Accommodating the Displaced

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

Masters Thesis | Msc Urbanism | TU Delft
Asmeeta Das Sharma | 4736893
First Mentor : Dr. Gregory Bracken
Second Mentor : Dr. Verena Balz
Climate change as the driver for Human Mobility and Displacement
No. of People in millions

Year

36.5
42.4
32.4
19.1
24.2

Average Disaster Displacement/Year : 21.7 Million

Statistics Source: Internal Displacement Monitoring Centre and World Bank
This research aims to scientifically establish a relationship between climate change and human migration. Further to investigate the role of spatial planning and governance in reinstating or upholding the socio-economic dignity and rights of the environmentally displaced persons.
Environmental Change

LIVELIHOOD LOSS

Government managed Relocation

SELF-BINAGED adaptive strategies

LAND LOSS

1. Impact of Cyclone Sidr; Source: U.S. Navy photo taken by Mass Communication Specialist Seaman Christopher Lange
2. Impact of Cyclone Sidr; Source: AsiaNews.it
NEGATIVE CYCLE OF VULNERABILITY

VULNERABLE POPULATIONS

SELF SUSTAINING

NATURAL LIVELIHOODS

PETTY LIVELIHOODS

POVERTY STRICKEN

MARGINALIZED
INTERNALLY DISPLACED PEOPLE (IDP)

ILLEGAL MIGRANTS OUT OF DISTRESS

REFUGEES ASYLUM SEEKERS

ECONOMIC MIGRANTS (LOW SKILLED)

ECONOMIC MIGRANTS (HIGH SKILLED)

ENVIRONMENTALLY DISPLACED PEOPLE

ENVIRONMENTAL REFUGEES

SHORT TERM
5-10 years or less

LONG TERM
10-30 years

PERMANENT

CIRCULAR MOVEMENT

FORMAL CATEGORIES OF MIGRANTS
Two of my sons migrated to Dhaka after the family home was destroyed by storms multiple times and agricultural jobs were lost. Only Allah can save us, we don’t have any power to save our children.

Photo credits: Tim Mcdonnell
Densely Populated Deltas
Least Developed Countries with low coping capacities

Increased Intensity of Cyclones
Frequent Flooding
Water Contamination
Sea Level Rise
River Erosion

Source: luminocity3d.org/WorldPopDen/55/200/10/00
2000 people arrive in Dhaka everyday in search of a better life. 80% of migrate due to climate shocks!
RESEARCH QUESTION

HOW CAN SPATIAL PLANNING AND GOOD GOVERNANCE BE USED AS A TOOL TO FACILITATE THE USE OF CIRCULAR CLIMATE-INDUCED MIGRATION AS AN ADAPTATION STRATEGY FOR THE SENDING REGIONS AND FOR THE DEVELOPMENT OF THE NEIGHBOURING REGION?
Standing atop an 18-foot embankment, Badruddin Sarkar pointed to the horizon - to his previous home, engulfed by a rising sea; Own Image
THE CASE


Source: Google Earth
54 Inhabited Islands

1064 Villages

4.5 Million inhabitants

Source: Google Earth
Sustainable Livelihoods Framework; (Adapted from Frank Ellis, 2003)
LIVELIHOODS APPROACH

1. VULNERABILITY
2. ADAPTIVE STRATEGIES

HUMAN CAPITAL
SOCIAL CAPITAL
NATURAL CAPITAL
PHYSICAL CAPITAL
FINANCIAL CAPITAL
VULNERABILITY ANALYSIS

CLIMATE INDICATORS

- Sea Level Rise
- Flooding
- Geological Shift
- Salinity

Inundation due to 1m and 2m sea level rise

Flood Prone areas

Geological classification of the Delta

Current areas with increased saline content; Own Image
VULNERABILITY ANALYSIS
SOCIO-ECONOMIC INDICATORS

- Population Change
- Population Density
- Poverty Headcount Ratio
- HDI
VULNERABILITY ANALYSIS
PHYSICAL CAPITAL

Mismanaged Water transport

Lack of Public Transport

Lack of Road Infrastructure

Isolated Islands with limited Connectivity

Source: Own Image + Google Images
Lack of healthcare facilities

Source: Own Image + Google Images
Resident of Bali Islands (Indian Sundarbans)
Current Occupation: Tour guide
Age: 35

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

CIRCULAR MIGRATION

INFORMAL URBANISATION, "POPULATION PRESSURE"

CHEAP LABOUR FOR 3-D JOBS: DIRTY, DANGEROUS AND DEGRADING

ECONOMIC AND SOCIAL REMITTANCES

EXPLOITATION: LONG WORK HOURS, LOW WAGES AND POOR QUALITY OF LIFE

RURAL - URBAN RELATIONSHIP
COPING STRATEGIES
HUMAN CAPITAL

Return home during harvest season
Return home during sowing season

Seasonal Migrant
Temporary Migrant: Most dominant type of migration
Women Migrants: Short Distances

TEMPORARY MIGRANT: MOST DOMINANT
TYPE OF MIGRATION

WOMEN MIGRANTS: SHORT DISTANCES
ADAPTIVE STRATEGIES
SOCIAL SUPPORT

Disaster Management
Healthcare
Eco-Tourism
Education
Food and Water Security
Livelihood

Source: Own Image + Google Images
ADAPTIVE STRATEGIES
TRADITIONAL KNOWLEDGE

FISHING
HANDLOOM
TERRACOTTA
JUTE HANDICRAFTS
FARMING

Source: Own Image + Google Images
The Forest Tour guides work as a union. We ensure every guide can sustain their families by helping the weaker links work harder!

Fisherwomen quit fishing and make cloth dolls for sale

Women’s collective built 12 km of brick roads

Community Fishing
INFORMAL URBANISATION
POPULATION PRESSURE

CHEAP LABOUR FOR 3-D JOBS: DIRTY, DANGEROUS AND DEGRADING

DIRECT CONNECTIVITY
GOODS AND SERVICES + TRANSPORT ECONOMY

TRANSPORT INFRASTRUCTURE, HEALTH-CARE AND EDUCATION SERVICES
BASIC GOODS AND SERVICES

ECONOMIC AND SOCIAL REMITTANCES

EXPLOITATION: LONG WORK HOURS, LOW WAGES AND POOR QUALITY OF LIFE

CENSUS TOWNS
TRANSITION POINT

REGIONAL IMPACT
REGIONAL IMPACT
URBAN DEFINITION
Population > 5000
75% Population employed in non-agri activities
Population Density > 400 Persons/Sqkm

RURAL GOVERNANCE
Governed by a democratically elected ‘Panchayat’
Family presence and power play
REGIONAL IMPACT

- RURAL CHARACTER
- IMPROPER INFRASTRUCTURE
- WETLAND DESTRUCTION
- ADHOC ECONOMIES

Source: Own Images
EXPLORATION - CONCLUSIONS

HUMAN CAPITAL

SOCIAL CAPITAL

NATURAL CAPITAL

PHYSICAL CAPITAL

FINANCIAL CAPITAL
DESIGN THEMES

- HUMAN CAPITAL
- NATURAL CAPITAL
- SOCIAL CAPITAL
- PHYSICAL CAPITAL
- FINANCIAL CAPITAL
DESIGN THEMES

SUPPORT STRUCTURE
- Governance
- Gender Sensitivity

SPATIAL STRATEGIES
- Traditional Knowledge
- Connectivity

CIRCULAR MIGRATION
- Community Networks
- Trans-local livelihoods

DESIGN THEMES

SUPPORT STRUCTURE
- Governance
- Gender Sensitivity

SPATIAL STRATEGIES
- Traditional Knowledge
- Connectivity

CIRCULAR MIGRATION
- Community Networks
- Trans-local livelihoods

DESIGN THEMES

SUPPORT STRUCTURE
- Governance
- Gender Sensitivity

SPATIAL STRATEGIES
- Traditional Knowledge
- Connectivity

CIRCULAR MIGRATION
- Community Networks
- Trans-local livelihoods
TRADITIONAL ECONOMIES
GOODS FOR CONSUMPTION AND EXPORT
DIRECT CONNECTIVITY
SERVICES + TRANSPORT ECONOMY
TRANSPORT INFRASTRUCTURE, HEALTH-CARE AND EDUCATION SERVICES
BASIC GOODS AND SERVICES
ECONOMIC AND SOCIAL REMITTANCES
RESEARCH AND FUNDING
VILLAGE
REGIONAL MODEL

MIGRANT LABOUR

CLIMATE RESILIENT COMMUNITIES

ENVIRONMENTALLY SENSITIVE URBANISATION

ECONOMIC STABILITY

SOCIAL INCLUSION

TRADITIONAL KNOWLEDGE

INPUT

GOVERNANCE

OUTPUT

SOCIAL VALUES

GROWTH CLUSTER

CITY

TOWN

VILLAGE

URBAN RURAL SYSTEM

SPATIAL STRATEGY

INPUT

OUTPUT

REGIONAL MODEL

REGIONAL MODEL

REGIONAL MODEL

REGIONAL MODEL
Defining Growth Clusters
Enhancing Connectivity
Wetland Conservation
Defining Growth Clusters
Traditional Knowledge Economies
Proposed Multi-modal Hubs

Urban Centres

Proposed Highway Link

Under construction Rail Link

Voluntary enrolment and basic training

Labour and Maintenance team to include technical experts

International and Local NGO’s

Existing Government Schemes

Private CSR input - Monetary or Expertise

Community Built + Managed Infrastructure

Proposed Multi-modal Hubs

Voluntary enrolment and basic training

Labour and Maintenance team to include technical experts

International and Local NGO’s

Existing Government Schemes

Private CSR input - Monetary or Expertise

Community Built + Managed Infrastructure
Mobilize and Facilitate

Policy Suggestions

International and Local NGO’s

Local Governments

Migrant communities, resident communities and scientific research and engineering to form Management Co-ops

Lease at economical rates for to Management Co-operatives

Household Scale: Construction of Channel to the common grid + maintenance

Town Scale: Construction of common infrastructure: Bio-Swales and channels

Large Wetlands: Livelihood opportunities

Wetland Conservation

Wetland Conservation

Slope

Movement of Water

0 52 km
Defining Growth Clusters

Growth Clusters
Census Towns
Urban Centres
Highway Network
Railway Network

Cluster Governance Network
Ministry of Panchayati Raj + Ministry of Commerce
Existing Interventions

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

Traditional Knowledge Economies

- Community ownership of natural resources
- Co-operatives
- International and Local NGOs
- Retail Industry
- Traditional Economies
- Business partnerships

Local Area Planning

- Local Government
- Knowledge Transfer
- Technical Support
- Research and Academia
- Central and State Governments
- International and Local NGOs

Convince

- Policy
- Schemes
- Business partnerships

Partnerships

- International and Local NGOs
- Central and State Governments
- International and Local NGOs
- Research and Academia
- Knowledge Transfer

52 km
How does this work for me?
PRE - DISASTER SITUATION

Dependant on Natural Livelihoods

Coastal Village

To the City for Processing and Consumption
POST - DISASTER SITUATION

Migration to the labour based informal economy

To the City in search of alternate livelihoods
BROKEN LINKS
RESTRUCTURING OPPORTUNITIES
COMMUNITY OWNERSHIP OF NATURAL RESOURCES

IDENTITY

COLLABORATIVE APPROACH

RESTRUCTURING OPPORTUNITIES
Land Clubbing
Functions : Sowing, Harvesting, Transport

SPATIAL GOVERNANCE
Farming Co-operatives
Land Clubbing

Functions: Sowing, Harvesting, Transport

SPATIAL GOVERNANCE

Community-leased wetlands and fisheries

Fishing Communities / Villages

Farming Co-operatives
Land Clubbing Functions: Sowing, Harvesting, Transport

Community-leased wetlands and fisheries

Space for work and sale during peak tourism season

Fishing Communities / Villages

Self Help Groups

Farming Co-operatives

GOVERNANCE

SPATIAL
Land Clubbing
Functions: Sowing, Harvesting, Transport

Community-leased wetlands and fisheries

Space for work and sale during peak tourism season

Community-built and managed tourism resorts
SAHYOG KENDRA
Efficient Connectivity
Skill Training
Opportunity
Local Agri Collaborative
Research Institutes + NGO's
Fisheries Department
Database + Innovation
Local NGO's
Co-operative Schemes
Local and International NGO's
Database for Migrants
Efficient Connectivity
Sahyog Kendra
Special Economic Zone Status

Storage, Processing and Marketing

Local & State Government
Private Investors and retailers

Benefits

Local & State Government

Fishery Co-operatives, market + Community

Retailers to market local produce

Local & State Government

Finance + Training

Local & State Government

Fishery Co-operatives, market + Community

Retailers to market local produce

Local & State Government

Private Investors and retailers

Benefits

Storage, Processing and Distribution
Incorporate Bottom Up collaborations into Top down Plans
LOCAL AREA PLANS

CONNECTIVITY

ZONING PLAN

growth limit

WETLAND PRESERVATION AND ORGANIC SEWAGE TREATMENT

COMMUNITY SPACE

COMMUNITY
INDUSTRY
SOCIAL INFRA
COMMERCIAL
WETLANDS
THE CASE OF MINAKHAN

Positioning the Minakhan Cluster

- To Kolkata
- To Sunderbans
- To Ghojadanga

Proposed Cluster Zoning (Author, 2019)

- Eco-tourism
- Sahyog Centre
- Creating Arrival Points
- Organic Sewage Treatment
Schematic layout of a Sahyog Kendra (Author, 2019)
SAHYOG KENDRA

- RICE: Processing
- RICE
- ECO TOURISM
- HANDICRAFTS

Social infrastructure for labourers on the fields
Arts Haat during tourism season
Use of the Centre as an access to skills and the online market
NATURAL RESOURCES: FLOOD RESILIENCE

Public Infrastructure:
- Bioswale

Private Infrastructure:
- Connectors

Separating Sewage and waste water

Surface Run off

Bamboo or wood grills

Pukur

Overflow channel

Bio swale

Road

Bamboo or wood grills

Pukur

Overflow channel

Bio swale

Road
NATURAL RESOURCES: FLOOD RESILIENCE

- Sedimentation Pond
- Fish Pond
- Fresh Water Pond

Organic community farming

Solid Waste

Sewage Inlet

Bamboo Screen

Hyacinth

Phytoplankten

Stocking Pond: 1-2 m deep

Fertilizer

Sedimentation Pond: 4.5 m deep

Fish Pond: 4.5 m deep

Constructed Wetlands for Organic sewage treatment (Author, 2019)
Spaces for Informal Retail markets

Bioswales as water and social infrastructure

Concrete Block Paved Roads

Low Density Urban Environment

Integration with the existing fabric

NATURAL RESOURCES: FLOOD RESILIENCE

Spaces for Informal Retail markets

Bioswales as water and social infrastructure

Concrete Block Paved Roads

Low Density Urban Environment

Integration with the existing fabric

NATURAL RESOURCES: FLOOD RESILIENCE

Dada, How much for this? You know this is my grandmother's recipe! Didi, 20 rs

The new bus service is so convenient!
I think we will need 200 workers this season! ok, I will register that on the app!

This new bus service is so convenient! I am home before the low tide.

Arrival Points

Social Infrastructure

Bioswale

Panchayat Office

Public Plaza

Pedestrian Promenade

Integration with the existing fabric
CONCLUSIONS

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?
FURTHER RECOMMENDATIONS

- Possibility for Cross-Border Movement
- Multi Disciplinary Action
- In-depth research on spatial consequences of migration
- Research on the impact of economic stability on Disaster Regions
- Preparation for permanent relocation for Communities prone to SLR
- Work in Progress
THANK YOU!

ধন্যবাদ!
3 PILOT GROWTH CLUSTERS

FORMATION OF CO-OPERATIVES
RESEARCH + NGO

LOCAL AREA PARTNERSHIPS (LAP)

ECO-ECONOMIC DATA COLLECTION + 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

NEEDS

PARTICIPATION

ONGOING DRR PROGRAMMES

VULNERABILITY ANALYSIS

HIGH RISK COMMUNITIES

GROWING REVENUE FROM MARKET DEMAND

DATA COLLECTION COMPLETION + QUALITATIVE AND QUANTITATIVE ANALYSIS

PROGRESS ANALYSIS IDENTIFY MAJOR SENDING REGIONS

CHECK SOCIAL VULNERABILITY, HEALTH, EDUCATION AND SKILL

ASSSESSMENT

ONGOING DRR PROGRAMMES

VULNERABILITY ANALYSIS

HIGH RISK COMMUNITIES
SOCIO ECONOMIC ASSESSMENT
COMMUNITY ASSESSMENT
EXPANDING CENSUS INDICATORS

( NGO MOBILIZATION )
IOM, IDMC

[ CROSS SECTORAL DATA COLLABORATION ]
GOVERNMENT DEPARTMENTS

[ TRANSPORT FEASIBILITY ]
TRANSPORT AND PLANNING

REGIONAL ECONOMIC PLAN

3 PILOT GROWTH CLUSTERS

ONGOING DRR PROGRAMMES
VULNERABILITY ANALYSIS
HIGH RISK COMMUNITIES