the Delta

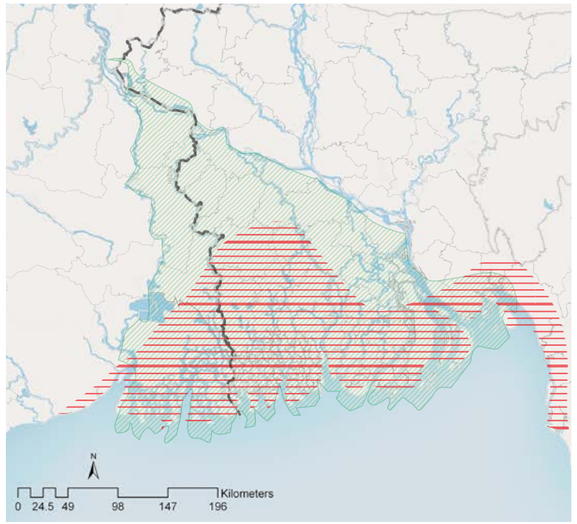


Figure 35: Current areas with increased saline content ; (Author, 2019)

Climate Change and Ganges-Brahmaputra Delta

Historically, coastal areas have attracted human settlements due to their fertile productive lands and easy access to sea routes for mobility. The rapid urbanisation and development in these areas have led to the degradation of the ecological systems like the loss of coral reefs, mangrove forests and flora-fauna species. The degraded environment when hit by the routine natural disasters owed to the geographical location, results in multi-fold damage of infrastructure, assets and loss of life (Mcgranahan G, Balk D, 2007). Cyclones, typhoons and tidal storm surges have been recorded to cause large scale destruction delta regions of the Global South for decades.

Climate change has been proven to be the reason for the increased intensity and frequency of environmental change. LECZ's are at the forefront of the disaster when it comes to climate change impact. They house 10% of the world's population and 13% of the urban population (Mcgranahan G, Balk D, 2007). Further, the least developed countries host a larger share of this population in its urban and rural areas, exposing a large socio-economically weaker population to unavoidable disaster events. This makes the disaster mitigation and risk reduction the primary focus on the development agendas of these regions.

Further, the river deltas in the LECZ's, are geologically dynamic areas (Figure 27) where a river drains out into the sea. The areas are active ecological systems which change with the changing course of the rivers. For the Ganges-Brahmaputra Delta, the actively changing part of the delta lies in Bangladesh while the coast of West Bengal is tidally active. This naturally makes these areas climatically volatile. Additionally, human interventions like barrages and dams alter the natural patterns of change. This dynamism leads to land erosion, loss of landcover and creation of new temporary sediment islands. This frequently displaces populations residing on the river banks. In combination with this dynamism, climate change amplifies the displacement and suffering in these regions. This has been noted due to the increasing flow of the rivers and frequent flooding caused by the melting of the glaciers.

The Ganges-Brahmaputra Delta is one of the most environmentally stressed deltas in the world. Owing to its high population density of 1206 people/sqkm and the inflow of two powerful rivers – Ganges and Brahmaputra, the environmental changes in the Delta have devastating repercussions for India and Bangladesh (Szabo et al., 2016). The predominant climate threats for the region are as follows:

1. Sea Level Rise: (Figure 25) A predicted rise of 27 cm in the sea levels by 2050 has dire consequences for the delta. Bangladesh and India have already lost 486 and 90 square kilometres of their coastal land to the sea, respectively. Further the World Bank states that cyclone induced storms are likely to amplify the effect of sea level rise (Rigaud et al., 2018). This combined with the constant subsidence of the coastal land puts the coastal communities at maximum risk of displacement. The risk is further exacerbated for the large share of the population living below the poverty line. 11% of the population is expected to be under direct threat of the rising levels for 2050.

2. Subsidence: A dynamic delta needs a constant supply of sediments from the incoming rivers to be able to build and rebuild its shores. However due to rapid urbanisation and human interventions like dams and barrages, the natural sediment inflow gets altered and prevents the reinforcement of the delta. A similar situation has been recorded in the Ganges-Brahmaputra Delta. The subsequent sinking of the land accelerates the perceived rate of sea level rise, inundating entire islands and displacing communities along the coast.

3. Flooding: (Figure 26) The delta experiences annual floods during the monsoon season due to the over flow of the rivers and low draining capacity of the land. The severity of the floods can be seen in the informal settlements of the cities and the rural areas of the region.

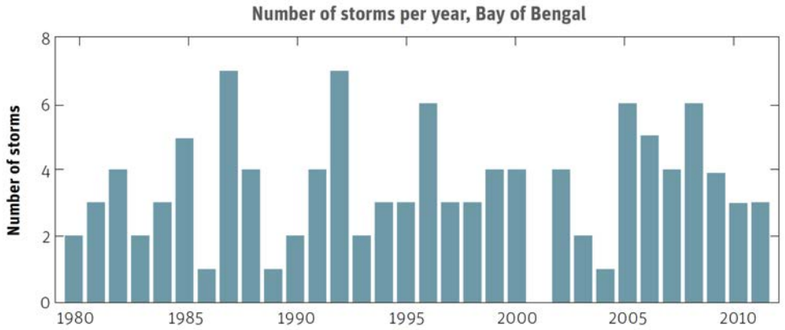


Figure 36: Graph showing the increasing frequency of tropical storms with intense events spread evenly over 2005-2010. (World Bank, 2018, Improving lead time for Tropical Cyclone Forecasting)

Figure 37: Impact of Cyclone Sidr (U.S. Navy photo taken by Mass Communication Specialist Seaman Christopher Lange)

Figure 38: Impact of Cyclone Sidr (AsiaNews.it)

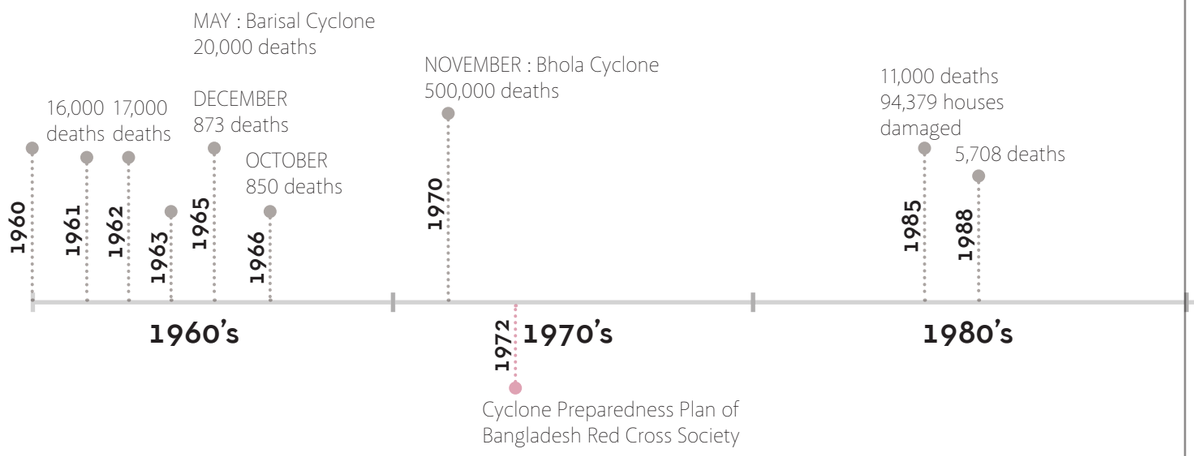


Figure 39: Timeline of Cyclones and response actions by Bangladesh. (https://www.dhakatribune.com/bangladesh/environment/2017/05/30/major-cyclones-bangladesh/Lumbroso, Darren & Suckall, Natalie & J. Nicholls, Robert & White, Kathleen. (2017). Enhancing resilience to coastal flooding from severe storms in the USA: International lessons. Natural Hazards and Earth System Sciences. 17. 1357-1373. 10.5194/nhess-17-1357-2017)

Climate Change and Ganges-Brahmaputra Delta

The areas experience standing water for weeks and at times months due to the lack of institutional support and expertise to adapt to the flood. With the increasingly melting glaciers and dam constructions on the rivers, the floods are predicted to get fiercer and cause more damage. This damage can be characterized in tangible and intangible assets. People tend to lose most of their physical assets like their home, cattle and belongings as well as their self-confidence due to the repeated flooding. This forces them to migrate to higher grounds or nearby settlements in search of alternate modes of sustenance.

4. Soil Salinity: (Figure 28) Increasing sea levels and cyclonic activity is contaminating the ground water with salt and arsenic. This is having an adverse effect on drinking water as well as water for daily use. An increase in skin and genital diseases has been observed and the negative impact on agriculture results in poor nutrition levels. Poor health, low agricultural produce and the limited access to potable water has a negative impact on the socio-economic status of the population and forces them to migrate.

5. Increasing frequency of natural disasters: The Bay of Bengal has witnessed devastating tropical cyclones and storm surges, the worst event in recorded history being cyclone Bhola in 1970. Bhola officially claimed 500,000 lives and countless damage to property and infrastructure. As seen in Figure 29 and 32 over the past decade the frequency of the cyclones has increased from being intense seasonal events to being spread evenly over the year. This subjects the vulnerable population to repeated disasters with little or no time for recovery. Government, international assistance and local NGO's efforts for disaster risk reduction through cyclone shelters, warning systems and disaster training, has reduced the loss of life. However, the loss of livelihood, inability to cope with the loss of assets and lack of alternate means of sustenance leading to abject poverty is the major challenge in the area. This has forced people to migrate to find alternate means of livelihood in nearby areas or promising destinations on foreign lands.

From the Victims

" We have no work in the village.. Have to survive from illegally extracting resources from the forest and fishing... have to deal with dacoits and corrupt officials "

Respondent from a coastal village in Bangladesh

" Government officials and contractors do not construct or maintain the embankments properly.. we had to stay on the boat for 2 days during Cyclone Aila.."

Respondent from a coastal village in Bangladesh

" Crops get destroyed due to the saline water and the fish population is also decreasing.. we have no means to sustain ourselves and our families "

Respondent from a coastal village in Bangladesh

From the Displaced

" We lost our home and land to the river.. had to move to the city.. have been living in the slums for 8 years now in a small space with no proper sanitation"

Respondent from slum in Dhaka, Bangladesh

" My father had lots of land in the village. We lost everything to the river and now don't have an address "

Respondent migrated from his coastal village to a nearby rural area in Bangladesh

" Life was much better in Goramara, I don't like it here. I miss my neighbours and fields.. "

Respondent from refugee from Goramara Islands (recently engulfed by the sea) moved to nearby Sagar Islalnds (India)

** All accounts have been extracted from the documentary Climate Refugees of Bangladesh (c) Kevin S. Boiragi 2012, found on www.youtube.com in the link : https://www.youtube.com/watch?v=ocy0ujUb5Dk. The Indian account has been extracted from a NTDTV report foind on : https://www.youtube.com/watch?v=WHsIsi4BAc4

From the Experts

" Climate change is already happening.. generating all kinds of refugees, largely due to livelihood loss"

" Displaced are not politically active but politically vulnerable. People are there to use them politically"

Afsan Chowdhury, Professor, BRAC University, Bangladesh

" Most migrants end up in slums.. most people don't enter the organised sector..the informal sector is already overburdened increasing unemployment and exploitation in the slums"

Dr. Maudood Elahi, Professor, Dept of Environmental Science, Stamford University, Bangladesh

" People are forced to migrate from their land... sometimes to urban, sometimes to rural areas or cross borders. Happens not only due to disaster events but lack of coping capacity to slow onset change"

Khondoker Mokaddem Hossain, Founder, Institute of Disaster management and Vulnerability Studies, Dhaka, Bangladesh

Migration as an adaptation strategy

Migration is the process by which individuals or whole households leave their usual place of residence for another geographic location, usually crossing an administrative or national border and remaining for at least six months, usually as a result of a change in the relative attractiveness, real or perceived, of the usual place of residence with respect to the destination. (Definition on Migration, DECCMA, 2015)

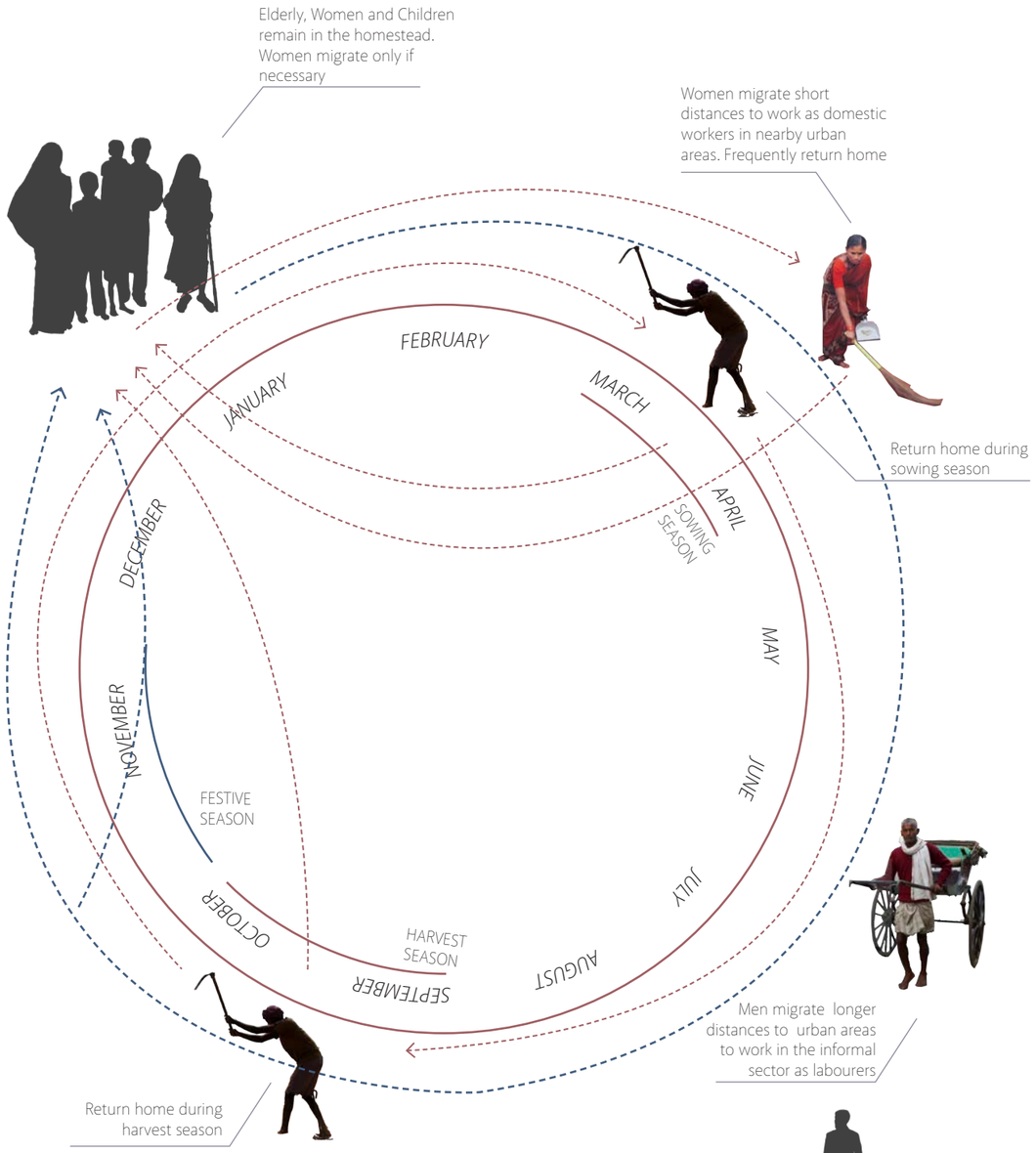


Figure 40: Circular Migration : representing temporary and seasonal migration over time (the harvest and sowing season have been mapped according to the Gram pulse agricultural cycle)

4.2.2 PHENOMENA

Transition as the new Constant

In India and Bangladesh, exclusively in the delta, circular migration is dominated by the landless and illiterate population, with a majority belonging to the lower castes and economic classes. Population analysis and studies also reveal that the migration is usually undertaken by the young working adults to towns or cities, industrial zones, stone quarries and productive agricultural and islands (Bird & Deshingkar, 2009). This research focuses on circular migration as an adaptation strategy for building climate resilience and cohesive regional development.

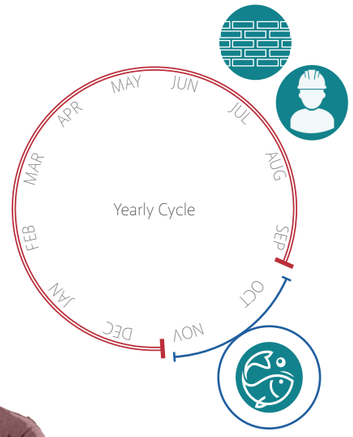
Coming from deprived and distressed backgrounds, the migrants are willing to take up the 3 D jobs - dirty, dangerous and demeaning jobs that others are unable or unwilling to do. Hence, they are usually absorbed in the informal sector which is often exploitative in nature and limits the prospects for exiting poverty. The process of employment is also lined by middlemen and contractors who exploit and cheat the migrants to maximize their profits. However, despite all the human rights violations faced, migration is used as a method to accumulate useful lump sums of money in order to escape poverty in the long run. This often takes generations to happen, but the migrant lives in hope.

Deshingkar in her studies on circular migration in India, establishes that internal migration can trigger positive change in both receiving and sending regions. The receiving regions benefit from the cheap surplus of labour which allow them to develop and grow faster spatially and economically. While the remittances sent to the sending regions play an important role in reducing vulnerability and pulling the people out of poverty. Investment in human capital or productive assets increases local wages, improves food security and stimulates the market, generally improving the economy.

Despite the extensive studies and evidence validating the circular movement of the population and the violation of the human rights of the migrants, the issue is rarely addressed in the local, state and national policies or development plans. Increasingly, the spatial plans and policies for urban areas are beginning to discuss the issue of informal urbanisation and restructuring of the urban fabric. However, these efforts are limited to improve the city landscape rather than the lives of the migrants.

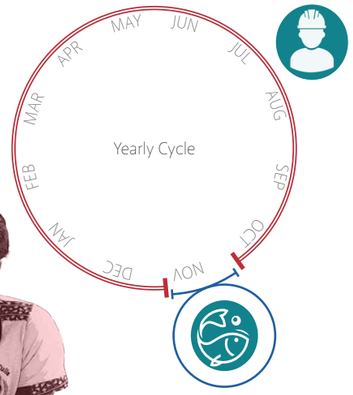
4.2.2 PHENOMENA

Migrant Stories



Resident of Bali Islands (Indian Sundarbans)
Current Occupation : Tour guide
Age : 35

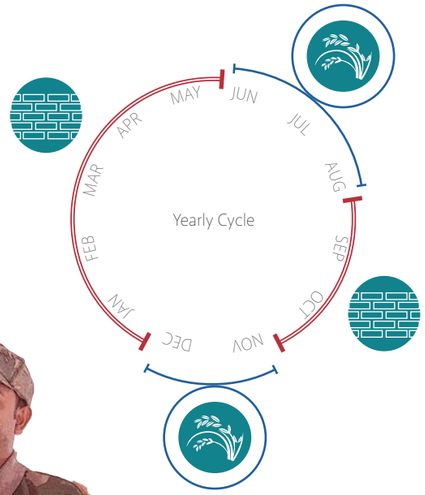
" I have worked in multiple cities in India. In Chennai, Kerela as a construction worker and in Karnataka in a cloth factory. 4 months ago I returned from the Andaman Islands. 6-12 of us from here had travelled with a contractor from the nearest town. We never received our payment on time, and when we did it was always less than promised. No rest, No breaks and it was difficult to adjust to the culture and food. At times when there was an urgent need for money at home, I would borrow from my colleagues. I ran away from there after I fell very sick. Now I work in a local Eco-tourism resort. "



Resident of Bali Islands (Indian Sundarbans)
Current Occupation : Boat man
Age : 27

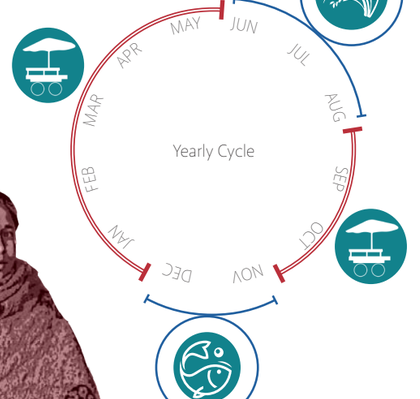
" Earlier we use to sell our left over crops in the village market. After Cyclone Aila, our land got spoilt and we couldn't cultivate for 2 years. My brother now works at a beer factory in Chennai. He started very young and is now 22 years old. He went with a group from Bali with a reference from a few of our people who were already working there. We don't know when he will return, but hopefully during the festival time. "

** Accounts have been transcribed from interviews taken during the field visit.



Resident of Bali Islands (Indian Sundarbans)
Current Occupation : Forest Guide during tourist season, odd jobs and tutoring during non peak season

" My father and brother work as construction supervisors in Andaman Islands and Chennai. My brother has being working as a construction labour since childhood. They return home during the crop seasons to help in the agricultural system. The labour charge in other cities is much higher than here on Bali Island. Today, you can get around 5 USD a day while there you can manage to earn between 10-15 USD per day. I studied in a nearby town and then did my graduation from Kolkata. There are schools in the village but the quality of education is very poor. "



Resident of Dulki Islands (Indian Sundarbans)
Current Occupation : Agricultural Labour/Ice cream vendor
Age : 30

" After a series of crocodile attacks on fishermen, my husband prohibited me from fishing prawns. For alternate income, now I work migrate to the neighbouring state of Orrissa to work as an agricultural and fishery labour in, twice a year. The yeilds in the fields at home is too low for emplyoying labour. I don't like it in Orrissa but have no option. When I return I sell ice cream in the town market. "

** The first account has been transcribed from interviews taken during the field visit. The second account has been extracted from the DECCMA research and a conservation and environment news platform (https://india.mongabay.com/2018/12/migration-aiding-sundarbans-youth-women-adapt-to-climate-uncertainties/)

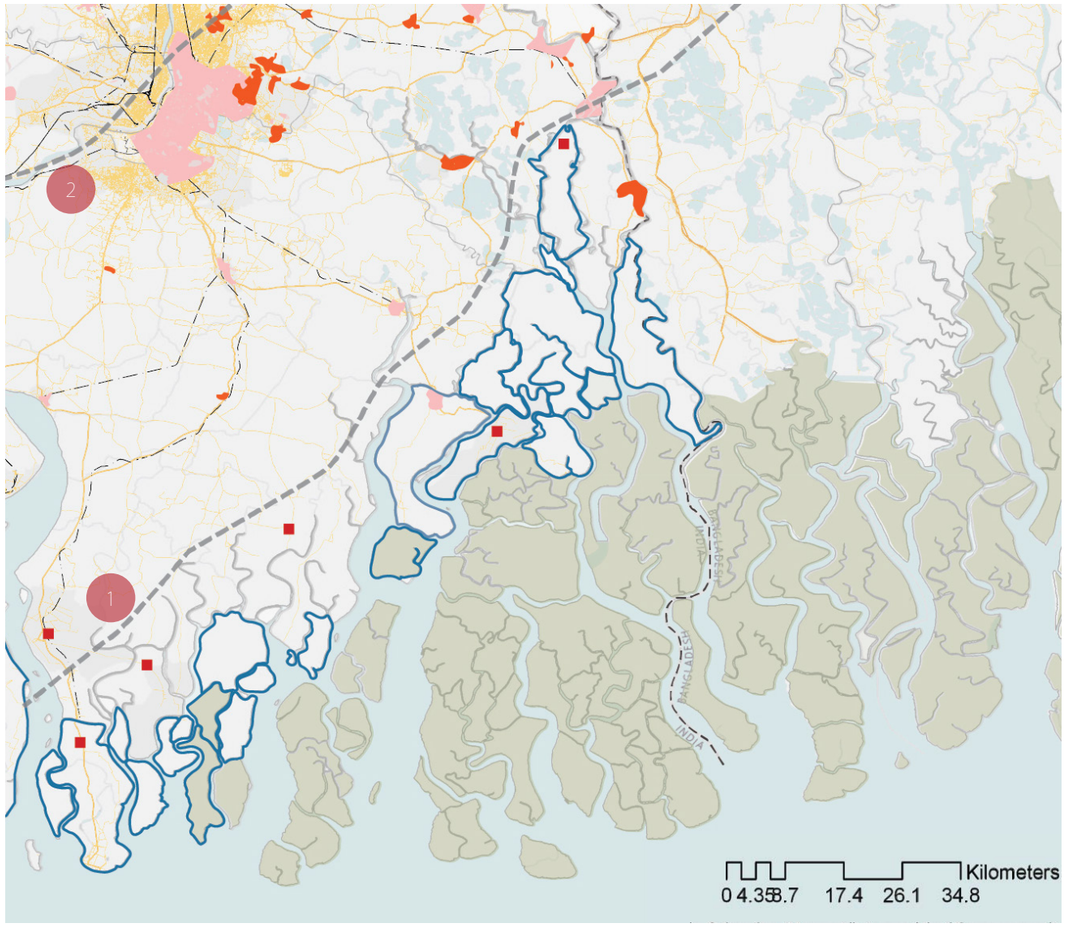
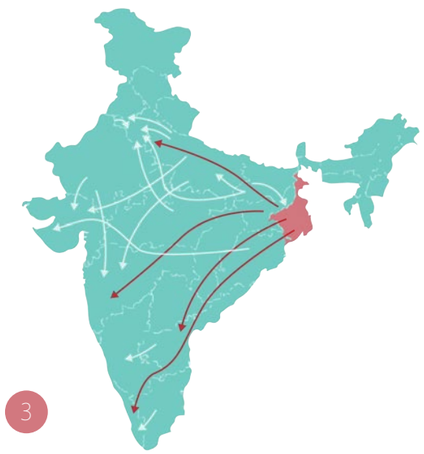


Figure 41: Spatial extents for male migrants; (Author, 2019)



Migrant Stories : Conclusions

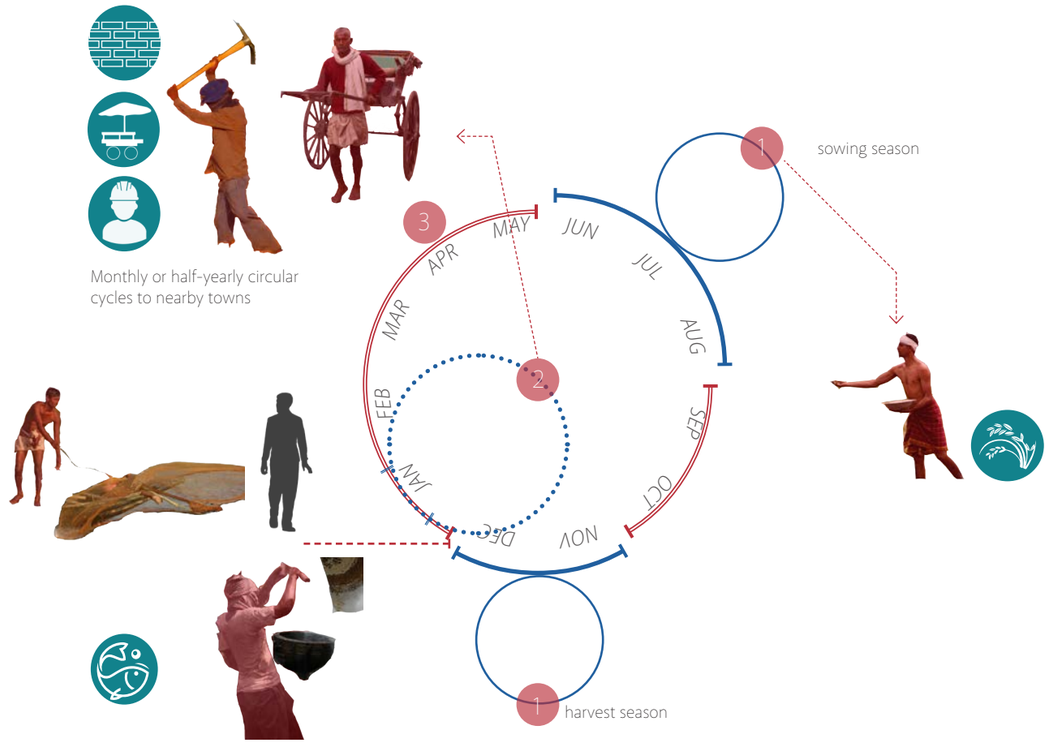


Figure 42: Different spatial cycles of a seasonal male migrant (Author, 2019)

Circular out migration from the Delta is dominated by the male members of the family. During the field survey it was observed that every household visited had at least one and often all its male members, even children, working in a big city within West Bengal or in the country. While the migrants who owned agricultural land in the village returned twice a year to sow and harvest their crops, many landless and small landholding owners returned only once during the festival season in October.

The workers primarily plug into the informal low-skilled labour sector due to their low education and skill levels. Their traditional skill-sets like farming, fishing, honey collection and handicrafts are rarely of any use in the city. They avail these opportunities through known social networks. Most often a known contact from the nearby towns approaches them with a vacancy and a lucrative salary package. Further, since the labour market runs on bulk employment, groups of workers are hired from an area. This makes their internal coordination more efficient and creates a social support system at the destination.

The migration is informal in nature, with no official registrations. This makes the migrants dependant on their contractor or middleman for social and financial support in unknown contexts. The middlemen in turn exploit them by overworking them and taking a commission from their untimely salaries.

The nearby towns act as a launchpad for the population as they are their nearest point of connectivity to the major cities and towns. They also become hubs for new types of services like cellular services, employment agencies and travel agents, contributing to their growth.

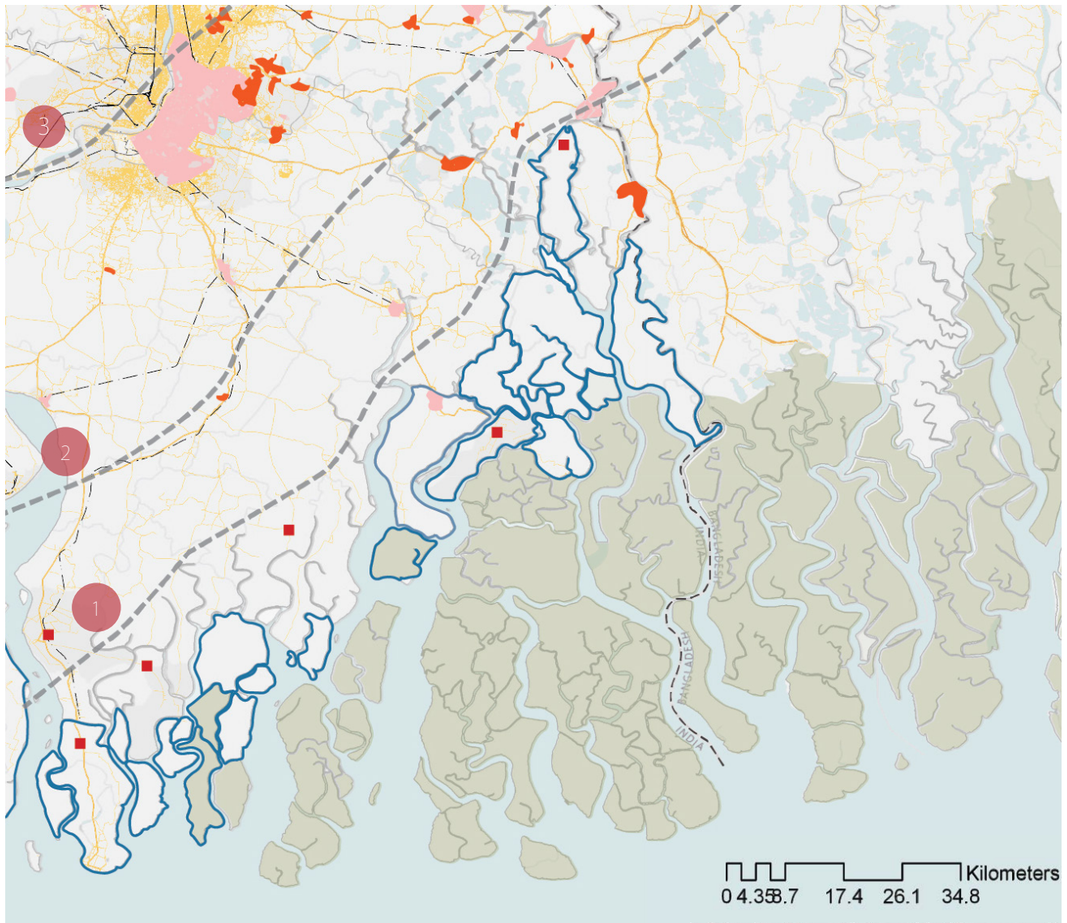
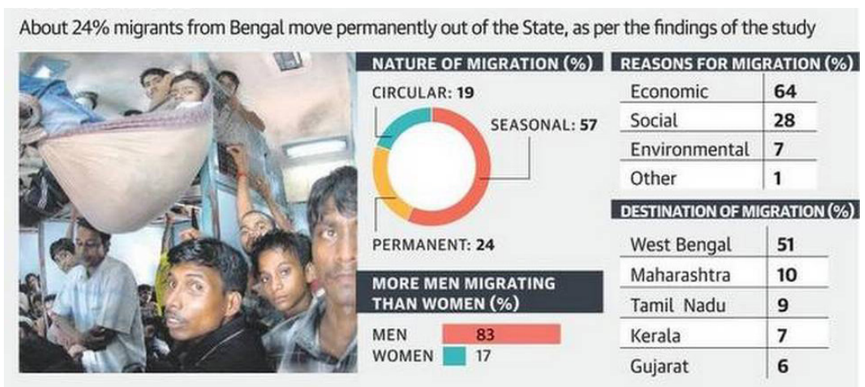


Figure 43: Spatial extents for female migrants ; (Author, 2019)



(https://www.thehindu.com/sci-tech/energy-and-environment/migration-in-bengal-delta-driven-by-livelihood-issues-gender-disparity/article26561763.ece)

Migrant Stories : Conclusions

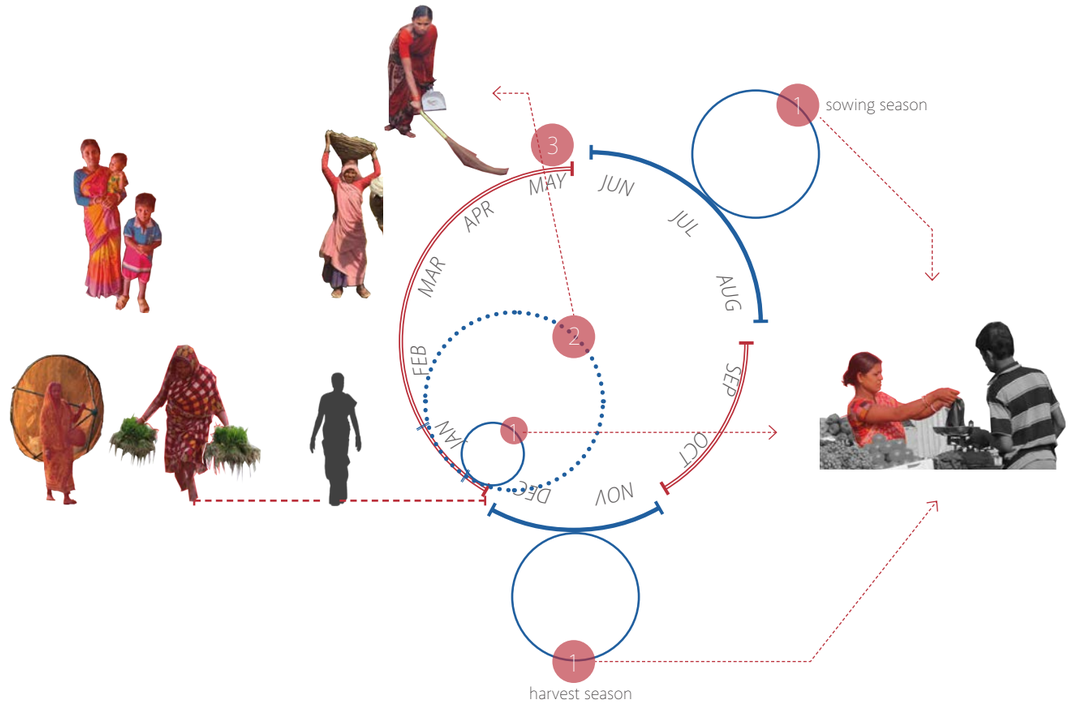


Figure 44: Different spatial cycles of a seasonal female migrant (Author, 2019)

Many studies and organisations also advocate the inclusion of the 'gendered' nature of migration in the discussion. Experts on disaster management and sociology reinforce this by highlighting the added pressure on the women. Women in India and Bangladesh take on the role of bread providers for the families. They are responsible for ensuring there is food on the plate and the home is comfortable for the family. This includes the responsibility of the children and the elderly. While men are expected to bring in the finances required. In times of disaster or environmental change leading to the loss of livelihood, women are expected to deliver their part despite lack of finances and food. Additionally, she is also at the receiving end of the male frustration due to the inability to cope with the change, often leading to sexual and physical violence. This distress is a dominant reason for the high women suicide rates in the island areas.

Consequently, when the male member of the family migrates in search for alternate income, the woman bears the additional responsibility of protecting the home and the young ones. Often, they are required to do all this on the basis of little or untimely remittances. As a result, some women choose to migrate short distances to undertake household or farm work to bring in additional income. The short distance allows them to be close to home and visit more often than her male counterpart. However, women are also more susceptible to the exploitation by middlemen, contractors and at times even their own relatives. They are often employed at a very young age as domestic workers, with or without marriage and face the prevalent dangers of human trafficking in the region.

Migrant Stories : Conclusions
Coping Mechanisms : Civil Society

Figure 45: Social Infrastructure like Schools and hospitals constructed by NGO's

Figure 47: Livelihood initiatives by promoting Self-Help Groups

Figure 46: Basic amenities like drinking water facilitated by NGO's (Clicked and edited by Author, 2019)

Figure 48: Eco-Tourism resorts built and managed by the community

The field visit revealed that the non-governmental organisations were very visible and played a crucial role in the coastal regions, both in India and Bangladesh. Many of these provide the missing infrastructural support by building multi-purpose cyclone shelters, schools and hospitals in remote areas. Additionally some organisations provide technical and organisational support through research initiatives, educational and skill development programmes. Alternate livelihoods, healthcare, education, disaster risk reduction and provision of drinking water are the top action fields. Most alternate livelihood programmes work with women Self-help groups and assist them in forming and running the group sustainably. In one instance an organisation had set up a bakery unit with the required machinery and trained the women in baking, packaging and marketing the products in the local markets. The organisations also play a crucial role in connecting the people to the available government schemes like subsidies for eye treatments or the Mahatma Gandhi National Rural Employment Act which guarantees 100 days of wage employment to one working member of every rural household who volunteers to do unskilled labour work for the community. The initiative has succeeded in building roads and other infrastructure in remote areas.

However, despite their widespread presence and influence, these agencies get little or no support from the government. Additionally they also lack collaboration amongst themselves and across the border which would ideally lead to sharing of invaluable knowledge and experience gained by each of them on site.

Migrant Stories : Conclusions
Coping Mechanisms : Community and Traditional Knowledge

Figure 49: Community like an extended family

Figure 50: Fisher women quit fishing and make cloth dolls for sale

Figure 51: Fishing as a community for better catch (Clicked and edited by Author, 2019)

Figure 52: Women's collective built 12 km of brick roads (Edited by Author, 2019)

Apart from the external support, the communities themselves have undertaken adaptation strategies to survive. The key strength behind most of these strategies is that the people function as a community unit. It was noted by one of the respondents from the islands, that community action and thought has increased substantially after the Cyclone Aila in 2009. Originally a collectivist society, community action is key to their survival in the difficult environment.

Recently a women from across 15 riverine villages built of brick roads to connect their village to basic amenities like schools and healthcare centres. The idea was pitched by an international organisation called World Vision, who also organised for the bricks. The women mobilized themselves and contributed with their labour and successfully managed to connect their previously remote villages to central services. (Azim, 2015)

Similarly, the fisher folk community also function as a collective which allows them to catch more fish and make more profit. Further, the migrants also prefer to migrate in groups for increased social and economic support in the receiving area. Many such self-organised adaptations can be found in the region.

Migrant Stories : Conclusions
Traditional Knowledge

The Sundarbans region is a unique ecosystem with the mangrove forest, its flora and fauna and the inhabitant communities coexisting in the same space. While the population in the riverine islands of the region are the worst affected by the climate adversities, they have been continuously adapting to the changing environment. One of the inherent strengths for them is their traditional or indigenous knowledge which not only helps them adapt but also forms a core link for the communities residing on either side of the international border. Both parts are culturally similar and share the same natural landscape. The only difference being that the Indian region has more people residing closer to the forest than in Bangladesh. While around 46 out of the 54 inhabited islands lie in India, the communities in Bangladesh are majorly settled in areas further north. However, cultural heritage is a common treasure for both the nations which transcends the political boundary and stems out of the natural environment. This rich traditional knowledge has evolved over generations through life experiences and has been passed on orally. (Nishat, 2019)

The region is home to a diverse set of ethnic groups (castes, tribes and clans). With the prehistoric dwellers being three fisher castes, Nishat (2019) lists 11 other castes which form the majority. The caste distinctions are more visible in the Indian part due to the historic Hindu links of the area. The groups form a group of fisherfolk, hunter gatherers, expert mariners, boat builders and agriculturalists. However, the cultivation trend in the region is said to have been a British inception. However, the native communities have many common rites, rituals and doctrines which stem out of the region. The people who migrate to the region rarely try to transform the landscape for their needs, rather it is said that the forest makes them adapt to their surroundings. The regional deities like Banbibi (the supreme deity of the Sundarbans) are worshipped across communities and religions. Banbibi in particular is a unique amalgamation of the Hindu and Islamic culture. She is known to give the people strength to survive with nature in the difficult landscape. (Nishat, 2019)

The most relevant and important aspect of this knowledge is the traditional ability to coexist with the natural ecosystem, in this case the mangrove's biodiversity and resources. The cultural practices, beliefs, traditional philosophies and use of the forest resources for sustenance ensured that the health of the forest was not affected, and the ecosystem is conserved. The natives have evolved their own technologies through experiencing and understanding the natural adversities. This knowledge is applied in fishing, farming and forest resource collection, which are the three main sources of livelihood in the region.

Forest Resources and Honey Collection: Honey and beeswax collection gives the highest monetary returns to the native population. It is a high-risk activity as it involves staying in the forest and searching for bee hives with the constant threat of tiger or animal attacks. The activity is undertaken once a year, in the month of April, by 500 individuals who venture into the forest for a period of 15 days with a permit issued by the forest authorities and the blessings of Banbibi. The methods for harvesting the honey have been evolved over generations and focus more on maintaining the ecological balance than commercial benefit. The collectors only cut a part of the hive as opposed to the whole hive, so that the bees can return to their homes. Further, they use only Hental leaves to create the smoke around the hive to minimize the impact on the natural process. Commercially kerosene is used for this purpose. Further, the lumber-men always harvest the feeble trees first to allow the growth of stronger ones rather than going for the older trees. (Nishat, 2019)

Fishing: Fishing is historically the primary occupation for the area and the larger Bengal region as well. With many attempts to introduce formal fisheries by the authorities, the tidal waters have remained predominantly in the hands of the communities (Danda, 2007). The fisher fold use hand-made nets which were innovated over time to fit the regions waterscape. The nets are made with bigger holes to catch large fish, leaving the spawn population to thrive in the waters and retain the natural processes. In some areas in Bangladesh, the technique of otter fishing is used which is critical in conserving the otter population along with the fish. This is an ancient technique which is now on the verge of extinction and is practiced only in Khulna and Narail districts of Bangladesh. (Nishat, 2019)
Agriculture: Practiced by 60 percent of the total working population, agriculture is the primary in the region. With 36.1 percent of the people working as agricultural labourers, the farmer community faces the challenge of landlessness or small land holdings with the average size being 0.36 hectares. The region mainly focuses growing on rice paddy and vegetables for sustenance. The little excess produce is sold in the local village or nearby town markets. Historically the population practiced subsistence organic farming which was corrupted by the modern-day chemical techniques for increasing yield. The increasing salinity and decreasing water quality is another reason for low yields today. (World Bank, 2014)

However, most of the community still migrates to other parts of the country to work as agricultural labourers but often lose their traditional knowledge of the land amongst the modern-day practices. Multiple efforts are being made on the research front on both sides of the border to generate salt resistant crops for the saline areas of the region. (World Bank, 2014)

Handicrafts and Industries: The Sundarbans do not have any medium or large scale industries due to the inaccessibility of the region. However, based on the traditional skills some small cooperatives or industries like pottery, fish net making and jute handicrafts have come up. The larger Delta region beyond the Islands is well known for other and more refined traditional crafts from the same raw materials like the famous Kantha stitch handloom. Developing the skills of the migrant population in these directions can refine their craft as well as provide them with an alternate source of income which they can earn from their homes.

The modern techniques today need to work in harmony with these practices to enhance them rather than destroy them for commercial purposes. These practices give an insight into the conservation and management of natural resources which is much needed in today's context where the world is searching for ways to harmoniously sustain with the natural surroundings.

The coastal regions of the Ganges-Brahmaputra Delta are experiencing a higher rate of sea level rise than the global average (as cited in Samling, C.L., Das, S. and Hazra, 2015). The Indian part of the delta has already lost crops and forest property worth 950 million Indian rupees (14 million USD), affected 0.4 million people and caused the migration of 600 families, due to slow onset disasters in the past two decades. Figure 55 lists the cumulative loss of GDP per capita by 2050 due to disasters. Due to the negligible efforts or policy formation to combat such disasters, a change in the mindset of the communities has been recorded. A study revealed that the coastal communities have more faith in their local deities than the efforts made by the authorities of the region. While this attitude stems from the failure of effective redressal by the government, it also affects the future preparedness efforts, making the community more vulnerable. While slow-onset disasters allow the community to employ multiple adaptation strategies and 'plan' their migration, a surge of large-scale migration was noted post-disaster events like Cyclone Aila, 2009. The efforts by the Government of West Bengal to relocate the Island communities which lost their land to the sea, was also a failure. It relocated less than half the target population over a period of 15 years to areas with inadequate amenities and no source of livelihood. These areas rank high on the deprivation index in the areas of housing, sanitation, health, drinking water and communication. (Samling, C.L., Das, S. and Hazra, 2015)

The policy analysis conducted by the DECCMA research reveals that disaster management and development authorities work independently without acknowledging the their combined influence. The exclusion of the migrants from the development plans is partly responsible for the growth of the informal illegal settlements. It indicates the deficit of affordable housing for the poor as well as the lack of recognition of the migrant which excludes them from the formal system of housing and services. The informal settlements deprive the migrants from a permanent address which further makes it impossible for them to tap into the formal governance systems, ousting them from the legal and formal society of the city. Further, the implementation of the current local development plans and zoning regulations involve the regularization of the informal settlement by the local bodies, police and bureaucrats, resulting in further harassment and exclusion of migrant population. Figures 53 and 54 highlight the current planning and administrative regime followed in India.

The policy responses recorded in the countries of India and Bangladesh, stem from the perception that migration is socially, economically and politically destabilising for the receiving regions. Attempts have been focussed on retaining the population in the rural areas to reduce the administrative pressure on the urban bodies (as cited in Bird & Deshingkar, 2009). Schemes like the National Rural Employment Guarantee Programme, which promises 100 days of wages for voluntary labour to one person from every rural family, development schemes for small and medium towns and assistance for improving agriculture, are being employed to curb the migration to the saturated urban centres. However, the impact of these schemes is limited, and circular climate-induced migration persists. Policy and financial priority is given to the urban and formal development of the receiving areas without considering the plight of the constituent migrant population as an important stakeholder. This further marginalizes the migrant and often traps the children in intergenerational poverty with limited schooling and poor health.

Deshingkar, DECCMA and some transnational institutions working with refugees like Refugee Economies, advocate that migration is inevitable and that it is essential to acknowledge and maximize the positive potential of the movement. There are numerous examples of cases where the migrants have contributed to the development of the receiving regions in addition to the benefits to the sending regions (mentioned earlier). A recorded example of this is in the Indian part of the Ganges-Brahmaputra Delta. The Human Development Report (2009) of the South 24 Paraganas district reveals that the in-migration from the district of Medinipur to the blocks of Sagar and Namkhana had a positive impact on the education levels and enrolments of the region. The DECCMA research recommends the inclusion of the migrants in the institutional setup by securing their status and entitlements to encourage the maximum, cohesive and symbiotic development of the sending and receiving areas and the region at large.

The discussion on the displacement in the Delta, specifically in Bangladesh, often discusses the role and repercussions for the bordering Indian states of West Bengal, Assam and Meghalaya. While illegal cross-border migration has been recorded officially and unofficially primarily to West Bengal and Assam, the recent uprisings by the local population in Assam and historical cultural affinity to West Bengal, have made the latter a preferred destination for migrants. In addition to this infiltration, the state must deal with internal displacement stemming from its own coastal areas. Being home to Kolkata, the single largest metropolitan city of the region, the state also attracts economic migrants from the North East and Central India. Having already lost 4 of its coastal islands to the sea, a mix of climate-refugees and displaced are constantly moving towards the urban areas of the state search for stability.

In the following sections the research locates and analyses the sending and receiving areas in the Ganges-Brahmaputra Delta. Further, it zooms in to the prevalent developmental challenges faced by the region.

CUMULATIVE LOSS OF GDP PER CAPITA BY SECTOR BY 2050

Delta	Infrastructure	Agriculture*	Fisheries
Mahanadi	11%	2-7%	0.09%
Indian Bengal delta	7%	4-8%	0.33%
Volta	2%	3-7%	0.85%
Ganges-Brahmaputra-Meghna	9%	8-11%	0.36%

* Conditioned on whether CO_2 fertilization and good management practices take place or not.

Figure 55: GDP loss by disaster (DECCMA, 2015)

Regional Development and Climate-induced Migration

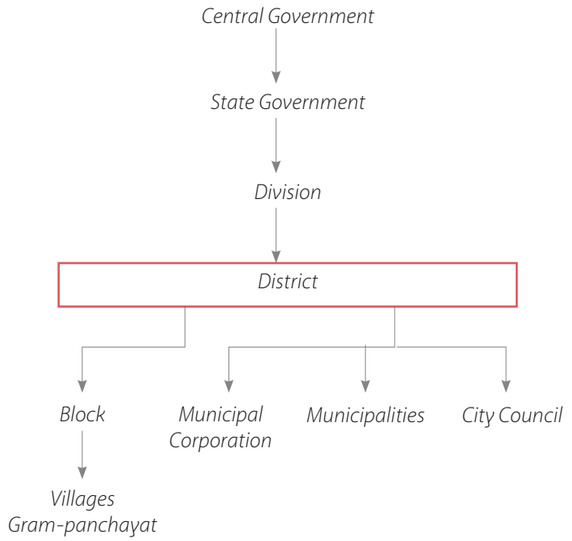


Figure 54: Administration Structure in India (Author, 2019)

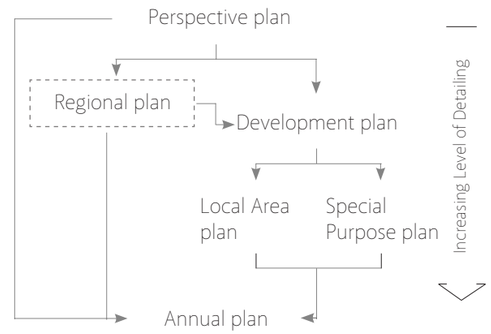


Figure 53: Planning system in India ; (Author, 2019)

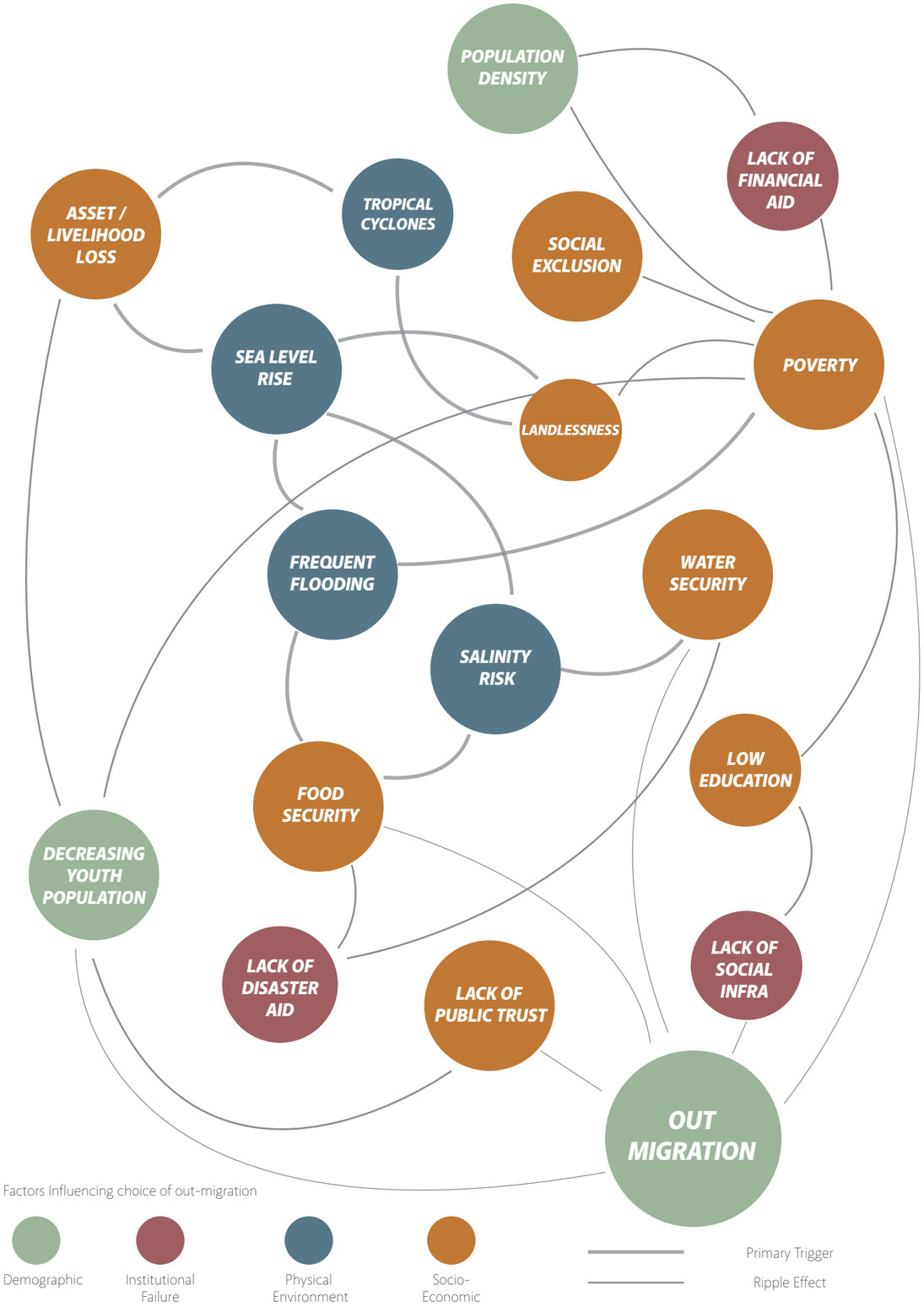


Figure 56: Migration triggered by Environmental Change - identifying indicators; (Author, 2019)

Indicators for locating sending regions

This research uses spatial mapping as a tool to visualize the phenomena of climate-induced migration. It maps the key sending areas and current receiving areas of the Ganges-Brahmaputra Delta using a set of indicators of each derived from the DECCMA research and other empirical studies carried out on the topic.

To map the sending areas of the delta, the research uses a set of climatic and non-climatic factors which contribute to the vulnerability of a region. Since the research focuses on the coastal areas, the climate indicators have been chosen accordingly. The aim is to locate the areas under high risk which will potentially act as sending areas from the Delta.

The identified indicators are as follows :

Climate Indicators (Refer to Section 5.2.1)

Effect of Sea Level Rise
Prone to Flooding
Salinity Risk
Frequency of Natural Disasters

Non-Climatic Indicators

Decadal Population Change

An analysis of the Decadal Population Change reveals the areas which have a stagnant or have a negative population growth. This indicates the current hotspots for out-migration in the region.

Social Vulnerability

Social Vulnerability is a multi-lateral factor which analyses the coping capacity of an individual or community based on socio-economic factors. It determines the capacity of a person to recover from a disruption in their livelihoods or when they are forced to adapt due to the changing physical environment. The sub factors include poverty, entitlement failure, resource dependency and access to institutional support. For example, the presence of cyclone shelters or support NGO's enhances the coping capacity of a community. In this research we consider all these factors and additionally use poverty as an independent feature. This has been done to address the multi causal nature of poverty in the given context.

Population Density

High population densities heavily impact the socio-economic status of the population due to the limited resources and unequal distribution. Further, highly dense areas face issues of sanitation, health and education. These areas also have a surplus of labour when compared to the employment opportunities, leading to out-migration of the able-bodied members of the family.

Poverty

Poverty is one of the key factors in determining the vulnerability of the area. As indicated in the diagram, poverty in the vulnerable regions is often a direct consequence of climate risks. The frequent disasters rob them of their assets and push them down the debt spiral pushing them into poverty. Populations living under the poverty line have very low coping capacities and often receive very little or no institutional assistance to help them cope. These communities are pushed to the ecologically vulnerable areas for habitation and live under the constant threat of eviction. Since poverty can be directly correlated with marginalization and lack of access to resources, it is an essential factor to calculate the vulnerability.

Public Trust

An additional tool to analyse the vulnerability of the population is the degree of public trust. The more the trust in the institutions and government the higher the coping capacity. People often do not migrate in the hope that they will receive assistance from the authorities. The absence or lack of public trust often forces people to migrate earlier in search of a state or system which makes them feel safer. In Ghoramara Islands in the Indian part of the Delta, it was seen that people have more faith in the local deity than the management strategies of the government (Samling, C.L., Das, S. and Hazra, 2015).

Water and Food Security : The water and food insecurity resulting from the constant environmental stress in the sending regions disrupts the lives of the residents. The lack of institutional support to cope with the situation pushes to people to generate local adaptation techniques or permanently migrate to unaffected areas.

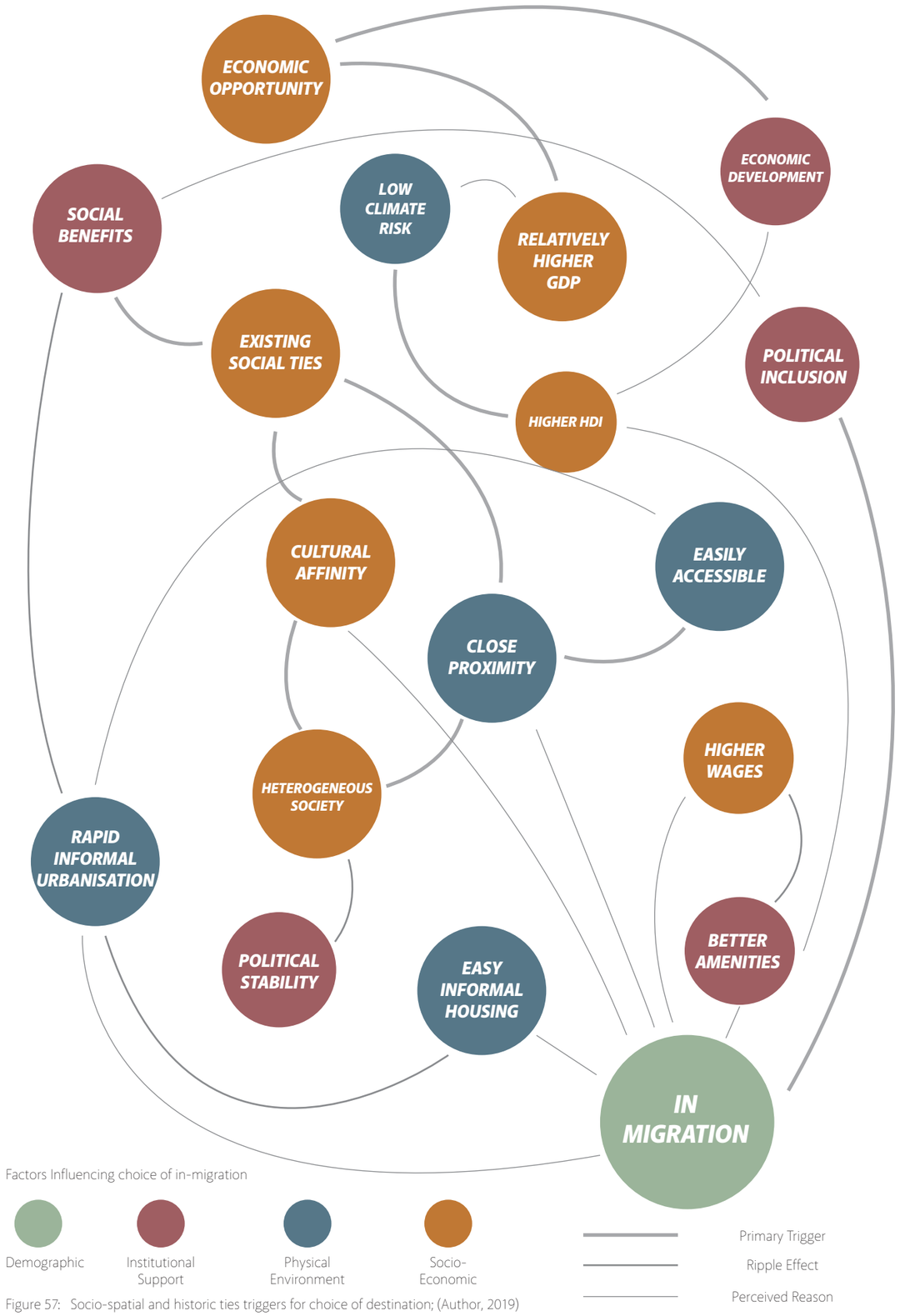


Figure 57: Socio-spatial and historic ties triggers for choice of destination; (Author, 2019)

Indicators for locating Receiving regions

While a considerable quantum of research can be found on identifying and qualitatively analysing the sending areas, limited research has been conducted on the receiving regions for this migration. The identification and socio-economic analysis of these regions highlights the potentials for defining the symbiotic niche for the future migrants.

Areas which act as receiving regions can be identified by key qualities which act as pull factors for the migrants. Figure 36 presents the complete set of inter-related factors which influence the choice of the destination. It also highlights the primary factors responsible and the consequent conditions created repercussions. The research maps a selection of these factors to locate the receiving regions in the Ganges-Brahmaputra Delta.
The existing trends can be identified by mapping the demographic and spatial growth and the nature of that growth.

Key indicators chosen are as follows :
Decadal Population Change : The mapping and analysis of the district-wise change in population over the past two decades reveals the areas which have grown at a higher rate than the natural growth rate. This indicates the trending in-migration to these areas and provides a direction to the research for further investigation.

Cultural Affinity and Societal Composition : Historical analysis of the societal composition and the predominant cultural features, like the language and ethnicity of the region reveals the preferred locations for migration. Cultural affinity and existing social ties has been recorded to be a key consideration for migration, especially in the case of distress migration. The social ties reinforce the confidence in the migrant about the risk taken, while the cultural affinity allows easy induction in the host society. This is a essential factor when it comes to south-south migration which is illegal in nature.

Better Wages and easy access to the market : As established earlier in this chapter, the migration is increasingly triggered by environmental stress, but the nature of the migration is still economic. The migrant, once temporarily or permanently displaced, looks for economic opportunities which can help restore his or her homestead. Easy access to the market through the informal or cash economy provides them with the flexibility to work in the receiving region while trying to rebuilding their life in the sending area. Alternately, they use the flexibility to establish multiple sources of informal income to be able to save more.

Human Development Index : The HDI, as defined by the United Nations, is a summary measure of the achievement of the three dimensions of human development - long and healthy life, knowledge and a decent standard of living. These dimensions are measured by the indicators - life expectancy, education index and the gross income - respectively. Higher HDI rankings indicate the adequate provisions of amenities and institutional support for the growth of the citizens. This makes it an attractive destination for the migrants, in the hope for a better life.

Urbanisation levels : In relation to the population change mapped, identifying the urbanisation levels of the larger region, indicates the attractive economic areas. Further since urbanisation is a product of increase in population, the rapidly urbanising areas validate the inflow of migrants to those areas in the past, present and the predicted flow in the future. In the Global South this urbanisation is characterised by the informal character which is seen to be an evolving complex challenge for the urban governance and planning.

Political regime or inclusion : A politically stable and open regime in the receiving regions is an important consideration to understand the migration trends. Governments often extend social benefits and support to the migrants for vote bank politics. This is an added incentive for the displaced, who often come from areas which experience minimal intervention and presence of governing bodies.

Climate Risk : Relatively low climate vulnerable areas are preferred destinations for climate migrants as they try to attain stability in their lives.

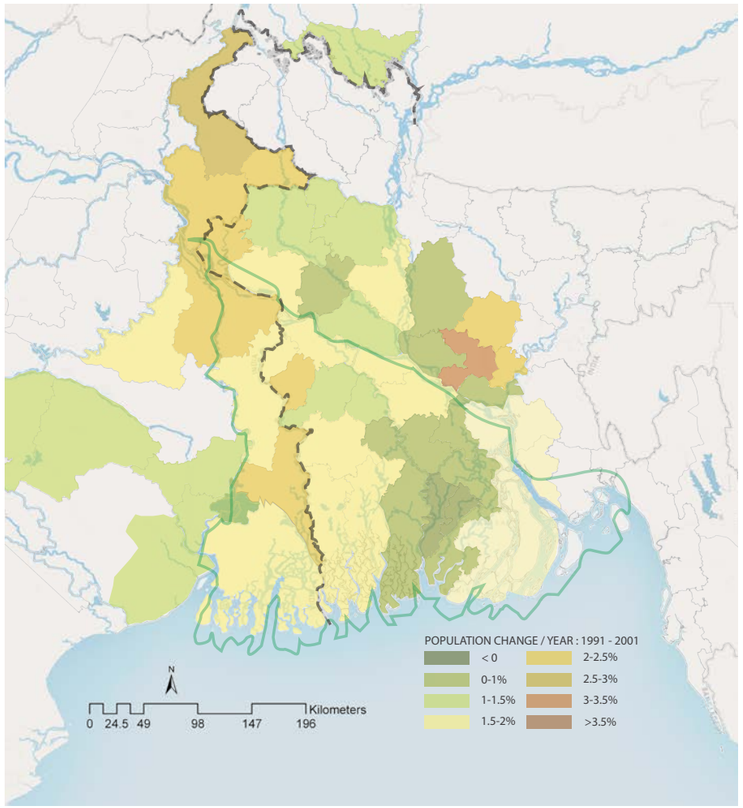


Figure 58: Population Change in the decade 1991-2001. The dark green districts record a population change of less than 1% indicating outmigration. While the districts where the population change is above 2% indicate in-migration as the natural population change rate is 1.65%.

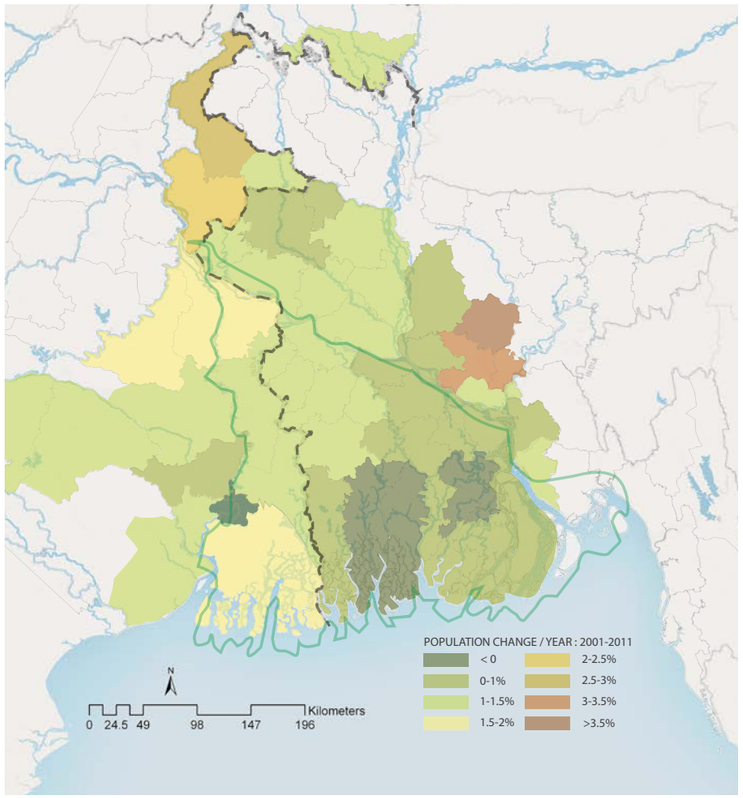


Figure 59: Population Change in the decade 2001-2011. By 2011, there is an visible trend of negative growth of some coastal districts in the delta. The population change in Khulna and Barisal districts is recorded to be negative, indicating that the out-migration exceeds the natural growth. Interestingly, Kolkata city also exhibits a negative population change indicating out-migration from the metropolitan centre of the region.

4.2.3 SPATIAL ANALYSIS

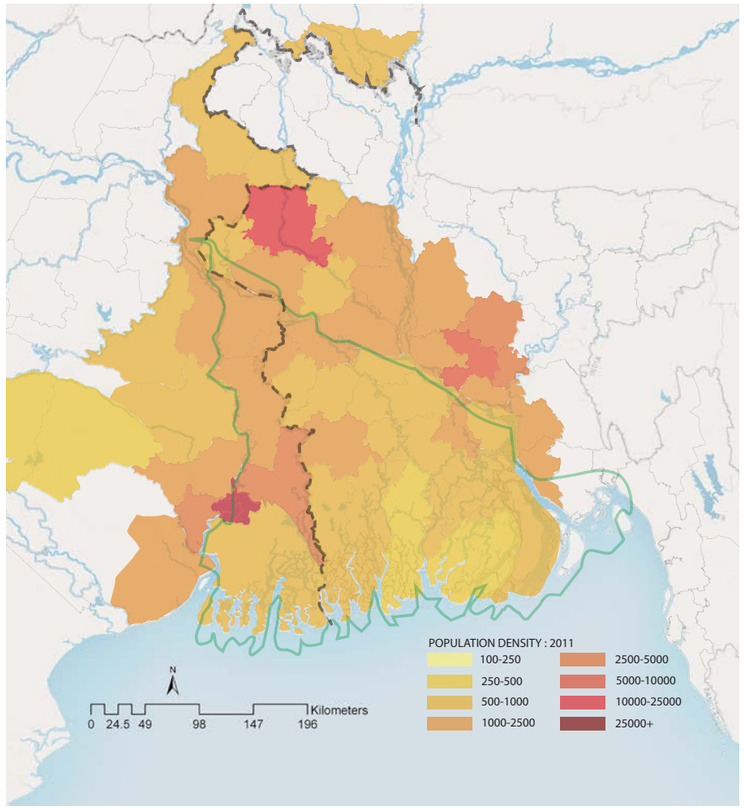


Figure 60: Population Density (2011) Map. The areas with high population density indicate in-migration. Here districts of Kolkata, North 24 Paraganas and Dhaka have the highest concentration of population within the Delta. When overlaid with the poverty map, the combination of high density and high poverty also indicates possible sending areas as out-migration takes place due to the lack of space and opportunity. Source : The Population change and density maps have been extracted from the maps for India and Bangladesh from http://www.citypopulation.de

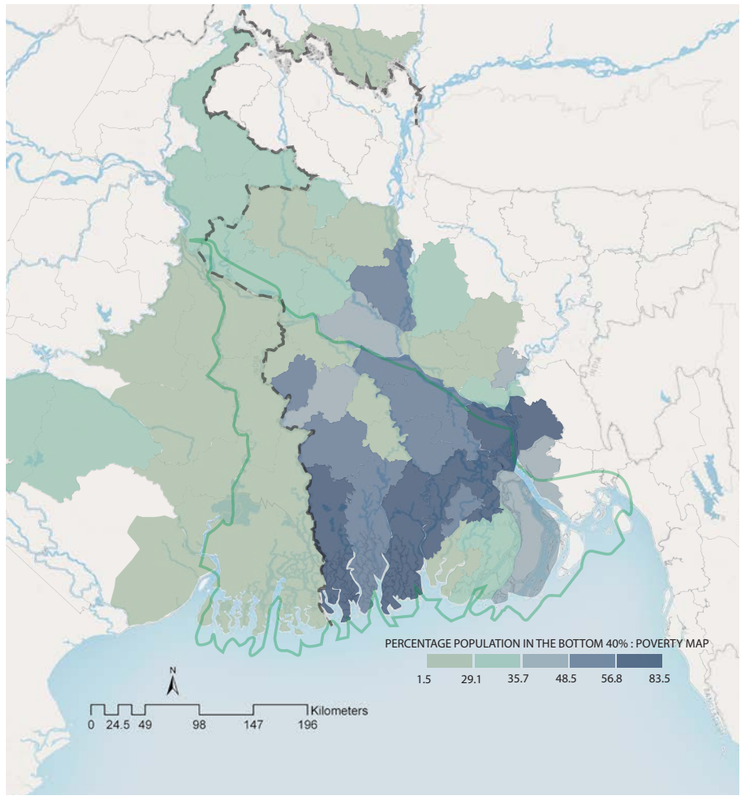


Figure 61: Percentage of population below poverty line (2011)
Figure 62: Poverty is an essential indicator which is caused by multiple indicators like no inclusive economic growth, lack of institutional presence or support and slow-onset or rapid onset disasters. The map clearly shows the difference between the economic stability and growth of Bangladesh and India. This makes West Bengal an attractive region for the poverty-stricken population from the coastal districts like Satkhira, Khulna and Barisal ; Source : This map has been constructed from the Poverty data from Census of India 2011. The data for Bangaldesh has been extracted from the Poverty maps generated by World Bank. http://www.worldbank.org/en/data/interactive/2016/11/10/bangladesh-poverty-maps

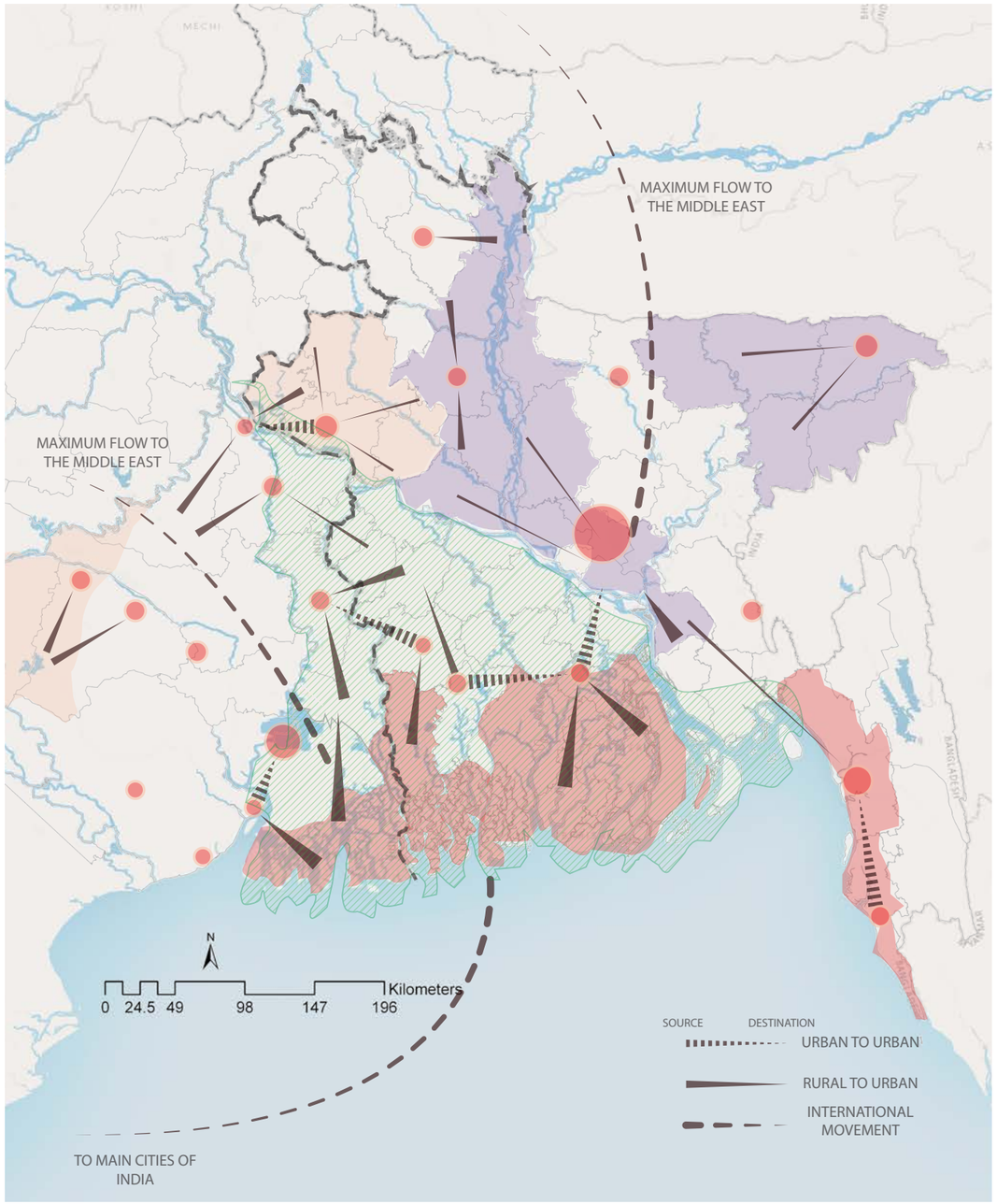


Figure 63: Patterns of movement in the Delta ; Source : Bangladesh Centre for Advanced Studies Executive Director Dr. Atiq Rahman's presentation at the Conference on Building resilience for food and Nutrition Security, 2014. https://www.slideshare.net/2020resilience/parallel-3-e-rahman-atiqifpriethiopia-presentation

Identified Sending Region

Ganges Brahmaputra Delta

Major urban centres

4.2.3 SPATIAL ANALYSIS

Movement Patterns

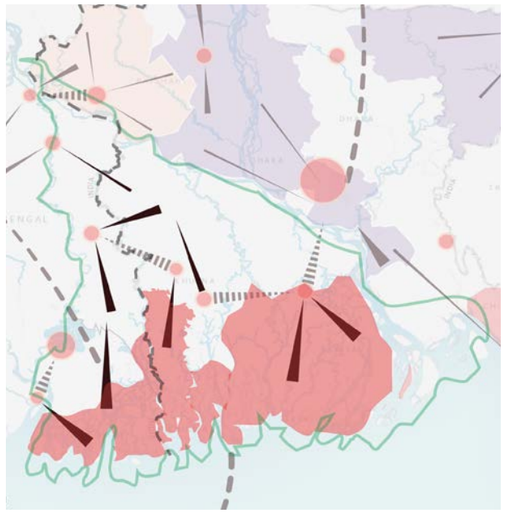


Figure 64: Urban Centres in the Sending Areas (Risk Zones) ; (Author, 2019)

As a result of the above factors, particular movement patterns have been recorded in the region. This movement is an opportunistic movement in which people move from rural to urban, urban to urban or to international destinations in search for better jobs or facilities. For climate migration, the hotspot considered for this research is the coastal villages. While international and planned urban to urban movement is usually undertaken by a higher economic class, the people moving from the Sundarban Islands to nearby urban areas or the outskirts of the metropolitan cities belong to the lower economic classes.

This movement seems like any regular rural-urban migration, except the climate affected population is economically more vulnerable and psychologically affected by the disasters back home, making them easy to exploit. However, they establish a relationship with the city through the migration. They fulfil the labour demand at the destination and bring back economic and social remittances which makes their homesteads more stable. Further they also bring back technology and skills which are unavailable in the rural areas.

This relationship is very important to maintain a balanced development in the region, but the by products like exploitation and population pressure can be avoided.

Figure 65: Current relationship between the City and the rural areas, (Author, 2019)

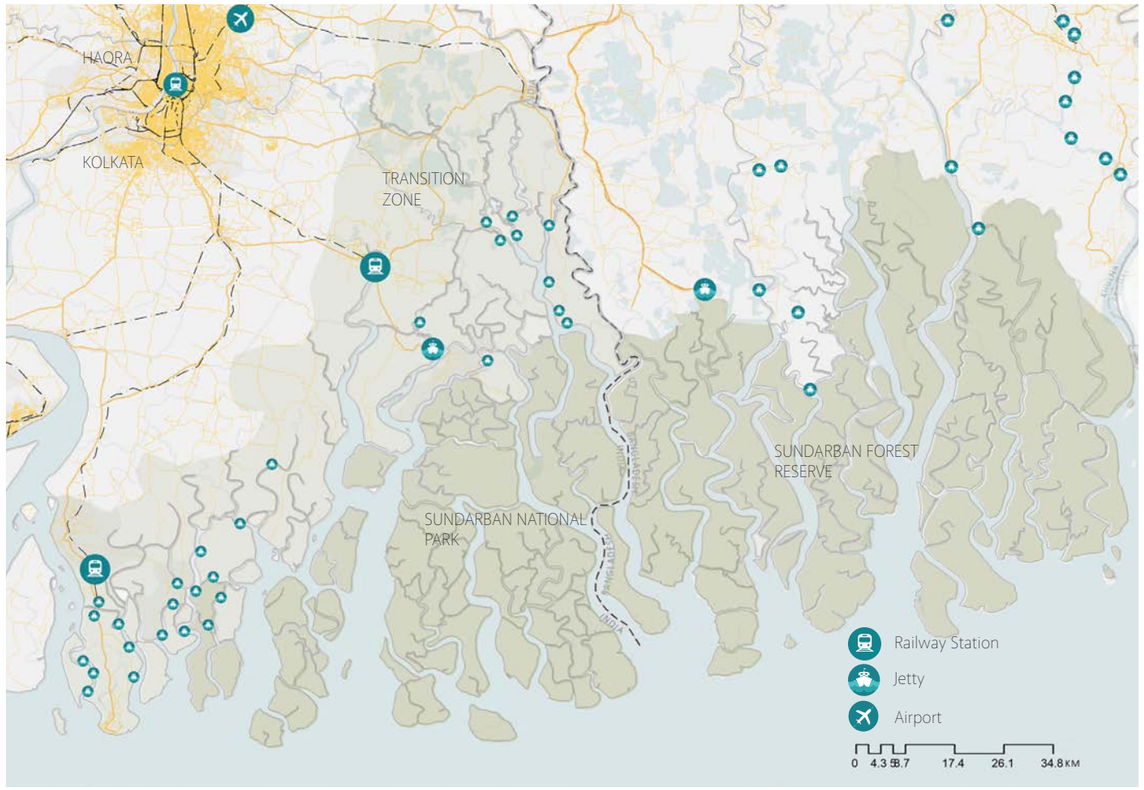


Figure 66: Zoning Sending Regions with the Jetties (Author, 2019)

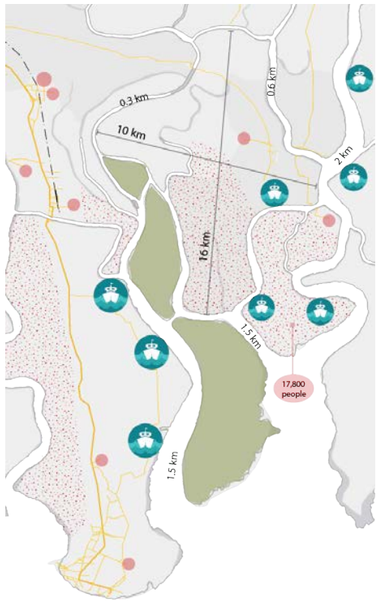


Figure 67: Isolated Islands with limited Connectivity (Author, 2019)

The identified sending region consists of the UNESCO World Heritage Sites Sundarban National Park and Forest Reserve and the Islands which form the transition zone from the mangroves to the main land. Human habitation is prohibited in the forest reserve areas however there are some communities living at the edge of the forests. Further some areas are accessible by the local communities for basic services like fuel wood and honey. The islands are dotted with villages and are home to a population of about 4.5 million people in India and 7.5 million in Bangladesh. (WWF-India, 2010)

The connectivity to these islands from the mainland is very weak. They are serviced only by boats or ferries which are privately owned and managed by multiple parties, making their service unreliable. The people depend on mechanized boats which are often overloaded. Further very few islands have pucca jetties which are also poorly constructed with no safety precautions.

Further, the water transport in this region is heavily dependant on the tide. The local boatmen are well versed

4.2.3 SPATIAL ANALYSIS

Sending Region Analysis

Temporary Solutions (Source : VisitSundarbanWorld, Edited by Author)

Tourist Boats (Source : Public Domain, Edited by Author)

Figure 68: Improper Jetty Infrastructure (Source : Sightsavers, 2017) https://www.sightsavers.org/from-the-field, Edited by Author)

Figure 69: Privately run boats overloaded and unsafe (Source : The Better India, 2016 Edited by Author)

with the high and low tide patterns and run their services accordingly. Many villages have also adapted to this natural system and have stilt housing and boat parking at culverts served by the tide.

However, after the Cyclone Aila in 2009 some bridge projects were initiated to improve connectivity to the mainland. But the internal roads on the Islands are either under construction or yet to be constructed isolating many village clusters as large as 17-18000 people strong.

The lack of connectivity is not only a deterrent for the people to travel to the nearby service towns but also a challenge for basic amenities like cooking gas, food and groceries to reach them. This often makes the transportation expensive and business in the villages non profitable leaving the villages to travel long distances for everyday needs.

For this research an in-depth study of the Indian Bengal Delta has been conducted due to the limited resources and time constraint.

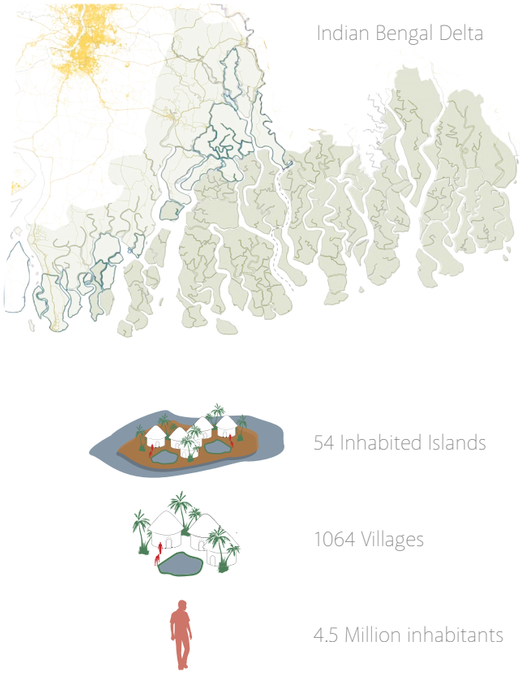


Figure 70: Statistics of the Indian Bengal Delta (Author, 2019)
Source : (WWF-India, 2010) Shodhganga : https://shodhganga.inflibnet.ac.in/bitstream/10603/171754/10/10_chapter%204.pdf

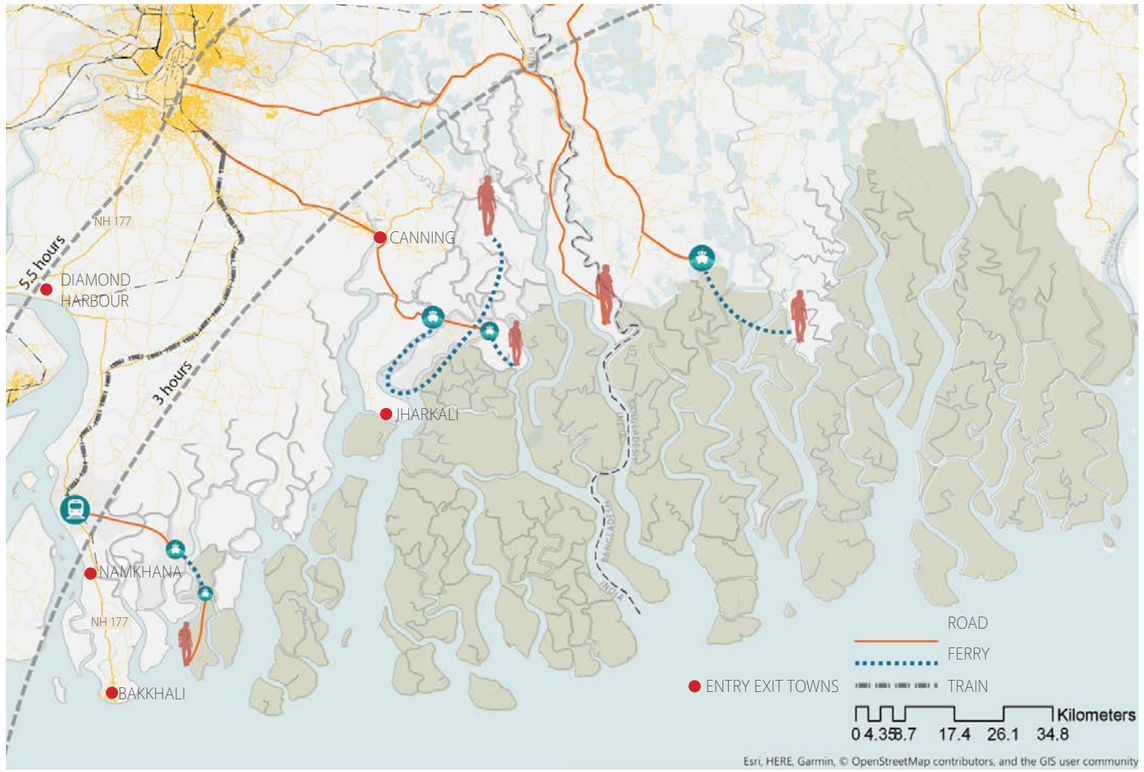
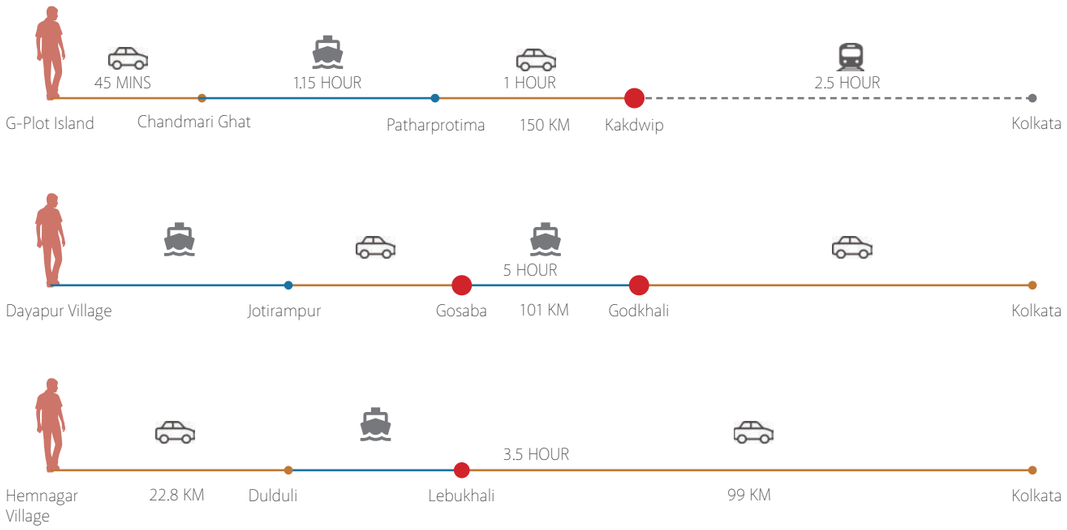


Figure 71: Isolated Islands with limited Connectivity (Author, 2019)



4.2.3 SPATIAL ANALYSIS

Figure 72: Isolated Islands with limited Connectivity (Edited by Author, 2019)

Figure 73: Lack of dependable public transport (Edited by Author, 2019)

To understand the accessibility of the islands better the commute times and paths were mapped for 5 locations which are at the tip of the inhabited area of the delta. It was seen that to access the city of Kolkata, the nearest major economic centre and a gateway to other parts of the country, one had to change multiple modes of transport. The average travel time was 5.5 hours and required local guidance. Often one has to travel to the nearest ferry point by road and travel to the nearest small town for a further link to the bigger towns. While some islands have cycle-vans for inland transportation as opposed to others which have no public transport at all.

The nearest railway stations are between 16-45 kms away from the Block headquarters, which act as a point of transition in the journey. The entry exit points for public road transport to Kolkata are the towns of Namkhana, Canning, Diamond Harbour, Bakkali and Jharkhali. From here people avail the water services to the interiors of the Sunderbans.

Sending Region Analysis

Figure 74: Brick Road constructed by an NGO on Bali Island (Author, 2019)

However, the bus services remain the most convenient and economical way of travel to the region. There are 14 terminals near the study area : Bakkhali, Narayanpur, Kakdwip, Barpali Bazar, Raidighi, Ramganga, Jamtala, Jaynagar, Canning, Sonakhali, Dhamakhali, Haroa, Nazat, and Hasnabad. The network has a better coverage and is a preferred mode of transport for long distances. Buses from these hubs are run by state transport corporations as well as private operators. NH-117 is the only highway connecting Kolkata to the western edge of the Delta. However, it has several issues like capacity constraints, congestion and poor quality of construction. (World Bank, 2014)

The lack of connectivity also severely affects the tourism sector as it is difficult to provide good hospitality services on the Islands without significant investment. This acts as a deterrent for local as well as international tourists to stay in the region.

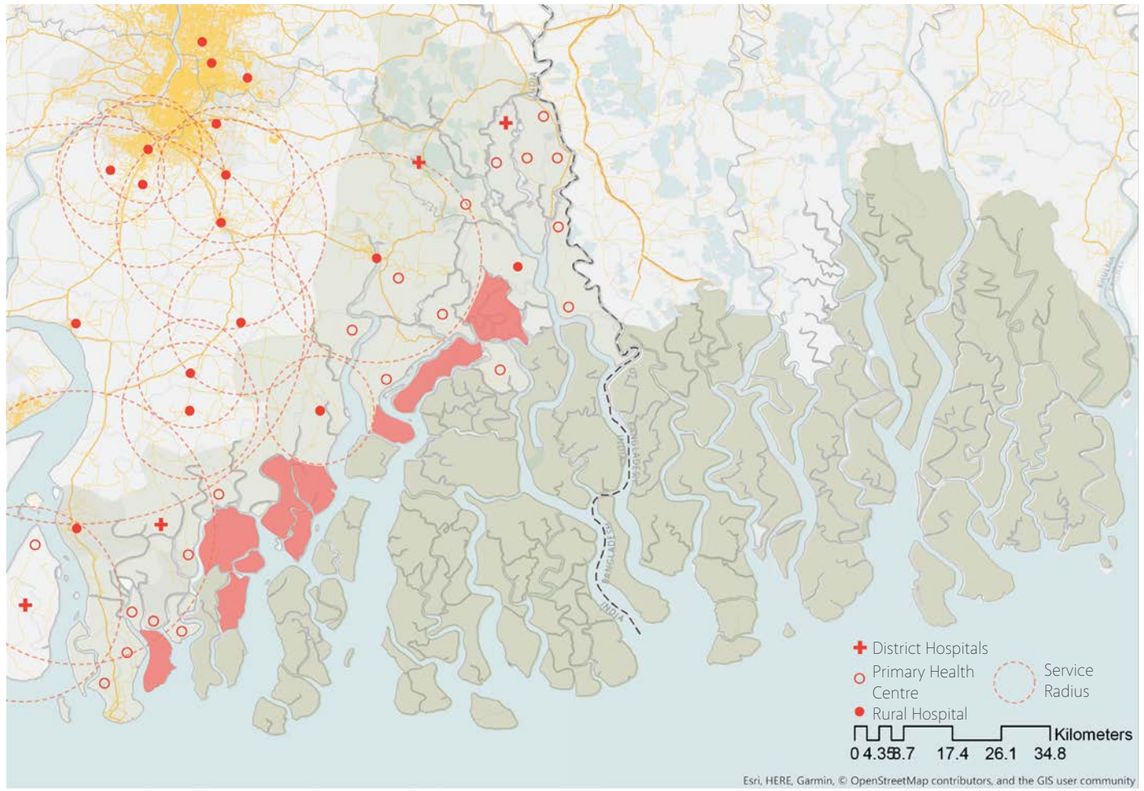


Figure 75: Lack of Healthcare facilities (Author, 2019)

The World Bank noted that the region had poor access to public services and facilities like water supply, sanitation, energy, healthcare and education facilities in both India and Bangladesh parts of the Sundarbans. Another issue observed in the region is the lack of healthcare services. Technological failures, piecemeal approach and poor governance were cited to be the main reason for this failure. The people who live in the southern region closer to the forest and the sea were found to face harsher conditions than those in the northern areas.

The 4500 square kilometre of inhabited area is serviced by 300 km of metalled road and 42 km of railway line. Further, the area is not serviced by electrical connections and alternate energy schemes like solar energy subsidies are also rarely availed.

Healthcare

The population is heavily affected by environment-induced health hazards like arsenic poisoning, debility from natural disasters and animal bites. These affect about 60% of the population and hospitals are too far away for emergencies. The healthcare system is a preventive and curative system which provides basic care at multiple locations through outreach workers. While there is a acceptable supply of small sub-centre care centres at the village level managed by trained multi-purpose workers, there is a lack of specialized healthcare as well as primary centres where the ratio is 30,000 people to a centre. the inadequacy is noticed more in the southern blocks (islands).

Education

The literacy level of the people of the Sundarbans is lower than the state average. While primary schools are present in most villages as per the planning standards, secondary and tertiary education is not locally accessible. Further, the quality of the education is questionable as the recruitment system is flawed and the teacher salaries are very low. The closes points for higher education are the mainland towns and the universities is the larger cities like Basirhat and Kolkata. Since daily or regular commute is impossible from this region, higher education requires the children to move to the city, which often is not socially or economically feasible.

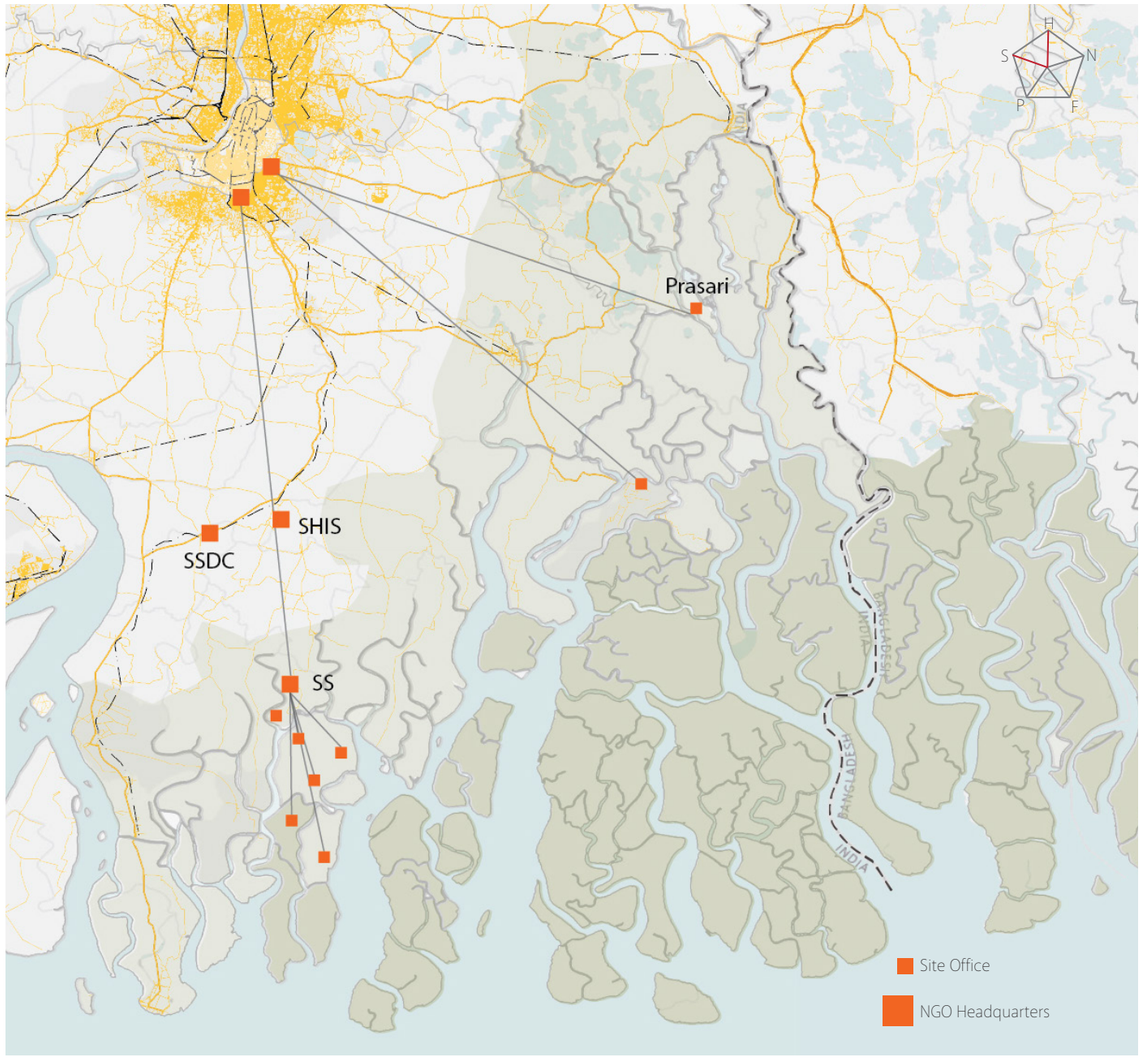


Figure 76: Mapping the NGO's (Author, 2019)

However, non-governmental organisations have played a major role in bridging this infrastructural gap. Many organisations have constructed multi-purpose shelters which double up as schools and healthcare centres in remote areas. Some organisations have also constructed specialist hospitals for eye care, while others have initiated the concept of mobile ambulances, These ambulances are boats which float through the islands during the high tide time and provide basic healthcare facilities.

The map above shows the location of some of the infrastructure constructed by 3 such NGO's. However, the headquarters for each of these NGO's is either based in Kolkata or in the mainland small towns.

A similar network is also present in the Bangladesh region but has not been mapped due to the lack of data and time.

Through the interviews of officers from several such organisations highlighted their dedication and focus towards some of the problems faced by the people in this area. However, it was also noted that there is an evident lack of collaboration and knowledge sharing between these organisations as they work in complete isolation from their locally active colleagues. This needs to be addressed at a policy and design level to make their presence more effective.

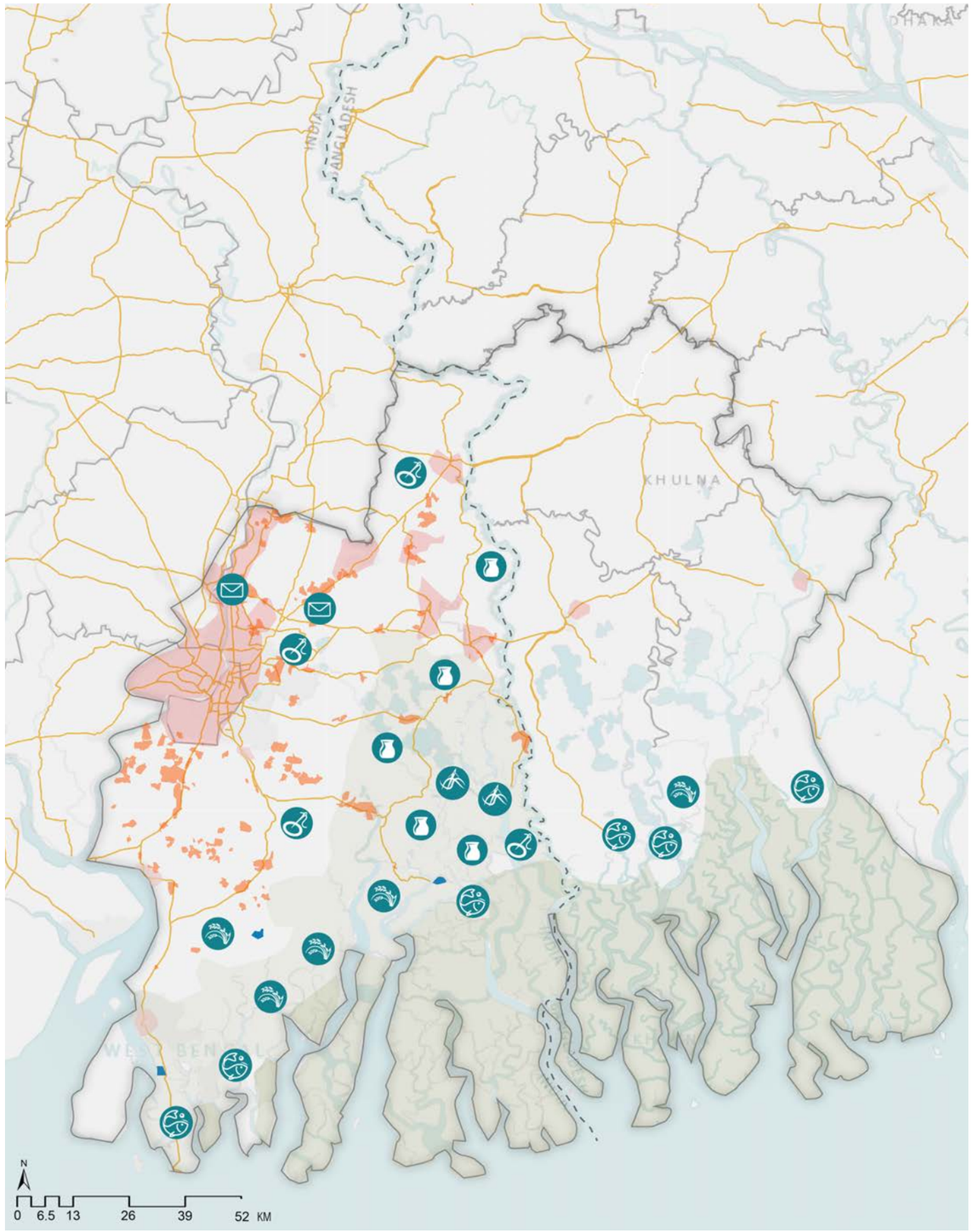


Figure 77: Presence of Traditional Economies in the region

Traditional Knowledge Economies

Agriculture is the largest employer in the Delta region. The workers range from large land owners, small land owners and landless labourers. The labourers being the largest group with the lowest socio-economic status. Traditional cultivation practices like indigenous seeds and responsible crop rotation according to the capacity of the land have been practiced for time immemorial. However, with the drive to grow more cash crops and the risk of crop failure due to the changing climate, more and more farmers have shifted to chemical substitutes and modern practices.

Fishing is the primary or secondary occupation for most families in the region. West Bengal is the highest producer of fresh water and marine fishes in the country and 31% of that is produced in the Delta. Being the oldest occupation of the region, traditional practices are still embedded in the industry and ensure a sustained produce.

Kantha Stitching is a popular handicraft in the region where patterns and art is stitched on cloth to make textile products. The craft is majorly practiced by women in the rural areas. However, despite its exclusivity, the industry suffers due to low investment and poor marketing. The current initiatives are supported by NGO's working with women livelihoods.

Jute Handicrafts stem from the jute production in the region, which was the most prosperous industry before the partition. Artisans make storage units, mats and packaging material. However after the boom of the plastic industry the market for these sustainable products have gone down.

Terracotta is the oldest and most widely used material due to the abundance of fertile clay soil in the region. Originally used to make cooking and storage vessels, today the industry has evolved to produce show pieces and other household items.

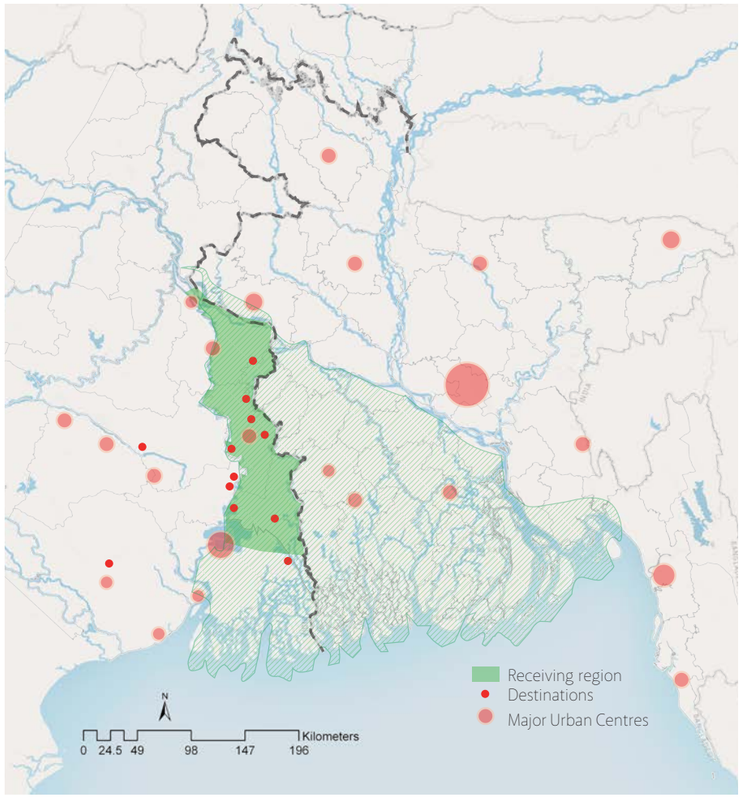


Figure 78: Destination locations in the receiving region ; (Author, 2019)

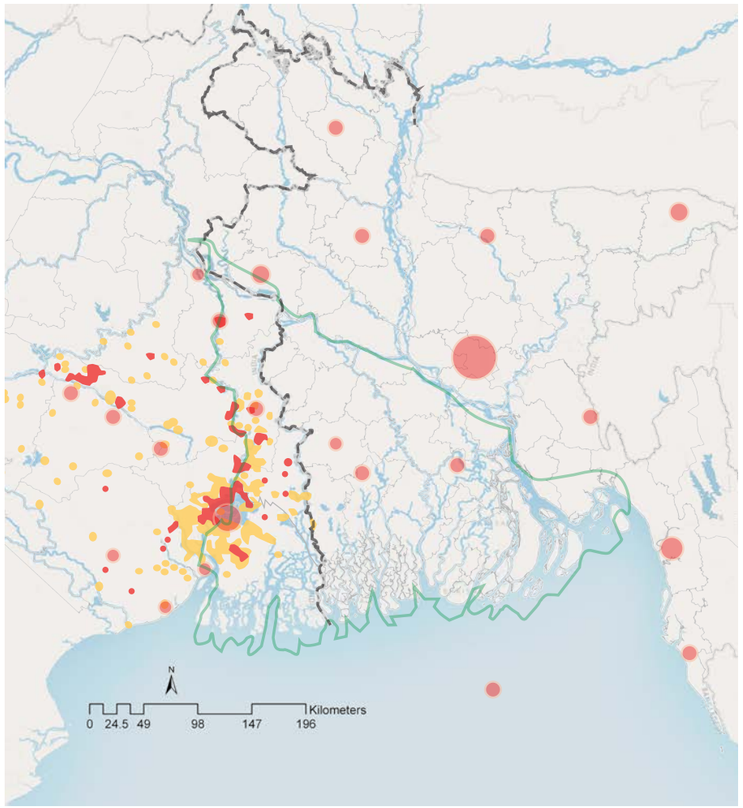


Figure 79: Development of new towns in the decades 1991-2001 and 2001-2011 in the receiving regions ; (Author, 2019)

4.2.2 SPATIAL ANALYSIS

Small Towns - a point of transition

The spatial analysis of the sending region and the movement patterns reveal a new relationship into the equation between the city and the village. It introduces the small towns as points of transition for the migrants, giving them direct access to large cities with job markets. Further, they also provide services like healthcare, education and market facilities to the isolated population allowing them to transform socio-economically. Often, the mobile population chooses to temporarily reside in these towns for easier commute and to avoid the high living costs of the cities.

However, this relationship is one of demand and supply. The demand for such services is a major reason for the growth of these towns which too were once villages. An analysis of the urbanisation patterns of the region revealed that West Bengal has seen the highest increase in the number of new class V towns also known as Census Towns in the past two decades. These towns are classified based on their population size, density and major occupation of the male working population. When mapped it reveals an increased concentration of these towns on mainland of South 24 Paraganas and North 24 Paraganas districts. The growth of the villages to towns can be attributed to construction of transport infrastructure like highways or railway stations. This further attracts the migrant population to commute and reside in these towns and create a demand for services like building materials, grocery stores, cellular services and other small industries. While the migrant population remains a transient one, they initiate growth and form a community in such settlements.

This combined with socio-economic maps and observations presented earlier outlines a dominant receiving area for the region where an increase of census towns, population density and low poverty levels indicate an inflow of migrants from the southern region and across the border. The following section analyses the transitional state of these towns and relates them to the larger movement pattern of the migrants.

Class 1	>1, 00,000 population
Class II	50,000 to 99,999 population
Class III	20,000 to 49,999 population
Class IV	10,000 to 19,999 population
Class V	5000 to 9,999 population
Class VI	less than 5,000 population

Figure 80: Classification of towns by population by the Census of India ; (Author, 2019)

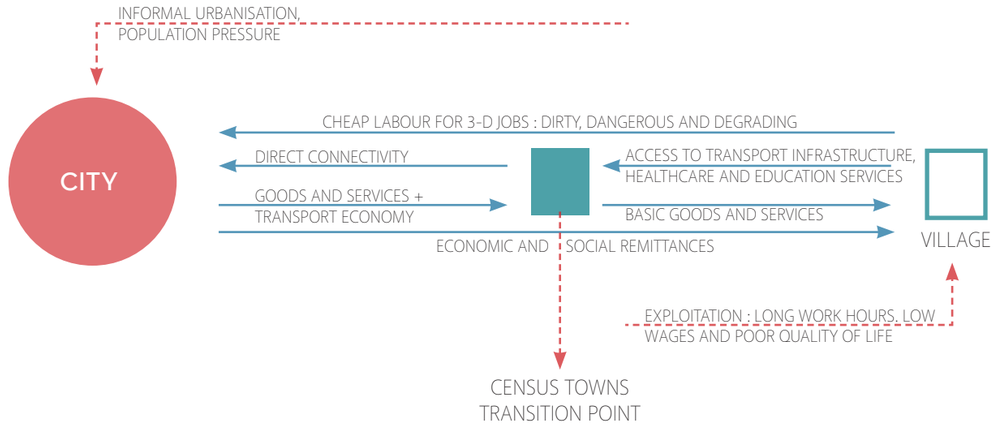


Figure 81: Role of the Census town in the City-Village Relationship

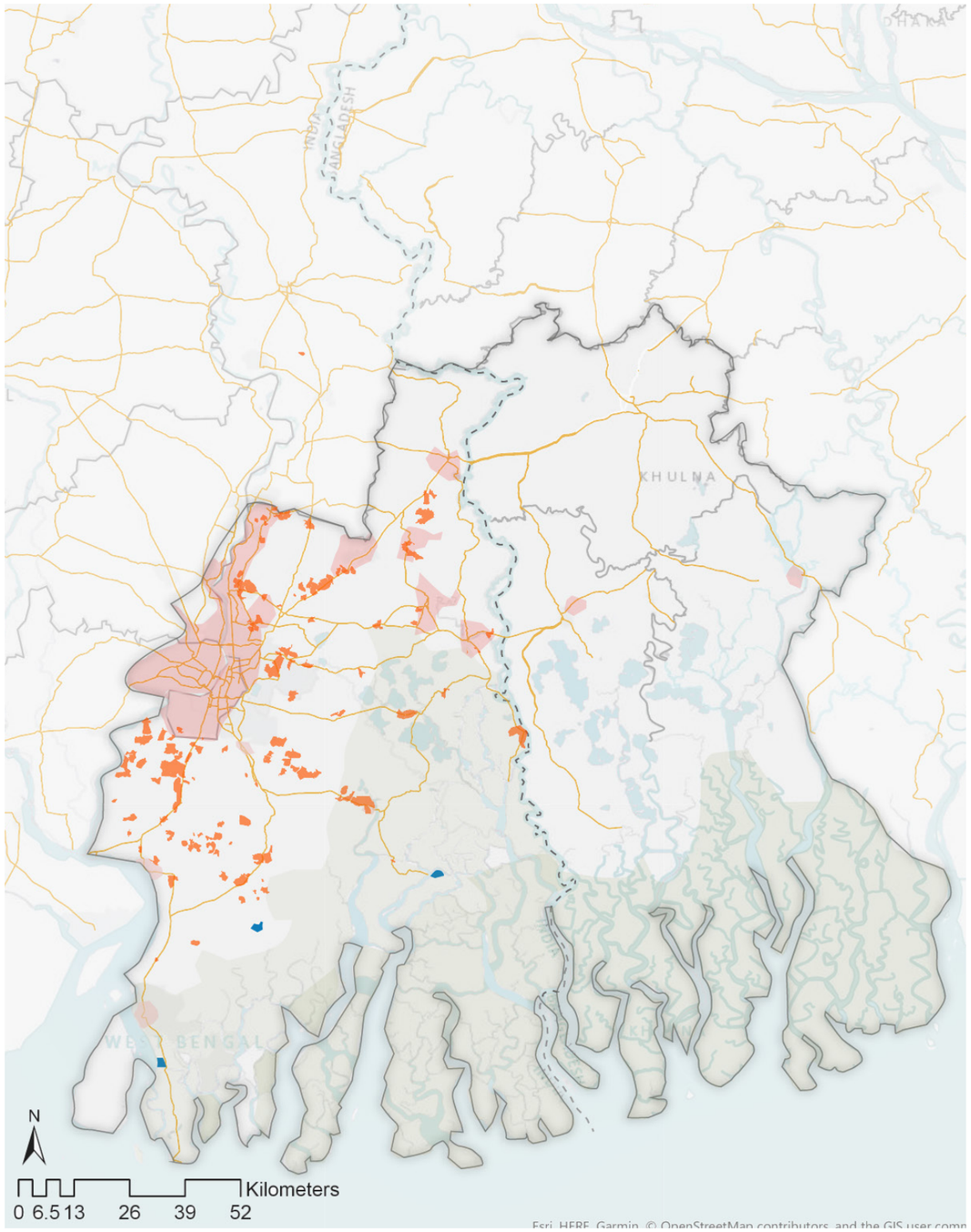


Figure 82: Mapping the transition points and census towns in the region (Author, 2019)

The state of West Bengal gained 537 new Census Towns in the 2011 Census. Census towns contribute to 29.7% of the total urban growth of the country. (Guin & Das, 2015)

Census Towns

India and Bangladesh are one of the few countries which define their urban settlements by population size and density through a Census study. Census towns are villages which have attained urban characteristics like a population more than 5000 people, population density more than 400 people per square kilometre and 75 percent of the male working population employed in the non-agricultural sector but are not statutorily notified or administered as a town. They usually range between Class VI to IV towns depending on their population size. Essentially overgrown villages, what makes these towns unique is that despite their formal urban status, their government system remains rural in nature. (Mukhopadhyay Partha, Helene Zerah Marie, Samanta Gopa, 2016)

The rural government or panchayat is a democratically elected body of five representatives, out of which one is appointed as the head or the Sarpanch. The Panchayat is responsible for the development of the village, responding to the higher levels of governance and resolving household or community issues. In its capacity as a local government body it has limited resources as it does not collect tax from the resident population like urban municipal bodies. It is dependent on the funds given by the Block administration. The choice of governance for these transitional settlements depends on multiple factors like resistance to urban taxation, loss of autonomy upon becoming an urban local body and the conditions set by the state for the conversion. Further the availability of several subsidies and schemes for the rural population are an incentive to remain essentially rural in nature. (Mukhopadhyay Partha, Helene Zerah Marie, Samanta Gopa, 2016)

Census towns can be characterised into 3 categories based on their spatial characteristics - Proximate, clustered and isolated. In West Bengal 55.6% of the CT's are proximate and house 5.6 million people (Roy & Pradhan, 2018). These towns are located in the periphery of large cities and might or might not share an administrative border with the city. Their economies depend on the adjacent cities or on the expanding industries of the cities. The clustered towns are towns which lie outside the buffers of large towns or cities. They rather exist as clusters with other towns which together manifest a local ecology of their own. Further their economies are influenced by the closest town but is more dependant on each other. Lastly, the Isolated towns which are not influenced by the location of other cities or towns. They often have their independent economies and may be influenced by factors like transport networks. In the 2011 census, the number of census towns in India surged from 19% to 36%. West Bengal had the highest number of new census towns. Most found in West Bengal in the last Census round. While 44% of the growth can be attributed to natural population growth, 21% is due to migration. Guin and Das claim that in West Bengal this shift is due to agricultural distress which pushes them to seek other forms of livelihood. This distress is one of the reasons for the increasing number of these towns as the locals change their livelihoods and people from neighbouring villages cluster at better connected larger villages. (Mukhopadhyay Partha, Helene Zerah Marie, Samanta Gopa, 2016)

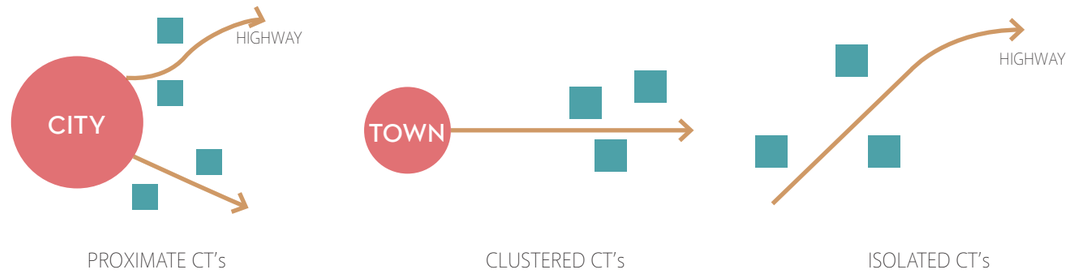


Figure 83: Types of Census Towns (Author, 2019 , Adapted from (Roy&Pradhan, 2018)

INFRASTRUCTURE

Figure 84: Improper Planning

Figure 85: Haphazard development

Figure 86: Lack Basic systems like waste management

ECONOMY

Figure 87: Town Specific Activities : not common for all (like brick kilns)

Figure 88: Everyday economy : set around local market, bazaar

Figure 89: New activities introduced : Para-transit and construction, private education, healthcare services

Economic Transition

The economic sustainability of the Census towns has been an ongoing debate in the discussion on urbanisation in India. This is mainly because of the flickering nature of the agricultural sector and the absence of strong alternate employment. The economies are in a transitioning stage where the traditional agricultural activities are slowly being abandoned due to low returns. While some towns have local anchor industries like brick kilns or agro -processing, others are completely dependant on daily economies like local markets. Due to the increasing demand from the nearby villages, the non-farm activities are focussed on providing services. Ranging from transport providers like local public transport, buses and goods trucks, private education and tutoring services, cellular retail and related services to healthcare providers, pathologists and pharmacies. These initiatives employ local people and service the adjacent rural population. The migrants fit into this transitioning economy in two ways – as consumers and as labourers. Some towns act as market towns for the goods produced by the rural population. Further many of the construction-based towns are dependent on the return migrants who have acquired the skills of modern construction in the larger cities. These characteristics make the town economy and rural migrant population heavily dependent on each other. In an event that the rural population is struck by a natural disaster, the consequences will also be felt by the dependant town economies.

Formally the economies can be classified in to 3 categories (Mukhopadhyay Partha, Helene Zerah Marie, Samanta Gopa, 2016) :

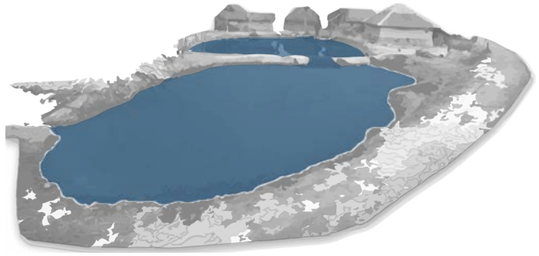
1. Everyday economies: These revolve around local markets or bazaars which sell goods and services from the cities as well as the surplus produce from the farmers and fishermen of the surrounding villages.

2. Town Specific Activities: Rarely some towns have specific industries like brick, terracotta handicrafts or timber production. These economies are relatively more stable as they have limited dependency on the surrounding areas.

3. New Service economies: Primarily dependant on services like private education, healthcare or transport businesses, these economies are heavily dependent on its rural hinterland and the connection to the city.

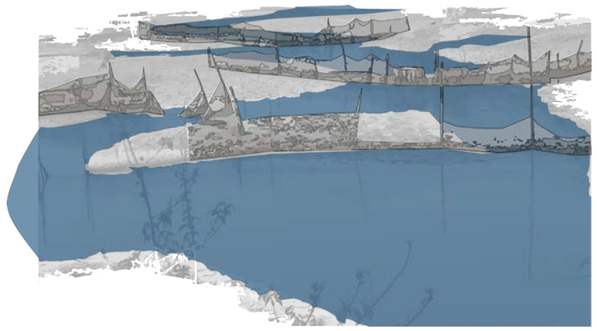
These towns attract very little attention when it comes to private investment or industries due to the location and character of these towns. This is partly because the quality of urban services like roads, solid waste management systems, sanitation, water and electricity is poor. However, since the towns are relatively more prosperous than their rural counterparts they attract the rural populations. The rural governance does not have enough resources to provide these urban services or attract private investment. This puts the future sustainability of these models in question and presents a need for a more balanced economic model for the benefit of the town and its rural hinterland.

WETLAND ANALYSIS

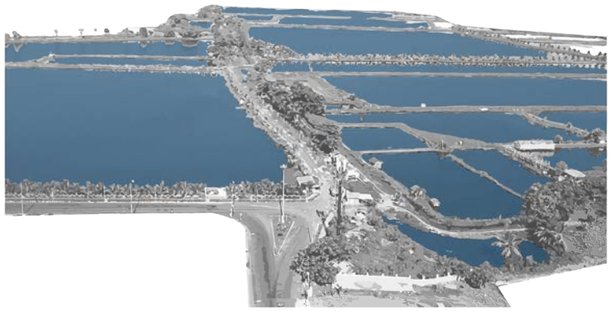


PUKUR : FRESH WATER PONDS

Figure 90: Types of Wetlands (Author, 2019)



MARSH LANDS : USED FOR AQUACULTURE



FISHERIES OR CONSTRUCTED WETLANDS

Community Transition

The popular approach of evaluating rural transformation through the change in economy, portrays the process as a very unidirectional and deterministic one (Guin, 2018). Scholars like Gibson, Cahill and McKay (2010), Nayyar and Sharma (2003) have challenged this approach and propose a more heterogeneous nature of rural transformation. Unlike popular theories the transformation of these towns is not an industrial turn rather an occupational diversification which has different implications for different economic classes. The pattern of transformation of the livelihoods of the town population is similar to the one of the climate migrants. The dominant difference is the distress due to the changing climate. Due to social and institutional dynamics the farmers of the large villages are forced to move to alternate non-farm activities by either migrating to the city or taking up in-situ petty jobs like small trading or shop keeping. However, like the climate migrants, many town residents practice dual livelihoods through cyclical farm and non-farm activities. Due to their locational advantage and connectivity to the cities and larger towns, the transformation and growth into Census Towns is faster as opposed to the climate affected coastal villages. With this transformation, comes a change in lifestyle of the people. The resident population is exposed to more technology and services like dish antennas, cellular services, gymnasiums, refrigerators, ATM's, cars and bikes for starters. They become the emerging consumers who don't have to pay taxes or rent and have a disposable income for expenditure in the new market. Further, through their exposure to the urbanized world their aspirations for quality education also increase. (Guin, 2018)

Ecology and Census Towns

Ecology is an essential point in this analysis. The Ganges-Brahmaputra Delta is a wetland region with a generous dispersion of wetlands. Further, each house has its own man-made pond or 'pukur' for personal use. Figure 88 depicts the types of wetlands commonly found in the region. This gives the region a rich diversity of plants, fish and other biodiversity as well as a natural flood management system. However, with increasing urbanisation most of these wetlands and ponds are being used for concrete construction. A similar scenario can be seen in the Census Towns. On comparing the proximate towns with the isolated towns one can see the difference in the wetland network. The proximate towns, under the influence of the expanding city have very few of these ecological features than the isolated towns. When mapped over time, the shrinkage in the water bodies can be noticed within a short span of time. Figure 89 shows the evolution of the town of Kalua over 15 years. The town is a proximate town where reclamation of land from the wetlands has been used to accommodate the urbanisation.

Figure 91: Degradation of Wetlands in Kalua Census Town
(Author, 2019 , Adapted from Google Earth)

Rapid new Construction (Author, 2019)

Interspersed Rural Character (Author, 2019, Adapted from Suburbin : https://suburbin.hypotheses.org/636)

CHARACTER ANALYSIS

Figure 92: Urban-rural characer of the Census Towns (Author, 2019)

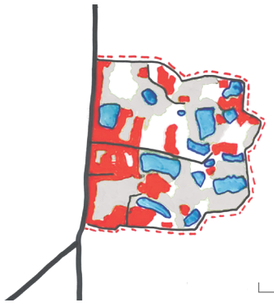
Community Transition

Community and Traditional Knowledge

The inflow and outflow of the migrants seeking opportunities, low rentals and cost of living also has a significant impact on the social structure of the settlement. Originally a community - based rural settlement with minimal economic disparities, the economic disparities are deepened in the society. The transitional physical state of the settlement interspersed with kuccha (not permanent) and pucca (permanent/concrete) construction is a statement of prosperity a selected section of the society.

As discussed in the previous section the influence of the urban continuum into the large villages is detrimental to the community structure of the rural society. The flooding of goods and services in the market has a significant impact on the local sustainable practices of the population. Practices like traditional construction techniques, cloth making and simple handicrafts for local use are diminishing due to the increased availability of brick, ready made cloth and products. Moreover, they lose intangible knowledge of sustainable daily practices, passed on orally through generations. There is a need to document and preserve these practices and bridge them with modern science and technology for sustainable use.

Fringe Rural Character (Author, 2019)



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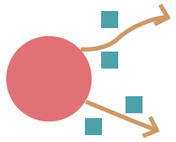
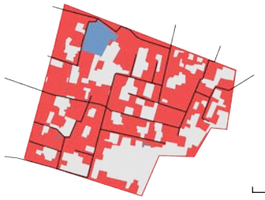
Ayodhyanagar





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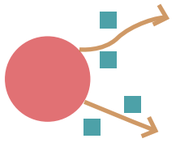
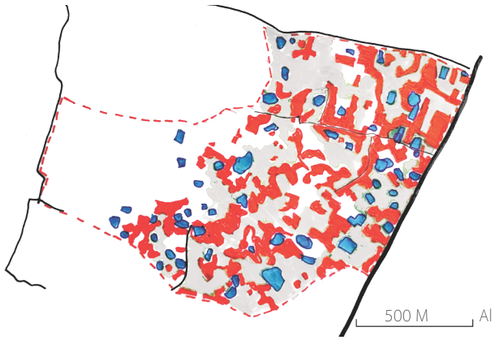
Bandipur





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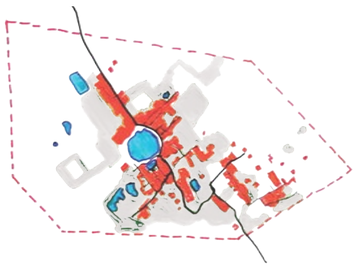
Alipur South



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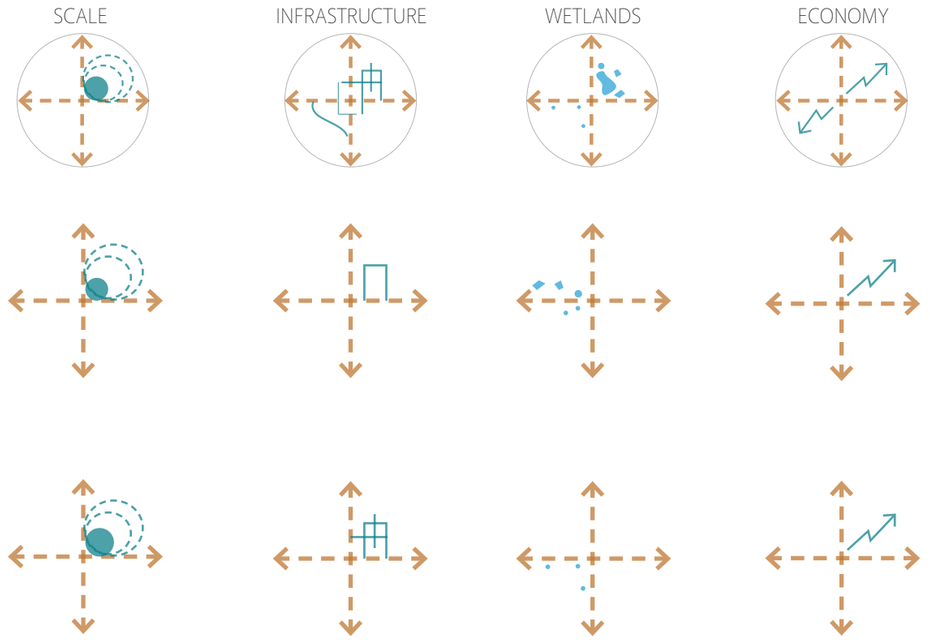
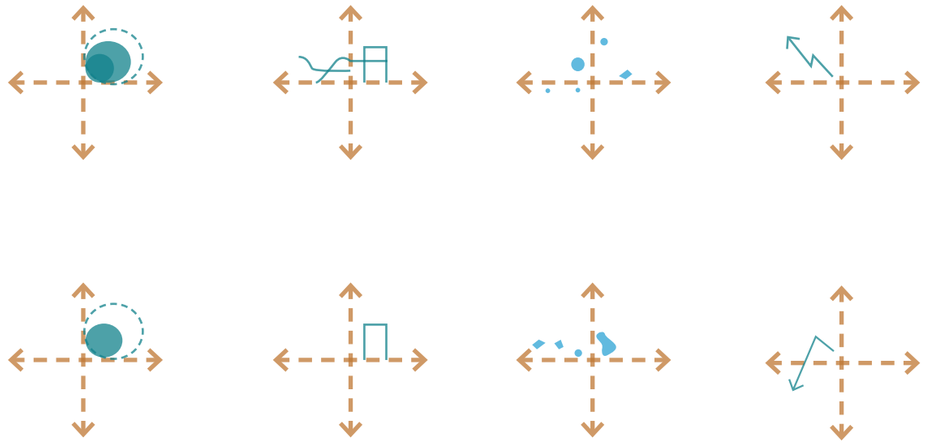




CROP LAND

ADMINISTRATIVE BOUNDARY

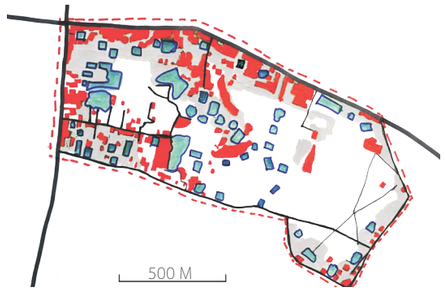
SETTLEMENT

WATER BODY

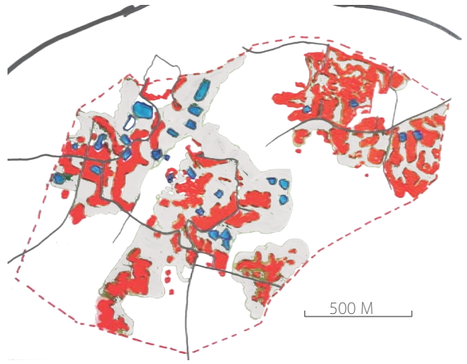
GREEN

Spatial Transformation

Analysis of the spatial transformation of Census towns across scales and types revealed that the towns closer to the city had more organised transport infrastructure as opposed to the isolated towns. Further, their economy was directly dependant on the city, while the cluster and isolated towns had demand dependant economies with poor future projections. Lastly, while the isolated towns maintained their ecological landscape, as the towns progressed towards the city they lost their natural wetlands and green spaces.

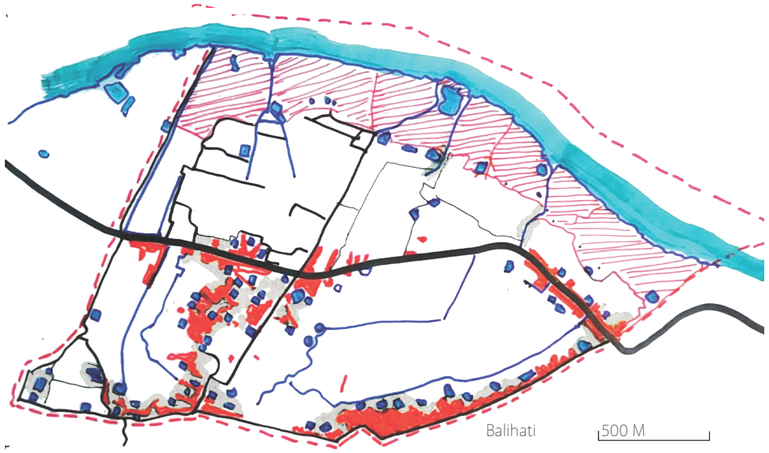


Amtala

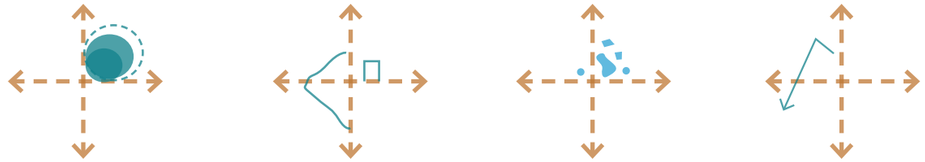


Anarbaria

Babanpara



Balihati

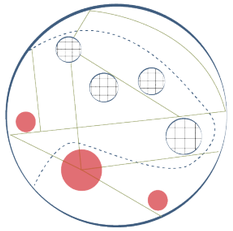


1. Circular Migration is a common adaptation strategy for populations affected by slow-onset or rapid on-set environmental change. It is a distress outcome for the lower economic groups of the population and often lead to exploitation and human rights violations.

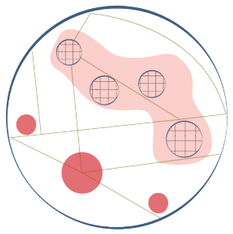

Traditional Knowledge

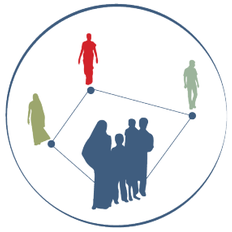

Community Networks

1. Traditional knowledge and the traditional ***community-based societal model*** are the key strengths of the migrant population. They are instrumental in their present capacity for climate resilience. However, due to the increasing climate pressure and lack of institutional support and basic services, these strengths are slowly being lost as people are moving as unskilled labour to alien lands.


Connectivity

2. There is an evident ***lack of spatial connectivity*** between the sending regions and the city of Kolkata. The lack of infrastructure also limits access to amenities like education and healthcare for the island population. While the difficult terrain is a deterrent factor for this, the lack of political will and improper planning are the primary reasons.


Governance

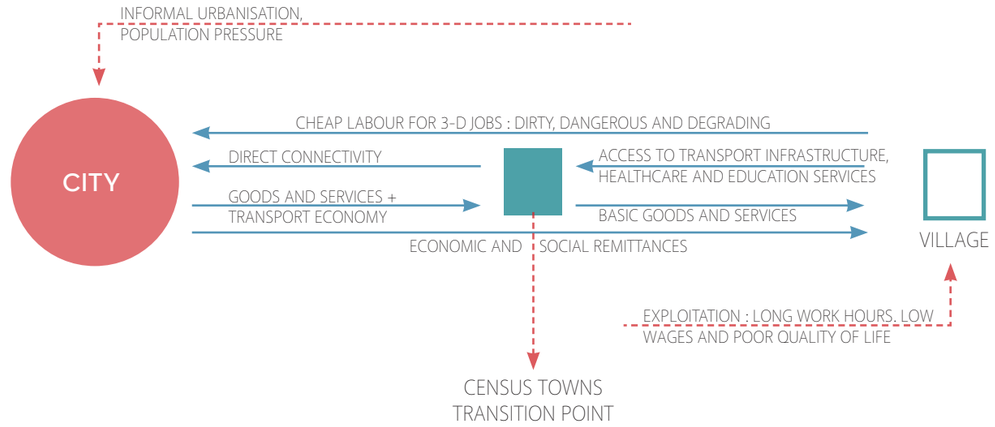

Trans-local Livelihoods

3. The state and national climate and migration policies of India and Bangladesh do not respond to the prevalent circular migration or long-term climate distress in the region. This leaves the migrants to fend for themselves leaving the economically disadvantaged to get trapped in debt cycles, exploitative informal employment and lose identity and culture in the receiving regions. They ***practice trans-local livelihoods***, by working in the cities in the off-season times and adaptive livelihoods in the homestead on-season.

Key Findings


Gender Sensitivity

4. The gendered nature of the circular migration is an important finding of this research. The change in gender roles and responsibilities and the additional pressures for both men and women need to be factored in any policy or action plan for the region. Currently, the NGO's play a vital role in supporting the population with their institutional, geographical and socio-economic challenges.



5. The region has seen an abnormal rise of Census towns in the past 2 decades. The ***towns are a point of transition*** for the migrants in their journey to the city as they have direct connectivity to the city (Kolkata). They also act as resource settlements for the rural areas as they are equipped with the basic services like markets, healthcare facilities and educational institutions. However the economies of these towns are temporary in nature and are heavily dependant on the demand generated by the rural population.

6. The Delta region is an ***ecologically sensitive zone*** with a rich wetland network and ecosystem services. However, the extended urbanisation is detrimental to its ecological health. This can be noticed with the rise in flooding instances in Kolkata city and the development pattern of the Census Towns, where wetlands are destroyed for real estate development.
The research builds upon these key findings to propose a regional strategic framework for the Delta which consists of spatial strategies and supporting policies which respond to circular climate migration.

The next section highlights some of the reference studies used to inform this framework.

REFERENCE STUDIES

- INTERNATIONAL
- REGIONAL
- LOCAL

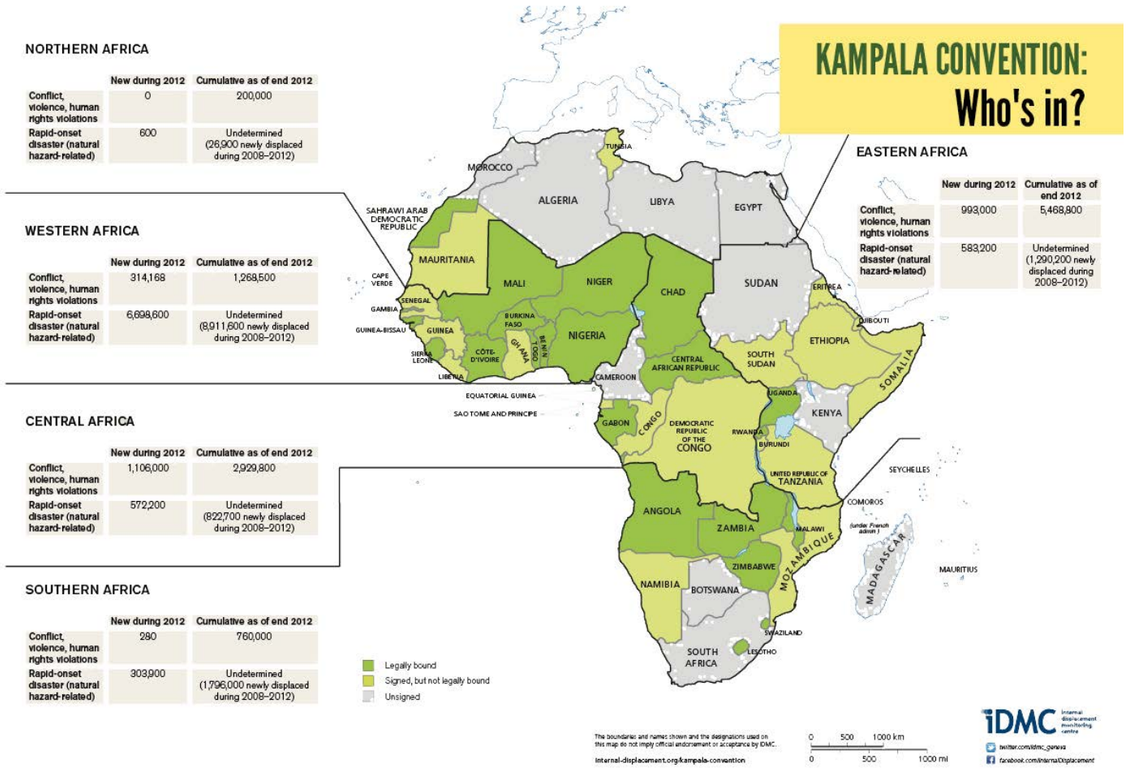


Figure 93: Overview of the countries part of the Kampala Convention ; Source : International Displacement Monitoring Centre

Kampala Convention and the Ugandan Refugee Policy

Kampala Convention and the Ugandan Refugee model

African Union Convention for the Protection and Assistance of Internally Displaced Persons or the Kampala Convention is a treaty which was adopted in October 2009 for ensuring international protection to populations displaced by armed conflict, natural disasters and development projects in Africa. It had been signed by 40 out of the 54 member states. It is the first of its kind legally binding international treaty protecting the rights of internally displaced people in the light of the growing displacement problem across the world. As of 2016, 25 out of the 40 signatories had ratified the document. (HelpAge, 2018)

Key Learnings (AU, 2009):

- Article 5(4) of the convention formally acknowledges natural disasters including climate change, as a cause for displacement and holds national authorities primarily responsible for the needs of the displaced and the host communities alike.
- Emphasizing on the need to uphold the dignity and the rights of the displaced, the convention mandates that information is provided to the people so that they can take a free and informed decision about where they want to settle and what they want to do. Adequate financial, social and institutional support must be provided for them to resume a dignified lifestyle.
- States are required to partner with relevant international organisations, humanitarian agencies and civil society actors to provide the required protection and assistance to the displaced.

Within the Africa Union, Uganda's Refugee Act (2006) remains the most progressive with its open border policy. Under this Act the refugees are entitled to the right to seek employment and free movement. They are also given access to the social services like health and education provided by the state. The policy also has a provision for providing land to families for their own agricultural use. (World Bank, 2016)

Despite the weak implementation of the policy, there have been positive social and economic impacts. The World Bank highlights that a 'commendable level' of peaceful coexistence has been achieved between the refugee and the host population. Further, 78% of the refugees in the rural areas are practicing agriculture and attract Ugandan traders for their crop surplus. Almost 43% of the population is employed in the local labour market actively contributing to the economic growth and fighting national poverty. (World Bank, 2016) The most notable initiative is the Koboko Partnership. A development plan initiated in 2015-16, the Partnership is a collaboration between the Prime Minister's Office, UNHCR, Koboko District's local government and civil society and private implementing partners. It aims to develop commercial agriculture for local economic development in the refugee hosting areas and increased self-reliance of the Congolese refugees of the district. With an initial infrastructural investment from UNHCR, land acquisition by the government bodies and skill training and agricultural equipment by the private and civil society organisations, the initiative represents true institutional collaboration. Further, it encourages social and economic interaction between the host and refugee community by creating a mutually beneficial model. (World Bank, 2016)

Conclusion

The purpose of this study was to understand the regional governance policies needed for successfully assisting the displaced population, in this case by climate change. A common understanding and acknowledgement of the problem at hand by both the nations involved, India and Bangladesh, is an imperative. At a larger scale it is possible to develop a similar legally bonding treaty for the SAARC nations (South Asian Association for Regional Cooperation). Freedom of movement and the right to work is essential to empower the population and move towards a self-reliant model from the current state or aid dependant one. The migrants should be treated as economic actors through the development approach with focussed investment in the pressing needs of the host communities. This will not only boost the local economy but also have social benefits like reduced safety and security risks.

Local Enterprise Partnerships - UK

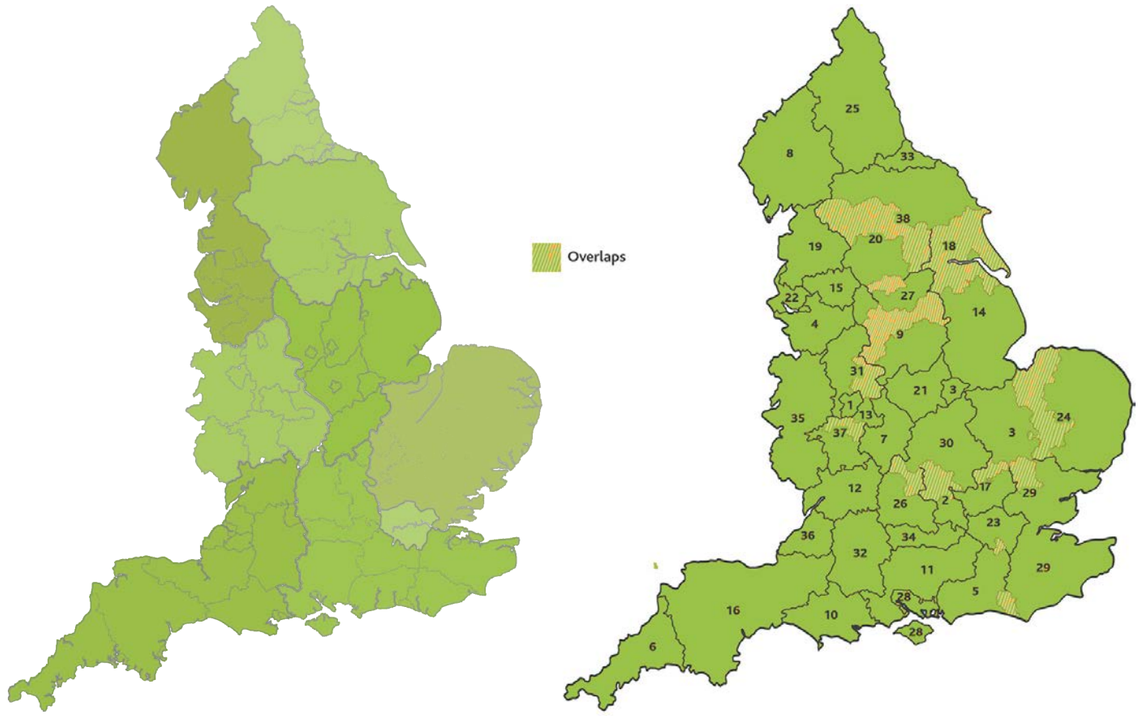


Figure 94: Comparison between the Regional Division of England and the LEP's Source : Public Domain

In 2010, the United Kingdom approved 24 Local Enterprise Partnerships (LEP) by publishing a white paper called 'Local Growth: Realizing Every Place's Potential'. This was a move towards shifting power and innovation to the local scale and dissolving the current practice of administrative regional development. The new policy encouraged dynamic local partnerships between businesses and local governments to operate in an area which made economic sense. The aim was to decentralize development and empower local communities to drive their economies. Private sector involvement in local governance and spatial plans was believed to transfer knowledge and expertise to the local communities. It was also introduced to channelize public and private investment for focused development. The new partnership bodies would contain atleast 50% of business professionals or be chaired by one. These bodies would then plan the infrastructure and other development investments. Further, a LEP network was formed to allow all the bodies to share their experiences, knowledge and good practices. (The Smith Institute,2013)

Conclusion

Even though the model has seen widespread criticism and has faced funding and administrative issues, it is theoretically very strong. Considering the case of mono-centric regions like the Ganges-Brahmaputra Delta, the LEP framework can be used to activate poly-centric development. Further, it can reinvent the cross-border relationship through renewing old economic ties like the Jute Industry and forming new ones for more holistic development. The key need is to generate local jobs and economic growth within the region to attract the migrant population and reduce the out-migration to outside the region.

Western Ghats Development Programme

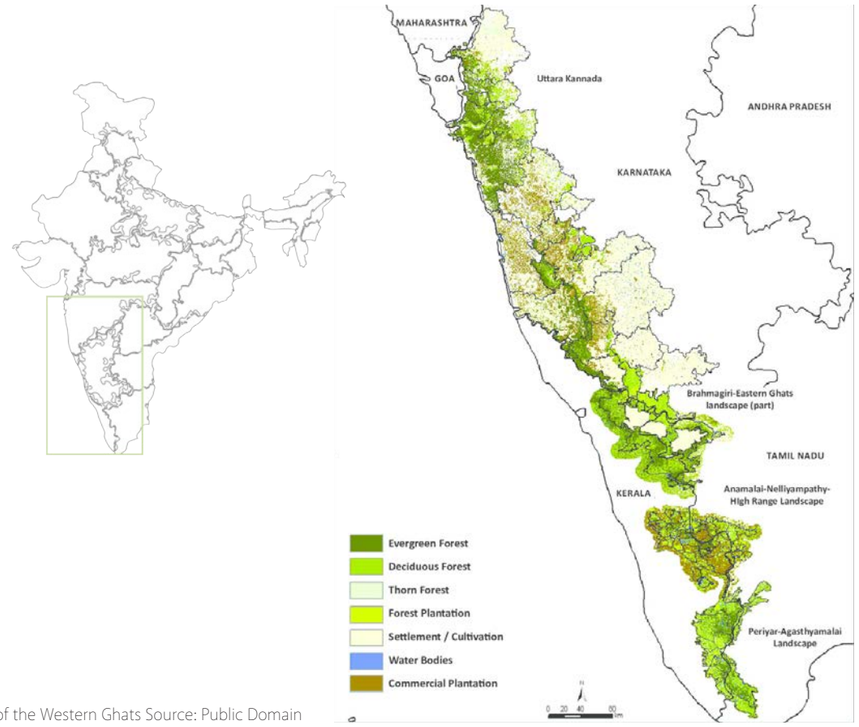


Figure 95: Regional Plan of the Western Ghats Source: Public Domain

The Western Ghats Hills are hill ranges located on the inner edge of the western coast of India. The hills span a length of 1600 square kilometres cutting across five states (2nd tier administrative units) – Maharashtra, Karnataka, Kerala, Tamil Nadu and Goa. Due to the increasing population pressure and its consequences on the fragile ecosystem of the ecological area a Special Area Programme called the Western Ghats Development Programme (WGDP) was launched in 1974-75. In 1981, the description of the Western Ghats Region was included into the programme. The area was demarcated based on the elevation and in line with the sub-district administrative divisions. 159 divisions were picked for the implementation. Each state was provided special central funding for the conservation of the range within their administrative boundaries with 75% weight-age to the hill area and 25% to population residing in the area.

The WGDP has released nine action plans, each with a different set of objectives. Seventh and eight plans focused on maintaining the ecological balance, biodiversity preservation and awareness and education programs for the locals. The Ninth plan shifted to an Integrated Watershed Approach. This required the identification and demarcation of micro and macro watersheds and the preparation of an integrated development plan addressing all the relevant sectors. A comprehensive Perspective Plan to guide this approach was formed in consultation with all the State Governments.

Conclusion

Similar programs have been employed in various ecological regions of the world, with the watershed management in Europe, specially the Alpine region being an exemplary example. However, for this research a contextually relevant example from the same region was chosen to understand the governance dynamics. The primary learning from this study is that the Central government in India is sensitive to ecological regional planning. Further, the funding dynamics for this program can be used as an inspiration for the Delta Region. The Ganges-Brahmaputra region needs an ecological plan to preserve its wetlands and have a combined flood-risk plan for the benefit of both India and Bangladesh. This needs policies and laws to preserve the existing water bodies and revive the old ones to make a network with the river system in the region.

Figure 96: East Kolkata Wetlands bordering the city of Kolkata

Figure 97: A view of the wetlands ; Source : https://www.telegraphindia.com/states/west-bengal/plea-to-regularise-east-calcutta-wetlands-road/cid/1672879

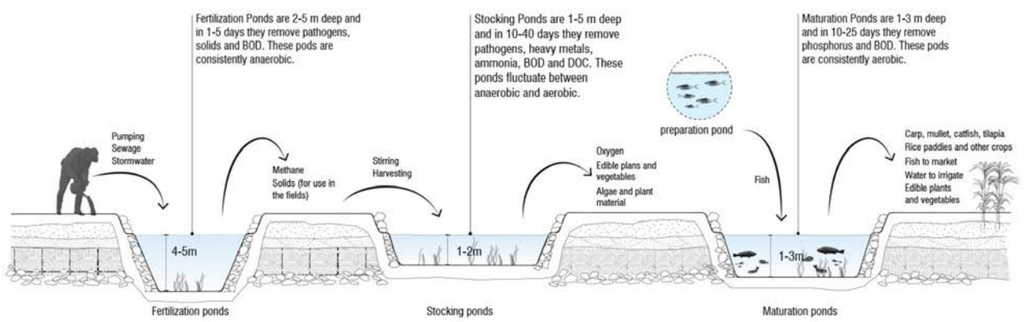


Figure 98: Working of the Wetlands ; Soruce : Illustration by Despo Thoma ; Source : https://www.studiorede.com/india-wasterwater-wetlands

East Kolkata Wetlands

The Eastern Kolkata Wetlands (EKW) are a unique and perfect example of an ecosystem conserved by traditional knowledge and ecosystem services. Managed by local communities since the 1960's, the EKW are the largest organic wastewater treatment systems in the world. Classified as a Ramsar Site in 2002, the site is a community run and managed system which embodies all the principles of circularity and conservation through ecosystem services. The 12,500 hectare wetland comprises of 254 sewage fed fisheries, agricultural plots and solid waste farms. Initially a buffer zone, the area was earlier used as a dump-site for the city's waste. The communities slowly developed the practice of sewage fed pisciculture and agriculture. With 45.93% of man-made water area, the waste water goes through many processes of purification before reaching the fields or the fish ponds. (Saha, Pal, Kundu , 2008)

250 million gallons of sewage flows into the fertilization pond through a sluis gate made with bamboo sticks which segregates the plastics and floating solid waste. The construction of the gate requires a specific skill for which workers are specially called from a nearby town. The water and sludge then sits in the fertilization pond for 1-5 days where all the pathogens, solids and BOD are removed through bio- re-mediation and anaerobic processes. These ponds are harvested for Methane and solids for agricultural use. The water then moves to shallow stocking ponds through gates where reeds and a mix of aerobic and anaerobic processes remove the heavy metals and ammonia from the water. Finally the water moves to a fish pond where the fish through consistent aerobic processes make the water fit for irrigation. (Saha, Pal, Kundu , 2008)

Ecosystem Services

The wetland is a source of livelihood to close to 50,000 people from the communities which reside within or on the fringes of the wetlands. Their work ranges from managing the different processes of water purification to garbage segregation and recycling. They use traditional methods for recovering the resource and produce 2-4 times the average fish produce from a regular pond. Further, the communities also manage the wholesale of their produce and provide for 1/3rd of the vegetable, rice and fish requirement of the city.

Governance

After the EKW was declared a Ramsar Site, the State government of West Bengal formed an exclusive committee called the East Kolkata Wetlands Management Authority to manage the wetlands. The Authority consists of representatives from across sectors, from the Department of Urban Development, Department of Environment to NGO's and civil society representatives. The committee mapped all the land uses and plots of the site area and formed a sub-committee for outlining a conservation plan. The plan mandated that no construction or alteration in the landscape can take place without the permission of the Authority. (Saha, Pal, Kundu , 2008)

Conclusions

The EKW are an inspiration for this research in many ways. Starting with the scale and circularity of the process, the wetlands are a sustainable model and has scope to be a long term solution for the waste issues faced by cities in delta regions. The model can be replicated for any size of settlement and can also be used as an instrument to preserve natural wetlands and reduce flood-risk. For the Ganges-Brahmputra Delta region, this process can be implemented in the upcoming urban areas through policy and sensitive land-use planning. Further, the community-embedded process reinvents the urban-rural discourse above the current agricultural roles assigned to the rural areas. It assigns responsibilities like waste management and nature conservation to the communities which are fulfilled by using their traditional knowledge with interventions by modern techniques and research wherever required.

Transition

This research proposes a regional spatial and governance strategy where it generates a livelihoods framework to accommodate the migrants and their circular lifestyle as well as trigger poly-centric development in the region.

^Source: Photo by Joydeep Gupta, Account cited from the India Climate Dialogue. https://indiaclimatedialogue.net/2018/01/15/rising-sea-swamps-island-along-bengal-coast/

STRATEGIZING TRANSITION

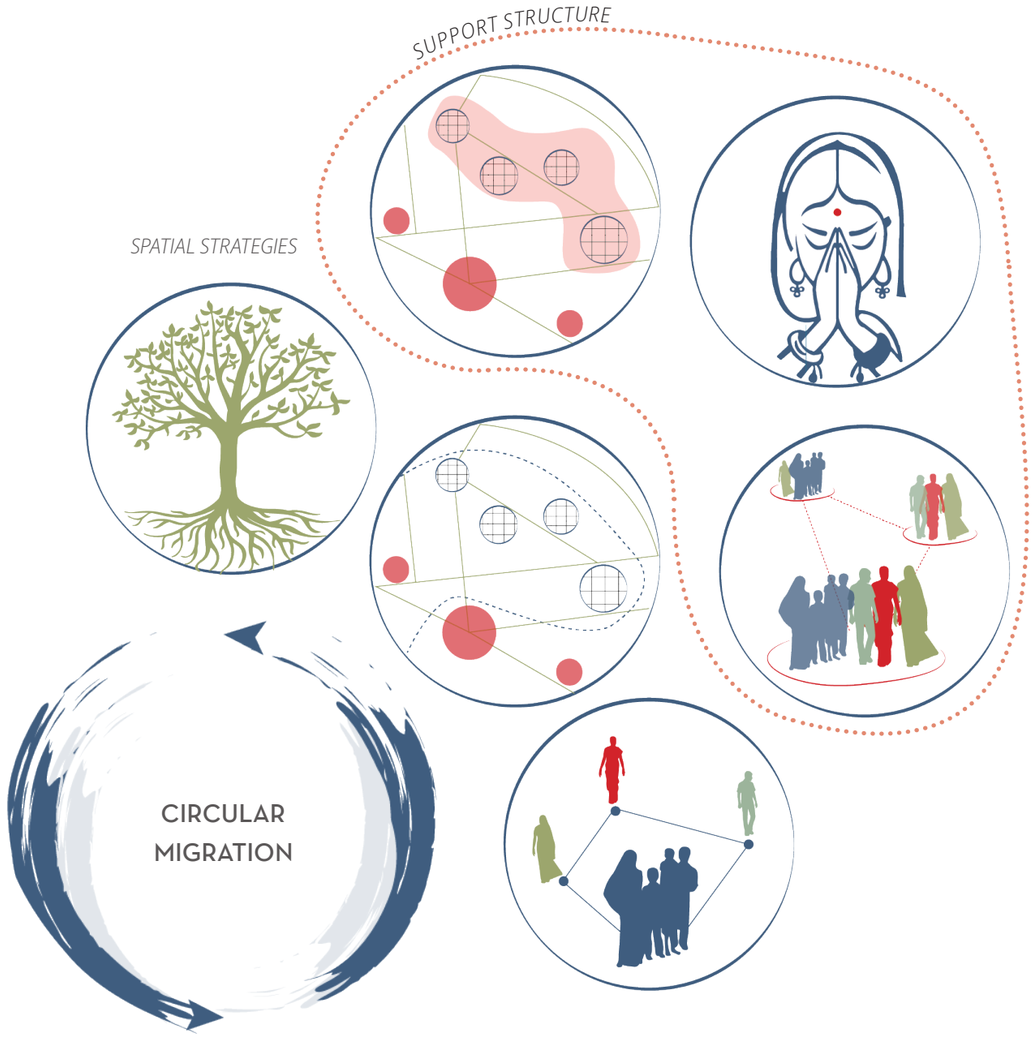


Figure 99: Research and Design Themes ; (Author, 2019)

Restructuring Opportunities

This research proposal takes a two-point perspective to the problem field. It aims to use the current migration trend as an adaptation strategy for climate migrants by accommodating them in a spatial and governance strategy for the larger region. Further, to use this migration as a catalyst for the benefit of the region. This is done through a regional framework which consists of spatial strategies and supporting policy guidelines. The strategies are based on a set of themes which were extracted from the exploration. Pre-requisites and policy recommendations have then been defined to address the themes which could not be addressed through the spatial strategies. It is a multi-scalar approach which aims to create sustainable livelihoods for the climate affected population.

Spatial Strategy Themes

1. *Traditional Knowledge* : The research considers traditional knowledge to be the primary asset of the migrant population. The strategy works with this core notion to use this knowledge for the socio-economic and environmental benefit of the region, exclusively in the context of small towns like the Census Towns.

2. *Connectivity* : The framework proposes strategies to increase the connectivity from the sending regions to the mainland for the ease of movement.

3. *Translocal Livelihoods* : The existing trend of translocal livelihoods as an adaptation to the changing environment has been reinforced by carefully planning these livelihoods based on the traditional knowledge of the migrants.

Support Policy and Action Themes

1. Governance : Models to implement the spatial schemes and bring the communities to the forefront of the fialogue have been proposed. These provide an idea of the roles and responsibilities of the various key actors in the process.

2. Gender Bias : Policy recommendations have been made for gender sensitive planning. The recommendations aim to form a safety net for the migrants, exclusively the women to facilitate their economic independence and increase climate resilience.

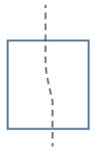
3. Community Networks : Methods and key actos for establishing trans-local community networks have been given to form safety nets and maintain the community value of the migrating communities.

The normative ideology of the proposal is that environmental migrants do not need a top-down aid based regime to escape the current negative vulnerability cycle. The current aid based regime has a very limited impact for a short period of time. They need access sustainable livelihoods in order to sustain and grow in environmentally difficult areas. This needs to be planned in addition to the existing disaster mitigation strategies being employed in such regions.

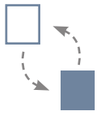
The recent response to Cyclone Fani (which hit the Ganges-Brahmaputra Delta in April 2019) showed the increased awareness of the governing bodies in disaster risk reduction and mitigation. The Government of Odisha succeeded in moving 8 million people to safety in 3 days, away from a very severe cyclone. However, post the cyclone the people remain trapped in debt cycles due to the loss of livelihood and the burden of reconstruction.
There is a need to include their skills and provisions for developing their skills further in the spatial planning and governance models of the affected region.

This can be done by activating the safe zones to accommodate the livelihoods of the people from the affected areas to localise benefits which would also encourage economic growth.

The following sections detail out the strategic framework over 3 major scales - Regional, Functional Relationships and Local.



REGION



FUNCTIONAL RELATION

LOCAL

The proposal works over 3 major scales of intervention :
1. Regional : A model to re-organise the urban-rural system. Applying this model on a new cross border Bengal ecological for careful economic planning which creates opportunities for the environmentally displaced and migrants to practice sustainable livelihoods.

2. Functional Relation : Elaborating on the systematic relationship between the sending region, census town and the city to implement the regional vision. Proposes community-based governance models to establish these relationships and give a more homogeneous urban development across the region.

3. Local Area planning guidelines : Suggesting spatial guidelines to be considered during the local area planning of the Census towns. The guidelines aim to serve the regional vision and manage the predicted growth with a socially and environmentally sensitive approach.

Each scale of intervention also defines the key actors and their responsibilities to achieve the intervention proposed. Each scale is explained starting with a model system which is the transferable element of the strategy and then the application of the model on the Ganges Brahmaputra Region.

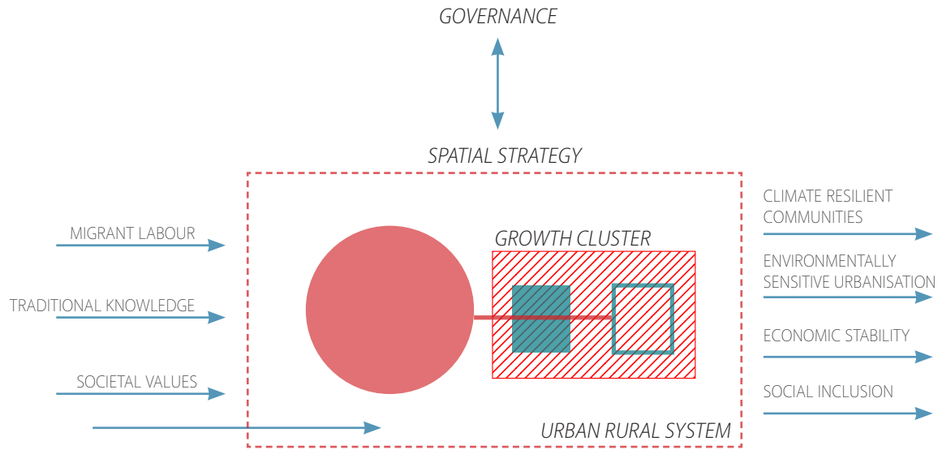


Figure 100: Model for an Urban Rural Region (Author, 2019)

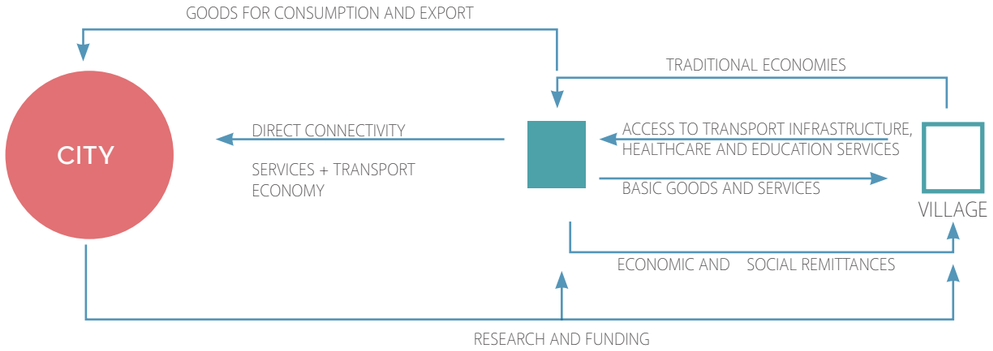
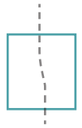


Figure 101: Restructuring the relationship (Author, 2019)



Proposal

Regional
This research looks at delta regions as one of the most environmentally vulnerable geographies. Further, it established that the deltas in the developing nations are at the front-line of the disaster. However in most instances, these regions are divided by political boundaries, often governed by different notions of development.

As a conclusion to the exploration, the research establishes that the first step towards protecting the environmental migrants is to recognise their existence and give them a uniform definition across the region. For this, it is essential to acknowledge the delta region as one spatial entity. While the administrative jurisdiction can remain the same as the existing system, the planning and local governance guidelines need to acknowledge the ecological and cultural functionality above the political boundaries.

Upon establishing this, the next step is to conduct a detailed vulnerability mapping with the indicators considered in section 4.3XX. This would reveal which communities are at the front-line of the disaster and need immediate attention. Next, the region should be designed as an Urban-Rural system (shown in figure 97).

The Urban-Rural system is an alternative to the prevalent extended urbanisation in the developing world. It identifies and respects the independent functions and the spatial integrity of the big city, the emerging towns and the rural villages and plans around these functional demarcations. The system begins by highlighting the transitional role played by the emerging towns in the city-village (urban-rural) relationship. It then redefines the functions of the town to accommodate economic opportunities for the migrant rural population and the functional demands of the traditional economies. This makes the town a processing unit and an economic hub for the rural hinterland. The careful planning of inter-dependant industries in a cluster of towns activates the growth of the settlements. This phenomena allows poly-centric development outside the limits of the big city. These new economic hubs have been termed as ***Growth Clusters***.

Input : The traditional knowledge, manual labour and social values of the migrants are the input resource for the system. As mentioned earlier, these are the strengths of the migrants which make them social and environmental assets for the region.

Output : The use of traditional knowledge and economies spearheaded by the migrants allows the careful use of resources and puts the towns on a sustainable development trajectory as opposed to the current resource intensive urbanisation. Further, the activation of the traditional economies provides a sustainable long term economic model for the towns and restores the initial social values of the society. Lastly and most importantly, the system gives the migrant population economic remittances which allows them to escape the debt cycles and rebuild their homesteads in the event of a disaster. In addition they also take back technology and innovation which is instrumental in strengthening their climate resilience and facilitating their growth without compromising on the spatial and social construct of the rural society.

The key actors involved in the system have been categorized into Public (Institution), Private and Civil Society, symbolized for the rest of the chapter as follows.

Figure 102: Vision Map (Author, 2019)

The New Region

The regional model when applied to the Ganges Brahmaputra Delta suggests the formation of a new cross-border region as shown in figure 98. The analysis of the Delta region revealed the ethnic and cultural similarities across the region despite being divided by an international border. The socio-economic and environmental challenges faced are also uniform across the geography. Further, the movement patterns of the migrants also suggest the presence of formal and informal functional relationships across the region, despite the presence of a heavily secured border. The region defined and tested for this proposal consists of the administrative districts of North and South 24 Paraganas in India and Satkhira and Khulna in Bangladesh.

Due to the limitations of time and resources for this research, the model has been tested in the Indian half of the Delta. However, a similar trajectory for the analysis and design can be followed to generate a similar scheme for the Bangladesh Delta.

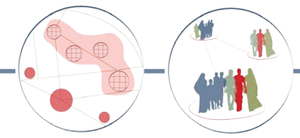
By mapping the existing economies and documenting the traditional knowledge, the system generates a configuration of growth clusters. These clusters respond to a set of features which form a model for their identification and development. (elaborated in the Next section) It then functionally plans the livelihoods in the cluster to ensure there are work opportunities available across all seasons of the year. To enable the migrants to feed into this system and create a daily commute patterns. Transport interventions have been proposed to increase the connectivity from the sending regions and across the border to the mainland.

Further, economic planning is carried out keeping the ecological balance as a key consideration. Guidelines for the preservation of the existing environment of the growth clusters have been charted to mainly protect the wetland network in the region.

The strategy consists of 4 key features, elaborated in the consequent sections :

1. Polycentric Development : Growth Clusters
2. Connectivity
3. Flood and Water Management
4. Traditional knowledge Economies

POLICY RECCOMENDATIONS



The following policy interventions are required for the implementation of this strategy.

1. Bilateral Memorandum of Understanding : An MoU ratifying the definition of a climate migrant and defining their rights and obligations needs to be signed and upheld across the region. The MoU should define the roles and responsibilities of the national, state and district level governments to carry out the required surveys and procedures for the economic planning of the region.

2. Economic ties : Provisions for strengthening bilateral economic ties through logistics and market dynamics like subsidies and investment to facilitate the growth of the traditional economies. Incentives to smoothen the cross-border flows of these industries should also be planned collaboratively by all the respective ministries (Ministry of agriculture, fisheries, jute etc) and the climate change bodies.

3. Strengthening Civil Society collaboration : State initiatives to organise collaboration between the non-governmental organisations working in the region should be taken as a part of the MoU. These should be implemented by establishing cross-border knowledge platforms through conferences, online platforms and libraries to curate and share the on field experience of the agencies. The co-ordination of such collaborations can be done by international agencies to increase the visibility and attract the NGO's for participation.

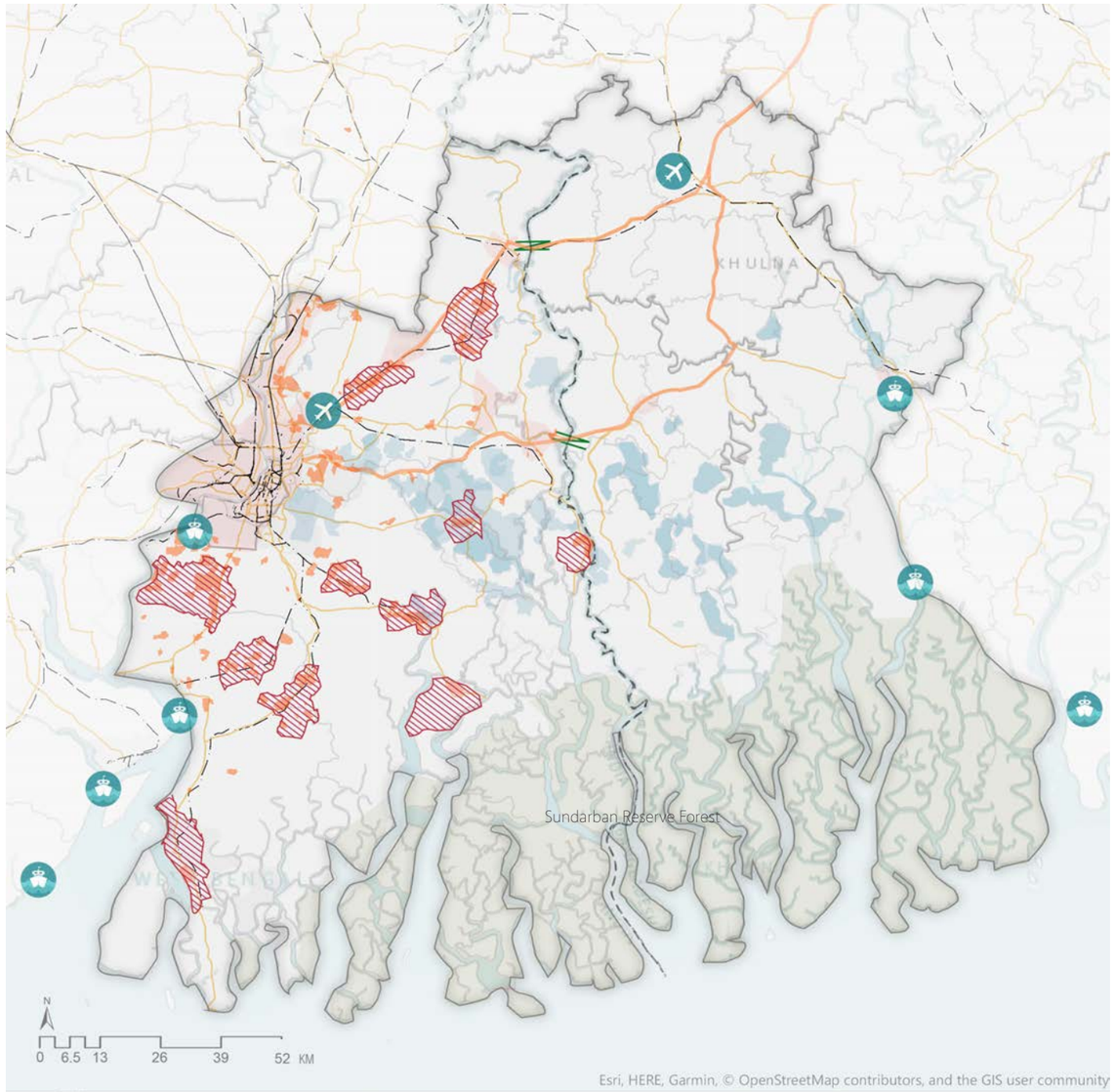


Figure 103: Proposed Growth Clusters (Author, 2019)

1. Poly-centric Development

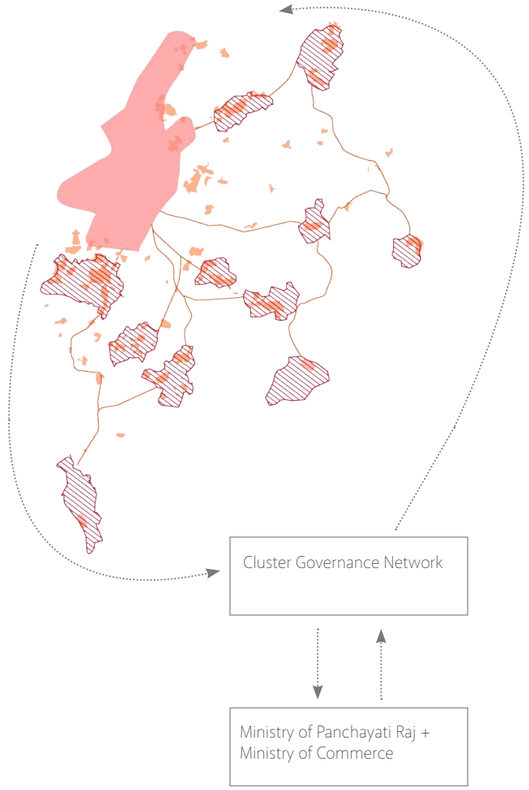


Figure 104: Proposed Poly-centric development

This strategy proposes a shift to poly-centricity in the predominantly mono-centric region. It introduces alternate areas for urban development which form a network with the existing road and rail infrastructure, connecting them directly to the city of Kolkata. The region is primarily dependant on agriculture and aquaculture for employment, with limited processing and storage facilities which are concentrated in the city. A dispersion of these to clusters of Census Towns has been proposed to initiate an alternative development trajectory.

The clusters have been termed as Growth Clusters and consist of urban and rural settlements which act as a processing unit for the surrounding hinterland. They not only act as economic hubs, but also as safe havens for the climate migrants. Stable economic opportunities on the mainland allow the migrants to practice sustainable livelihoods and in turn increase their resilience. The boundaries of the cluster are defined by analysing the existing economy, processing industry and the nature of the census towns.

The Clusters absorb the migrant population at different times of the year according to the industry they host. The increased connectivity to the hinterland allows the migrants to reach their workplaces in shorter commute times. This reduces the pressure on the informal economy of Kolkata and its peri-urban areas and will have a long term impact on the informal settlements. The Clusters form a network through the rail and road systems and are inter-dependant on each other for raw materials and markets. These economies also stimulate the production in the hinterland and aim to curate the traditional practices of production and processing production processes through the migrants.

The administrative bodies of the settlements in a cluster form a partnership with each other as well as interested private, public and civil society organisations to share resources and plan as well as implement the economic trajectory and industries in the cluster. These partnership bodies further form a virtual network through a knowledge sharing platform where they share their experiences, opportunities and build allies for development. This platform also informs the relevant ministries of the developments in the region and facilitates the sharing of the methods to other parts in the country.

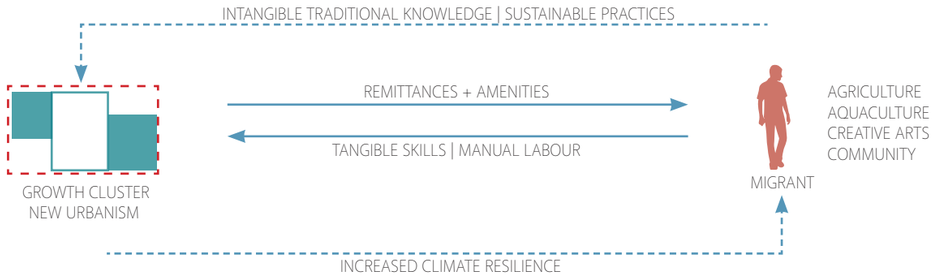


Figure 105: Restructuring the relationship (Author, 2019)

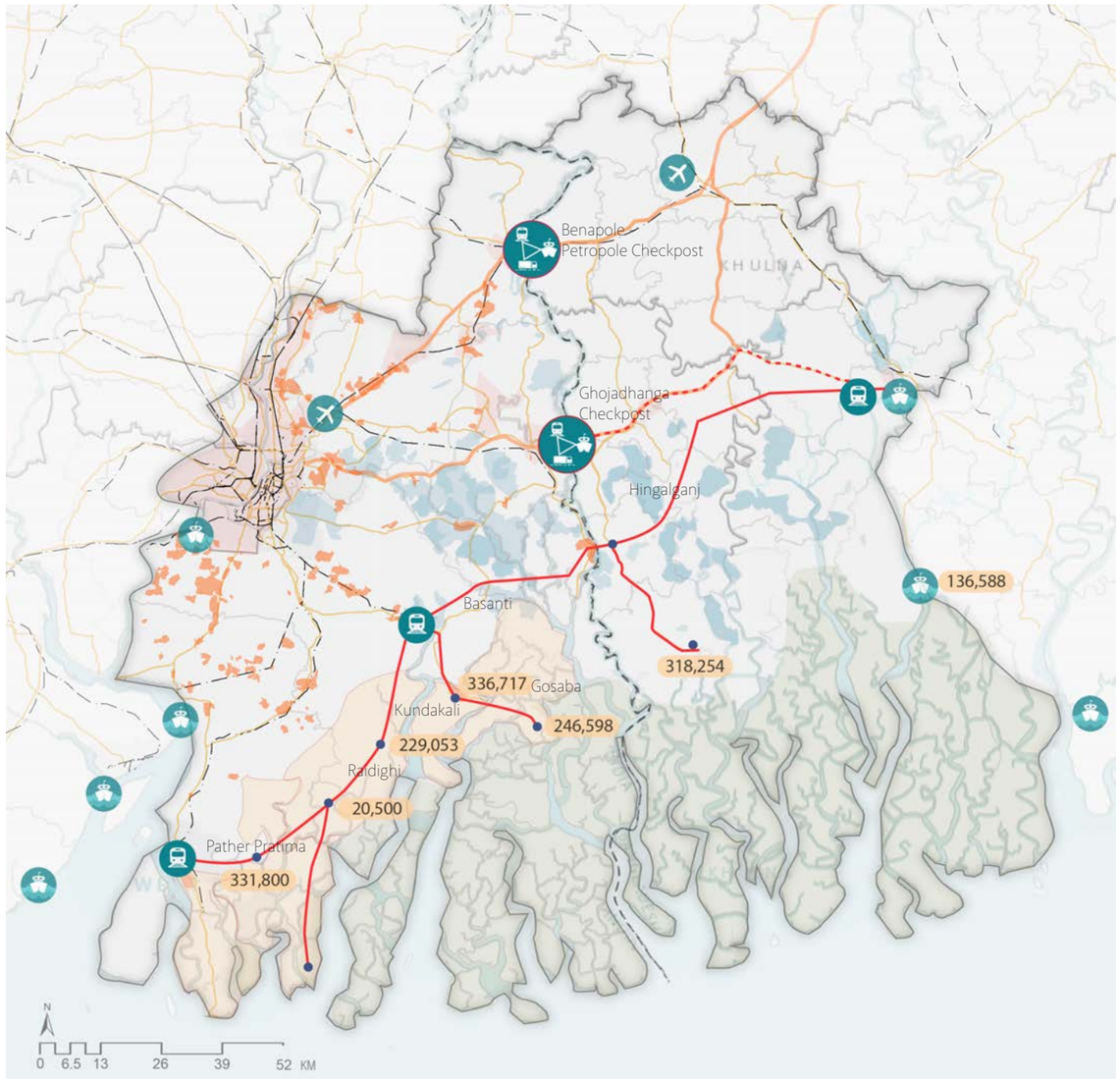


Figure 106: Improving rural connectivity (Author, 2019)

2. Connectivity - Rural Infrastructure

Improving rural connectivity is a key starter strategy for this proposal. Connecting the remote islands through road infrastructure will allow the residents to avail the services and opportunities in the towns. The infrastructure will include Concrete block or brick roads and bridges wherever required while the construction and maintenance will be done by a community-based organisation.

The connection to the mainland network will also ensure supply of local workforce for the Growth Clusters. Since these islands are ecologically sensitive, heavy-duty infrastructure like railways are not feasible. Hence, direct connections from the existing highway to the centres of the existing administrative blocks have been proposed. The implementation model for the construction will be similar to the case example presented here. However additional funding will be availed through the existing rural schemes like the National Rural Employment Programme (NREP) which ensures renumeration for voluntary labour contribution for constructing public infrastructure. Funds for the materials can be mobilized from the Pradhan Mantru Gram Sadak Yojana (rural roads scheme) as well as international organisations.

Further, transport network changes need to be made to introduce small bus hubs in the marked settlements as well as multi-modal hubs at the border checkpoints for efficient movement across the region. An efficient bus service will be put in place by the local governments or tendered to private contractors feed into the Cluster network. However, the streamlining of water transport also needs to be done to ensure all islands are connected. For this, a central body will coordinate the boats, which are procured from private organisations as a part of their Corporate Social Responsibility and run by local boatmen to provide timely services. Each boat needs to be equipped with basic amenities like toilets and first aid.

CASE Example : Rural Infrastructure Development under SCBRMP in Bangladesh

The SCBRMP is a 12 year community-based resource management project funded by the International Fund for Agricultural Development. It is being implemented through a collaboration of different institutional stakeholders and community groups. The objective of the project was to increase the income and livelihood opportunities for the remote areas with high poverty rates in Haor, Bangladesh through rural infrastructure development, community fisheries, micro-finance, agriculture and project management. (INAFI & PROCASUR, 2014)

The rural infrastructure was build in the form of concrete block roads through a Local Contracting Society(LCS). The permanent residents of the villages connected by the road could enroll for the LCS if they were unemployed with less than 2.5 acres of arable land and physically capable. Women and locally skilled labour would get precedence. An implementation team managed by the local leaders and professional contractors was also formed and engaged in the process. SCBRMP has built 352152 km of village roads through this model, connecting 935 villages to the road network. (INAFI & PROCASUR, 2014)

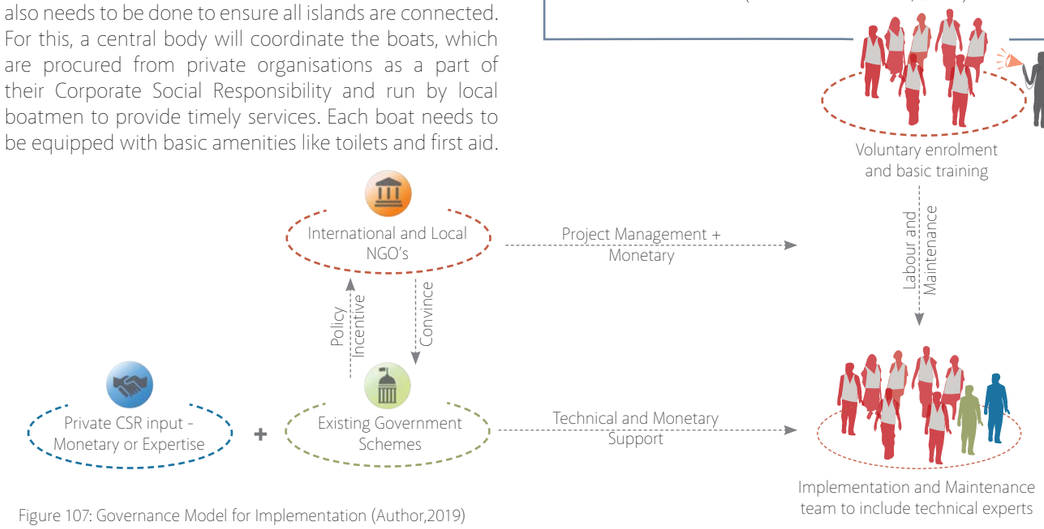


Figure 107: Governance Model for Implementation (Author,2019)

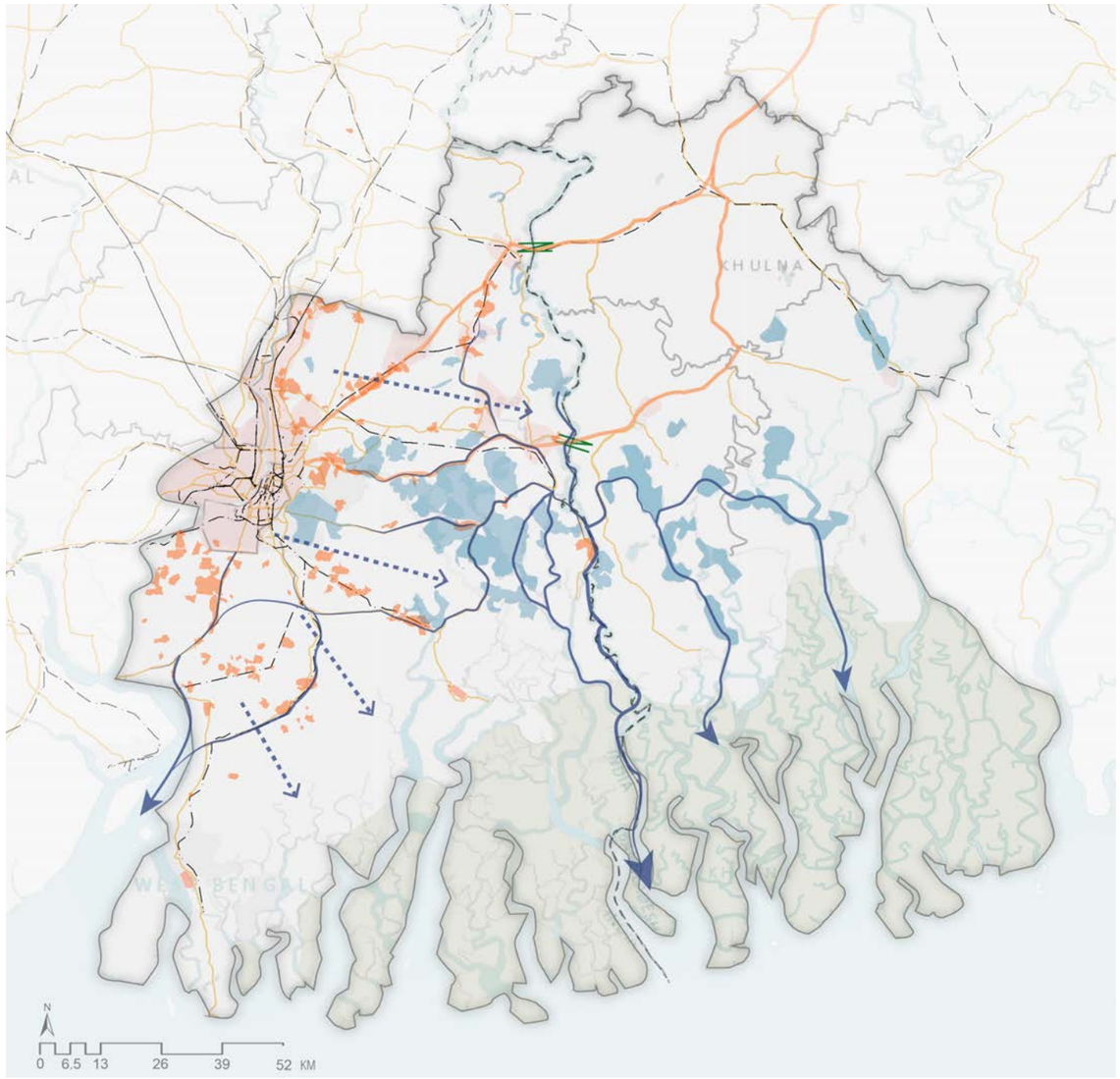


Figure 108: Proposed Wetland Network (Author, 2019)

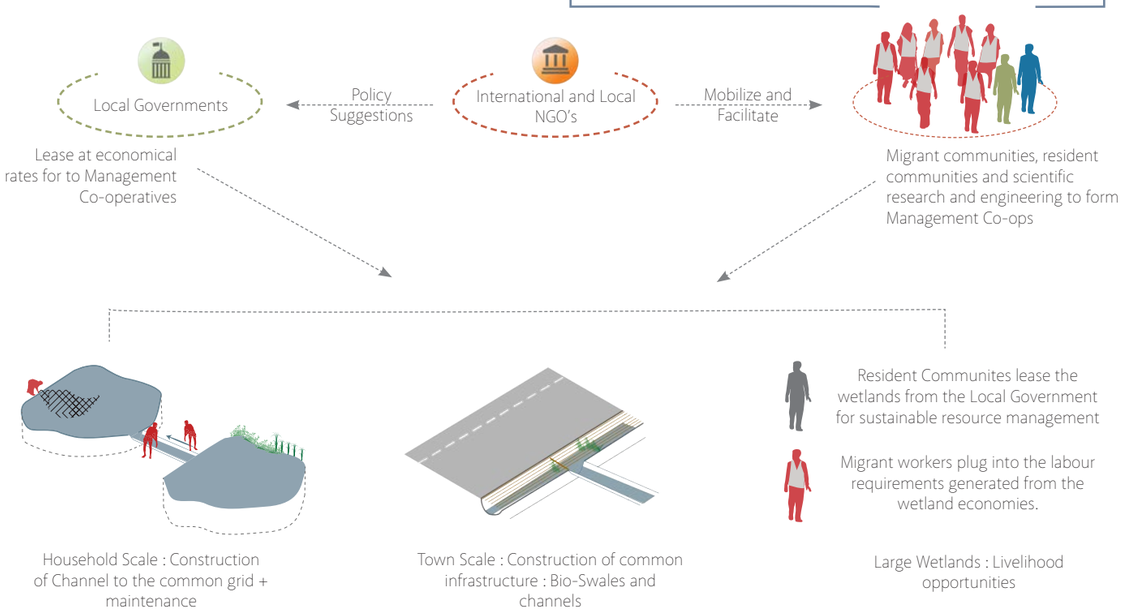
3. Flood and Water Management

To ensure environmentally sustainable growth of the region, it is essential to address the flood risk which disrupts peoples lives for 3 to 4 months in a year. The plan proposes the preservation of the existing wetlands of the region and to form a physical network between the small ponds, their neighbouring wetlands and the larger cluster of wetlands in accordance with the slope of the land. This would make room for the rain water to move through the region and drain out into the main rivers. It will also preserve the surrounding biodiversity and enhance the provisional benefits for the region.

However, strict policy and laws to enforce this preservation, is necessary to curb the current trend of filling and building over the wetlands to meet the demands of the real estate market. Additionally, generating an economic value is essential to provide ownership and motivation for the conservation of the wetlands. Using the migrants traditional knowledge of pisciculture and organic sewage treatment, (as seen in the case of East Kolkata Wetlands) traditional economies can be developed around the wetland ecosystem. This provides an incentive to communities to protect their source of livelihood. Collaboration with scientific research and monitoring is necessary for informed conservation and to sustainably maximize these economies. The network will be made by making bio-swale connections which will have a considerable impact on the air and spatial quality of the region. Water conservation is one of the only elements which runs across all 17 Sustainable Development Goals.

CASE Example : Community Based Co-management of Wetlands, Project MACH, Bangladesh

Management of Aquatic Ecosystems through Community Husbandry (MACH) project was developed in response to the extensive flooding in the South Asian region. With an aim to restore wetlands and the biodiversity, the project took a landscape management approach to conserve three large wetland systems covering 32,000 hectares. It devised a community involvement methodology to enable the local communities to manage the natural resources and reap direct benefits. The key building block of the programme was the formation of 16 Resource Management Organisations which represented all the user groups of the wetlands. The RMO's were registered with the local government and were given 10 year lease access to the wetland area. The elected representatives along with the wider community involved charted out management plans and set the targets. 60% of the members were from the poor communities and received training and credit from a larger robust system. Community planning workshops were held to plan the resource use of the sites. (World Resources Institute, 2011)



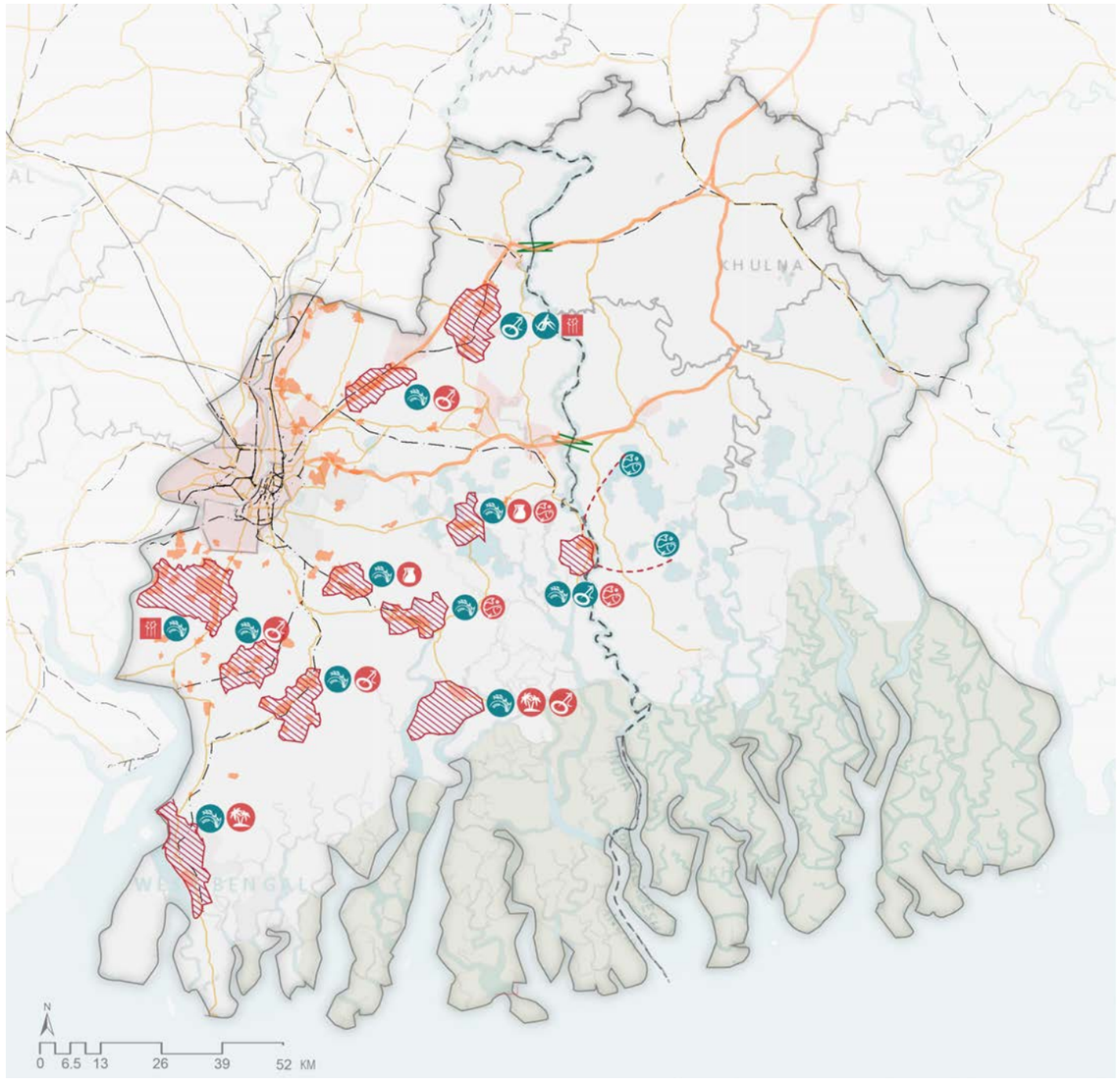


Figure 109: Traditional Knowledge Economies (Author, 2019)

Existing Intervention

- Jute Mills
- Terracotta Industry
- Agricultural processing
- Kantha Stitching Handloom
- Jute Handicrafts
- Fisheries

4. Traditional knowledge Economies

The mapping of the existing industries and small scale processing units in the Indian Delta revealed the economic strengths of the Growth Clusters. These economies were then analysed for their seasonality and ability to create a labour demand. This created a time-line for each cluster based on the existing and gives a guideline for which industries can be introduced to fill in the gaps in the time-line. The interventions ensure that the space allocated for processing has a defined use for different parts of the year.

The migrant population can choose to plug into any of these industries at the times convenient to them. This makes their trans-local lifestyle more comfortable in terms of shorter commutes, freedom to stay in the homestead and avail work opportunities in relatively formal environments ensuring their security. While the use of traditional knowledge makes them indispensable and additional regulations to ensure their employment are also necessary.

The process of allocating these economies and their spatial and governance design has been elaborated in the next section.

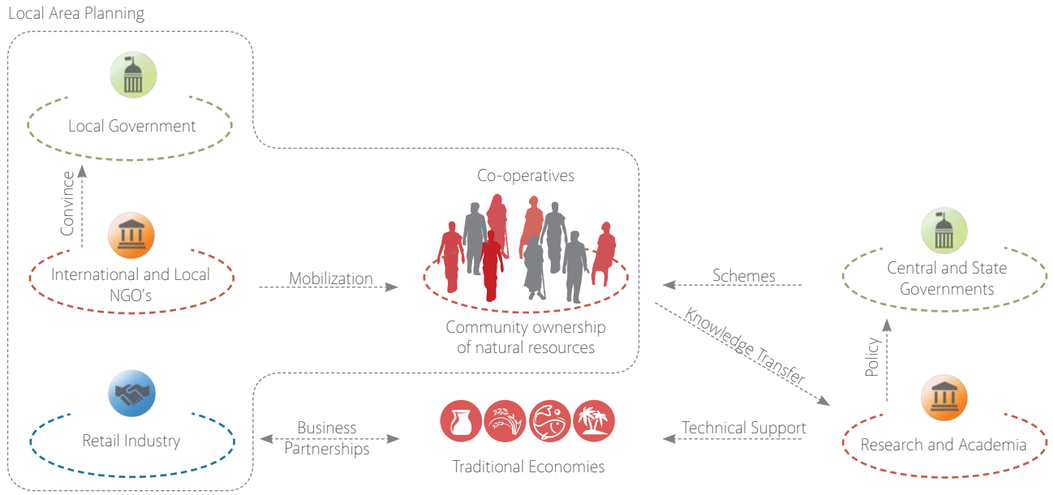


Figure 110: Governance Model for Implementation (Author,2019)

Seasonality

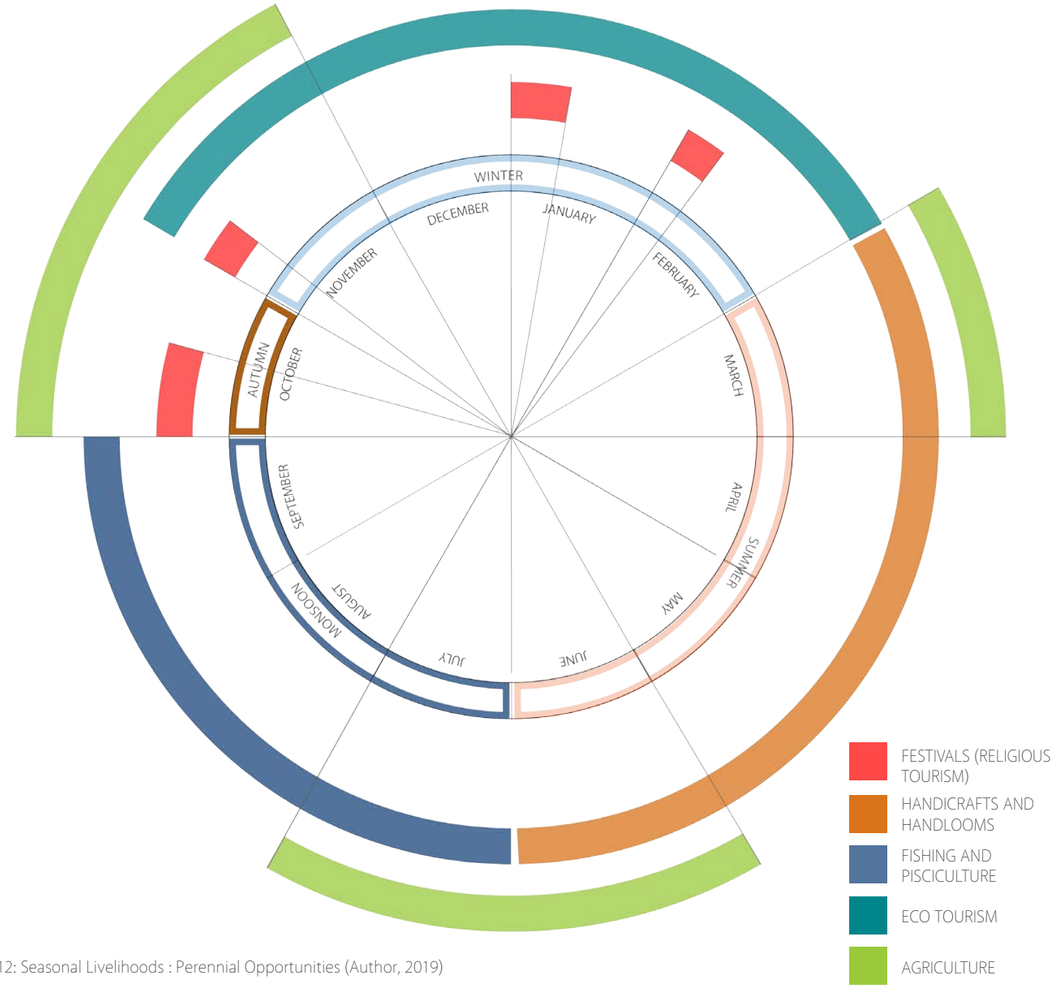


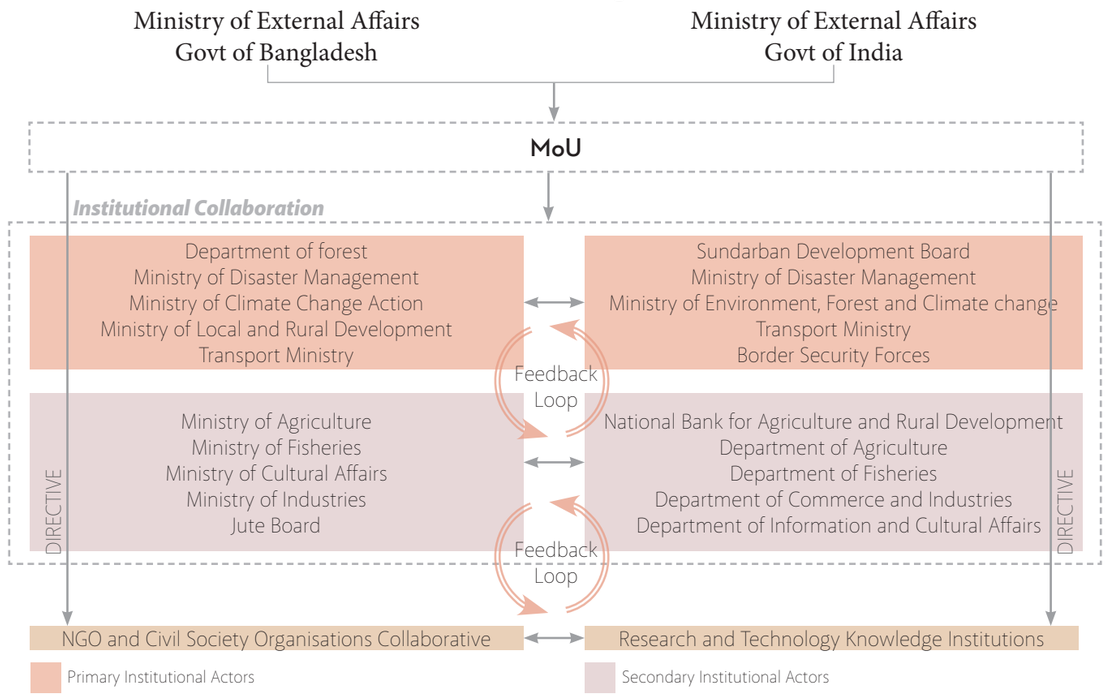
Figure 112: Seasonal Livelihoods : Perennial Opportunities (Author, 2019)

The key to creating sustainable livelihoods is to ensure that work opportunities are planned in accordance to the movement periods of the migrants. For this the life-cycle of each industry is mapped over time and intervals where the migrants can plug in as labour are highlighted. This creates a comprehensive calendar of opportunities for the migrants to choose from. To facilitate the freedom of choice, some overlaps are planned which can be utilized differently on the basis of need and gender.

The above diagram highlights the prevalent traditional economies in the region. Economies like agriculture are season dependant and offer opportunities in the cultivation and processing sector. While the seasonal economies based on religious and eco-tourism offer a wider variety of activities where the migrant can plug in. These economies have been mapped in detail in the next section.

In order to activate and facilitate the growth of these sectors, supporting policies and governance structure are needed to ensure that the migrants can easily avail the opportunities and the economic profit is sustained. This framework has been created for each sector and has been highlighted in the next scale of intervention.

Regional Actors



In order to draft and implement this regional strategy a Memorandum of Understanding for an exclusive Delta Region between the national governments of India and Bangladesh has been proposed. The research proposed 4 clear sets of actors : Primary institutional, secondary institutional, NGO's and Civil society and Research and Technology Knowledge Institutions. Following are the areas that should be considered while drafting the document and the *actors responsible*.

1. Definition of Climate Migration : A clear definition of climate migration should be made through the MoU and rights and obligations are defined through a dialogue between the countries. Further the primary institutions should be directed to map the vulnerable communities, document the demographics and present future projections. *Ministries of Disaster Management, Climate Change and Development Boards ; Civil Society Organisations*

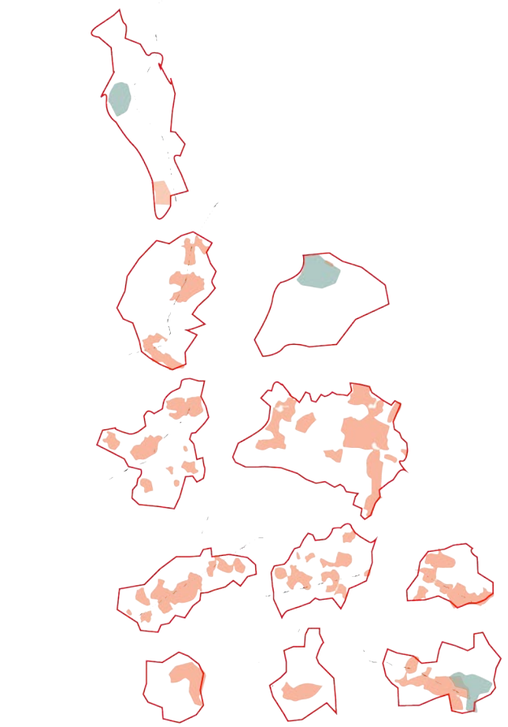
2. Drafting a Regional Environmental Plan : An action plan should be charted out to demarcate the protected areas and natural features in the region. Flood risk management guidelines at the regional scale will be planned out for implementation by local bodies.
Ministries of Forest, Disaster Management and Development Boards ; Research Institutions

3. Regional Economic Plan : Plans for the growth of each traditional industry will be presented to a joint committee. Collaborative planning will be done by all the sectors to generate a circular and efficient model for growth. This model will highlight the current challenges faced and the possible solutions for each industry. Policies and actions will also be drafted for increasing local and cross border trade prospectives.
Ministries of Agriculture, fisheries, Industries, Jute, Culture and Information.

4. Capturing Traditional Knowledge : A research programme will be funded and regulated to document and publish all the traditional knowledge and techniques prevalent in the region. *Ministries of Culture partnered with Research Institutions*

5. Transport and Planning : A spatial plan for increased connectivity to the sending regions and between the two countries will be charted. *Transport Ministry, Border Security Forces and Development Boards*

A continuous feedback loop will be maintained between the primary and secondary institutions and open houses will be initiated for the feedback from the NGO's and Knowledge institutions. These activities will be chaired by the Ministry of External Affairs (MoEF).



FUNCTIONAL RELATIONSHIPS

Defining Growth Clusters and functionality of Census Towns

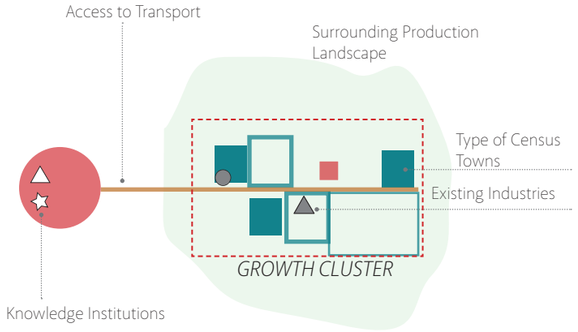
This chapter elaborates on the model used to define the Growth Clusters and a detailed description of all the traditional economies and how they work.

Growth Cluster Model

The model is a derivation of the Sustainable Livelihoods Framework (Chambers and Conway, 1992) and economic planning practices, where the existing features of an area are merged with the assets and skills of the migrant population to generate a livelihood pattern which offers work opportunities all year long. The first step is to map the existing industrial infrastructure in the region. Then identify the types of small/census towns and understanding their character. Further, to demarcate a cluster area which includes one or more census towns, villages in its immediate proximity and 2 or more of the existing industries. Th boundary of the cluster is defined by the administrative boundaries of the constituent voluntary partnerships.

To identify the industrial interventions the model first identifies the prevalent traditional economies of the area. Then, through the seasonality calendar it determines the seasonality of the existing functions. The intervention functions or industries are chosen to complete the calendar year keeping the surrounding production landscape as a key consideration.

The Growth Clusters aim to restructure the circular migration patterns, currently used as a climate adaptation strategy, to localise the movement to within the Delta region and give it an identity. The interventions redefine the role of thw towna in the urban-rural relationship



from a transition settlement to a work destination for the migrants. Further, they become processing units for the city's demands as well as testing labs for the research and technology generated in the city. The presence of knowledge institutions in the city is an asset for the system. These institutions are key to harvest the knowledge of the migrants, merge it with emerging and enhancing technologies and implementation bodies for these innovations. The region will become a living lab for sustainable practices.

The Growth Clusters are thus built on voluntary local partnerships. Inspired by the British model of Local Enterprise Partnerships, a partnership is made between the local governing bodies of the constituent settlements of the Cluster to form a governing committee. This committee follows the guidelines presented by the regional strategy and implement the growth cluster model in their cluster.

This section tests this model on the Delta Region.

Access to State or National Highway	Access to Railway Network	Presence of Census towns/ Type	Existing Industrial Seasonality	Proposed Industrial Seasonality	Surrounding Production Landscape

Assessment Criteria for determining intervention industries

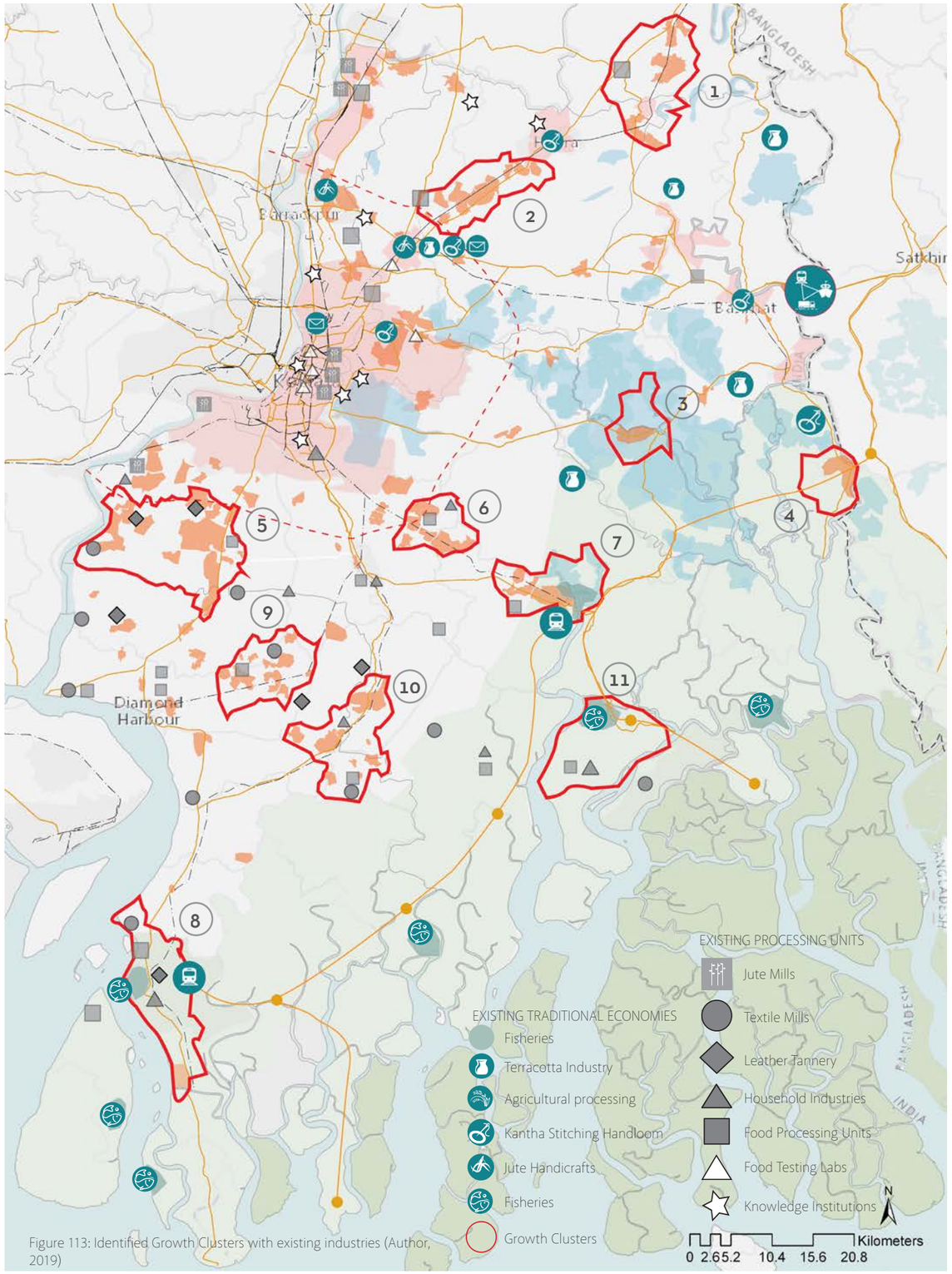


Figure 113: Identified Growth Clusters with existing industries (Author, 2019)

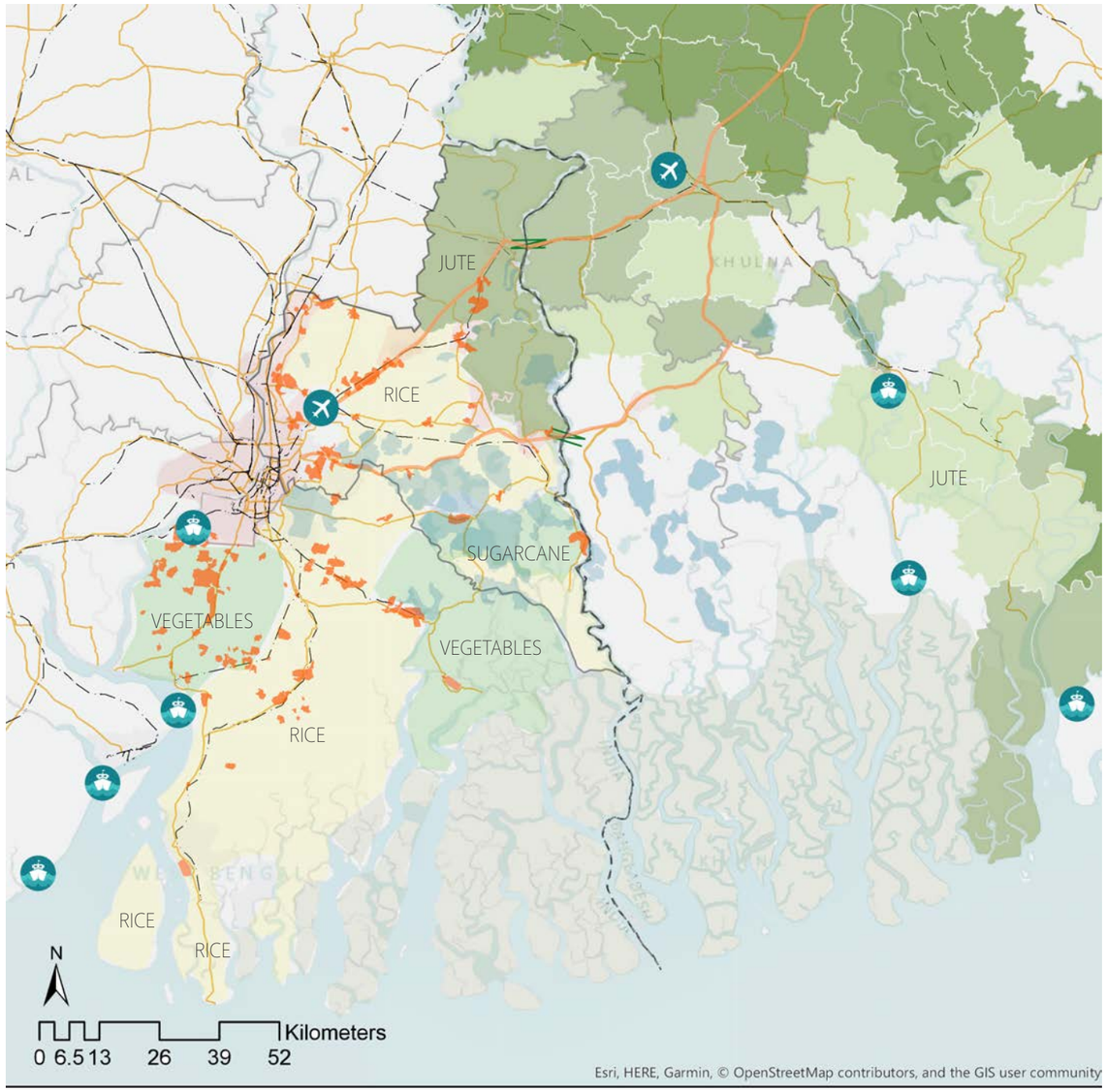
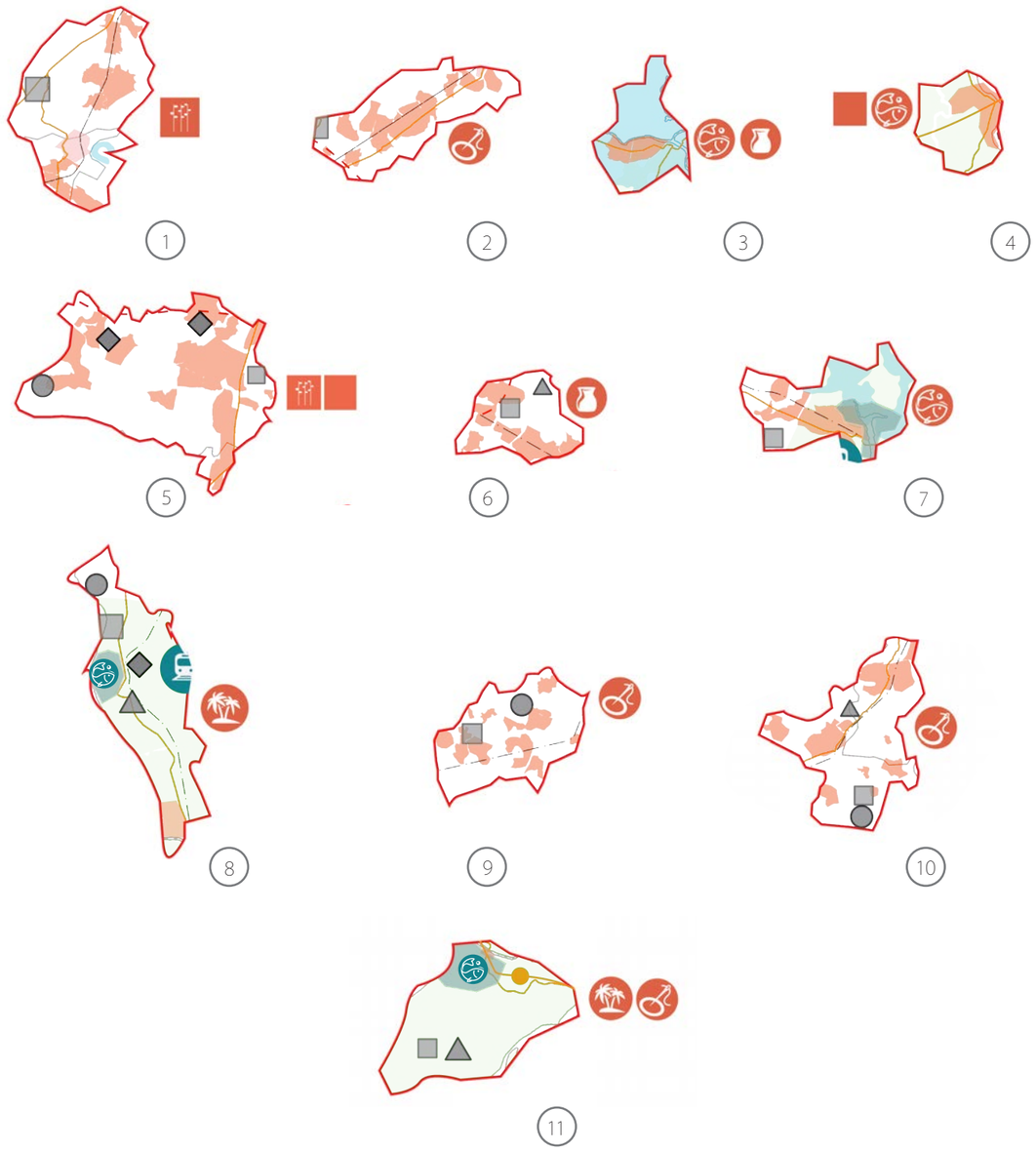


Figure 114: Production Landscape : Cultivation areas for different crops (Author, 2019)

The Delta region is primarily an agrarian economy. The traditional knowledge of the people lies in the organic agricultural and fishing techniques and their allied crafts. This region produces rice, vegetables, sugar cane and jute. While rice has a huge market within and outside the state, vegetables and sugar cane are more for local consumption. Further, while once this region was the highest producer of jute products, after partition the industry declined as the border separated the major cultivation areas (in Bangladesh) from the mills concentrated in Kolkata.

Indicators for Intervention

	Access to State or National Highway	Access to Railway Network	Presence of Census towns/ Type	Existing Industrial Seasonality	Proposed Industrial Seasonality	Surrounding Production Landscape
1	YES	YES	CLUSTER	RICE	JUTE, HANDI CRAFTS	JUTE CULTIVATION
2	YES	YES	CLUSTER	RICE	HANDI CRAFTS	RICE PADDY
3	YES	NO	ISOLATED	BRICK KILNS	FISH, HANDI CRAFTS	RICE + BRICK
4	YES	NO	ISOLATED	BRICK KILNS	FISH, RICE	SUGARCANE BRICK
5	YES	NO	CLUSTER	RICE, TEXTILE	JUTE, RICE	RICE PADDY
6	YES	YES	CLUSTER	RICE	HANDI CRAFTS	RICE PADDY
7	YES	YES	CLUSTER	RICE	FISH	RICE PADDY FISH
8	YES	YES	ISOLATED	RICE, TEXTILE	ECO TOURISM, RELIGIOUS TOURISM	RICE PADDY FISH
9	YES	YES	CLUSTER	RICE, TEXTILE	HANDI CRAFTS	RICE PADDY
10	YES	YES	CLUSTER	RICE, TEXTILE	HANDI CRAFTS	RICE PADDY VEGETABLES
11	YES	NO	ISOLATED	RICE	ECO TOURISM, HANDI CRAFTS	RICE PADDY FISH



The Growth Cluster Economies build upon the existing economies and fill in the seasonal calendar gaps by introducing new traditional economies. In this research out of the various small scale economies, existing traditional economies have been considered. The role of the Cluster is to localise the processing of the produce by providing the infrastructure and expertise closer to the producers. Each cluster assesses the potential of the surrounding region and formulates a business model to enhance the productivity using the existing and proposed industries. The model is then pitched to the surrounding villages and treaties are made for direct procurement of produce and direct profit sharing of the processed and distributed product.

The partnership model gives more power to the local panchayats of the cluster, decentralizing the current regime. The cluster network creates economic competition amongst the Clusters, while generating more work opportunities in the booming industries. Relevant NGO's, knowledge institutions and civil society organisations will be activated to manage the on ground implementation of the social infrastructure - day care centres and skill development programmes- and knowledge infrastructure - online portals for different sectors and documentation of the traditional knowledge. The spaces allocated for these economies are transitional and change character as per the seasonal change of occupation.

The migrants and their communtiies can avail the unskilled labour opportunities in the region. Further, they can increase their skills by enrolling in the skill development programmes which will be locally available to them at their workplace. With increased connectivity to the Clusters, the migrants can follow a daily or weekly commute pattern to earn a respectable income closer to home. However, the predicting this movement is extremely difficult and depends on multiple factors which are outside the scope of this research. Further research and surveys with the communities can enrich the model to make it more attractive for the environmental migrants.

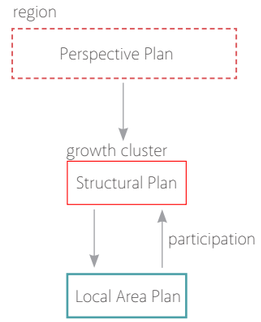
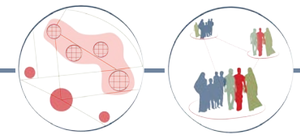


Figure 115: Proposed Planning System (Author, 2019)



POLICY RECCOMENDATIONS

The following policy interventions are a prerequisite to the implementation of this strategy.

1. Local Area Partnerships : Local Area Partnerships (LAP) need to be introduced by the State governments as a governance model for the Clusters. This will be a voluntary exercise and the interested panchayats can discuss the possiblities under the supervision of a state development official. The partnership is spatial and economic in nature. The functional intervention proposed in the research will be incorporated in a Structural Plan for the Growth Cluster and further in the Land-Use Plans of the participating settlements. (Figure 115) At the regional level a perspective plan on the lines of the proposal in the previous section should be created by the State Planning authorities in collaboration with the different industry departments.

2. Private and Civil Society : Sectors for collaboration with the Private sectior and the Civil Society Organisations will be defined. The investment heavy industrial and infrastructural interventions will be done in collaboration with the private coorporations as a part of their CSR or as a design and maintain contract. Soft solutions like child day cares, skill development and formation of cooperatives will be implemented in partnership with the Civil Societ and non-governmental organisations.

3. Documentation : Online labour registries will be maintained by the Cluster authorities and submitted quarterly to the central labour department.

Figure 116: Existing Situation : Currently, most of the processing, storage and distribution services are concentrated in and around the city of Kolkata. This forces the farmers to travel long distances leading to loss of produce and high transportation costs.

Restructuring the Supply Chain : Agriculture

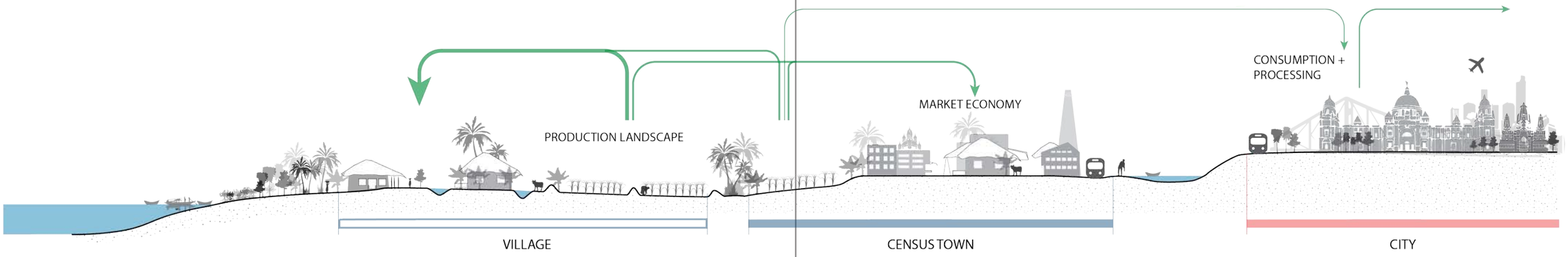
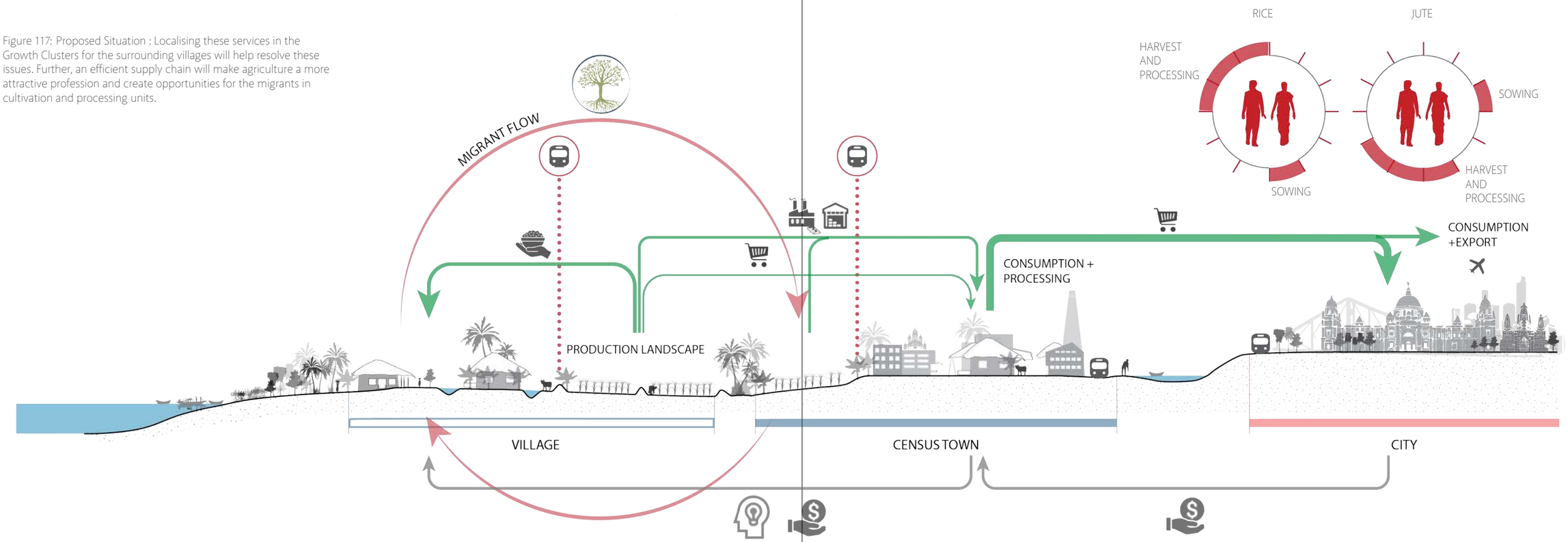
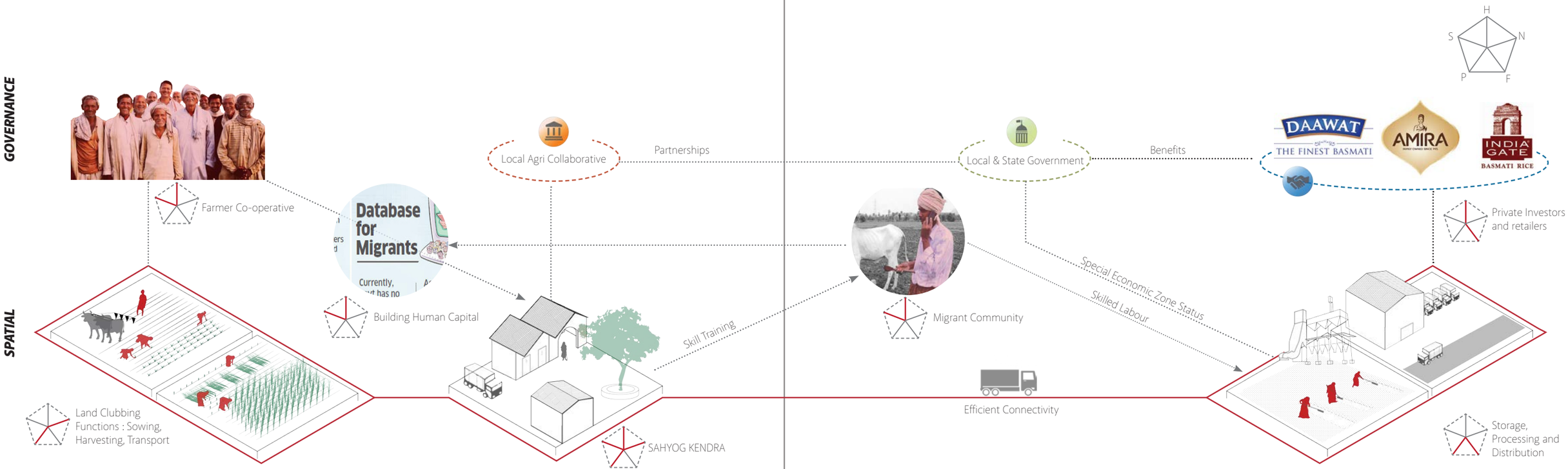


Figure 117: Proposed Situation : Localising these services in the Growth Clusters for the surrounding villages will help resolve these issues. Further, an efficient supply chain will make agriculture a more attractive profession and create opportunities for the migrants in cultivation and processing units.





The British transformed the Bengal Delta into a major agrarian hub. Contributing about 20 percent to the states GDP, West Bengal produces close to 20 percent of the rice of the country. Hence, economic and social growth of the area is embedded in the agricultural sector.

Major issues faced
1. Small land holdings : The average land holding size is 0.36 hectares in the region. Small farmers get marginalized as gaining revenue from such small land parcels is very difficult. These parcels also face the threat of further fragmentation in the future and eventual sale for real estate purposes.

2. Use of chemical pesticides : Increasing use of chemicals and inorganic techniques to increase yield has become common for the distressed farmer. Further, the unpredictable weather conditions due to the changing climate pushes the farmers to move more towards cash crops than the crops which are traditionally good for the land.

3. Flooding of farm lands is one of the common reasons for crop failure and increased salination of the land making it unfit for cultivation for 2-3 years.

Traditional Solutions
There is scope to reconnect the farmer with the land by reviving the traditional knowledge of crop patterns and the traditional seed varieties of the region. There are some NGO's who are trying to revive these practices of organic farming in the region. These practices will be documented and further propagated through central skill and knowledge development centres called the ***Sahyog Kendras (Collaboration Centres)*** in every cluster.

Cooperative farming : To transplant the societal model of community action onto the farming sector. The lands and resources of a particular village are clubbed to form a cooperative and is cultivated by the entire community. A supply chain is formed within the community, with different groups responsible for cultivating, marketing, managing the finances and managing the resources. This would give higher yield and maximize the welfare of the farmers rather than individual profit. Awareness programmes and schemes to communicate the benefits of co-operative farming will be held by the NGO collaboratives and the Agricultural Departments.

Jute Industry : Revival of the Jute industry through renegotiated cross border ties will be an opportunity to reinstate traditional practices and return to sustainable packaging and textiles. The industry is also an employment intensive one and will open new work opportunities .

Technological Support
Research : Sharing of the existing research on salt resistant varieties of crops conducted both in India and Bangladesh is instrumental to tackle the issue of increased salinity of land. The resultant seeds will be tested, approved and then released in the market by the Agriculture Departments.
Training and Knowledge Sharing : The Sahyog Kendras will act as centres for learning traditional and modern organic farming techniques. The sessions will also allow quality checks to be conducted by doubling up as a platform for sharing practices.

ICT : The growing use of mobile phones and internet technology in rural areas allows the use of these technologies for management and knowledge propagation purposes. A central mobile application and online platform will be created for the region. This application will enable the farmers to access ongoing research and information on other technologies online. Further, it will be a grievance redressal platform. The main function of the application, however, would be to connect the migrant labour to the cooperatives. The cooperatives can project a demand and time line for their labour requirement and migrant labourers can register for the openings online. This will allow the elimination of middlemen from the chain and increase security for the migrants.

POLICY RECOMMENDATIONS

The following policy interventions are a prerequisite to the implementation of this strategy.

1. Co-operative Scheme : The Departments of Agriculture, NABARD and the associated research and civil society institutions like farmers alleviation organisations need to partner to ensure the formation of co-operatives in the region. Financial benefits which are currently scheduled for the individual farmer will be tweaked to target the initiative and provide incentives.

2. Land Clubbing : An amendment in the governing guidelines will be made to make farmers who have land holdings of less than 2 acres club their lands with their surrounding farms. Agricultural land conservation laws will also be reinforced.

3. Support for Kendras : The Kendras will be incorporated in the current government framework for agriculture in the region. The Centres will be built in each Growth Cluster by private co-operations as a part of the Corporate Social Responsibility Scheme. Further, they will be allotted and monitored by NGO's which are already working in the field. Initial skill development and capacity building workshops for the community will be conducted by these organisations and reign will then be handed over to the community.

4. Gender Provisions : The Centres will also double up as social infrastructure to support the women labourers.

Figure 118: Existing Situation : Fresh water and marine fishing, primarily practiced in the rural areas for sustenance and retail in the adjacent towns and the city. Loss of produce due to lack of storage facilities.

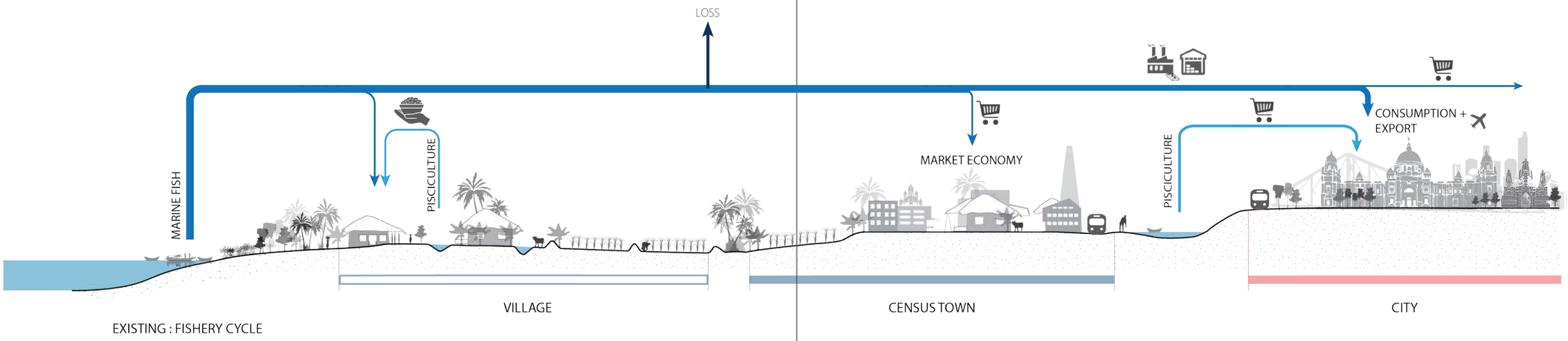
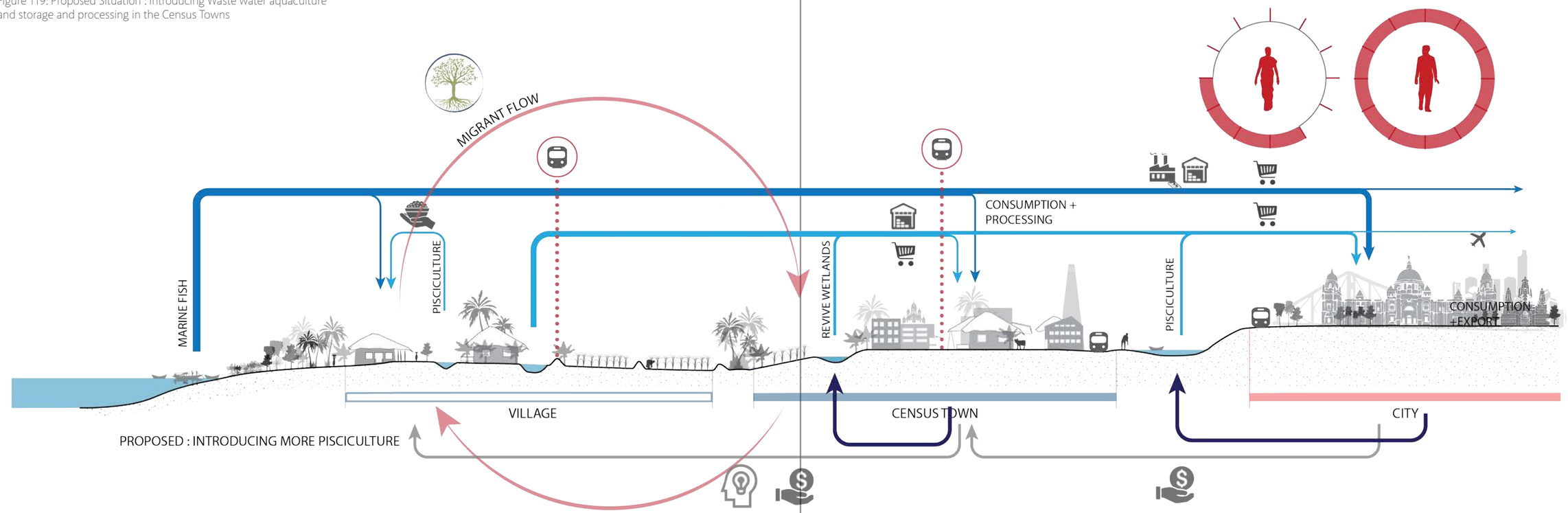


Figure 119: Proposed Situation : Introducing Waste water aquaculture and storage and processing in the Census Towns



GOVERNANCE

SPATIAL

Monitoring

Traditional Practices

Fisheries Department

Research Institutes + NGO's

Partnerships

Local & State Government

Benefits

Fishing Communities / Villages

Database

Innovation

Traditional Equipment

Community Lease

Knowledge integration

Skill Training

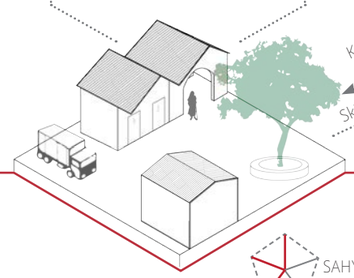
Migrant Community

Special Economic Zone Status

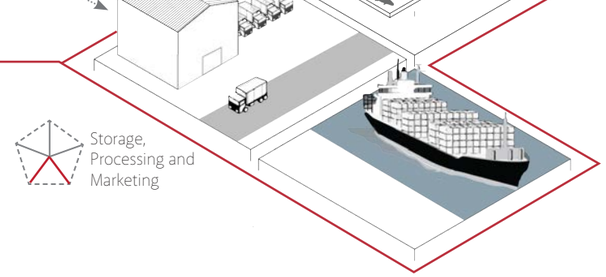
Entrepreneurs

Fishery Co-operatives market + Community

Community-leased wetlands and fisheries



SAHYOG KENDRA



Storage, Processing and Marketing

West Bengal is the largest fish producer in the country and the sector is dominated by North and South Paraganas due to their direct access to the river and the sea. Majority of the aquaculture is practiced in fresh water ponds or in the 5 fisheries marked in Figure 113. While these sectors face their own production issues, propagating the aquaculture model generated by the East Kolkata Wetlands (Reference Studies) has multiple benefits and would act as a boost for the sector.

Traditional Solutions

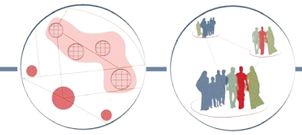
Wastewater Aquaculture : Wastewater aquaculture has been practiced in the East Kolkata Wetlands for more than four decades. The communities use traditional and organic practices to convert the sewage of the city into wealth through aquaculture. The proposed wetland network will create an organic sewage treatment wetland for every Growth Cluster. Community co-operatives can lease the wetlands for practicing wastewater aquaculture. Knowledge sharing workshops will be conducted between the currently practicing communities and the migrant communities. This initiative can resolve the challenge of sewage treatment and act as a flood buffer for the towns while providing traditional livelihoods for the migrants.

Traditional Practices : Traditional practices like using handmade fish nets, organic additions to the pond for better growth and treating ailing fishes through natural therapies are widely practiced in the coastal zones. These practices will be captured through commissioned research assignments and further promoted as sustainable practices for use. The infrastructure required by the constructed wetlands are also indigenously created and generate a demand for artisans.

Technological Support

Wastewater Aquaculture : The community run practices in the EKW are run with the support of technical experts. Panels of water management experts for quality check, hydraulic engineers and sanitation engineers will be formed to conduct timely surveys of the constructed wetlands in the Growth Clusters.

Cold Storage : The sector experiences major losses due to the lack of cold storage facilities. Relocating or building new storages in the respective Growth Clusters will be instrumental in increasing income for the large fisheries as well as small fish farmers across the region. These cold storages will be built and managed by fishing cooperatives or by private entities.



POLICY RECOMMENDATIONS

The following policy interventions are a prerequisite to the implementation of this strategy.

1. Protection of Wetlands : A policy provision to enforce the protection of the existing wetlands from encroachment is essential for the ecological balance of the region. A conscious effort for spreading awareness about the importance of the wetlands and make urban communities aware of its benefits will deter the sale of land to real estate developers. Strict regulations to control building activities on the wetlands starting from legal action on the encroachment on the EKW will be the starting point for the course of action.

2. Exclusive Managing Authority : An exclusive multi-sectoral authority should be set up for large clusters of wetlands. The Authorities will be responsible for the leasing the areas to different communities, managing and regulating the functions and charting out conservation guidelines. Further, the Authorities will be responsible for gaining international status for the wetlands for increased protection.

Figure 120: Existing Situation : Artisans currently work from home and are dependant on external agents for the sale of their product

Boosting Handicrafts Industry

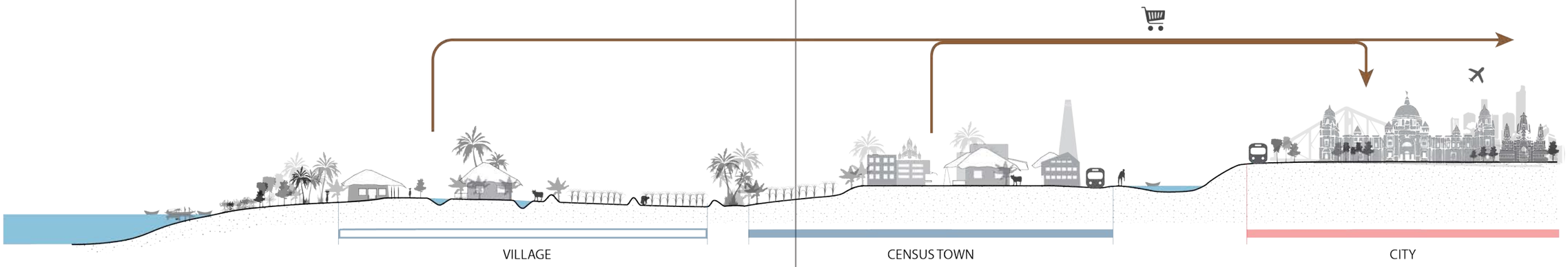
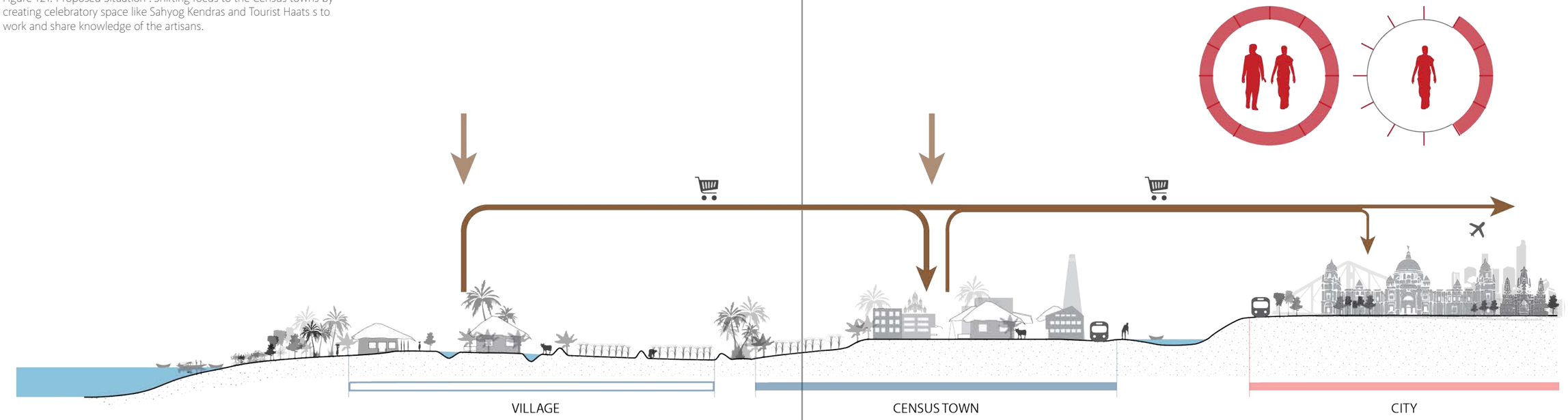
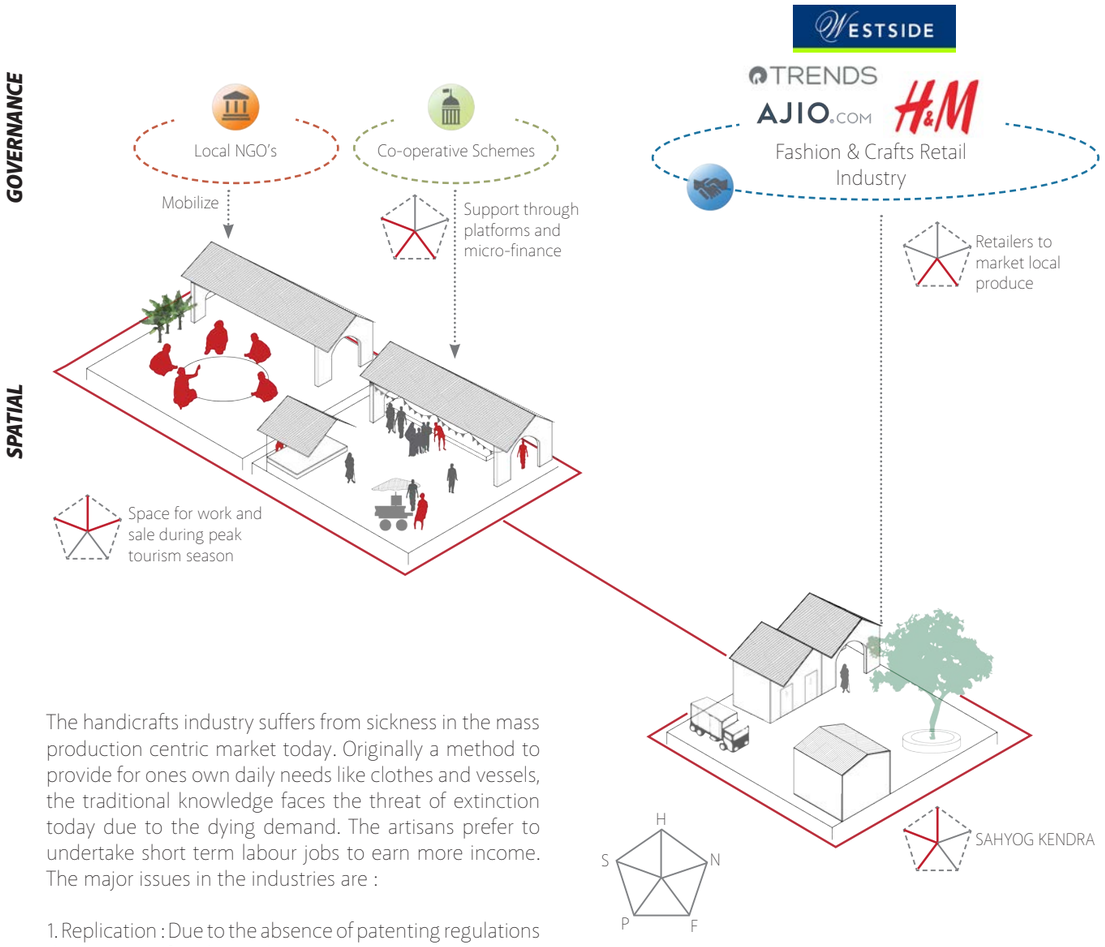


Figure 121: Proposed Situation : Shifting focus to the Census towns by creating celebratory space like Sahyog Kendras and Tourist Haats s to work and share knowledge of the artisans.





The handicrafts industry suffers from sickness in the mass production centric market today. Originally a method to provide for ones own daily needs like clothes and vessels, the traditional knowledge faces the threat of extinction today due to the dying demand. The artisans prefer to undertake short term labour jobs to earn more income. The major issues in the industries are :

1. Replication : Due to the absence of patenting regulations the artisans often loose their art to machine replication. This floods the markets with the artwork but in a cheaper quality which devalues the original product.

2. Middlemen : The presence of middlemen in the supply chain of the handicrafts often leads to exploitation of the artists who receive only a fraction of the original sale price of the product. Attempts to reverse this have recently been initiated by the Ministry of Culture and Textiles and some NGO's who facilitate the direct sourcing of the produce.

3. Indirect sourcing of the raw material : The raw materials for the products like jute fibre and thread are often sourced from secondary sources. This makes them more expensive, often for low quality products.

Traditional Solutions

Direct Sourcing : Community networks will be established to encourage direct sourcing of the raw materials.
Knowledge Transfer : The Sahyog Kendra's can double up as libraries and community schools for the transfer of the artisan's knowledge. Schools of the region will have these crafts included in their extra curricular training. Extra vocational training for the women from the coastal regions who are not familiar with the art, as an alternate source of livelihoods.

Technological Support

Online patent library and sale : Agencies across the country are working on curating the traditional artwork before it gets lost. To create a online paid access library which documents the art form. Further partnering with online shops for direct retail will help minimize the exploitation by the middlemen and give the artisans an identity.

Mapping : mapping of the artisan communities and numbers to track their development over time. Direct access to these communities for tourism, art workshops and sourcing.

Local and cross-border haats : Markets or haats to be organised in local areas, especially tourist destinations. These will be organised by the SHG's, retail partners and NGO's. Further, Cross-Border haats at the border checkpoints to celebrate and share the common culture of the people across the border.

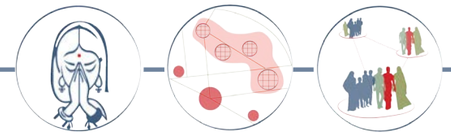
Space : The Kendra's in handicraft clusters will have special storage and space for the groups practicing the art giving them a sense of pride through space. This space would be used for sourcing and storing raw materials. Women from across communities will meet at the Centre to collect their share and work from home. A similar model is followed by food cooperative called Lijjat which makes flat bread.

CASE Example : Shri Mahila Udyog Lijjat Pappad, Mumbai, India

Started in 1959 by 7 women, with a seed capital of 1.5 dollars, Lijjat Pappad cooperative is a women's co-operative which makes consumables and is renowned for its spiced flat-breads. The objective of the institution was to provide employment and a dignified livelihood for women in the area. Over decades the movement has spread all over the country, employing urban and rural women to generate an annual turnover of 109 million dollars in 2018. It is a pure community based initiative built on the traditional knowledge of making spiced breads.

The key learning from this initiative is the mechanism used for production. Local branches have been established in localities where the women members collect the raw materials and after a stipulated time return the finished products for quality check and packaging. The co-operative is also an effective medium to provide literacy classes, skill training and health awareness information to the members. (World Intellectual Property Organisation, 2013)

POLICY RECOMMENDATIONS



The following policy interventions are a prerequisite to the implementation of this strategy.

1. Self-Help Groups : : Self-Help groups to be encouraged to practice traditional arts. Schemes like raw material and machinery provision and different subsidies to attract more women to practice the arts.

2. Private Ownership : The handicrafts clusters or villages can be put up for organisational ownership where fashion or art organisations is given the ownership of certain SHG's or artist villages to transfer their marketing and sales knowledge as a vocational training. In return they can access the arts and crafts directly for their collections. This model would attract these organisations to the rural areas and expose the population to the real dynamics of the market.

3. Gender : Lower interest group finance for women SHG's. Supporting computer education, literacy and health and hygiene programmes to be conducted by the Centre managers at the Sahyog Kendras.

3. Identity : Programmes to document and register practicing artisan groups in an open access database. For every season the artisan works, they can log their availability and avail direct contracts from the market.

Figure 122: Existing Situation : Sundarbans used mostly for day trips in the Tourism season

Introducing Eco-tourism and Religious Tourism

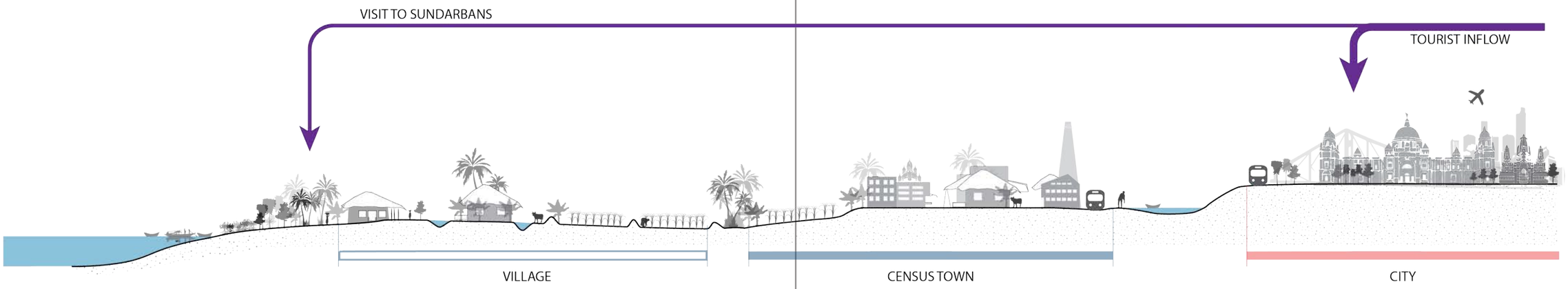
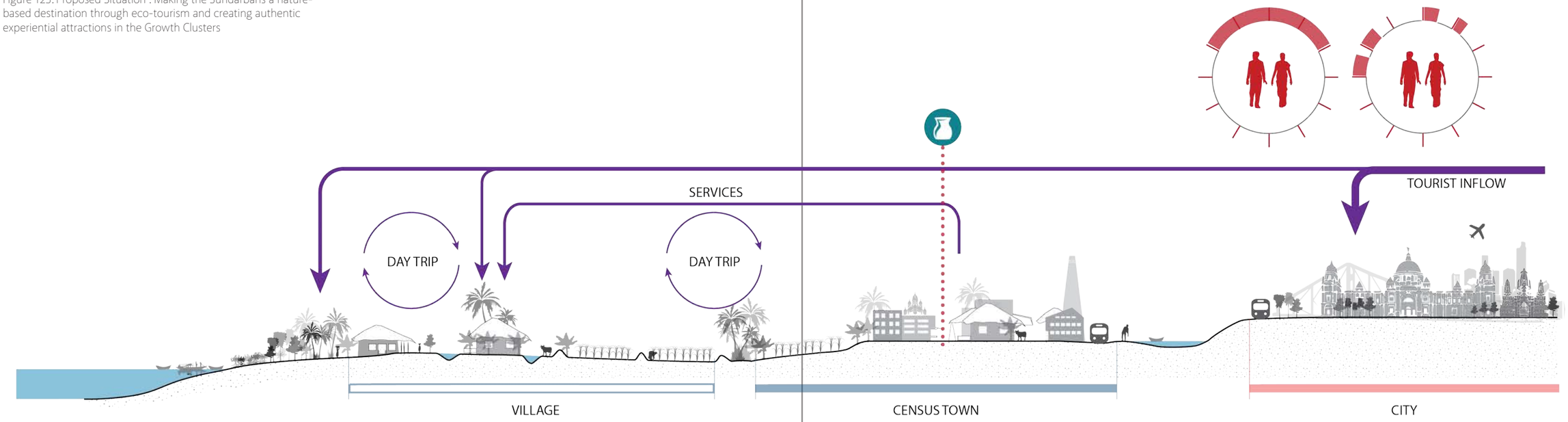
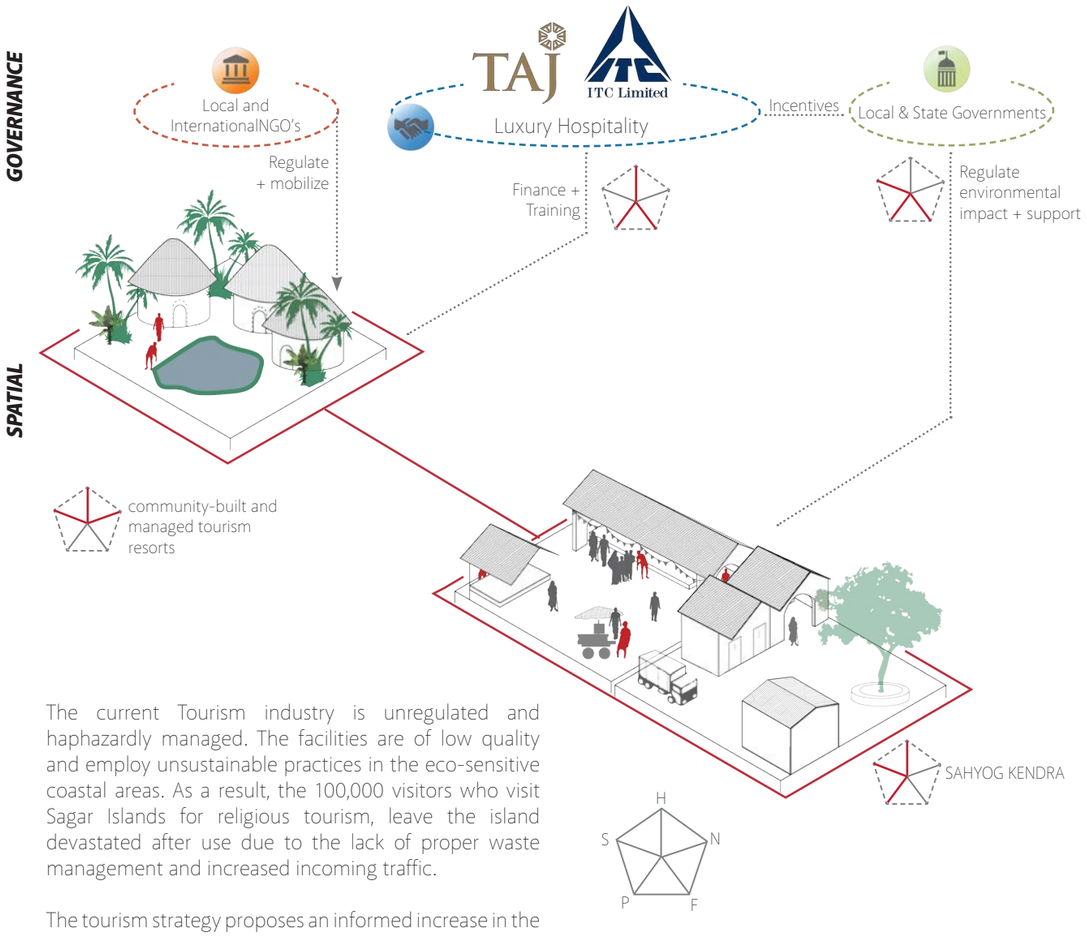


Figure 123: Proposed Situation : Making the Sundarbans a nature-based destination through eco-tourism and creating authentic experiential attractions in the Growth Clusters





The current Tourism industry is unregulated and haphazardly managed. The facilities are of low quality and employ unsustainable practices in the eco-sensitive coastal areas. As a result, the 100,000 visitors who visit Sagar Islands for religious tourism, leave the island devastated after use due to the lack of proper waste management and increased incoming traffic.

The tourism strategy proposes an informed increase in the eco-tourism resorts in the coastal zone. These would be built and managed by the communities in collaboration with eminent private hospitality organisations. These organisations will be attracted to the area by the increased connectivity, social responsibility norms and financial incentives by the state government. The architecture of the resorts will retain the rural character and traditional construction practices, while giving the user a luxury experience.

Training and capacity building workshops will be held for the locals at the Sahyog Kendra's by NGO's and private actors to enable them to manage such properties. These programmes will also promote local cultural tourism through artisan bazaars and cultural programmes, to create an alternative to the current declining tiger driven tourism. Since sighting a tiger is a rare activity, tourists often get discouraged to visit the region given the under developed section.

The practice of environmentally friendly eco-tourism practices will be enforced through locally active organisations like NGO's, Tiger conservation and research organisations and Forestry commissions. Limiting the number of hotels and tour guide licenses to the local population only, can also help limit the unsustainable practices in the region. Further, the areas for tourism will be clearly demarcated by the tourism and environmental agencies.

The tourism industry, although not a traditional industry, will encourage the preservation of the cultural treasures of the coastal communities. Additionally, it is a very good source of income which will allow the communities to gain income as well as ownership of their natural surroundings.

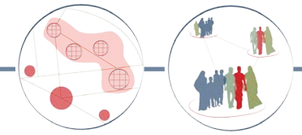
Figure 124: Tora Eco Resort (Author, 2019)

CASE Example : Tora Eco resort and Life Experience Centre, Bali Islands, Sunderbans

The Eco-resort was born from a joint initiative by WWF and the West Bengal Forest Department in an attempt to provide alternate livelihoods to the residents. The collaboration created a Bali nature and wildlife conservation society, whose chief promoter donated the piece of land on which the resort stands today. Recently a luxury hospitality brand VIVADA joint hands with the initiative to improve the services and attract more tourists.

Aimed at spreading awareness on tiger and nature conservation, the resort also gives a rural experience to its users. Built and managed by people from 15 villages on the Island, the initiative has succeeded in retaining many former circular migrants and providing them with better livelihoods. (Tora,2014) (Author, 2019)

POLICY RECCOMENDATIONS



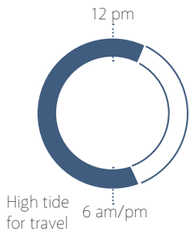
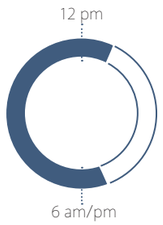
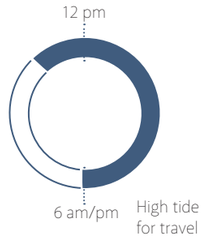
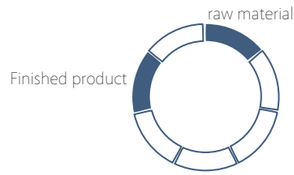
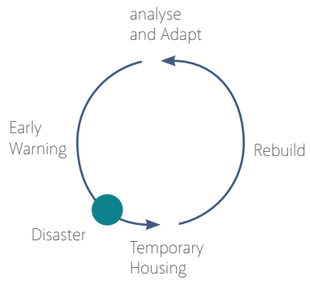
The following policy interventions are a prerequisite to the implementation of this strategy.

1. Regulatory Regime for Eco-Tourism : Promotion and regulation of eco-tourism practices should be factored in the tourism policy of the state. Locally active organisations should be made responsible for local enforcement.

2. Community Permits : Tourism permits should be issued to legitimate communities belonging to the coastal villages. Licenses should not be issued to private developers or individuals to ensure inclusive development.

3. International volunteer organisations to partner with communities to build vernacular resorts: Permits should have an exclusive clause for local or international civil society partners. Incentives should be given to these partners to encourage them to participate in these initiatives.

4. Community Planning : Local governments can also be party or instrumental in facilitating local community planning exercises to allocate space and activities for the development of a resort in a village.

	Agriculture	Fisheries	Eco-Tourism	Religious Tourism	Handicrafts
Daily					
Weekly					
Quarterly					
Disaster					

Dominant Travel Group

Commute Cycles

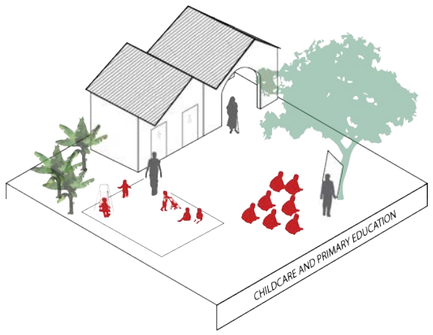
Activating the above processes will create opportunities for the affected populations t pursue alternate livelihoods. With an aim to reduce and eventually diminish the exploitation of the migrants, the livelihood planning attempts to create alternate movement patterns. By bringing livelihoods closer to home, the strategy creates shorter commute cycles for the migrants. These cycles vary from daily, weekly to quarterly cycles for different people and purposes.

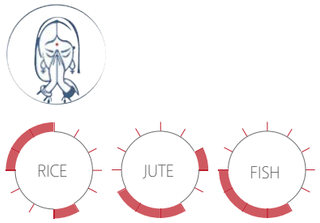
Daily Commute : The major factor determining the daily commute is the tidal patterns. Since the people from the remote islands can travel only during high tide, the transport mechanism and the employers need to keep that as a key consideration. This pattern would be followed by daily farm labourers, fishermen working in fisheries and tourism workers during season time.

Weekly Commute : Weekly commute will be undertaken by the handicrafts worker the most. The governance system involves skill training, material collection and deposit of the finished product

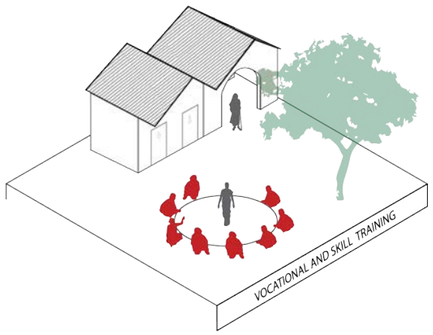
Quarterly Commute : Off season training will be organised by different stakeholders. The migrants can voluntarily participate in these programmes.

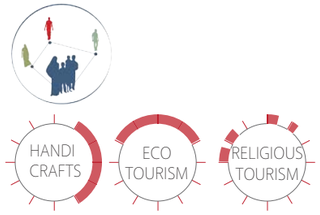
Disaster : The Growth clusters also act as disaster support systems for the coastal communities. While Cyclone shelters are useful at the time of the disaster, it provides little assistance in the post disaster scenario. The Growth Clusters will act as a support system for the migrants at these times and accommodate them temporarily in the Sahyog Kendras.



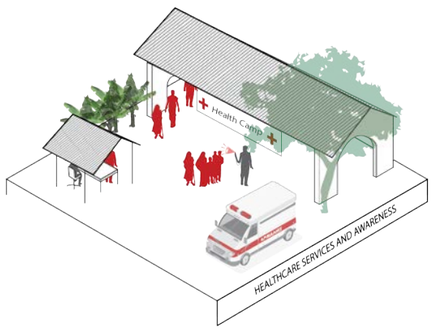


Labourers or wage workers, especially women workers, are often get limited due to the responsibility of their children. They carry their children to the work site depriving them of care, nutrition and primary education. A collaboration of existing NGO's and schools present in the Growth Cluster will provide services like child care and primary education in the Sahyog Kendras during the labour season.



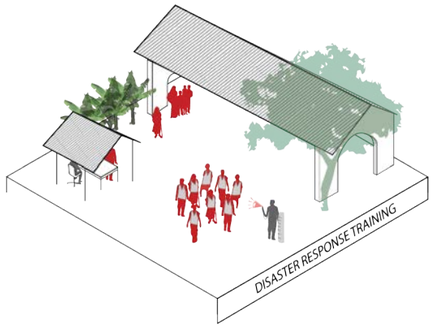


Workshops for transferring handicrafts knowledge from the elder generations and management training from private sector hospitality organisations will be organised by the local authority or NGO's. This will enhance the human capital of the region,

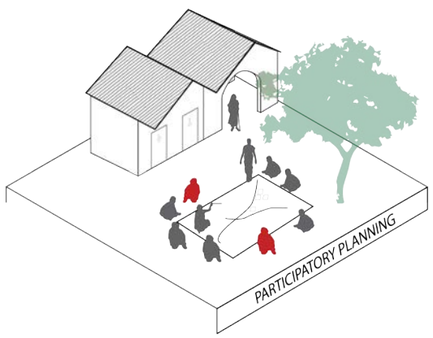


Periodic health camps and sanitation awareness workshops will be held as per rural schemes at the Sahyog Kendras. Having a centralised information system will help the migrants avail this service more effectively. The local NGO's will be responsible for propagating these programmes and the local governments will ensure that they are conducted in co-operation with the local hospitals.

Social Infrastructure



Additionally, the Sahyog Kendra can also be used for disaster training of the host and migrant population alike. The training will help spread awareness in the resident population of the clusters which will help them empathize with the migrant population leading to a more inclusive outlook.



Lastly, the space can be used for participatory community planning workshops. The presence of both the migrant and resident populations will help in achieving a balance between the traditional notions of sustainability and the contemporary ambitions of urbanizing population.

In addition to the economic interventions, additional social infrastructure is needed to cater to the needs of the migrant as well as the host population. These interventions will assist the workers to manage their responsibilities, gain more skills, avail some basic services and become self-reliant.

The next section proposes an implementation time-line for the strategy presented above. It elaborates on an assessment framework to check the progress of the strategy.

2019 · 2021 · 2023 · 2025 · 2031

{ NGO MOBILIZATION }
IOM, IDMC

[CROSS SECTORAL DATA COLLABORATION]
GOVERNMENT DEPARTMENTS

{T KNOWLEDGE COLLECTION}
RESEARCH +NGO

VULNERABILITY ANALYSIS

TRANSFER

REGIONAL ECONOMIC PLAN

STRENGTHEN ECONOMIC TIES
- TAX FREE TRADE
-LOCAL PURCHASE BENEFITS

MOU + CLIMATE MIGRANT DEFINITION

[TRANSPORT FEASIBILITY]
TRANSPORT AND PLANNING

CONTRACTING
LOCAL LABOUR

COMPLETION
PPP BUS SERVICE

TRAFFIC STATISTICAL ANALYSIS

3 PILOT GROWTH CLUSTERS

PROXIMATE
CLUSTER
ISOLATED

{FORMATION OF CO-OPERATIVES}
RESEARCH +NGO

LOCAL AREA PARTNERSHIPS (LAP)

P ECONOMIC DATA COLLECTION
G + INNOVATION RESEARCH

GROWTH CLUSTER PLAN

INFRASTRUCTURE
LAP + PRIVATE CSR INITIATIVE

IT SUPPORT
IDMC+LAP+IT CELLS

LABOUR REGISTRY
LAP+NGO

SOCIAL INFRASTRUCTURE
INT. AGENCIES + CROWDS

PARTICIPATION

NEEDS

{SELF-HELP GROUPS+AWARENESS CAMPAIGNS}
RESEARCH +NGO

ONGOING DRR PROGRAMMES

VULNERABILITY ANALYSIS

HIGH RISK COMMUNITIES

VULNERABILITY ANALYSIS

GROWING REVENUE FROM MARKET DEMAND

DATA COLLECTION COMPLETION
+ QUALITITATIVE AND QUANTITAVE ANALYSIS

PROGRESS ANALYSIS
IDENTIFY MAJOR SENDING REGIONS

CHECK SOCIAL VULNERABILITY :
HEALTH, EDUCATION AND SKILL

ASSESSMENT

EXPANDING CENSUS INDICATORS

CHECKPOINT
- Economic growth in sending regions
- Migrant employment registry
- Vulnerability analysis
- Economic analysis of region

COMMUNITY ASSESSMENT
- Feeling of safety
- Job satisfaction
- Happiness quotient
- Feedback

ASSESS CHALLENGES AND EVOLVE

REGION · TOWN · VILLAGE · ASSESSMENT · POSSIBLE INVESTOR · KEY ACTIONS · TRANSITION PERIOD

Assessment Framework

The above diagram highlights one of the many implementation approaches possible for the strategy presented. It takes the pilot study approach, where on the basis of initial actor mobilization, data and traditional knowledge collection a Regional Economic Plan is generated through a collaborative process between all the relevant stakeholders. This Plan is then tested out on 3 pilot settlements - one of each type.

In parallel bottom up initiatives like the formation of co-operatives and self-help groups are triggered by civil society organisations. The formation of the Local Area Partnerships is also initiated and further formalized under the Plan. The LAP's then make an action and investment plan for their clustiers.

The approach essentially aims to enable bottom up initiatives to work at par with the top down plans.

Further, an assessment framework has been proposed to check the progress of the Plan every 11 years i.e when the national Census Survey is conducted. The framework suggests the inclusion of additional indicators for data collection and analysis in climate affected regions. These factor the economic, social and physical impacts of a disaster and defines them under two assessment criteria.

Socio-economic assessment :

1. Economic growth in sending regions : Although this is already being done, exclusive focus on mapping the economic trends in the sending regions should be conducted to validate the impact of disasters.

2. Migrant Employment Registry : The Migrant database proposed in the strategy should be included in the Census Data for increased legitimacy and a better analysis of the state of the population.

3. Vulnerability analysis : A complete vulnerability analysis should be conducted as per the DECCMA (2015) guidelines to assess the impact of the economic planning on the level of vulnerability.

4. Economic Analysis of the Region : To measure the success of the plan, an analysis of the urban health and the economic state of the region is imperative. This will highlight the shortcomings of the plan with respect to the economies proposed.

The results of this analysis will reveal the structural flaws in the plan, which can then me deliberated and revised for implementation in the rest of the clusters in 2050. Further, it can be used to constantly keep the plan in check.

Community Assessment :

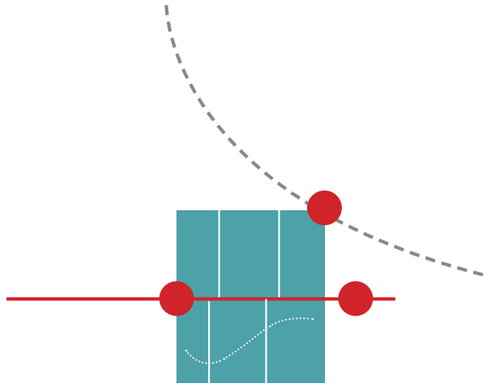
Since disasters have severe social and psychological impacts, the following soft factors should also be included in the surveys to check the status of the vulnerable populations. Since these factors are qualitative in nature, research should be conducted on how to include them effectively in surveys of this scale.

1. Feeling of safety (Major threats faced)
2. Job Satisfaction
3. Happiness quotient
4. Feedback on the Regional plan

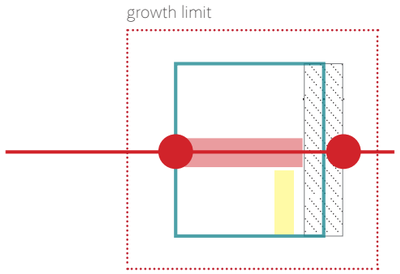
In addition, feedback loops from all the stakeholders should also be maintained to achieve optimum results. Data inventories should be maintained for periodic qualitative and quantitative analysis.

LOCAL

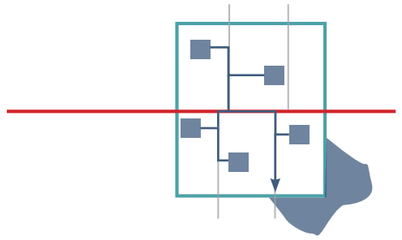
Defining guidelines for growth and elaborating with a test case



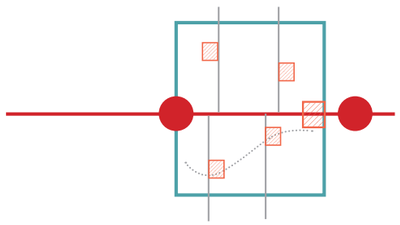
CONNECTIVITY



ZONING PLAN



WETLAND PRESERVATION
AND ORGANIC SEWAGE TREATMENT



COMMUNITY SPACE

Figure 125: Principles to be considered when planning Census Towns (Author, 2019)

Land Use Principles

India and Bangladesh employ planning practices at the local level through Land Use Planning.
Since the towns are in a transitional state with no clear planning guidelines to govern their growth, a set of land-use suggestions have been provided for each type of town in sync with its context and projected growth.

1. Connectivity : The town should preferably have 2 access points either by train or by bus. This will allow the bifurcation of the incoming migrant traffic and determine the areas suitable for commercial use.
The existing roads should be made pucca to service 800 metre wide blocks. The original informal pathways can be maintained to retain the movement patterns and social spaces of the local population.

2. Zoning : A zoning plan should be generated for every settlement which will mark the commercial zone, public space, land for the new industry and the supporting social infrastructure.

3. Preservation of Wetlands : Strict regulations to demarcate water-bodies as no build zones should be employed. Further, all the water-bodies in the settlements should be connected in accordance to the slope of land through bio swales and integrating them with the road infrastructure. This measure would reduce flood risk in the monsoon season and create a network of storm water flow.

4. Community spaces : Existing or planned community gathering spaces should be planned as no build zones for every 800 metre block. This is apart from the central public space which is used for the Panchayat functions. These spaces can act as arrival points for the migrants.

5. Economic Zone : The economic zone should be planned at the edge of the town, which is directly serviced by a mode of public transport and is adjacent to the production landscape.

6. Organic Sewage Treatment : Natural wetlands adjacent to the settlements should be used for organic sewage treatment and managed by the contracted communities. In the absence of a natural wetland, such areas should be constructed through traditional technology in the low elevation zones.

Proximate Towns

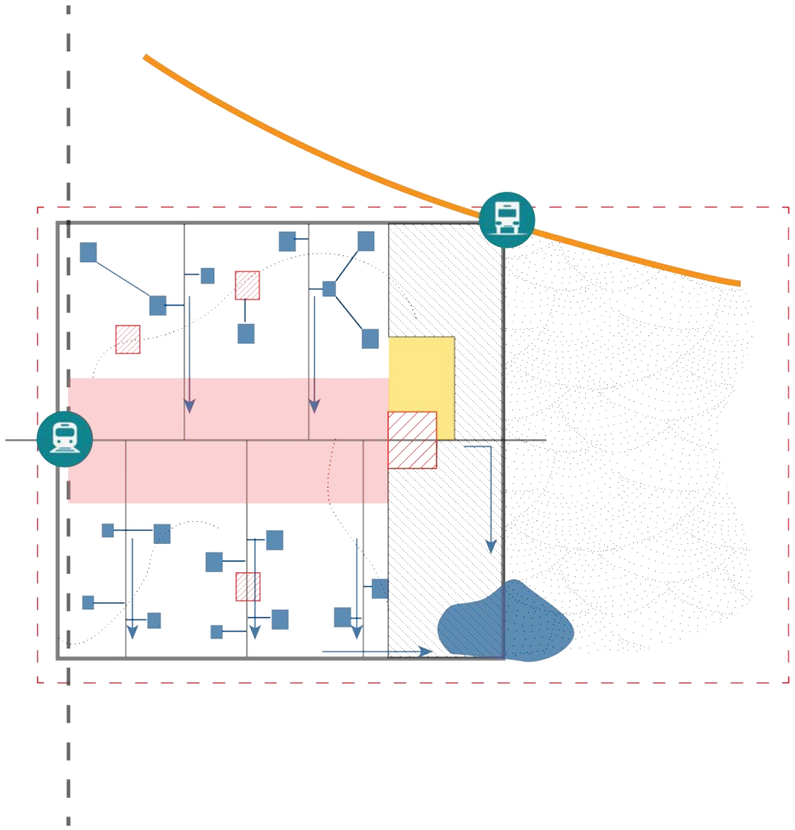


Figure 126: Land Use model for Proximate Towns (Author, 2019)

Proximate towns are heavily influenced by the adjacent city. The analysis revealed that even though they are well endowed with formal infrastructure and have an economy which is directly dependant on the city, they have lost their original natural character and lifestyle. The primary objective for the plans for these towns should be to restore the original wetlands or construct new ones wherever possible to create a network for flood management. Breather green spaces need to be created to supplement the wetlands.

Cluster Towns

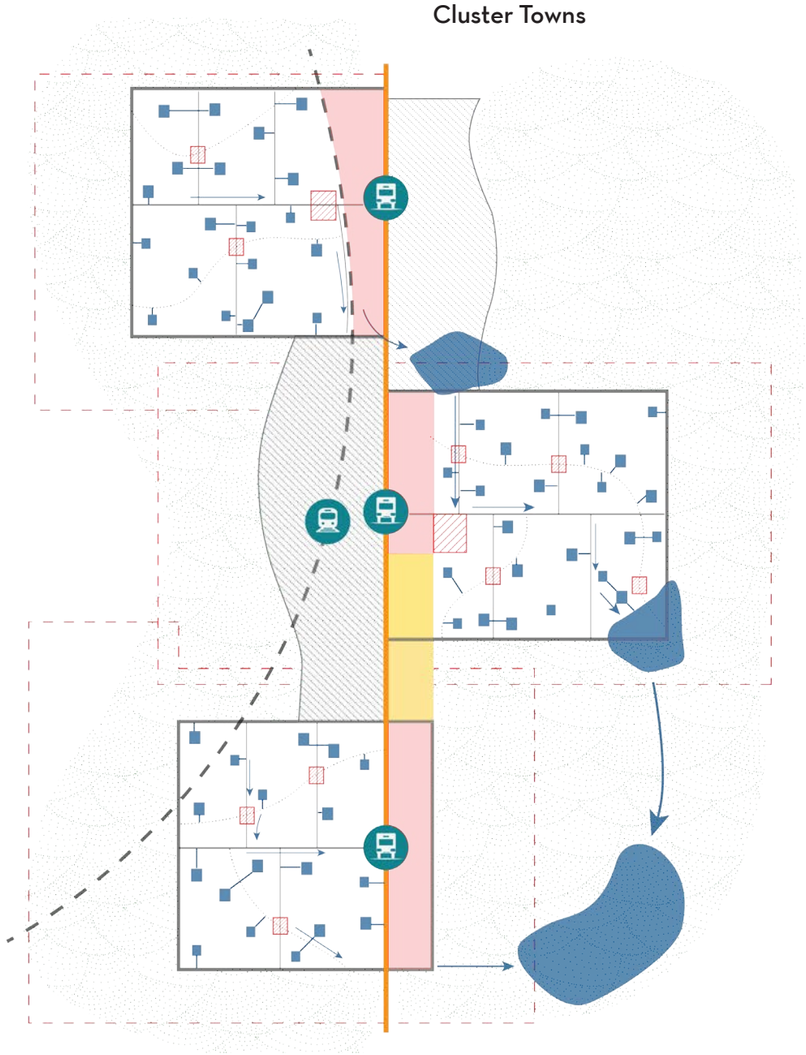


Figure 127: Land Use model for Cluster Towns (Author, 2019)

Cluster towns work on an unique inter-dependant economy where the towns are functionally dependant on each other. This allows them to work as a single spatial unit. These qualities should be considered by planning the cluster as a unit and acknowledging the shared relations. The industrial zones should be limited to the spaces between the settlements and common social infrastructure should be set up to enable integration of the migrant and the host population. The defined zones should be effectively connected with public transport.

Isolated Towns

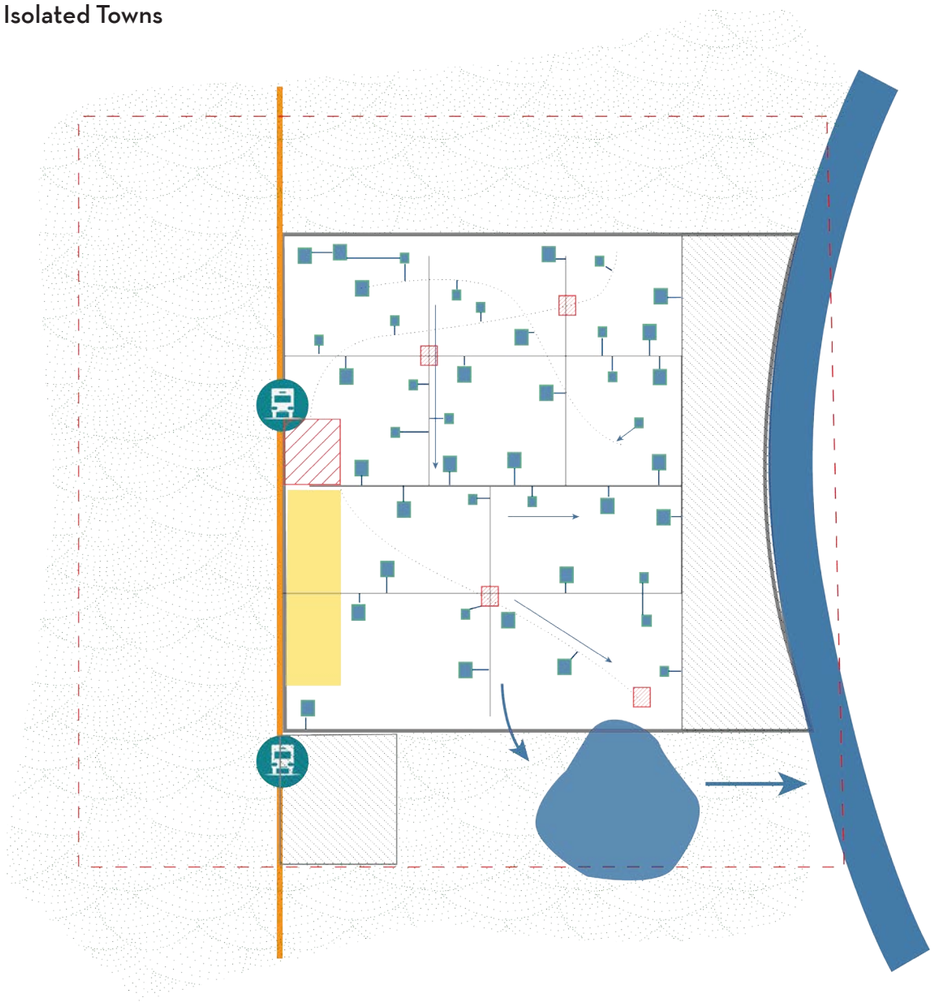
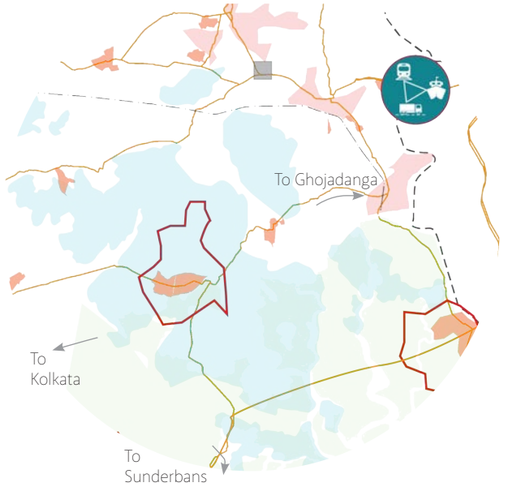


Figure 128: Land Use model for Isolated Towns (Author, 2019)

The Isolated towns are much larger than the other two types and often contain 2-3 villages within their administrative borders. These settlements are the most ecologically preserved and still have a significant population practicing the traditional livelihoods. However, most of these settlements already had an existing brick industry functioning along the bands of the river but lack the local skilled labour to cater to the industry. During the planning exercise, preservation of the existing natural features, efficient public transport networks and allocating spaces for Vyapaar Kendras should be kept as key considerations.

TEST CASE

The Case of Minakhan



Positioning the Minakhan Cluster

Figure 129: Minakhan and Balihati Census Towns (Author, 2019)

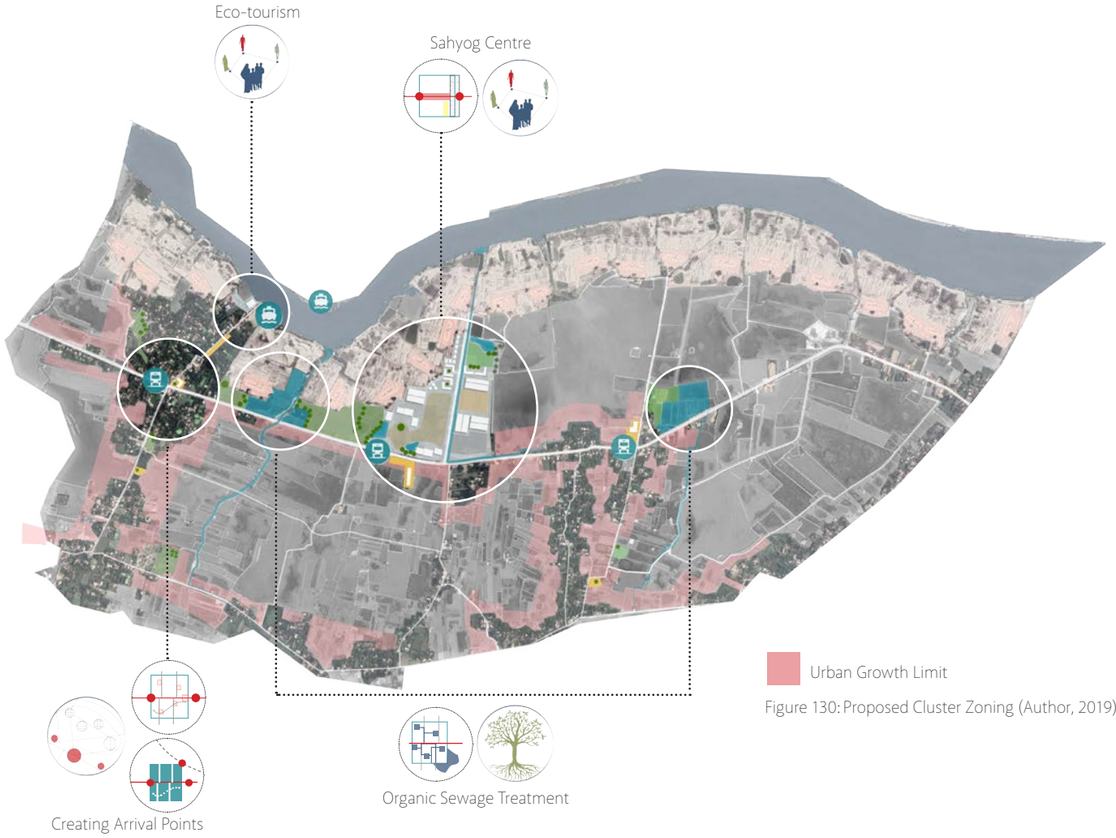


Figure 130: Proposed Cluster Zoning (Author, 2019)

The Minakhan Cluster is a Growth Cluster in the district of North 24 Paraganas. It consists of two census towns - Minakhan and Balihati. Both these towns and their surroundings are dominated by wetlands making the cluster ideal for setting up commercial fisheries and eco-tourism services. The growth guidelines when tested on the settlements give a possible zoning plan, as shown in figure 127. Eco-tourism and wetland farming and fishing in addition to the existing brick industry and rice farming have been planned to match the seasonality requirements of the migrants. Further, a growth limit boundary has been considered to depict the planned expansion of the settlement. This also allows the preservation of the agricultural land which will be clubbed and cultivated as co-operative farms.

It is well connected to the city of Kolkata, the Sundarbans and the border checkpost of Ghojadanga through the state highway network. The key features detailed here are as follows :

1. Sahyog Kendra : Accommodating the processing, its allied functions and social infrastructure needed for the new and existing economies.

2. Arrival Points : Designing the arrival points to express the mixed character of the settlement and make the migrants feel included.

3. Flood resilience : Detailing the water network to channel the flood and sewage water.

These have been detailed for Minakhan town in the following section.

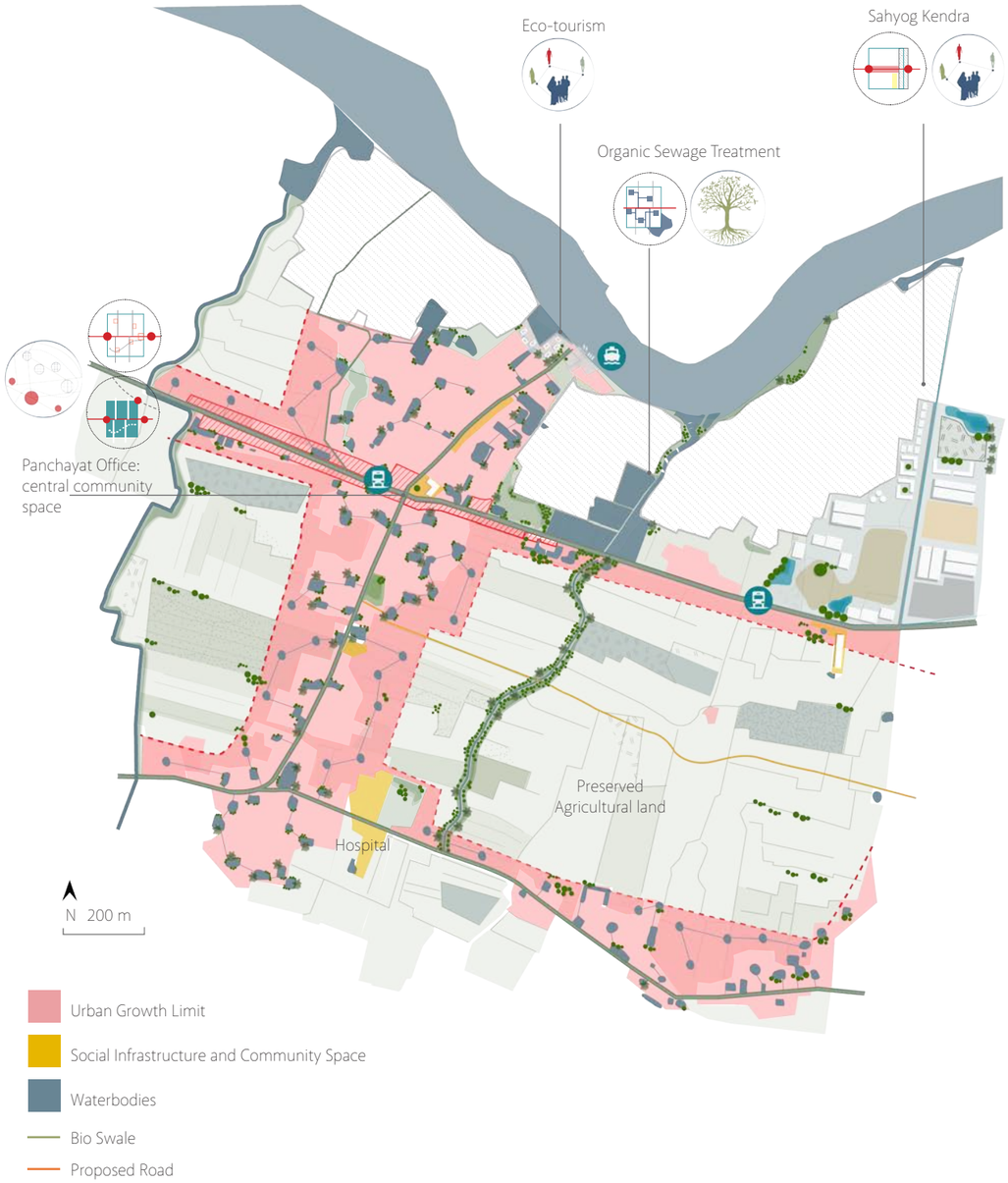


Figure 131: Proposed model for Minakhan (Author, 2019)

The Case of Minakhan

Minakhan is connected to the state road network through State Highway number 3 which connects it to Gosaba, one of the entry points to the Sunderbans. The nearest rail head is more than 10 km away. Further it hosts a population of 4000 people in an area of 3.1 kilometre square (Census, 2011).

The settlement is marked by brick kilns on its river front and attracts skilled labourers from other states to these sites. Most of the houses retain the spatial pattern of individual small pukurs, dotting the low lying landscape with multiple water bodies. However the trend of haphazard construction along the main roads is a sign of the ongoing urbanisation of the settlement due to the presence of the State Highway.

The town is home to one primary and one secondary school with no college within a 20 km radius. It also has a small 25 bed rural hospital within its administrative boundaries. However, given the location it is prone to extensive flooding. Further, it is majorly dependant on the brick kilns for its development which does not generate local employment or direct benefits.

The strategy when applied to the settlement proposes the construction of a shared economic zone (Sahyog Kendra) for the cluster which will process the agricultural produce, harness SHG's to start small scale handicrafts manufacturing, enhance eco-tourism opportunities and act as a skill training centre for the brick industry.

Figure 132: Planned Seasonality (Author, 2019)

Figure 133: Schematic layout of a Sahyog Kendra (Author, 2019)

RICE

Processing

RICE

Social infrastructure for labourers on the fields

ECO TOURISM

HANDI CRAFTS

Arts Haat during tourism season
Use of the Centre as an access to skills and the online market

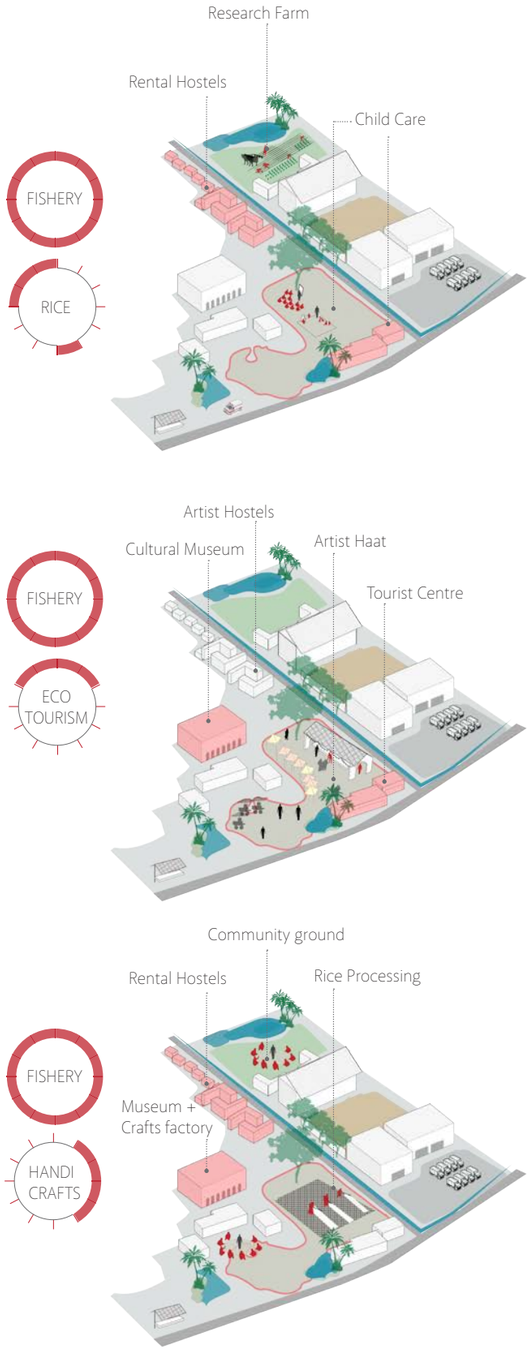


Figure 134: Seasonal Functionality (Author, 2019)

1. Sahyog Kendra

The Sahyog Kendras are points of arrival and identity for the migrant population. They have been classified as special economic zones where multiple allied functions of the rice production, handicrafts industry and eco-tourism services are carried out. For the towns of Minakhan and Balihati, the centre acts as a central point of attraction for different purposes at different times of the year as shown in figure 134. The spaces have been planned to change functions according to the needs of the economies. The built environment quality is recommended to resemble the rural environment.

A cold storage and granary have been proposed in the centre whose capacities can be determined by the private distributor companies. This brings the processing closer to the production, minimizing the loss during transportation.

A central committee will be entrusted with the management of the Kendra and the spaces will be leased out for the different functions.

Figure 135: Arriving at the Jetty (Author, 2019)

2. Arrival Points

The arrival points have been designed as welcome areas for the migrants with an ambient rural environment. They create an identity of the town for the migrant and ease the transition from rural to urban landscapes. In Minakhan, apart from the Sahyog Centre, the migrants arrive at the Panchayat (local government) Bus Stop and the waterfront park by the ferry.

Figure 136: Bus Stop as an Arrival Point (Author, 2019)

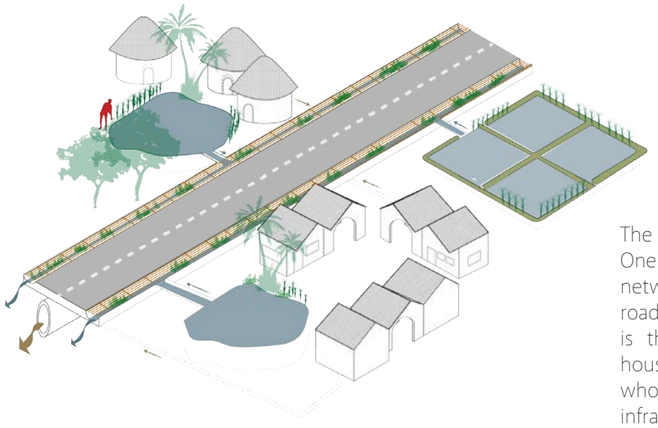


Figure 137: Bio Swales to transport excess water from the Pukurs (Author,2019)

The bio-swales are designed to function at 2 scales. One is the connection between the pukur and the main network and the other is the integrated network with the road system. The construction of the local connection is the responsibility of the household or cluster of households while the main network is constructed by the whole community as a communty-built and managed infrastructure. Further, the bio-swale is designed to be covered by bamboo or treated wood porous covers which are removable and easy to maintain.

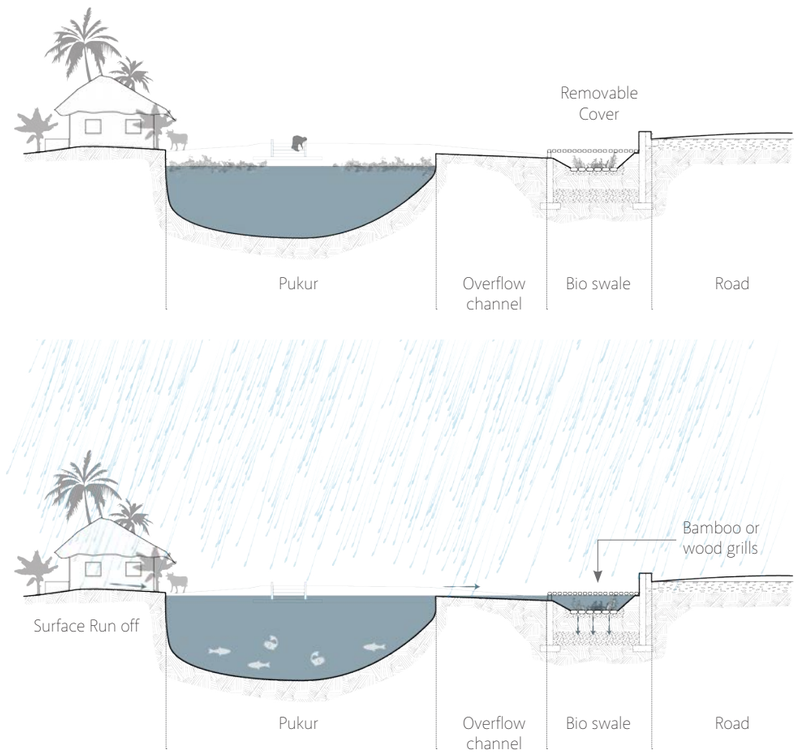


Figure 138: Bio Swale Section (Author, 2019)

3. Flood Resilience

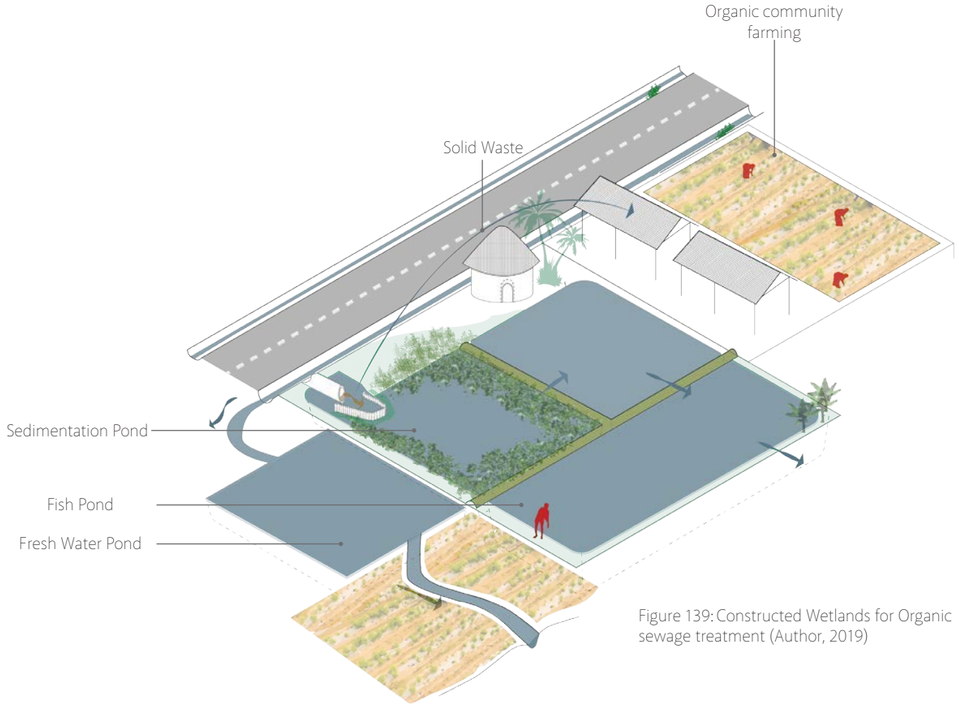


Figure 139: Constructed Wetlands for Organic sewage treatment (Author, 2019)

A wetland will have to be constructed for organic sewage treatment at the edge of an existing channel (as shown in plan). The capacity of the wetland has been calculated according to the thumb rule of 5 meter square per person and has been estimated for the year 2050, keeping the population growth in mind. A recycling plant adjoins the wetland which collects and processes the solid waste of the town and feeds the organic farming with compost. Figure 139 shows the schematic section of the wetland.

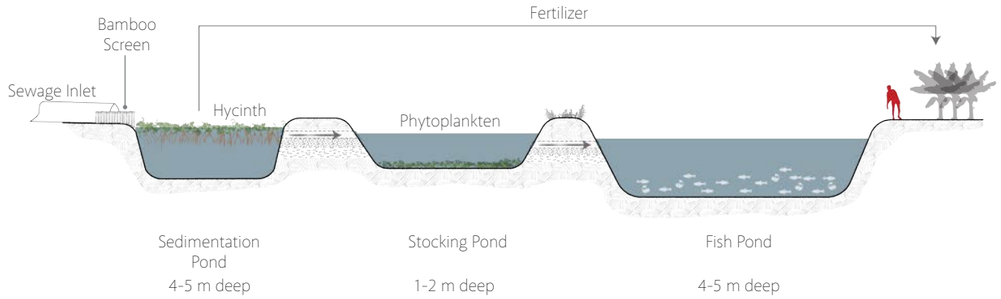


Figure 140: Constructed Wetlands Section (Author, 2019)

Figure 141: A section of Minakhan during Dry season (Author, 2019)

Figure 142: A section of Minakhan during Wet season (Author, 2019)

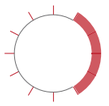
3. Flood Resilience

Figure 143: Bio-Swales and migrants in the Streets (Author, 2019)

Agricultural labour

Community Fishing

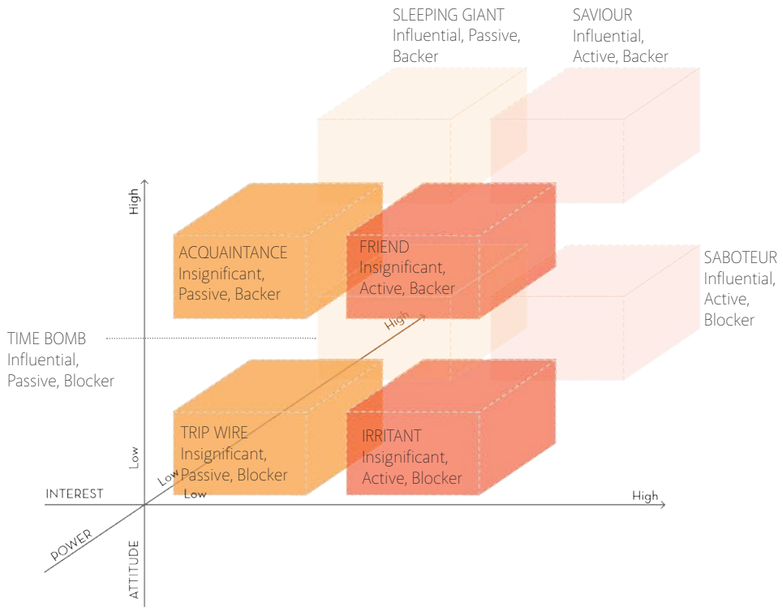
Processing

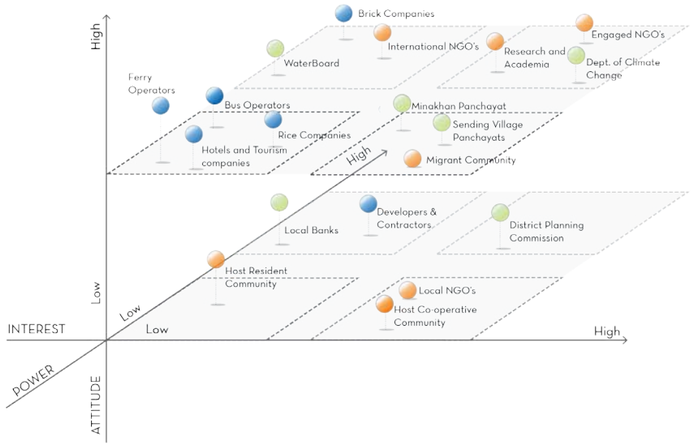


Skill Training

Figure 145: Migrant roles throughout the year (Author,2019)

The previous section highlights the principles for engaging the different stakeholders for a smooth working of the different economies. Here, the actors for the case of the Minakhan Cluster are placed on a Power-Interest-Attitude grid. The Power defines the power of the stakeholder to influence the project, while the Interest reflects the degree of alignment of the stakeholder goals with the project. The Attitude gages the possible relation to the proposal. Engagement strategies for each stakeholder have been presented in the table given.





Stakeholder Management

SNO	STAKEHOLDER	CORE VALUE	PROJECT OBJECTIVE	ENGAGEMENT STRATEGY
1	Department of Climate Change and Disaster Management , West Bengal	To identify and mitigate climate change impacts through policy and strategies.	Safeguard the affected coastal population through a shared responsibility scheme.	Policy and facilitate stakeholder management. To streamline their efforts through the proposal and initiate schemes and campaigns.
2	Minakhan Nagar Panchayat	Provision of basic infrastructure and development of the settlement.	To attract economic investment and avail central government schemes to achieve goals.	Policy and Partnerships. Be open to external investment but also regulate the partnerships to preserve the interest of the people.
3	Sundarbans Gram Panchayats	Safeguard the residents	Ensure sustainable livelihoods for the residents	Partnerships : State Departments Assistance : Civil Society
4	District Planning Commission	To develop a cohesive structural plan to accommodate the growth in the District.	Include the physical capital provisions to make the Minakhan Cluster an urban centre.	Policy directive from state. Partnership and demand by the LAP.
5	Water Board	To ensure sufficient safe water supply for public and private use.	Manage floods to harvest the water.	Core interest in the project due to added benefits for their goals
6	Local Banks	Responsible investment and maximum return.	Provide micro-loans to the co-operatives and governments for development.	Policy : Incentives to involve Convince : Generate business model for their benefit
7	Developers and Contractors	To maximize profit and gain market value	High interest in urbanising centres as they are hubs for construction	Regulate : Civil Society and state to regulate activities
8	Brick Companies	To maximize profit and minimize investment	Local skilled labour to cut costs of importing labour from other states	Partnerships : Sahyog Kendras to partner for skill development of locals
9	Rice Distributors and processors	To maximize profit and quality of product	Local production to ensure minimum losses. Co-operative farming to give higher produce.	Partner and invest : to invest in local infrastructure and do direct procurement from immediate surroundings.
10	Tourism Agencies or hotels	To maximize profit and gain market value through unique services	Eco-tourism a sectoral niche. Chance to build a luxury and international name.	Partner with local communities, invest in training and infrastructure
11	Ferry Operators	To maximize daily earnings	Regulated prices and timings with higher traffic due to migrant movt.	Formation of community unions and partner with private companies
12	Bus Operators	To maximize daily earnings	Regulated prices and timings with higher traffic due to migrant movt.	Formation of community unions and partner with private companies
13	Research and Academia	Adding new knowledge	Opportunity to explore and improve new and current traditional practices	Partner with local communities and other civil society actors to suggest changes to authorities
14	International human rights, development and conservation NGO's	People's welfare and nature conservation	Sustainable development model to conserve natural resources and prevent human rights violations	Initiate dialogue and convince for involvement and action
15	Engaged NGO's (Sunderbans)	Welfare of the local communities	Structured strategy for long term community resilience to disasters	Collaboration amongst NGO's to take action
16	Local NGO's (Minakhan)	Welfare of the residents of Minakhan	Economic benefits to improve the livelihoods of the local populations	Collaboration with Engaged NGO's
17	Migrant Community	Ensure sustenance for ones family	Multiple livelihood opportunities, increased social, human and financial capital.	To be engaged by the Engaged NGO's to participate in the strategy.
18	Host Co-operative Community	Maximize income gain and ensure sustainable livelihood	Access to better infrastructure, investment and human capital for businesses	Co-operative forming to be encouraged by the local government and Local NGO's.
19	Host Resident Community	Develop an urban lifestyle	Access to better infrastructure and amenities. Cohesive growth.	Engaged and educated through programmes at the Sahyog Kendra.

CONCLUSIONS
REFLECTION & RELEVANCE

The refugee and disaster response regimes have been a constant topic of concern, scrutiny and innovation in research and practice globally. Scholars from across fields, exclusively the social sciences, have repeatedly highlighted the structural flaws and humanitarian issues with the current top-down, state-aid dependent practices. The concentration of efforts and investment in the post-disaster responses involve huge infrastructural and economic losses often overlooking the plight of the people, who are left to struggle to meet basic physiological needs without sufficient support (defined by Maslow Figure 28 page 80).

This research calls for a more inclusive, development-based approach to the rapidly growing issue of environmental migration and displacement. It advocates the need to include the fields of spatial planning and supporting governance models, in vertical and horizontal collaboration with other sectors to pre-emptively include the vulnerable populations in the planning tools for an affected region. However, it emphasizes on the need to employ the proposed tools and practices in parallel to the current response regimes and does not aim to replace them.

Using the Sustainable Livelihoods Framework (Ellis, 2003), the tools emphasize on keeping the existing strengths of the region central to the strategy. Decades of experience with environmental events and changes, has forced the affected populations to independently undertake adaptive strategies to cope with and become more resilient to shocks. Further, their traditional knowledge of natural resource management is considered as a central asset and is harvested to generate a development model for the region. This model strengthens the existing and adapted social, human and natural capital by functionally reconfiguring the region and employing community-based bottom up strategies.

Further, the proposal takes a two-point perspective on the issue acknowledging the plight of the migrant as well as the impact of the phenomenon on the development of the region. Its devices multi-scalar models to use the traditional knowledge of the migrant communities to cater to the developmental needs of the larger ecologically functional region. As a first step, it presents an urban-rural system for ecological regions, where the relationship between the disaster struck rural areas (sending regions) and the different levels of urban settlements in the region have been defined. It builds on the transitional nature of the secondary urban settlements and highlights their potential use for poly centric growth as well as to build climate resilience in the sending region. By modelling traditional knowledge economies into these settlements, it uses the migrants as a social, environmental and physical asset to induce economic stability, environmental sustainability and revive societal values in the urban settlements.

Co-operative and community ownership models have been employed to reactivate the traditional economies. These propose the pooling of natural and physical resources for collective benefit and growth and employ bottom up collaborations for their management, with limited assistance from the state. It feeds on the existing government schemes for the region and suggests policy recommendations to enhance this assistance. The models plan around the ongoing trend of circular migration and present multiple livelihood opportunities through a Seasonality Calendar to the affected populations. This allows the migrants to plug into the economies of expertise and interest as per their communal needs. Inclusion makes the migration a successful adaptation strategy of choice rather than a distress outcome.
Further, Sahyog Kendras (Collaboration Centre) have been introduced as spaces of identity, networking, social support and skill development. Above the processing and economic functions, the Kendra's are aimed to provide the much-needed social infrastructure, skill training and a space of familiarity for the migrants and facilitate their social cohesion into the resident society. The archiving of knowledge and community programs planned are aimed to revive the communal strengths of the semi-urban town societies as well as strengthen the social bonds with the migrant communities. This gives the migrant communities a social and spatial safety net for times of distress.

The possible movement patterns generated by this strategy will reveal new trends of urbanization in the region. Pre-emptive inclusion of these trends in the structural and land-use plans for the Census towns has been proposed to contain extended haphazard urbanization and prevent the loss of ecological features and community space. These aim to create a more sustainable urbanizing model for the settlements and the larger region. Further, the

trends need to be be constantly assessed and the plan evolved as per the needs of the people and the region.

Due to the complexity and multi-causal nature of environmental migration, it is often brushed under the social sciences carpet and tagged to be economic in nature. However, through emergent concepts like informal urbanization and increasing mass movements from climate affected zones, the spatial dimension of the phenomena is being slowly highlighted. Its mismanaged, informal nature and the subsequent impact on the host society, puts the migration in negative light for most in the scientific, policy and the practice realm. Very few institutions, like the Government of Uganda, have begun to recognize the benefits of seasonal or permanent migration and make provisions for the movement. This proposal takes a leap forward by acknowledging the inevitable threat and presenting a pre-emptive regional approach for a smoother transition to more turbulent times, ensuring the needs and rights of the affected population are safeguarded.

Ganges-Brahmaputra Delta

The case of the Ganges-Brahmaputra Delta revealed that circular migration was a common adaptive strategy in the region. The restructuring of the region and development of economic growth clusters, allows the coastal communities to retain their trans-local livelihood lifestyle, practice their traditional nature-based livelihoods with a renewed role as the bearers of the traditional knowledge. This makes them a visible asset for the underdeveloped economies in the region while allowing them to retain their cultural values and language. The civil society and non-governmental organizations play a key role in the implementation of the strategy here. Their extensive presence and local influence often make them more powerful as proponents of change than the local governments. Further their sensitivity towards the real issues faced by the communities make them an embedded part of the strategy.

Further, gender sensitive planning also makes room for empowered women to avail social services like childcare, healthcare and education, which is currently a huge challenge for the local and state government. Through the case of Minakhan Growth Cluster a possible spatial impact of the strategy has been visualized. However, since this is highly dependent on the choices made by the migrants, the resident communities and the configuration of the economies, this impact can have multiple iterations and perceptions. The research does not quantify the movement but rather believes that the livelihood planning will endow the migrant with the right to choose their occupation as well as movement pattern independent of any external social influences. Additionally, by creating interdependencies between the economies, the migrant's traditional practices facilitate flood risk mitigation and ecological conservation of the delta.

Role of the planner

The role of the planner in this scheme is to create bridges between all the major components of the scheme. He or she acts as a mediator of the process and makes sure that the governance model is designed in a bottom-up transparent way. The planner understands the structural needs of the region, the needs of the people and can gage the spatial repercussions of the processes in play. This enables him/her to analyse the goals of all the stakeholders and pitch the scheme to them in accordance to their interests. However, as mentioned earlier, the issue at hand is multi-disciplinary in nature and the planner is only a part of the puzzle. For a successful scheme it is essential to analyse the existing context from other lenses like the social sciences, geography and political science. Further the drafting of the actual plan also must be done in a inter-disciplinary iterative process.

Further Recommendations

Given the issue is multi-disciplinary in nature, the presented research can be incorporated and taken forward by interested scholars from across fields. The behavioural and social consequences of disasters need more research to inform the proposed migratory patterns. Further, adaptive spatial strategies in response to seasonal livelihood changes as well as in disaster situations can be another topic for deliberation. The impact of migration on space, settlements and regions needs extensive exploration and is recommended to be carried out by multi-disciplinary teams for a cohesive result. The strategy presented here also has scope for inputs from multiple disciplines and can be tested out on other locations for further improvements and validation.
Further, one of the major issues with environmental migration is validating the issue itself. Research can be conducted on the economic impacts of disasters and losses incurred due to the post-disaster responses to quantify the issue and present it to the relevant stakeholders. This will give the migration higher visibility and validity in practice and academia.

Further, with a multi-disciplinary outlook research can be conducted to generate a complete Sustainable Livelihoods Framework (with guidance from organisations like the UNDP and DFID) for the climate affected populations.

Finally, the models presented can also be applied to the Bangladesh part of the Delta and attempts to functionally integrate the Delta, keeping in mind the security concerns, can be made. The implementation and assessment framework give room for cross-border dialogue to take place before the MoU is drafted. The similarity of planning and administrative systems in the two countries can act as an asset for the process of integration.

Multiple scenario planning can be done to predict future trends and incorporate the possibility of permanent migration in the event of complete inundation of some islands.

Evolution of the Argumentation

This project has presented a steep learning curve through its phenomenological and exploratory approach. The spectrum of findings presented in the last 200 pages has steered a constant change in dialogue and mindset and allowed one to be empathetic towards the issue, rather than sympathetic. Starting with the presumption that the affected population needs relocation and a regional plan proposing a redistribution of the population would be the logical solution. Investigation into the patterns and dynamics of climate displacement revealed that there were different categories of climate migrants which needed different types of support. Populations which were completely displaced due to the loss of land, like in the SIDS or the coastal regions, required State intervention to ensure new shelters or land was allocated to them.

However, large portions of the populations were seen to be employing independent adaptive strategies. They are moving informally due to the loss of livelihood and means of sustenance and are devoid of any support or recognition. Due to the multiple factors responsible for the decision to move they are usually mistaken as economic migrants by many migration experts. The in-numerous configurations of these factors make it almost impossible to have a generic support framework for all. The discussion on circular or livelihood-based climate migration is also nascent in the academic world, making it difficult to map and gather data on the issue. Further even though these concepts are evidently spatial in nature, they find little room in the planning and design dialogues today.

This research proposes a universal definition which considers all these factors. A common definition would make it easier to attract financial and technical support and create a common understanding between the relevant stakeholders. It would also encourage the existing initiatives and stimulate the formation of new policies for this form of migration. However, an official status was found to be an ineffective solution. With nuances like the misuse of the status by higher economic classes and politicization of the situation, there is a higher chance of increasing the exploitation. Further, an exclusive climate migrant status would deepen the divide in the society, especially because this category of migrants is able bodied and have a seemingly invisible plight.

Apart from the societal and political dimensions, another question that arises here is that do these people really need a status? A rural population which has protected its traditional knowledge of the land and harmoniously existed with nature for generations, today finds it difficult to survive due to various man-made and environmental changes. They have the power to survive and build resilience, provided they have the correct support framework, or even the basic rights that they deserve as a citizen of a nation. Communities which don't have access to the public institutional, social and economic infrastructure are the ones who are the worst affected. In times when the world is moving towards green initiatives and seeking methods to harmoniously survive with nature, the knowledge of these people can be used as a great asset to propagate state of the art practices with the right mix of modern technology. It becomes essential to weigh priorities here and acknowledge the true value of these people. The proposed strategy aims to facilitate the use of this true value for the benefit of the people as well as the larger region by integrating it in the spatial plans of the region.

The design proposal evolved through the discussion posed here and moves from a top down population distribution approach to a more economic and services-based design with bottom up community-based initiatives at its core. It presents a regional plan and the needed support policies in way that it stimulates economic movement to designated areas and makes optimal use of the expertise of these people. While these concepts seemingly sound idealistic, case examples drawn from the developing context throughout the report and research render the approach feasible and realistic.

Further, participatory methods might not work here as expected due to the lack of awareness in the population and the sheer trauma of struggling for basic needs like one square meal a day. What is key is collaboration. To bring the stakeholders with the decision-making power, high interest and local presence together with the

communities adapting on the ground. Here, the planner plays a key role in convincing the right stakeholders and spread awareness about the issue through academia and practice. An initial dialogue is enough to kickstart the initial stages of the proposal. Further, the strategy presented here aims to act as a model which is subject to change depending on the context, political will and the state of the community. However, the livelihoods approach allows the people to retain their dignity and gives them a new self-made status in society.

Political Dimension of Planning

During the research process, the inevitable role of politics in planning and policy design was another point of learning. Given the complex political situation in the chosen case, it was essential to understand the political dimension in order to make a workable design. At times it was frustrating for the researcher as every proposed strategy had a political complication which was outside the scope of the research. However, it was an unavoidable consideration due to the vulnerability of the people and the prevalent vote bank politics and citizenship issues in the region.

The role of this project can take two trajectories. One is that of a consultant to the government of the State of West Bengal to begin with and then once a successful pilot is achieved, to the national governments of India and Bangladesh for cross-border collaboration. Second is the possibility of convincing the trans-national agencies to convince and mobilize the actors in the state to implement the pilot. The proposal taps on the strong orientation of the State towards its cultural identity and independence by defining a region based on the original Bengal. Further by decentralizing economic development it presents growth opportunities to the local municipalities and panchayats with better development and infrastructure prospects. However, the functional mechanism to make the proposal work is spearheaded by the civil society, NGO's and the communities. The process attempts to minimize the investment from the government and political outfits and cater to the individual goals of all the stakeholders.

It re-emphasizes on the importance of planning at the regional scale beyond administrative boundaries and considering socio-economic ties and historic trends.

Limitations and Challenges

The research was bound by a set of limitations and encountered some challenges along the way.

The primary limitation being the fixed time-frame of 10 months in which it was expected to be concluded. This constricted the extent of the exploration and the depth of the design. The topic requires more in-depth knowledge of the ground situation and the people to generate a more realistic and implementable solution. This forced the research to limit itself to the Indian part of the Delta and addressing only one category environmental displacement.

However, given the scale of the topic, the research can be taken forward for higher research purposes with the processes highlighted in this document as informants. Further, the single disciplinary approach by a spatial planner to such a multi-disciplinary issue is also responsible for the possible discrepancies in the proposal presented here and the opinion of anthropologists, social scientists or lawmakers. Criticism is essential to make the design more realistic. A multi-disciplinary team with inter-disciplinary collaboration is needed to further develop this proposal and make it viable for implementation and make it airtight.

One of the key challenges faced during the analysis of the region was the lack of data and opinion. This can be credited partially to the ambiguous nature of the topic and partly to the context where spatial data is either heavily protected or does not exist. This limited the depth into which the design could be explored in the given timeframe. However, the data on which the research has been built has been verified by scholars and is scientific in nature. The research has attempted to logically develop the process rather than an implementable product. The process and ideology if followed by a multi-disciplinary team, based in the context, can result in a fruitful and more viable product. The product presented here is a possible idea of the solutions that can be generated, keeping the research themes central.

Scientific Relevance

Even though migration is inherently considered to be a part of the social studies, it has influenced the urban fabric for decades. The pressure on cities and resources has exponentially increased and has led to the expansion of the informal sector, which has become a subject of growing interest. Climate induced migration is mostly undocumented, and the migrants are subjected to resource scarce situations. The condition of these migrants is similar to that of refugees and requires considerable scientific research.

This research highlights two major gaps in the current global response - one of definition and the other of inter relations. Scholars from multiple fields have repeatedly tried to define a term for climate induced migration. Transnational humanitarian agencies have tried to initiate conversations about this issue by highlighting the scale of the impending disaster. Further, countries at the frontline of this disaster have repeatedly made appeals on international platforms for increased attention and assistance. However, all these elements of the dialogue are seemingly fragmented and do not cohesively address the humanitarian challenge behind environmental migration. This fragmentation often makes the claims and predictions less believable for the society and reflect in the lack of proactive action.

The second is the gap between scientific fields of spatial planning strategies and environmental migration. The potential of spatial planning tools and good governance to make a positive contribution has rarely been addressed by some nations. Effective planning can help generate effective processes to manage all the stakeholders, prevent disaster situations and protect the dignity of the migrants. This research cohesively defines and classifies the environmental migrants while establishing the positive role of spatial planning as a response to the issue.

Societal Relevance

"Environmental refugees are reshaping the human geography of the planet - a trend that will only increase as deserts advance, forests are felled and sea levels rise. Mega crises may well become the new normal. These are all threats to human security as well as to international peace and security." – Ban Ki-Moon (Former Secretary General of the UN)

Migration by definition is social and deeply influenced by the societal dynamics. This research aims to reflect on two scales of impact on the society – global and local. Common global challenges like security issues, radicalisation of the deprived, disease and conflict can be experienced as an outcome of this phenomenon. These impacts are being felt in the countries on the front line of the disaster and leaders are demanding accountability and support from the countries which have significantly contributed to the Green House Gas emissions. With the increasing demand for international 'burden sharing', this research is extremely relevant to the global community. It targets the global society with its contribution to the definition of the issue and the proposed transferable methodology. Through the proposed strategy and governance model, it defines the role of the community in supporting the crisis.

Further, at the local level, the challenge is to manage the ethnic tensions between the resident and migrant population as well as protect the dignity of the migrants. Especially in the case of the Ganges Brahmaputra Delta, which has historically been ethnically, linguistically and religiously segregated. Considering this, the mass influx of refugees will lead to an added pressure on the limited resources and further cause additional conflict and apprehension among the locals. The constant disaster and deprived situation has a direct impact on the socio-economic status of the region. This research aims to look at methods to mitigate this consequence through planning and design. Further, it looks at methodologies to ensure a basic quality of life for the refugees and works towards smoothening the transformation of the existing society. With the aim to develop a model for social and spatial inclusion of the displaced population, the research draws from the concepts of spatial justice and ones right to the city and resources

Through community participation and self-organisation, the affected communities can retain their original identity and culture by designing their own future. Efficient and sensitive livelihood management can be instrumental in reducing the local conflicts and make it a situation of mutual benefit.

Ethical Relevance

There are two types of ethical considerations which are crucial to address the issue of migration.
The first primarily addresses the receiving regions ethical stand on accepting and accommodating the migrants. Multiple ethical questions like how the migrant as an outsider be perceived as an asset in the receiving region and how the internal resource scarcity can be managed while catering to this population become key for the institutions of the country. Further, directing finances to a seemingly invisible cause will also require open mindedness and a pre-emptive manner of thinking. The current absence of the very definition of the term 'climate migrant' in the policy framework of both India and Bangladesh, makes this research relevant and urgent. (Kartiki, 2011)

Second, the research also highlights the ethical dilemma of an urbanist. Decisions like where to draw line between humanitarian ethics and social and spatial capacity and quality become key to the decision-making process. One bears the risk of romanticising about the rural life and environment often branding the urban as dysfunctional. It is essential for the urbanist to be aware of these shortcomings and approach the planning exercise keeping the people and the current development trends central.

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Environmental Displacement

Defining migration in the context of climate change and the possible response of spatial planning

Theories of Urban Planning and Design | AR3U023

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Abstract

Climate change is the defining crisis of the 21st century. While increasingly there are efforts being made at a global scale to spread awareness about the impact of human activities on climate, the discourse on the direct impact of the change on the 'human' is still nascent. There are an increasing number of people who are losing their land, livelihoods and basic means to obtain food and potable water due to the adverse effects of climate change. In their attempt to survive these people have no option but to seek sanctuary in nearby settlements. (Myers, 1997) This forced displacement is a result of the multi-causal and complex relationship between climate change and the concept of human migration. Myers prediction of 200 million climate induced migrants by the end of the century has brought this issue to the forefront and is being termed as the "human face of climate change". (Gemenne, 2010)

Caught in a 'negative vulnerability cycle' the displaced population lacks visibility, recognition and even a basic definitive category which makes it impossible for them to seek legal shelter and get national or international support. This consequently puts them under the category of 'illegal migrants' as well as strips them of their human rights, identity and at times citizenship, especially in the developing nations. Highlighting this issue of environmental, social and spatial injustice, this paper argues the urgency for a universal definition for the 'environmentally displaced'. It then attempts to defines the term by exploring scientifically peer reviewed literature and presents the entitled rights of the population defined.

Further, this paper reviews the current policy and strategies formulated in response to the population movement, across the global, national and local scales. Finally arguing for cohesive action and recommendations to incorporate migration in the existing development plans as a pre-emptive adaptive strategy for better growth of the region.

Introduction

The Fifth Assessment Report (2014) by the Intergovernmental Panel on Climate Change (IPCC) predicts a definite rise of 1.5 degrees Celsius above pre-industrial levels by mid-21st century (Intergovermental Panel on Climate Change (IPCC), 2013).The absence of extreme measures to curb emission levels is predicted to cause a rise of above 2 degrees by the end of the century. In hindsight these numbers seem insignificant and seemingly unfelt in daily life. However, experts have identified profound repercussions which are already visible in many regions of the world. Frequent natural disasters, rising sea levels, angrier rivers, heavier rains or drought in combination with extreme temperatures are only a few on the long list. In

1990, IPCC'ss First Assessment report was the first to declare that the single largest impact would be on human migration. The World Disasters Report (2012) highlighted that more than 25 million people have already been displaced due to environmental disasters while Myers predicts the displacement of 200 million by the year 2050. This would mean that one in every forty people would have been displaced from their original habitat due to unusual climate events (Brown, 2008a). The numbers are already set to surpass the 25 million official political refugees across the world (Basu M, Roy Rt, 2018). Hence, climate-induced migration has been termed as the "human face of climate change"(Gemenne, 2010).

In 1985, Hinnawi for the first time placed human mobility in the context of climate change and coined the term *"environmental refugees"*. (Stojanov et al., 2016) Over the past three decades, scholars like Myers, Black, Castles and international agencies like the International Organization for Migration (IOM) have criticized as well as published their own versions of the definition. In 2001, Black wrote: "there are as many typologies as there are papers on the subject", highlighting the lack of a cohesive definition as an initial challenge when addressing climate-induced migration (as cited in Klepp, 2017). This lack of definition leads to the reduced visibility and legitimacy for this category of the displaced, further leading to an added loss of identity, culture and at times citizenship, rendering them to be **'stateless'** (as cited in Klepp, 2017).

The 1954 Convention relating to the Status of Stateless persons defines a stateless individual as 'a person who is not considered as a national by any State under the operation of its law (UNHCR, 1954). Further, if the state ceases to exist, like in the possible case of the Small Island Developing States (SIDS), the definition can be extended to incorporate the displaced population (Park, 2011). However, the definition could also include the people operating outside the governance structure, where the government holds no responsibility for their well-being. The plight of being stateless has led to degraded human conditions, ethnic conflicts and at times war for resources. The trigger for this cyclical crisis is yet to be strongly addressed and resolved in the global and national policy frameworks.

In addition to the above mentioned, climate-induced migration has major repercussions on the development of a region. The IOM establishes that the larger region, especially the urban areas are subjected to complex development phenomena like informal urbanisation and invisible floating populations. Since urban areas are perceived to be safer and have parallel cash economies which increase access to informal employment, they become temporary or permanent destinations for people who have lost their means of livelihood and land. This 'urban flood' has an adverse effect on the densities, food and water security and the infrastructural capacity of the receiving cities. (Brown, 2008b) While the movement of people in this context remains undocumented and outside the governance structure in most countries, the developmental consequences are increasingly becoming a part of their agendas. Further the economic degradation of the affected population has a severe impact on the economic stability of the region due to the increased poverty levels and diversion of resource allocation to mitigate the rise in poverty and stabilise labour surplus (Ahsan, Karuppannan, & Kellett, 2011). This further leads to the emigration of the highly skilled classes due to the lack of opportunity, termed as a 'brain drain' for the region's hollowing economy. (Brown, 2008b) A combination of these impacts leads to the stunted development of the region. Developing nations, which are disproportionately affected by climate change, are faced with a greater challenge as it is an addition to their ongoing struggle to achieve a basic standard of living for their citizens (Althor, Watson, & Fuller, 2016).

The violation of the basic human rights of the climate-induced migrant and the consequent challenges posed to the development of the vulnerable and receiving regions make this issue extremely relevant and urgent. As an addition to the discourse, this paper attempts to define and classify climate-induced migration through a review of scientific literature. Further, it presents the rights and obligations of the displaced. Consequently, while arguing for the protection framework for the environmentally displaced, it critically reviews the current responses by international stakeholders, nations at the frontline of the disaster and the affected local areas. Finally, reinforcing the need for cross collaboration and the use of community based pre-emptive planning and migration as an adaptive strategy rather than a post disaster measure.

This paper uses the term 'environmental change' for slow onset (sea level rise and water salinization) and sudden onset (typhoons, earthquakes) disasters occurring naturally and due to climate change. Further it uses 'environmentally displaced' for refugees, forced displacement as well as voluntary migration as a response to environmental stress.

Environmental Refugee or Environmental Migrant?

In 2005, the world saw its first batch of official 'environmental refugees' when 1,000 residents of Carteret Island in Papua New Guinea were relocated to mainland Bougainville due to storm warnings and salt water erosion (Panda, 2017). However, this type of movement has been observed across regions and borders for decades as a response to the changing environment. The resultant stress is a major push factor for migration when the communities are unable to sustain themselves in the changed environment. SIDS and Lower Elevation Coastal Zones (LECZ) (zones below 10m elevation from sea level) are at the frontline of this phenomenon and are already experiencing the impact. Faced with the issues of frequent storm surges, rising sea levels and increased salt content in the groundwater in addition to the frequent and fierce disaster events like typhoons and cyclones, the existence of communities and nation states like Maldives and the Pacific Islands is under threat (Park, 2011).

However, despite these visible impacts, the prevalent action plans and policies majorly focus on post-disaster reconstruction rather than preventing displacement. This is predominantly due to the relative ease of procuring aid and the lack of a clear universal definition for the environmentally displaced in the global scientific and legal discourse. The little or no access to aid or institutional support before or during displacement pushes the displaced into a negative vulnerability cycle. It displaces them from one vulnerable location to another, further degrading their socio-economic, emotional and physical stability (Ahsan et al., 2011).

In response to this gap the SIDS, developing and Least Developed Countries (LDC), at the frontline of climate change impact are demanding a universal definition to be able to appeal for climate justice and international assistance to safeguard their populations. In 2009, the Government of Maldives called for worldwide cuts in carbon emissions in a cabinet meeting held underwater, to highlight their desperation for action (IOM, 2017; Klepp, 2017). However, the United Nations High Commission for Refugees (UNHCR) has been reluctant to officially include the environmentally displaced in the 1951 Refugee Convention definition due to the unclear and layered link between environmental change and migration. In agreement, some scholars like Black (2001) fear that the issue is too complex and its inclusion will dilute the essence and importance of the political refugees (as cited in Klepp, 2017).

The nature of environmental displacement is different and more layered than the current

definition of refugees and internally displaced people (IDP).

*"A refugee is someone who has been forced to flee his or her country because **of persecution, war or violence**. A refugee has a well-founded fear of persecution for reasons of race, religion, nationality, political opinion or membership in a particular social group."* (UNHCR, 1951)

While the IDP's have been defined as people who have been forced to leave their places of habitual residence, and move within the boundaries of their state, as a result of or to avoid conflict, natural or human-made disasters and human rights violations. This category does not have a legal status or exclusive rights. (UN, 2004)

While a majority of the environmental displacement comes under the IDP category, the crossing of borders has not been factored in these definitions. The focus on the environmental factors is also usually associated with sudden-onset disasters and mass movements, disregarding the long-term distress caused by slow-onset disasters. Further, IDP's are legally considered to be under the protection of their own state and hence are not eligible for international aid (UN, 2004). This aid is reserved for the refugee category for which environmental change is not considered as a push factor. Hence, there is a need for an exclusive definition for migration in the context of climate change and their consequent rights.

The UNEP, in sync with the neoclassical theories of migration, defines 'environmental migration' as follows:

"...those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life. By 'environmental disruption' in this definition is meant any physical, chemical, and/or biological changes in the ecosystem (or resource base) that render it, temporarily or permanently, unsuitable to support human life." (El-Hinnawi, 1985)

This definition has been often criticized for its ambiguity and failure to differentiate between migrants and refugees (Bates, 2002). The overlap characterizes a 'voluntary' nature to the migration, making the change in environment a dormant push factor. This ambiguity makes it impossible to validate the need for dedicated protection for the displaced (Klepp, 2017). Another working definition supported by the International Organization of Migration (IOM), published in 2008 is:

"…persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad." (IOM, 2011)

However, this definition too leaves out the specifics of loss of land, livelihood and the nature of the forced migration in question. Furthermore, the use of the word "compelling reasons" adds ambiguity to the definition. What is required is a definition of sub-clauses incorporating the different consequences of various environmental changes like the loss of land due to sea level rise or the loss of means of subsistence due to continuous drought or increased ground water salinity.

A more accurate definition would be:

persons or groups of persons who have been displaced from their habitual homes due to the loss of land, livelihood and lives caused by the adverse effects of environmental change (slow and sudden onset) and are unable to cope with or recover from the situation due to economic, social, political or environmental reasons.

This definition includes the classification proposed by the UNDP and IOM based on the

stage and complexity of the migration (Ahsan et al., 2011).

Climate Justice, Rights and Obligations of the Environmentally displaced

With the increasing visibility of the impacts of environmental change, the concept of environmental justice is becoming increasingly popular in academia as well as international human rights platforms. Countries and communities at the frontline of the disaster as well as future generations are increasingly demanding climate justice to be addressed seriously. The key principles behind these demands are based on existing refugee or human rights laws, presented in the context of the environmentally displaced. This section elaborates on these rights.

The basic rights highlighted by the Universal Declaration of Human Rights, is the right to life, food, shelter, movement and clean water (Klepp, 2017). The State is obliged to provide these as well as access to adequate health care facilities to all under its jurisdiction (UN Human Rights Council, 2018). However, when it comes to nation states which face the threat of extinction or the governance structure is unable to cope with the disaster, the shift of this responsibility remains undefined. Bell, in his analysis of international justice theories, asserts that global climate is not a territorial subject but is rather a 'global common' (Bell, 2004). Risse (2009) reinforces this notion by referring to human rights and 'a common ownership of the Earth' as a primary reason for the common responsibility to protect the migrants. (as cited in Klepp, 2017). Hence the territorial contributions to climate change which have led to the depletion of the global common should be held proportionately accountable for its adverse effects. This call for accountability, especially by SIDS, makes it a discussion between the rights of the affected, in this case the Developing and LDC's and the responsibility of the major contributors to greenhouse gas emissions, in this case the Developed countries (Klepp, 2017).

Bell further analyses Charles Beitz's 'Resource Redistribution Principle', which says that the material advancement of society is a combination of human cooperative activity and equal distribution of natural resources. Beitz enforces that "each person has an equal prima facie claim to a share of the total available *resources"*(as cited in Bell, n.d.). This entitles the environmentally displaced, especially the refugees, with an equal share of the leftover global resources, shifting the accountability from a local and national scale to a global subject. Another point to note here is that most of the SIDS and LECZ's value their social and natural environment more than just a resource. Their culture is embedded in their environment and forms the core of their identity (Bell, 2004). This claim can be well observed in the case of Kiribati, where many resident communities have chosen to stay on the sinking island despite offers to relocate to other locations on the pretext of their cultural and social needs.

In this context, Nine (2010) and Kohler (2012) propose a territorial approach by discussing the right to self determination and cultural preservation for the affected populations. Using the Lockean Proviso, Nine argues that in the event of the loss of complete nation states and prospective population relocation to lands unknown, the people should have the right to self-determine their functionality and form of governance appropriate to their native culture (Nine, 2010). The plight of the naturalization process in a new country not only leads to a loss of cultural identity but also impacts community life and socio-economic stability. They argue against the current 'individualistic' approach to refugee management and believe the only solution is to grant autonomous territories to the displaced nation states as a moral duty to protect their culture and community (Lister, 2014).

In response, Lister (2014) highlights the practical issues of this approach and says that it is almost impossible under international law to criminalize the polluting nations for their

actions (Lister, 2014). Hence, there is a need for exploring a midway solution between the individualistic and territorial approach to climate migration. Arnall (2015), in his observation on the third wave of research on the climate migration, mentioned the increasing relevance of 'hearing out the experiences of the affected people' as a key tool to address the problem. This can be derived from the right to voluntary relocation under the right to adequate housing (Anwer, 2012). The freedom to choose the place of resettlement directly places the displaced as active participants of the process. Black, McLeman and Oliver-Smith reinforce this need for participation by revealing the 'importance of socioeconomic context and historic experiences' for achieving successful adaptation strategies. (Klepp, 2017)

There is also an increasing consensus on the need to include the affected population in the global and national decision-making processes which directly concern or affect them (Klepp, 2017). Participation is seen to be most effective with communities bound together with socio-cultural ties, especially in disaster situations. Many studies highlight that increased resilience is achieved through working in communities, as they are the key actors and the primary beneficiaries (Abedin, 2013).

Lastly, economic inclusion of the displaced and refugees is an upcoming solution under research. The Refugee Economies Programme believes and has empirically proven, that the right to work and mobility is the most essential for the reconstruction of the affected society. This right not only allows them to regain their autonomy and financial independence, it also allows them to communicate with the host community and contribute to the host economy. This smoothens their integration in the host society. Constructive occupation was observed to be an effective way to overcome mental trauma and control radicalization in the camps in Uganda. (Betts, 2018)

In comparison to the political refugees, the environmentally displaced are faced with an increasingly complex situation. The ambiguous definition of responsibility and accountability due to the interdependent drivers for migration leads to the abandonment of the displaced and classifies them as economic migrants. The movement is a result of multiple failures to cope with disaster events or environmental changes, which deprives the population of all possible resources and assets. There is also a disproportional impact across the economic scales. Further, in contrast to the refugees, there is often no hope for returning home. This highlights the need for independent and exclusive protection for the displaced, disjointed from the refugee framework.

Experts like Hermsmeyer (2005) and King (2006) have proposed the formation of transnational agencies and treaties exclusively addressing the environmental migrants is an urgent first response (Klepp, 2017).

Responses

Despite the lack of definition and the inherent complexity of the issue, some effective responses have been recorded at the global, national and local levels. The transnational humanitarian, development and climate action agencies acknowledge and support research into the climate migration nexus and facilitate the inclusion of soft guidelines and policy responses in the national plans of the vulnerable nations (UNHCR, 2017). The 21st session of the UNFCC Conference of the Parties (2015) directed the formation of a Task Force on Displacement to develop 'recommendations for integrated approaches to avert, minimize and address' climate related displacement (IDMC, 2018). The research revealed that the link between internal displacement and climate change was a point of concern for 53% of the 66 countries reviewed. An increasing awareness and inclusion of the climate migration nexus was noted in the National Action Plans submitted to the UNFCCC as a part of this program (IOM, 2018). Further, in-depth research was published by the Internal Displacement Monitoring Centre (IDMC) as a

part of the Task Force, investigating the displacement related to slow onset disasters (IDMC, 2018). A detailed stakeholder analysis was also conducted by IOM, elaborating on the current roles of the transnational organizations in the pre-displacement, during displacement and post displacement phases. Recommendations for further improvements and actions were also proposed (IOM, 2018).

The synthesis and reflection on all the above research are scheduled to be discussed in the Intergovernmental Conference on The Global Compact for Migration in December 2018. The first of its kind, the historic conference aims to form an international pact for safe and orderly international migration and is expected to address climate induced migration on a global platform.

Another notable international response is the Nansen Initiative (2012). Formed by the governments of Norway and Switzerland, it is a bottom-up, state led initiative which provides consultation, through participatory processes, to decision making bodies for better protection of the displaced. Further, the Agenda for the Protection of Cross Border Displaced Persons in the Context of Climate change (2015), launched by the Initiative, focuses on raising awareness and integrating the best practices by states and other organizations into their own consultation process. (Klepp, 2017)

In addition to these global efforts, affected regions and nations have been actively acting to reduce displacement. The Pacific region is leading the way by taking a soft-guideline approach through regional collaboration in the Moana Declaration (2009) and the Niue Declaration on Climate Change (2009) to share resource and knowledge on climate migration (Klepp, 2017). While nations like Bangladesh are investing heavily on disaster risk reduction and technologies like early warning systems, cyclone shelters and embankments to minimize the effects of flooding or disaster events, island nations like Maldives, Fiji and Kiribati are exploring the option of international relocation for its population. Bangladesh and India are also using livelihood diversification schemes and community disaster training as methods to keep the populations in their original habitats. However, these efforts are still very nascent and localized and need considerable intervention to be scaled up and have regional impacts. These preventive measures concentrate on risk reduction as a coping mechanism and fail to factor in the further development of the region. Their aim is to restore stability in the affected areas, but they overlook the negative impact on the growth and development of the larger region. Alternately, most countries still focus on employing post disaster measures, which usually focuses on the reconstruction of an area, rarely addressing the long-term socio-economic distress caused by the disaster.

A noted progressive response is the Kampala Convention (2009), an international treaty by the Africa Union, on internal displacement caused by conflict, natural disasters and development. The treaty was signed by 40 states and ratified by 25 member states. The objectives were primarily to regionally and nationally include legal frameworks and policies to prevent, mitigate and provide solutions for internal displacement in Africa. The states are required to establish the framework and define responsibilities of all the stakeholders, for protecting the displaced. (Union, 2009)

Lastly, it has been observed that locally embedded and community based adaptive strategies have been successful in reducing disaster risk and the impacts of displacement (Shaw, 2013). While some of these initiatives are led by communities and NGO's, others like the development of alternate agricultural practices in the saline coastal areas of Bangladesh, is supported by the municipal and national governments and knowledge institutes. Voluntary migration has emerged as one of the most prevalent local adaptive strategies, especially in the developing nations. Working individuals often migrate in seasonal or

temporal patterns to increase the economic stability of the family. They take advantage of the cash economies in the host cities and do odd jobs to gather capital, which is further used for restoring their homestead. While this strategy has been proven to be a successful way to increase resilience in the communities, it puts immense pressure on the urban areas. Since the migration is unregistered, the migrants are marginalized and subject to a substandard quality of life. Further, families also permanently relocate when they cannot sustain in their homestead. The policies and strategies currently fail to include this mobile population in their frameworks, which not only impacts the migrant but also the overall development of the region.

However, the above efforts are independent and have varied agendas, which limits the potential benefits of collaborative and cohesive action.

Conclusions and Recommendations

In conclusion, this paper calls for three key actions in the current discourse – a cohesive universal definition for the environmentally displaced, inclusion of environmental migration in the national and local spatial planning policy instruments and the need for community-based strategies and pre-emptive planning as a response to environmental change.

A comparative analysis of the responses above reveals the presence of the awareness and will to act in all the stakeholders involved but there is an evident lack of cohesive action. The international, national and local strategies need to be aligned through multi-sectoral collaborations to achieve the desired results. The participatory model will enable the national plans to be more effective, the international efforts to be more focused and the allow the transferability of local strategies to other similar contexts. The Kamapala Convention is a good example of how states can collaborate and generate effective action.

Further, national and regional spatial planning instruments need to address environmental migration as a key consideration for the development plans. Here, regional planning needs to play a key role in streamlining and regularizing the reorganization of the displaced. There is also potential to use the population movement for the benefit of the region by optimizing the available socio-economic opportunities. This will not only be instrumental for the growth of the region but also minimize the adversities of the displacement and violation of human rights.

The complexity of the issue requires a relational approach rather than a deterministic Euclidean approach like permanent resettlement or one-time infrastructure construction. Deeper insight into the movement patterns and socio-economic practices is required to understand the interventions needed in the regional planning instruments (Klepp, 2017). The local perceptions of the environmental change are also an essential addition to fill the gaps in the international approaches (Stojanov et al., 2016). In support, international collaborations should be used to support the region economically, institutionally and technically for knowledge sharing. Further, for efficient absorption of the population in a larger region, it is essential to investigate the needs and possible reactions of the host population. Here, the concept of symbiotic relationships can be employed to create a mutually beneficial situation for both communities.

Lastly, there is a need for participatory pre-emptive planning which employs actions in anticipation of a disaster rather than right before or after the disaster. This approach not only enhances community resilience but also facilitates socio-economic growth and development. In many countries like Vietnam, Columbia and China, pre-emptive planned relocation has been conducted to relocate populations under risk to safer locations in a dignified manner. While this method has its challenges and is considered to be the last resort

for any disaster management plan, it is increasingly becoming the only solution for many countries. It is important to review the various planned relocation practices and identify their adverse impacts on the host and migrant communities. (Petz, 2015)

The combination of awareness and will with the actions mentioned will enable nations to address the issue of climate-induced migration and its developmental impacts cohesively. Further, reducing the detrimental impact on the displaced and the host settlements.

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5.2.3 COMPARATIVE ANALYSIS

	Global Response	Scale	Scope	Objective	Policy Instrument	Expected Results	Agencies Involved	Phase of Displacement
1	2030 Agenda for Sustainable Development (2015)	Global	Global development framework for transformational change and ensure well-being for all.	Implement planned and well managed migration policies and reduce fatalities due to disasters through effective DRR.	Sets 17 sustainable development goals to be achieved, out of which 6 are relevant to migration or climate change.	Each goal has its targets set till 2030. A voluntary commitment and multi-stakeholder partnerships to achieve the targets.	Multiple agencies within the United Nations, United Nations, Member States	During
3	The New Urban Agenda	Global	To set a new global standard and approach for sustainable urbanisation	To address the rights of the displaced in an inclusive urbanisation model. To include disaster risk reduction in urban planning. Establishing framework to strengthen urban-rural linkages.	Non-binding guideline for urban development for the next twenty years	To achieve goal 11 of the Sustainable Development Goals.	United Nations General Assembly	
4	Paris Agreement (2015)	'respect, promote and consider their respective obligations on human rights' when taking action to address climate change	'develop recommendations for integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change'					
5	Global Compact on for Safe, Regular and Orderly Migration(2018)	Transnational (UN Member States)	To ensure all types of international migration is carried out in a safe and orderly manner	Articulate a common set of commitments for all UN Member states to respond to the challenges and opportunities of contemporary migration	Non-legally binding Intergovernmental global agreement on international migration	- Recognition of Climate change as a driver for displacement. Data collection and validation of the concept. Movement predictions. '- Support for Enhanced pathways for regular migration through state cooperation and stronger solutions for people migrating in the context of slow-onset disasters. Working at a regional level. '-Accelerate fulfilment of SDG's	United Nations, UNHCR, IOM	Pre-Displacement
	Sendai Framework for Disaster Risk Reduction	Transnational (UN Member States)	To reduce disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries	To reduce the scale of displacement by disasters and opportunity to include human mobility in Disaster Risk Reduction programmes	15-year, voluntary non-binding agreement	Substantially reduce global disaster mortality and number of affected people by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015.	UN Office for Disaster Risk Reduction (UNISDR), United Nations General Assembly	Pre and during displacement
	UN Framework Convention on Climate Change	Transnational (UN Member States)	To stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.					

6	*Nansen Initiative Agenda for the Protection of Persons Displaced Across Borders in the Context of Disasters and Climate Change, October 2015 and the Platform on Disaster Displacement,*	*Endorsed by 100 governmental agencies*	*To protect the needs of cross-border migrants displaced by climate adversities by Enhancing understanding, provide a conceptual framework, and identify effective practices for strengthening the protection of the cross-border migrants*	*To furnish disaster preparedness plans for the affected states by incorporating all the relevant stakeholders and local approaches in the process.*
7	*African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa (Kampala convention) (2009)*	*Africa Union*	*Guidelines for protection of Internally displaced people in Africa.*	*Early warning systems for areas with high climate risks. Immediate protection and assistance to climate-displaced.*

5.2.3 COMPARATIVE ANALYSIS

A compilation of a broad set of effective practices from bottom-up state led consultaiton processes. A conceptual plan for a comprehensive approach to disaster displacement.	*The Protection Agenda was endorsed by 100 States. A follow up movement called the Platform on Disaster Displacement was launched. The PDD consolidates the findings of the Protection Agenda and works towards knowledge and data collections, enhancing the best practices and main-streaming climate migration by linking policies and actions.*	*The Government of Sweden and Norway, Mac Arthur Foundation and the European Union*	*Pre and during displacement*
voluntarily legally binding framework for signatory countries. Countries can also choose to sign but not be legally bound by the framework.	*Increased accountability and protection for the IDP's in Africa. Signed by 22 countries and ratified by 20.*	*Collaboration of all National Governments*	*Pre and post Displacement*

Country	Scale	Scope	Objective	Policy Instrument	Expected Outcome	Actors	Resources	Sectoral Collaboration	
								HOR.	VER.
Bangladesh : 2009 Climate Change Strategy and Action Plan	National	10-year programme (2009-2018) to build the capacity and climate resilience of the country. Programme comprises of 6 pillars - Food Security and protection of the poor, disaster management systems, infrastructure, research, mitigation and capacity building of government ministries and agencies .	Livelihood protection for the vulnerable groups and support displaced population to cope with the new environment post displacement.	Local strategies generated through participatory planning for contextual adaptive livelihood options for all sectors. Includes alternate crops and better livestock management. Development of effective insurance schemes to insure property and assets.	A foundation of research and relevant actions for the 20-25 year plan to build capacity and resilience of the country to meet the challenge of climate change. To reduce the adverse affects of displacement and financially safeguard the population.	Ministry of Environment and Forests, Ministry of Foreign Affairs, National Environment Committee, Implementation by relevant line ministries (Agriculture and fisheries, urban development etc), Relevant local NGO's working on climate change for capacity building, Businesses	International Donor agencies per programme through the National Climate Change Fund, The Government of Bangladesh		
Bangladesh : 2015 National Strategy on the Management of Disaster and Climate Induced Internal Displacement	National	A rights-based approach to disaster risk reduction to respects, protects and ensures the rights of climate-induced internally displaces persons	To identify high risk communities, create livelihood options and integrating disaster risk in land-use and urban planning.	Strategic Framework implemented by a National Task Force on Displacement, a inter-ministerial and inter-agency body.	Disaster Resilient Communities and regions with cohesive socio-economic development.	Ministry of Disaster Management and Relief, Government of Bangladesh	UK Aid, European Union, Norwegian Embassy, Government of Sweden, Australian aid, UNDP, Government of Bangladesh		
Pacific Islands : 2017 - 20130 Framework for Resilient Development in the Pacific	Transnational Region (Pacific Islands)	To guide all stakeholders' actions to strengthen resilience in the region	Stronger and more resilient communities with human mobility addressed by all stakeholders in their national mobility policies and roles for the civil society and private sector	Guidelines defining strategic objectives and priority actions for 4 main goals.	If the framework is adopted, low carbon climate resilient future development and stronger communities for ongoing climate change.	Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP), Pacific Islands Forum Secretariat (PIFS), United Nations Development Programme (UNDP), United Nations Office for Disaster Risk Reduction (UNISDR) and University of the South Pacific (USP	Pacific Community		
Kiribati : 2013 National Framework for Climate Change and Climate Change Adaptation	National	Mainstreaming CC and CCA in the National Development Plan under UNFCCC guidelines	Economic capacitation and skill development of existing population. Facilitating the emigration of population through sponsorship and agreements with host countries. The diaspora is expected to further finance and assist the eventual relocation of the entire population.	Vocational and Technical training and Mobility in Labour Policy	To be able to control the population growth, limit the peripheral populations and strengthen diaspora base for permanent immigration.	Ministries of Water, Coastal Resources, Economic Planning, Fisheries, and Environment, Labour, Commerce and Communications.	AUSAID, UNFCCC, EU, USAID, World Bank, ADB		
Ghana : 2016 National Migration Policy	National	Manage migration flows in the context of national development as well regional and global interests to facilitate sustainable development.	Acknowledge migration as a positive coping strategy and manage it well so that it can serve to build resilience to environmental change.	Broad Policies and strategies to mainstream migration in development planning, climate change policies and urban policy. Further promote inter-agency cooperation and research on.	Action plans to Mainstream migration in local, regional and national spatial plans. Strengthen government capacity to deal with internal climate displacement.	Ministry of Interior, Centre for Migration Studies, Technical institutes, German International cooperation (GIZ), EU, IOM	IOM, EU, GIZ, Ministry of Finance		
Uganda : 2005 Internal Displacement Policy and 2018 Migration policy	National	To protect and streamline the flow of internally displaced and refugees. To define rights and bodies accountable. Facilitating return, resettlement or integration of the displaced.	Defines population displaced by natural disasters as one of the target groups. Defines rights and protection as equal to that of refugees. Believe that regulated and supported migration is beneficial to host society.	Uses a rights-based approach. Enables the population with the right to freely move, work, setup businesses and access public services and travel documentation.	Protected rights of migrants and stronger local economy	Government of Uganda, Ministry of Immigration, Africa Union, IOM	-