



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



Drought in Somalia

Photo: AU UN IST Photo / 7



Flooding in Bangladesh



Hurricane floods in Haiti

Climate change as the driver for Human Mobility and Displacement



River Erosion in the Sundarbans



Cyclone in Bangladesh



Forest Fires in Indonesia



KEY CONCEPTS

TOOLS

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.

NORMATIVE FRAMEWORK

PLIGHT



EXPLORATION



STRATEGY

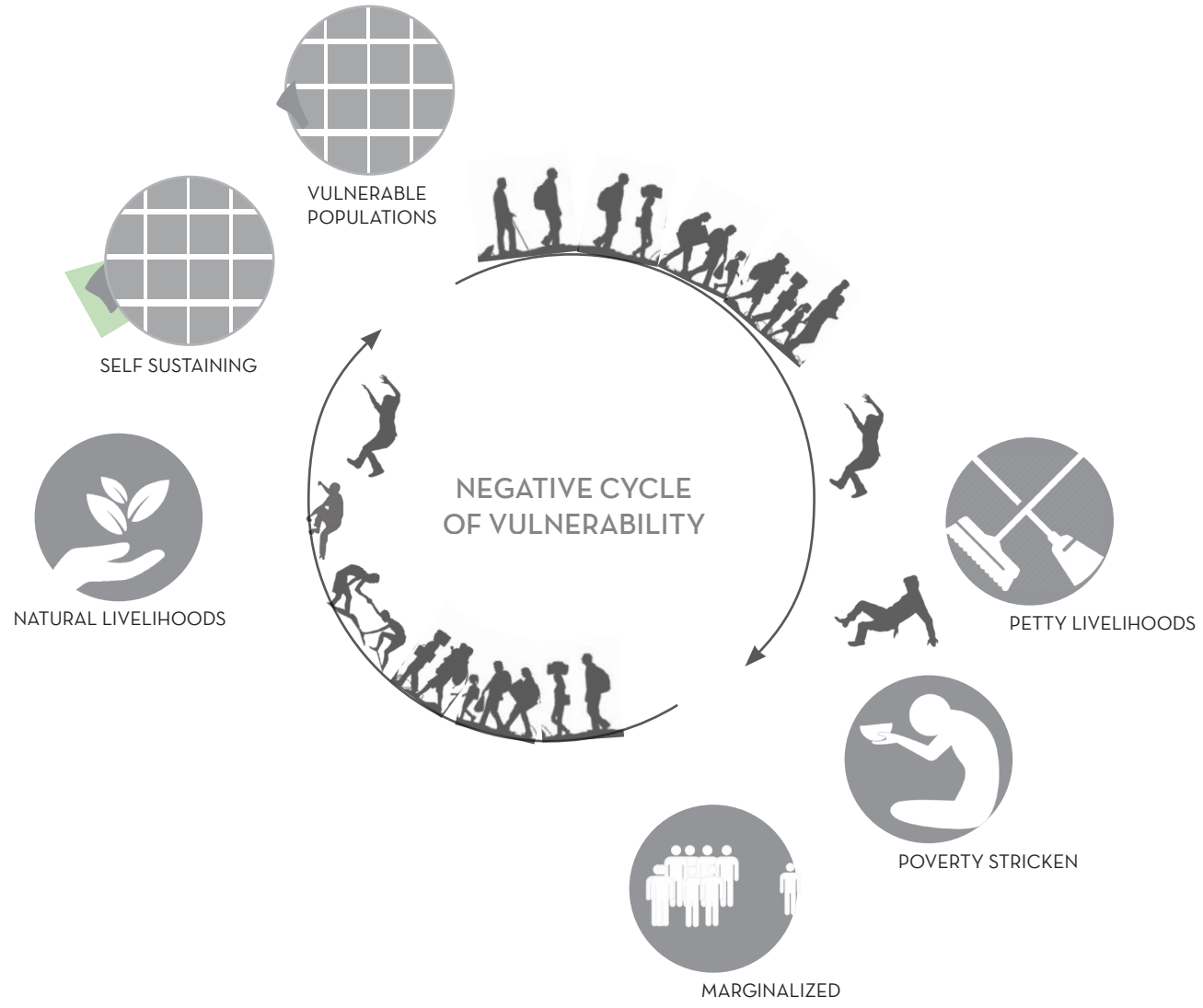


CONCLUSIONS

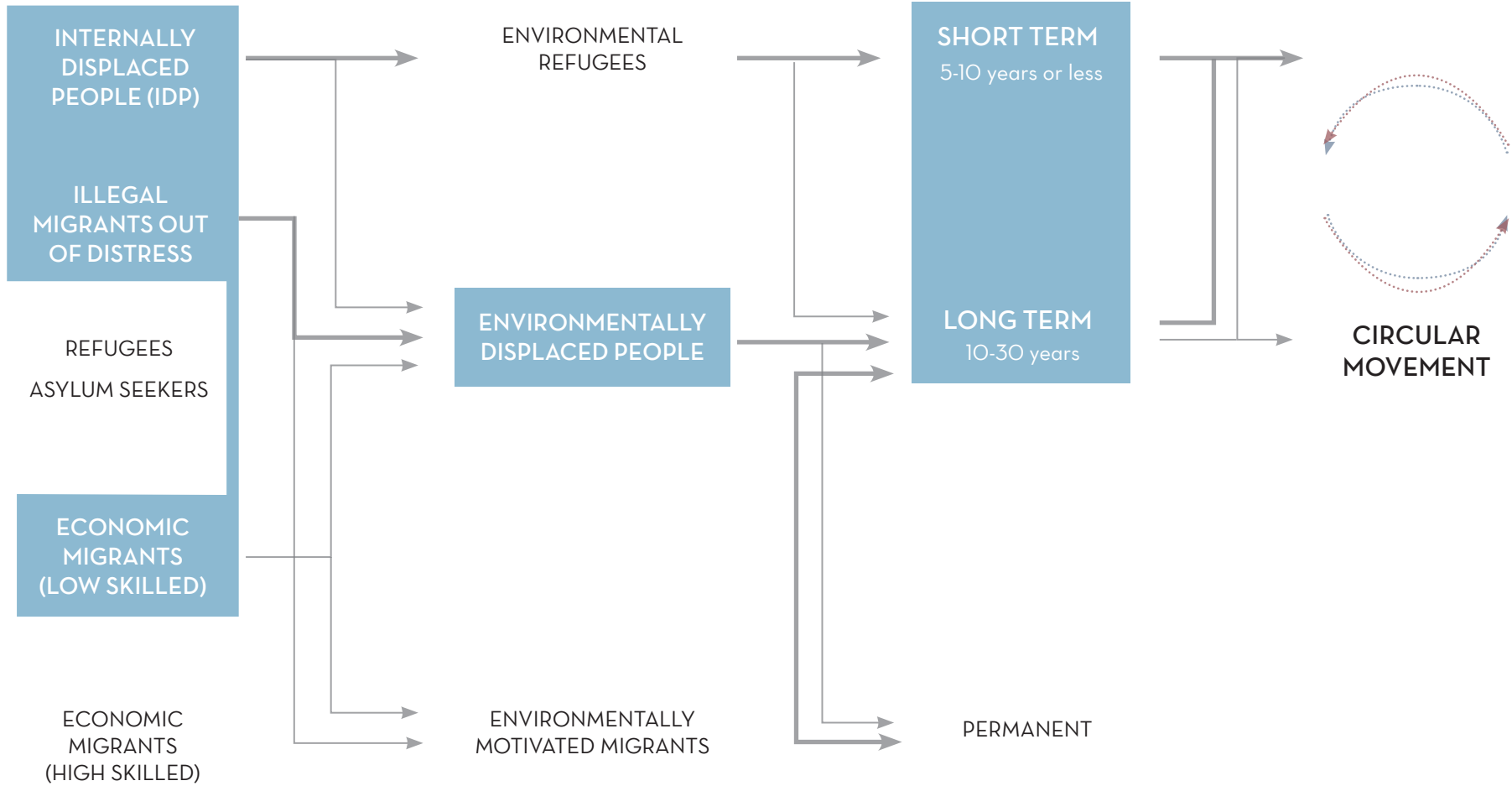


Environmental Change

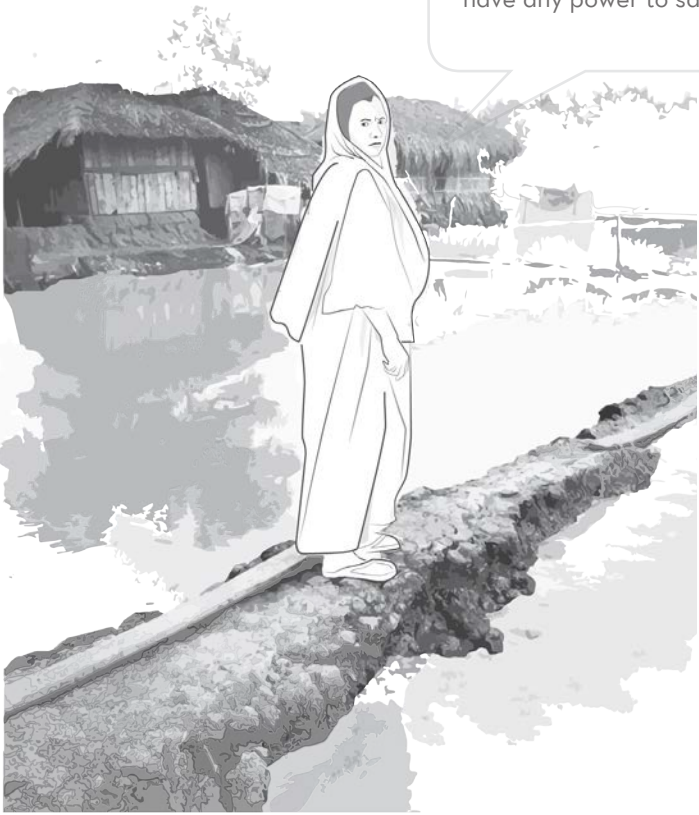




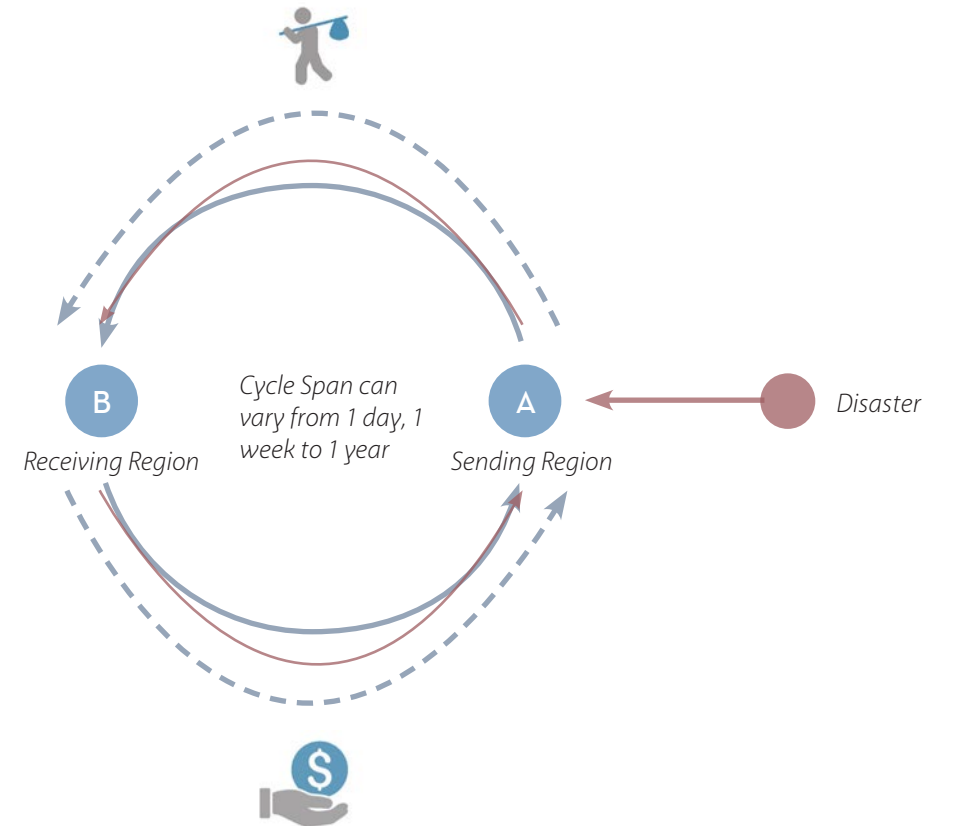
FORMAL CATEGORIES OF MIGRANTS

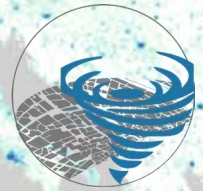


Two of my sons migrated to Dhaka after the family home was destroyed by storms multiple times and agricultural jobs were lost. Only Allah can save us, We don't have any power to save our children.



CIRCULAR MIGRATION A Common Adaptation Strategy





Increased Intensity of Cyclones



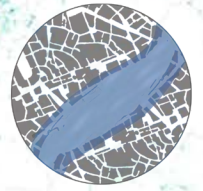
Frequent Flooding



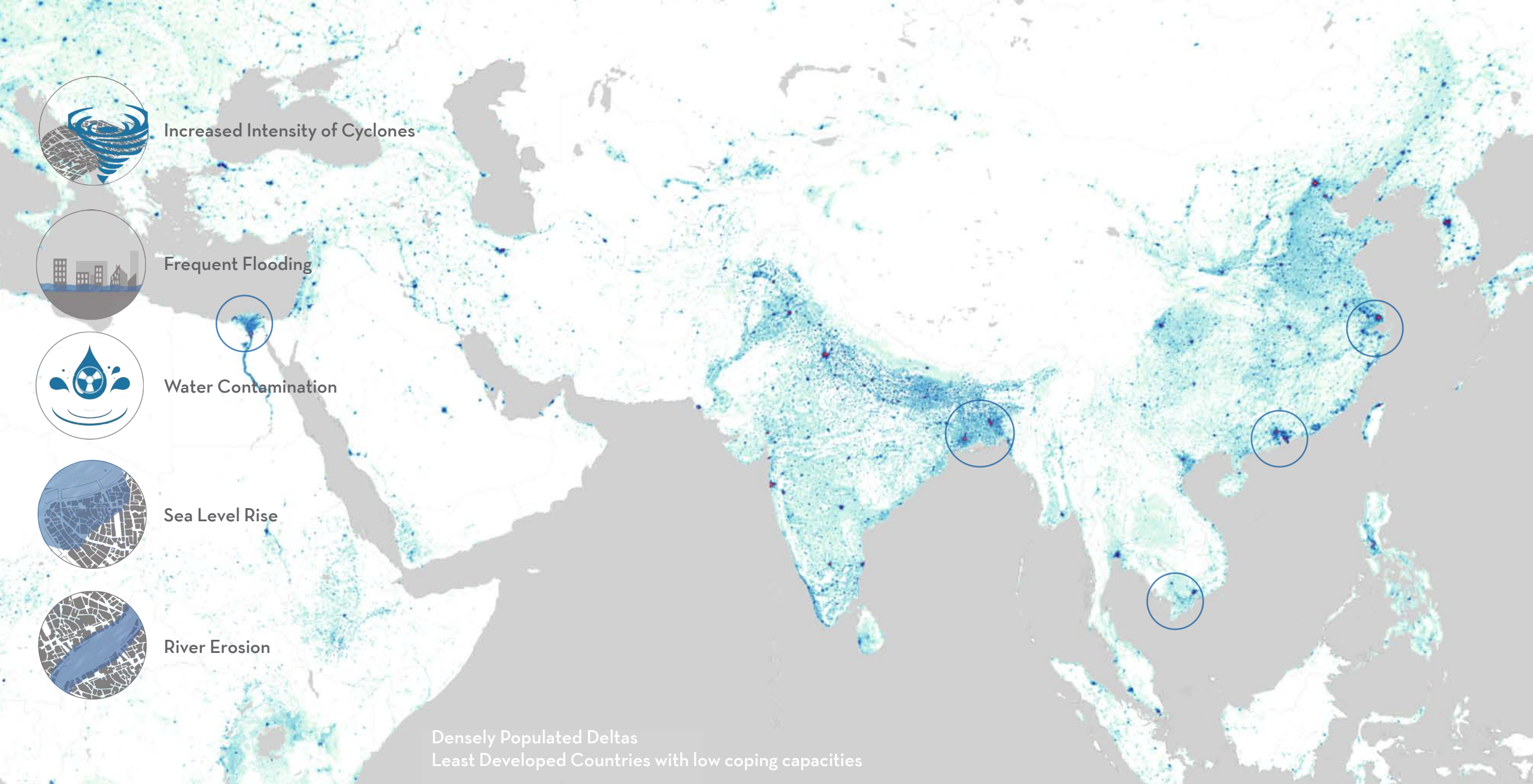
Water Contamination



Sea Level Rise



River Erosion



Densely Populated Deltas
Least Developed Countries with low coping capacities



INFORMAL



HUMAN RIGHTS VIOLATIONS



FORMAL



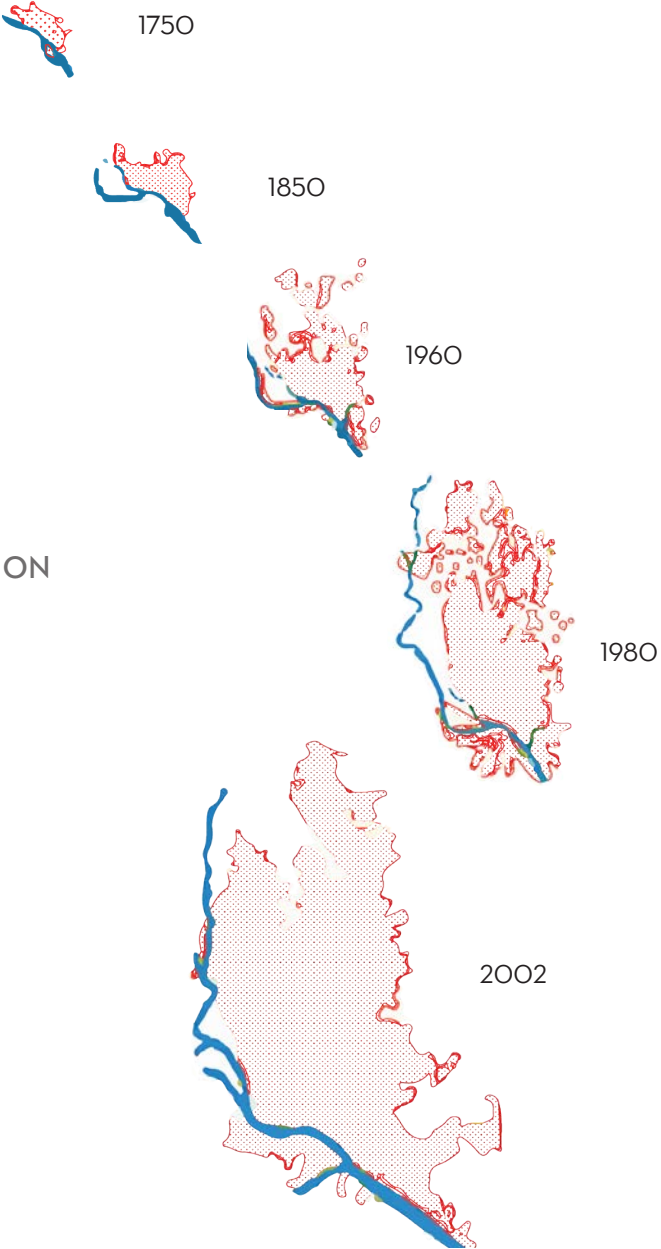
MARGINALIZATION

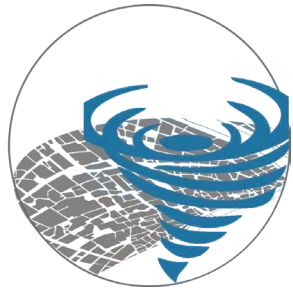


2000 people arrive in Dhaka everyday in search of a better life. 80% of migrate due to climate shocks!

UNCONTROLLED URBANISATION

URBAN GROWTH OF THE CITY OF DHAKA,
SOURCE : DCC PROFILE





DISASTER



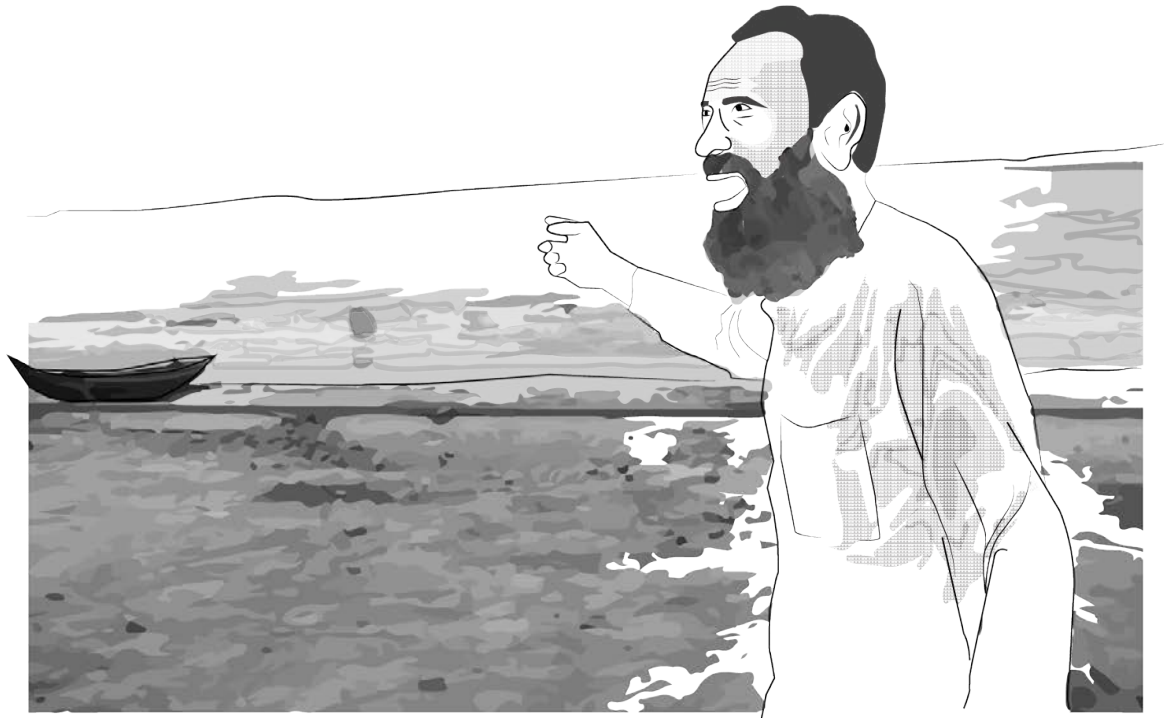
MIGRANT



REGION

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?

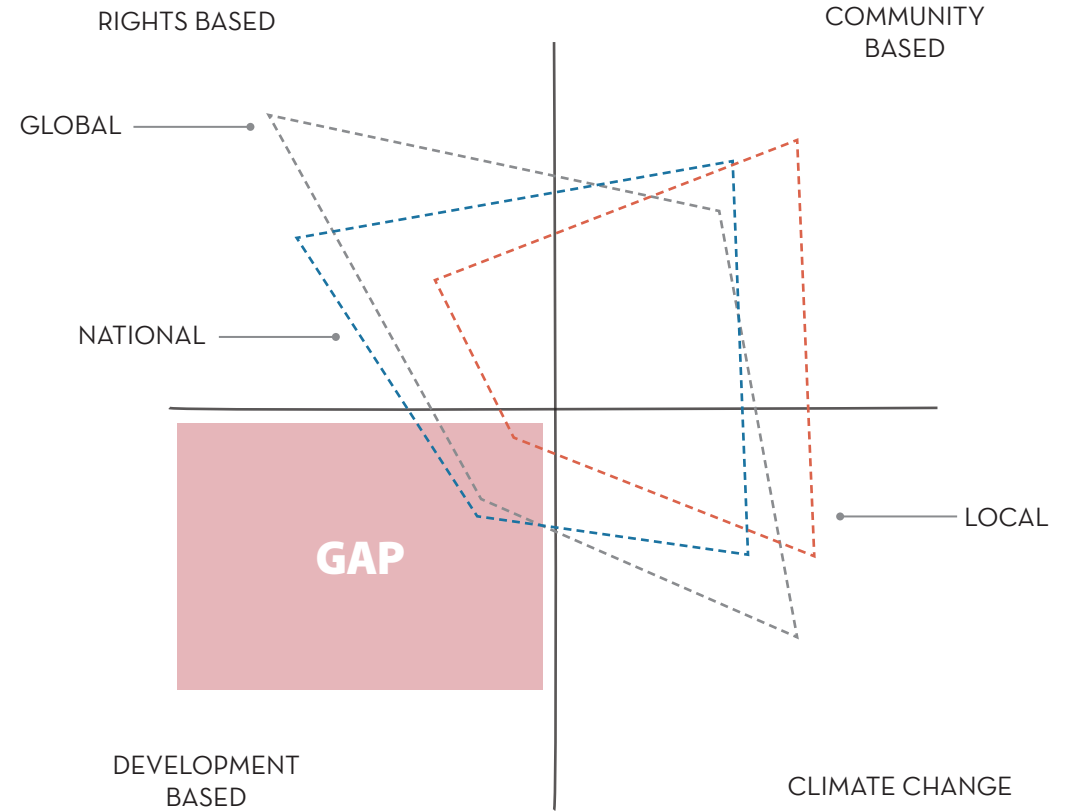
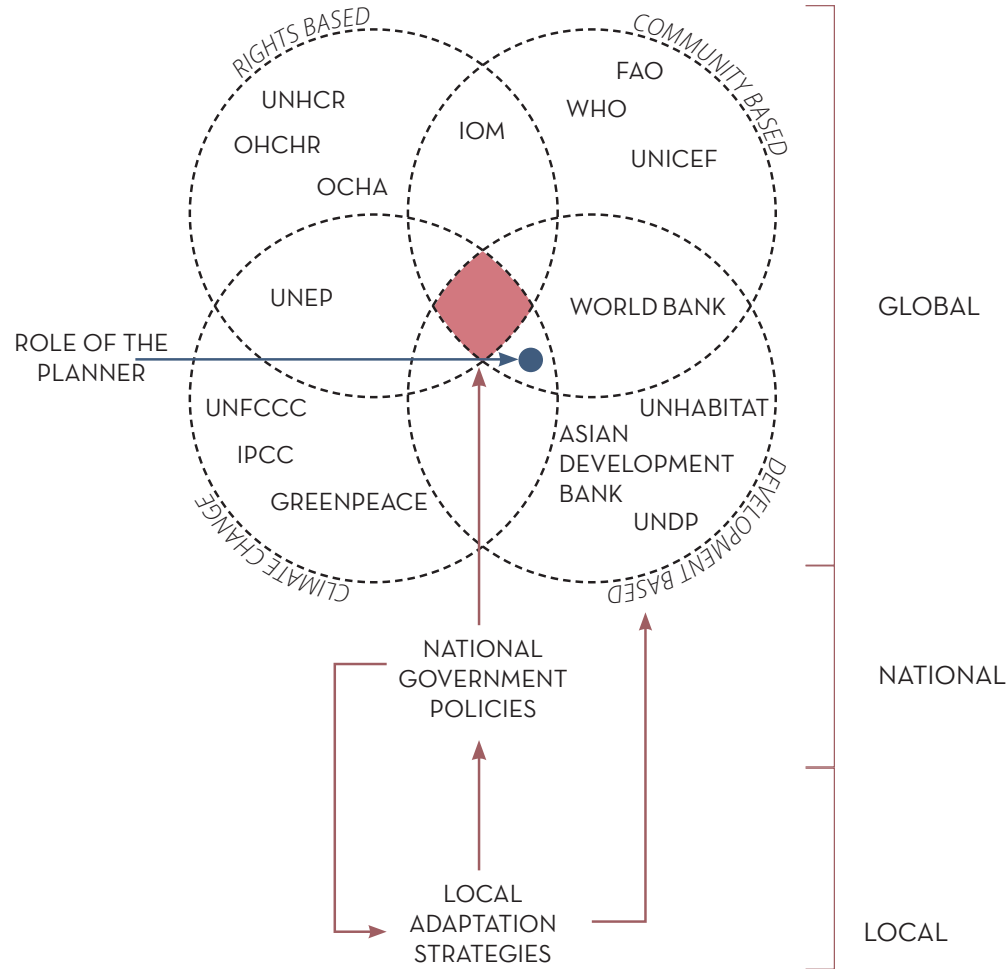


Standing atop an 18-foot embankment, Badruddin Sarkar pointed to the horizon - to his previous home , engulfed by a rising sea ; Own Image

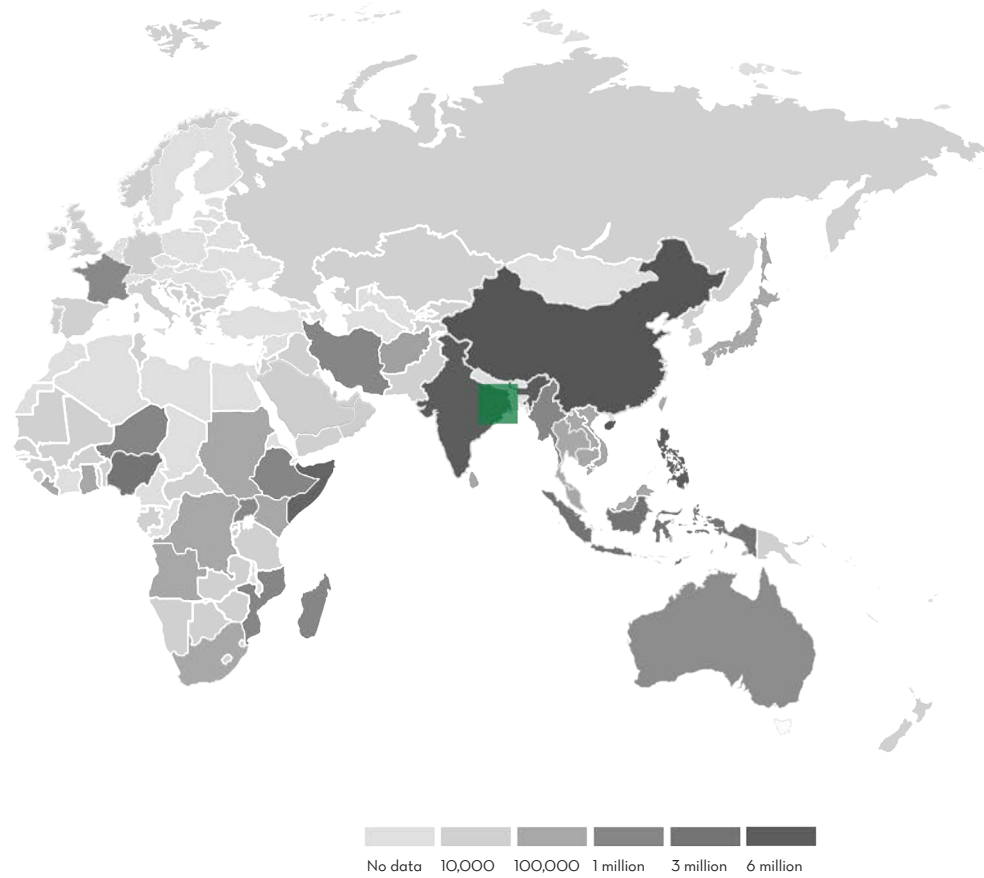
EXPLORATION GAPS

RESPONSE ANALYSIS
THE CASE OF GANGES BRAHMAPUTRA DELTA

GLOBAL RESPONSE



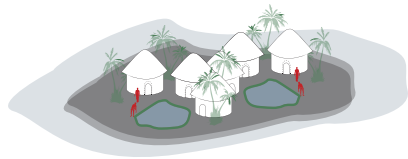
THE CASE



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



Source : Google Earth



54 Inhabited Islands



1064 Villages

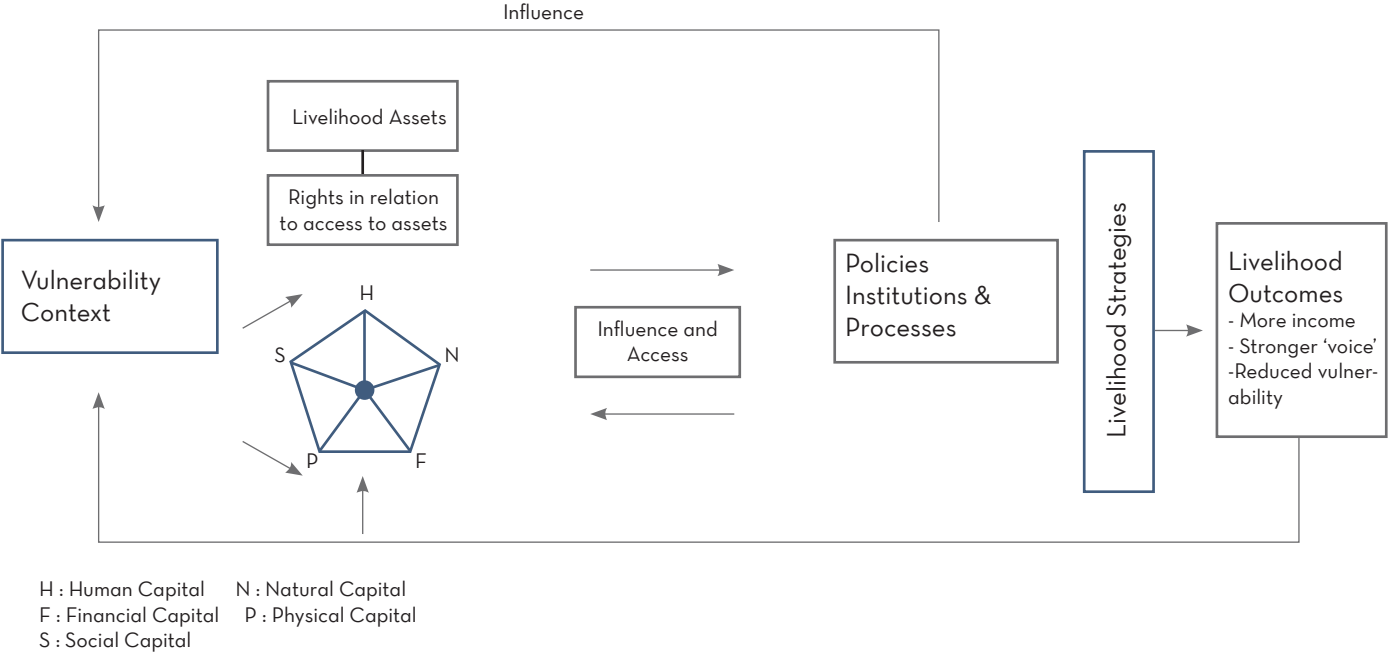


4.5 Million inhabitants

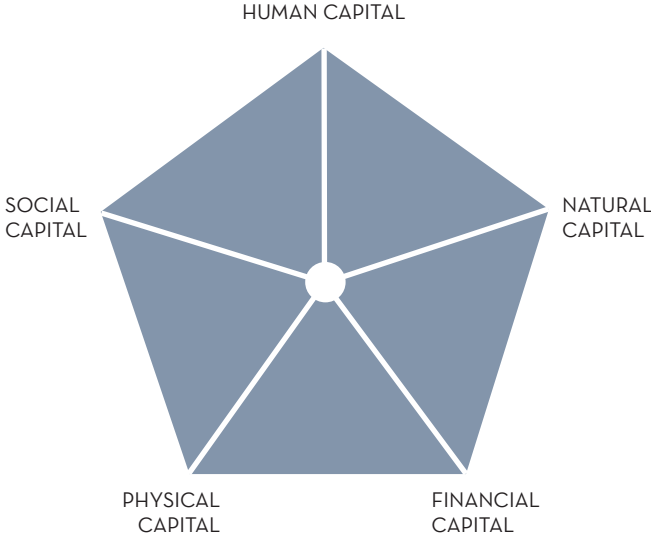


Source : Google Earth

LIVELIHOODS APPROACH



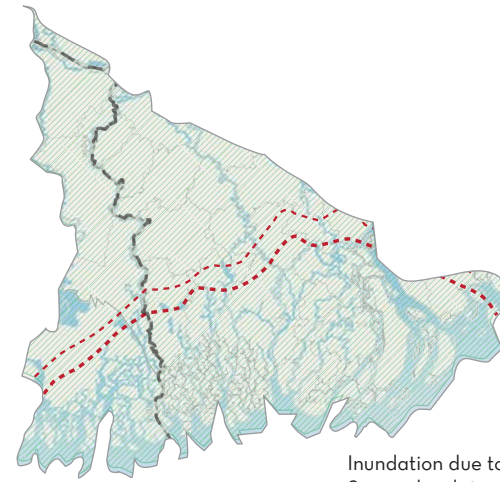
Sustainable Livelihoods Framework; (Adapted from Frank Ellis, 2003)



- 1. VULNERABILITY
- 2. ADAPTIVE STRATEGIES

VULNERABILITY ANALYSIS CLIMATE INDICATORS

- Sea Level Rise
- Flooding
- Geological Shift
- Salinity



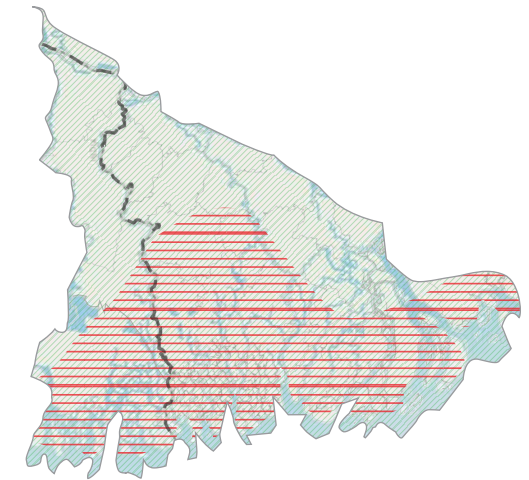
Inundation due to 1m and 2m sea level rise
 - - - - - 2 M
 - - - - - 1 M



Flood Prone areas



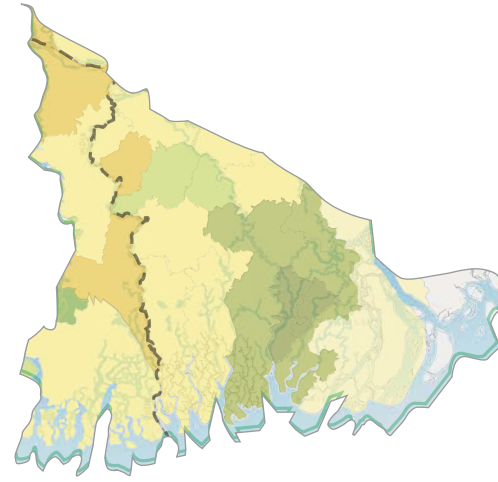
Geological classification of the Delta



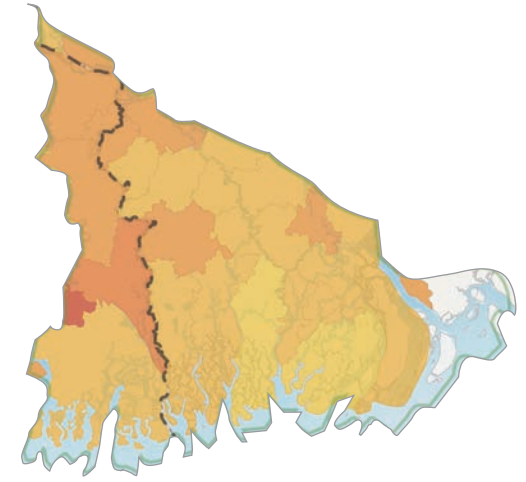
Current areas with increased saline content ; Own Image

VULNERABILITY ANALYSIS SOCIO-ECONOMIC INDICATORS

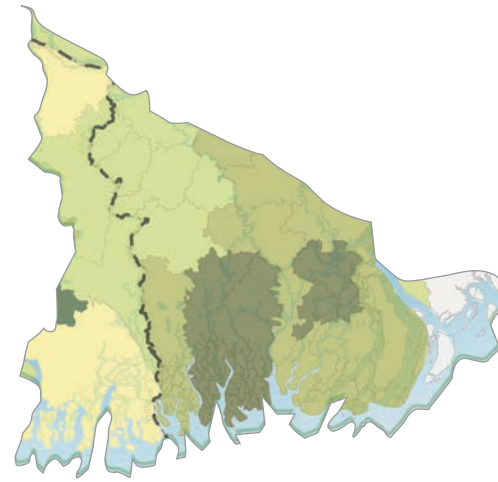
- Population Change
- Population Density
- Poverty Headcount Ratio
- HDI



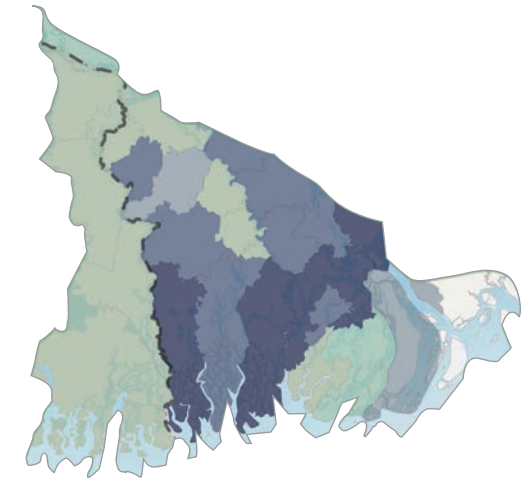
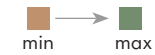
Population Change 1991-2001



Population Density 2011



Population Change 2001-2011



Poverty Headcount Ratio 2011



VULNERABILITY ANALYSIS
PHYSICAL CAPITAL



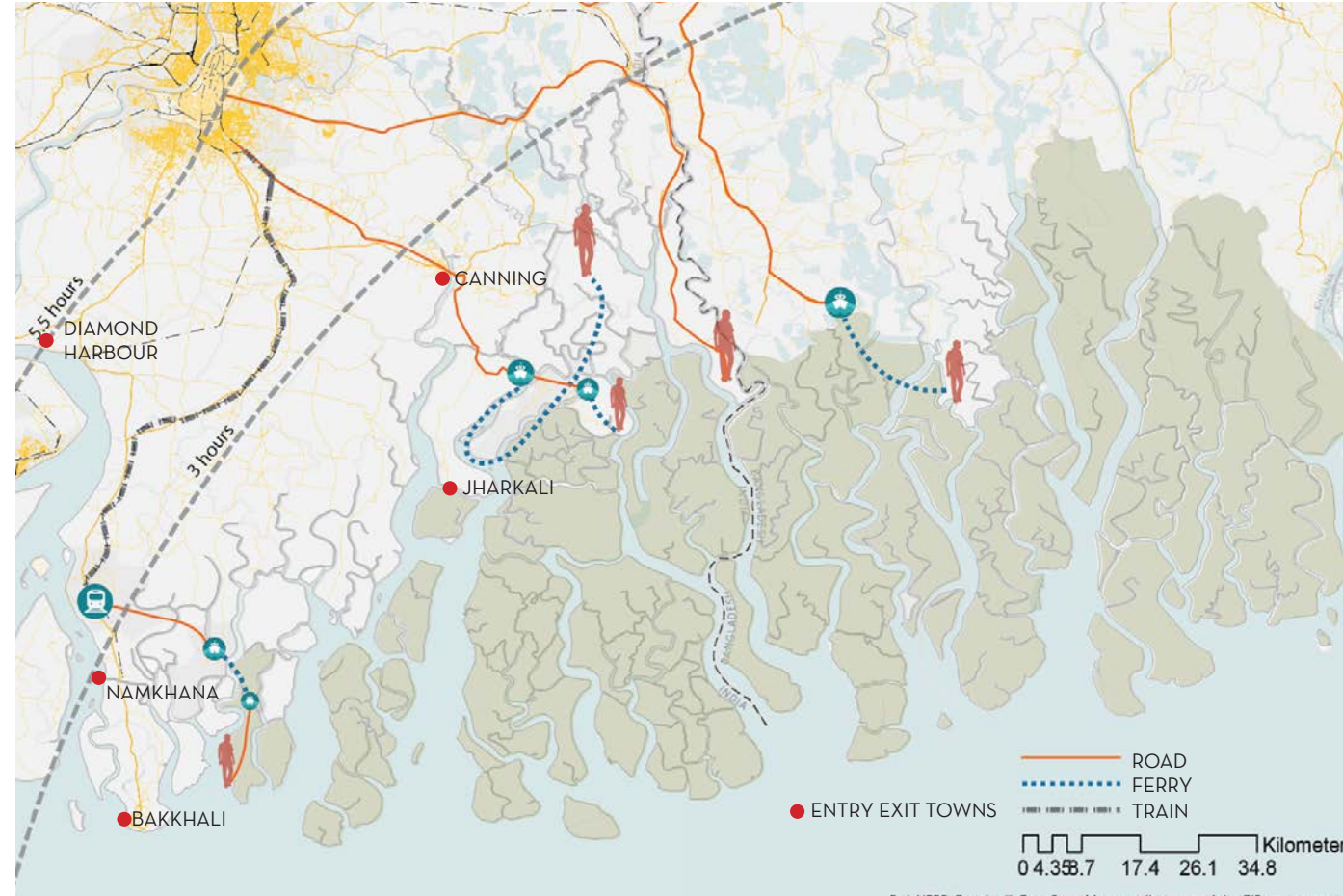
Mismanaged Water transport



Lack of Public Transport



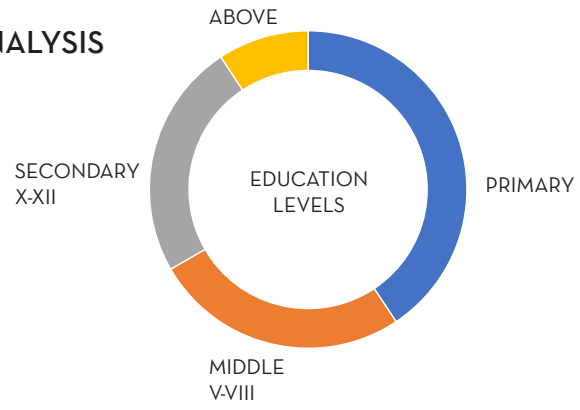
Lack of Road Infrastructure



Isolated Islands with limited Connectivity



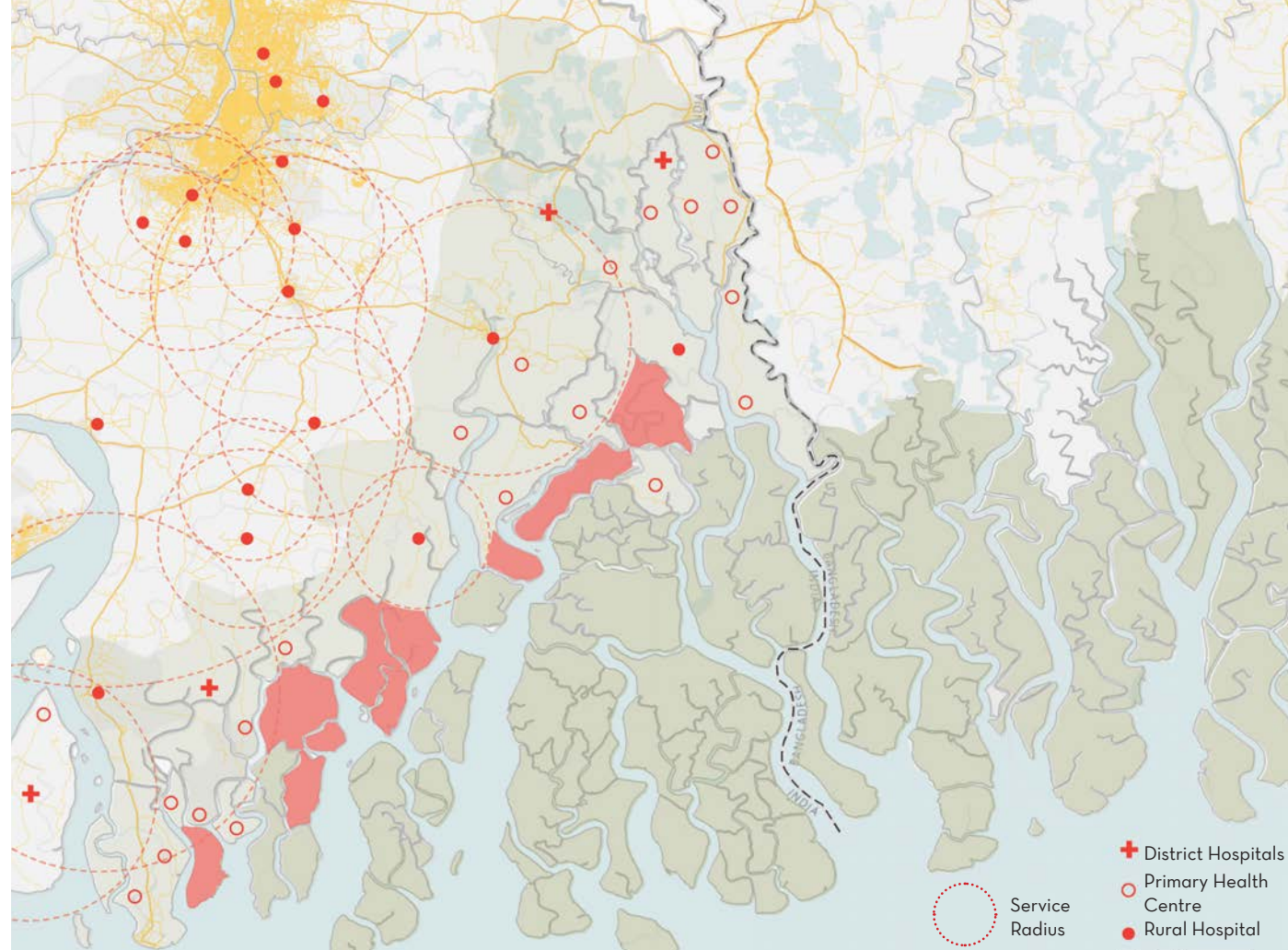
VULNERABILITY ANALYSIS PHYSICAL CAPITAL



Lack of Basic Amenities



Poor Accessibility



Lack of healthcare facilities



TECHNICAL AID

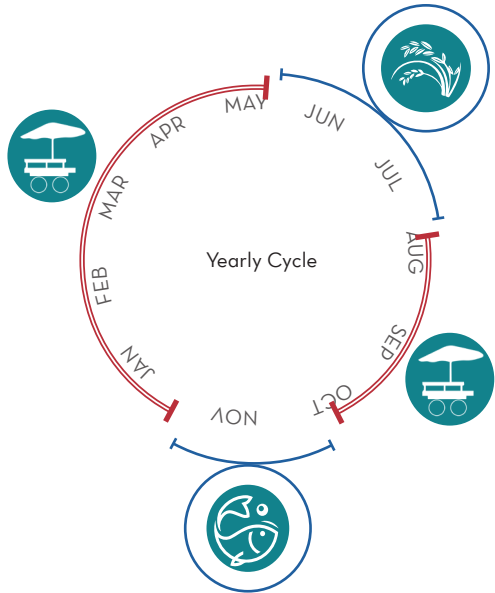
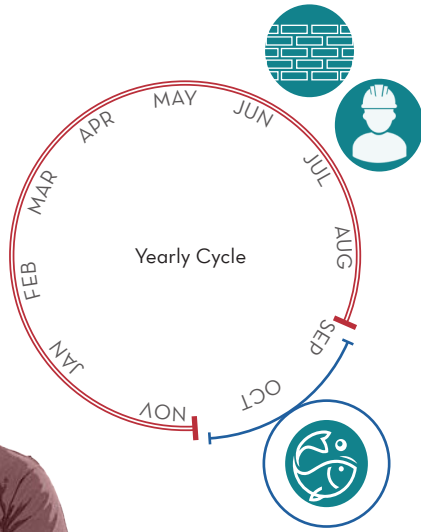


INFRASTRUCTURE

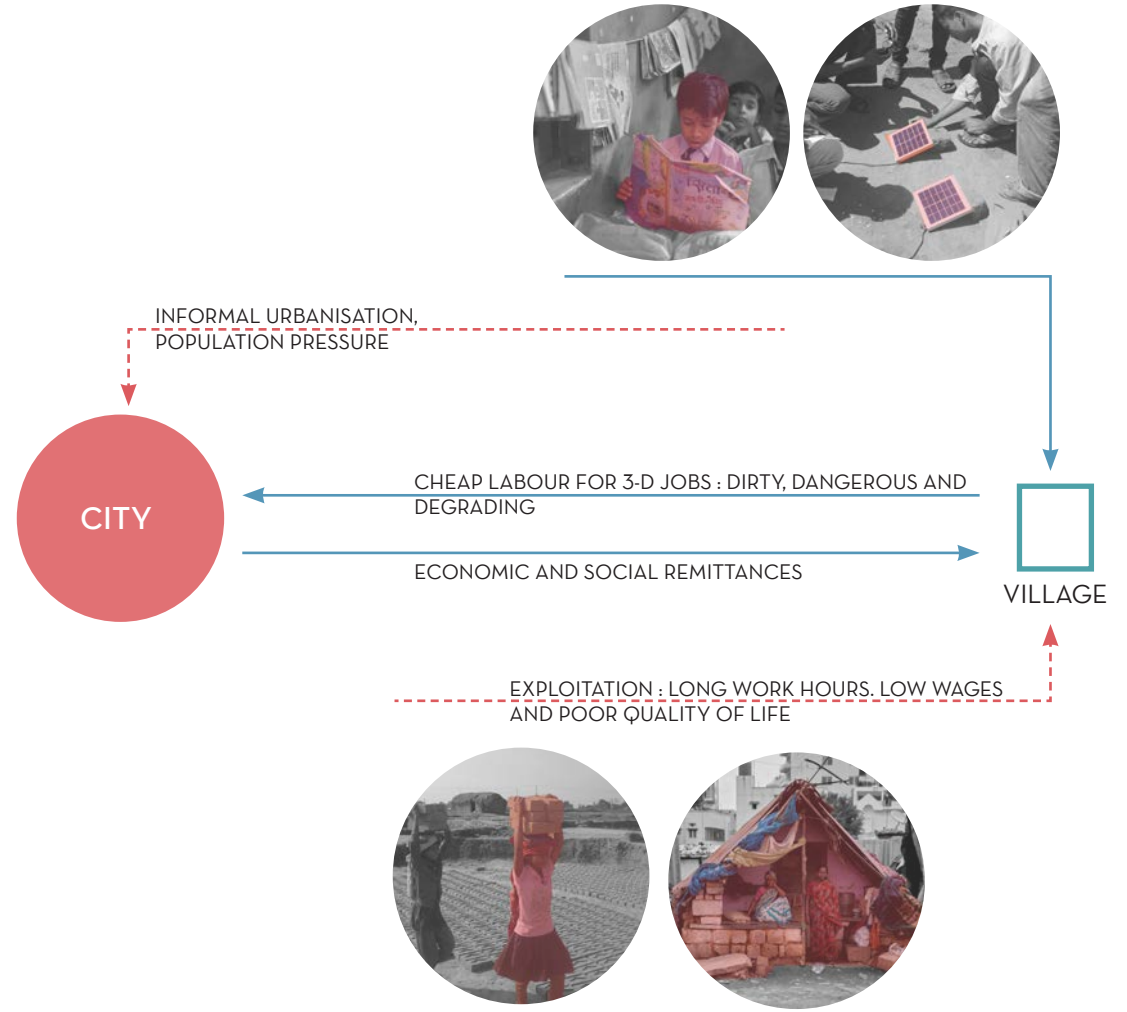
CIRCULAR MIGRATION



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

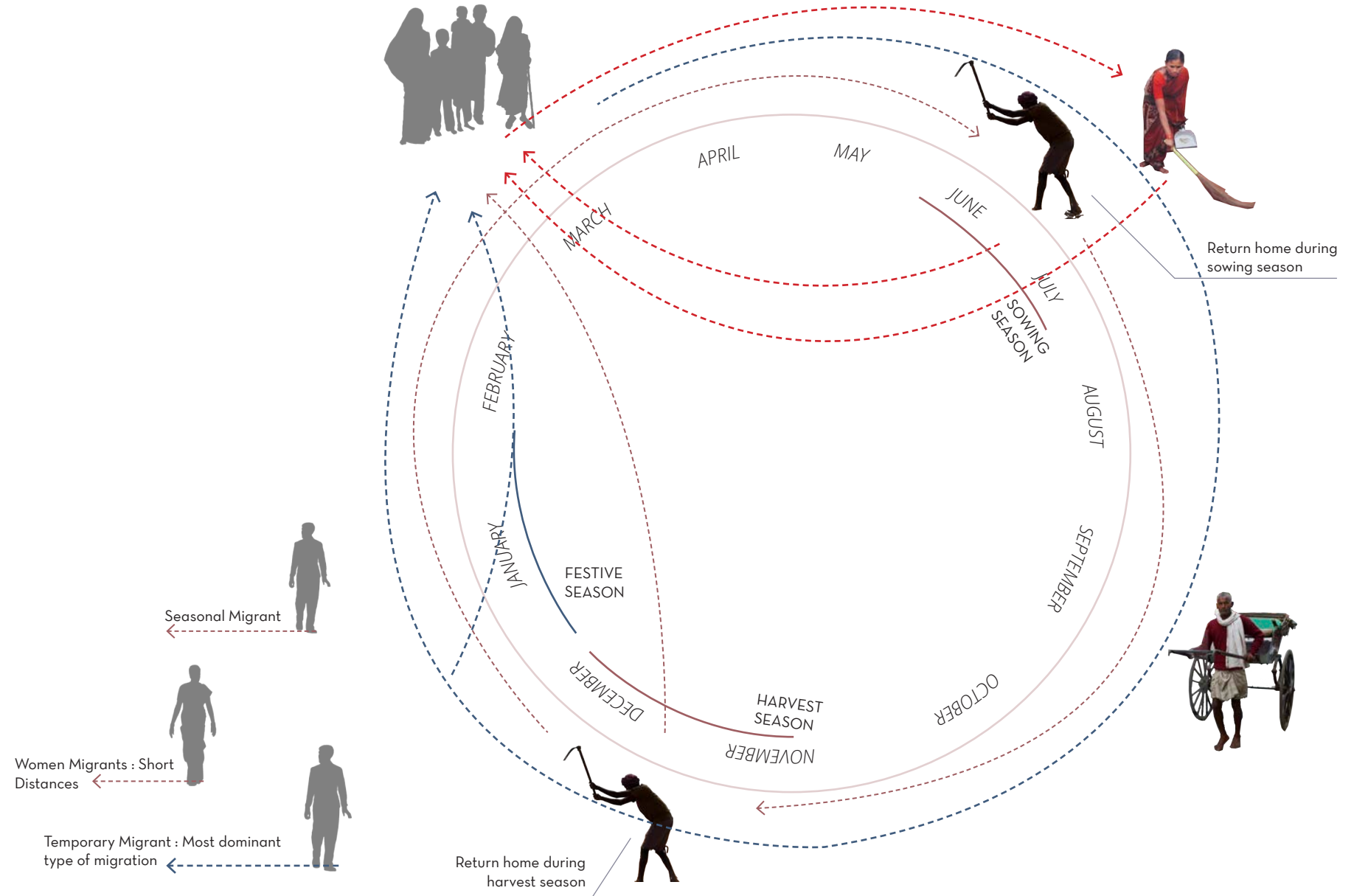


Resident of Dulki Islands (Indian Sundarbans)
Current Occupation : Agricultural Labour/Ice cream vendor
Age : 30



RURAL - URBAN RELATIONSHIP

COPING STRATEGIES HUMAN CAPITAL



ADAPTIVE STRATEGIES SOCIAL SUPPORT



Disaster Management



Healthcare



Eco-Tourism



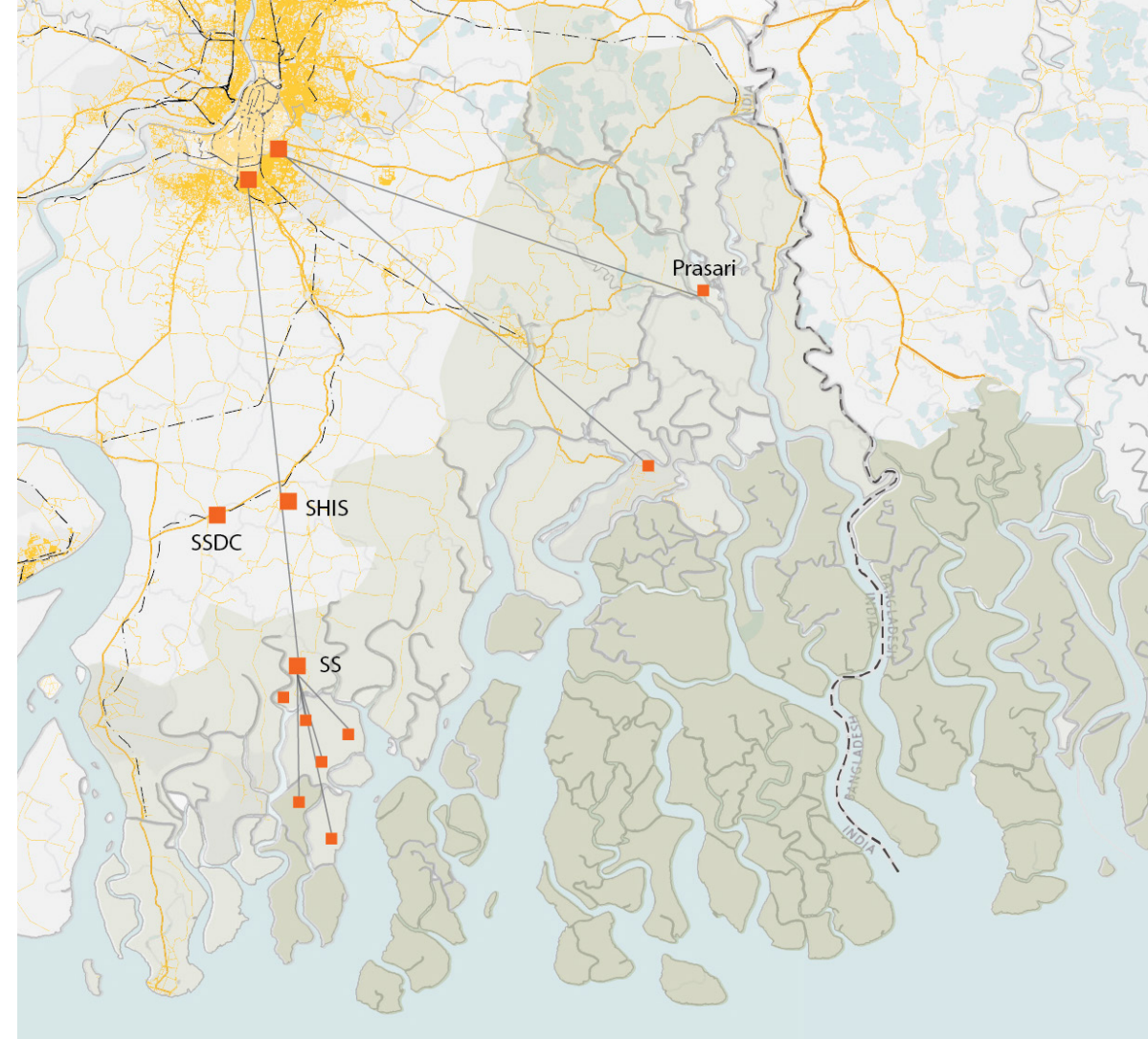
Education



Food and Water Security



Livelihood



- Site Office
- NGO Headquarters



TECHNICAL AID

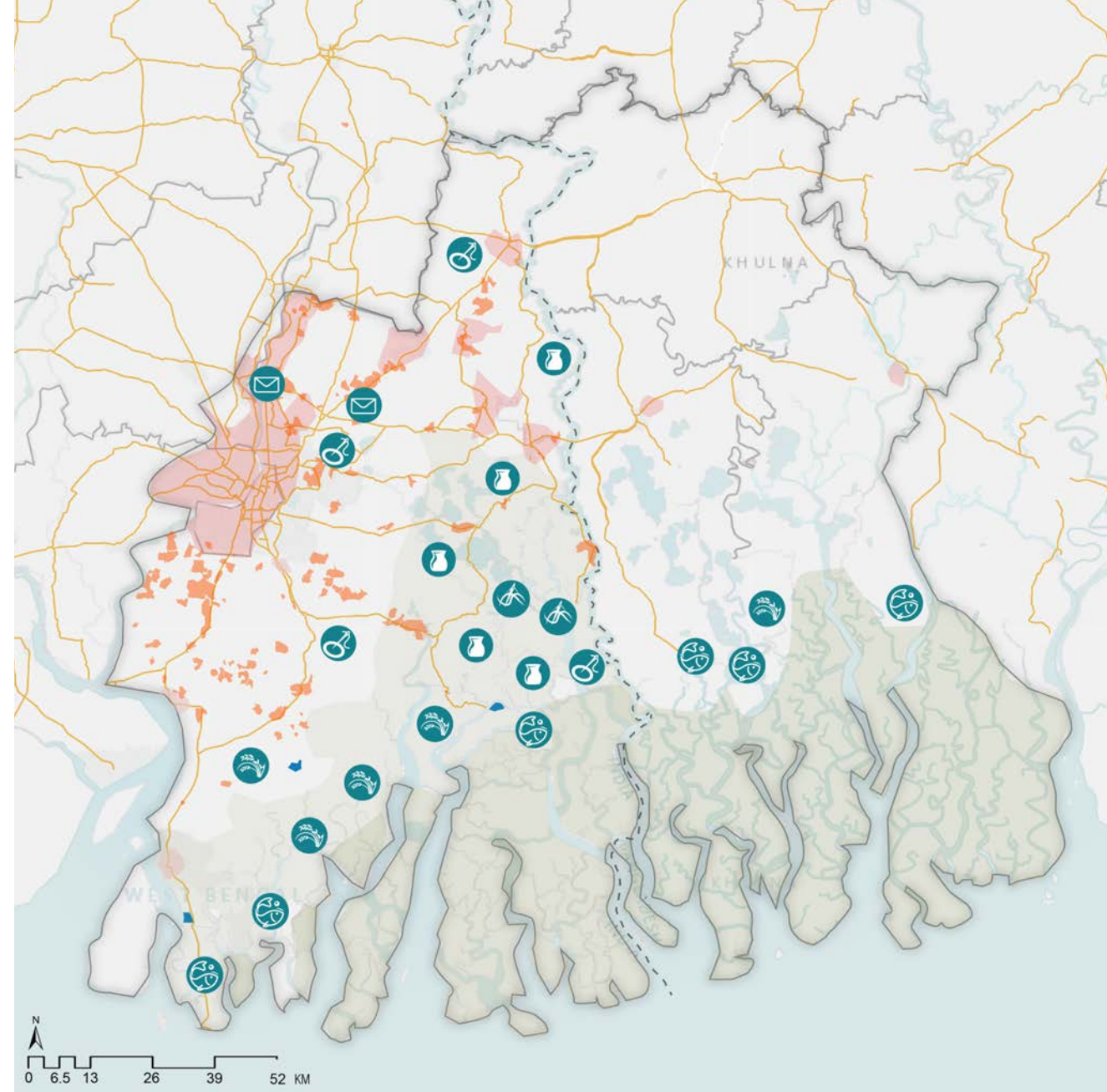
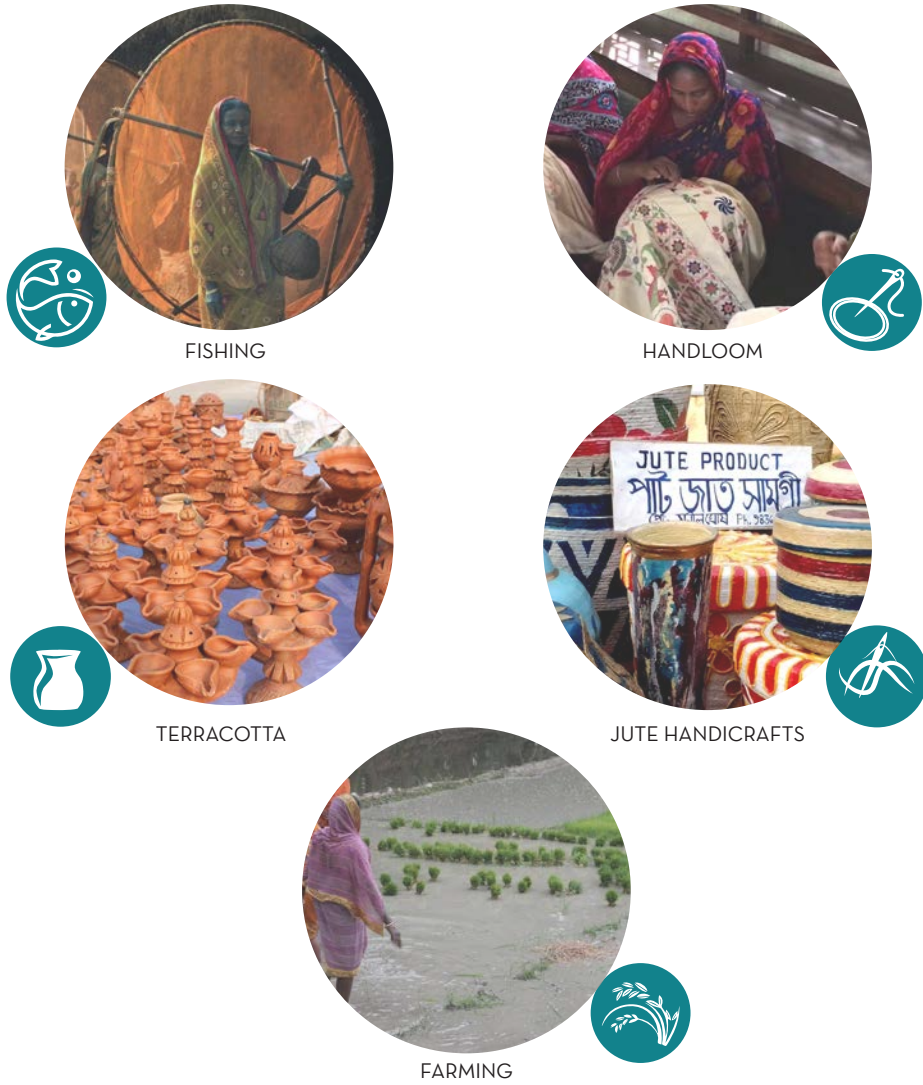


COMMUNITY ACTION



INFRASTRUCTURE

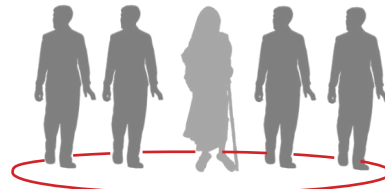
ADAPTIVE STRATEGIES TRADITIONAL KNOWLEDGE



ADAPTIVE STRATEGIES
SOCIAL CAPITAL



The Forest Tour guides work as a union. We ensure every guide can sustain their families by helping the weaker links work harder!



COMMUNITY ACTION



Fisherwomen quit fishing and make cloth dolls for sale

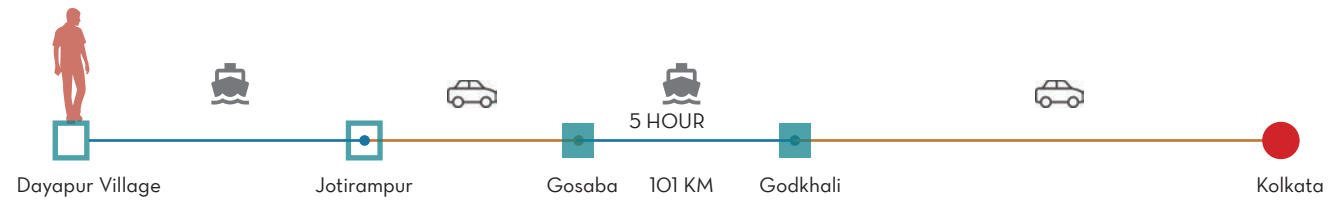
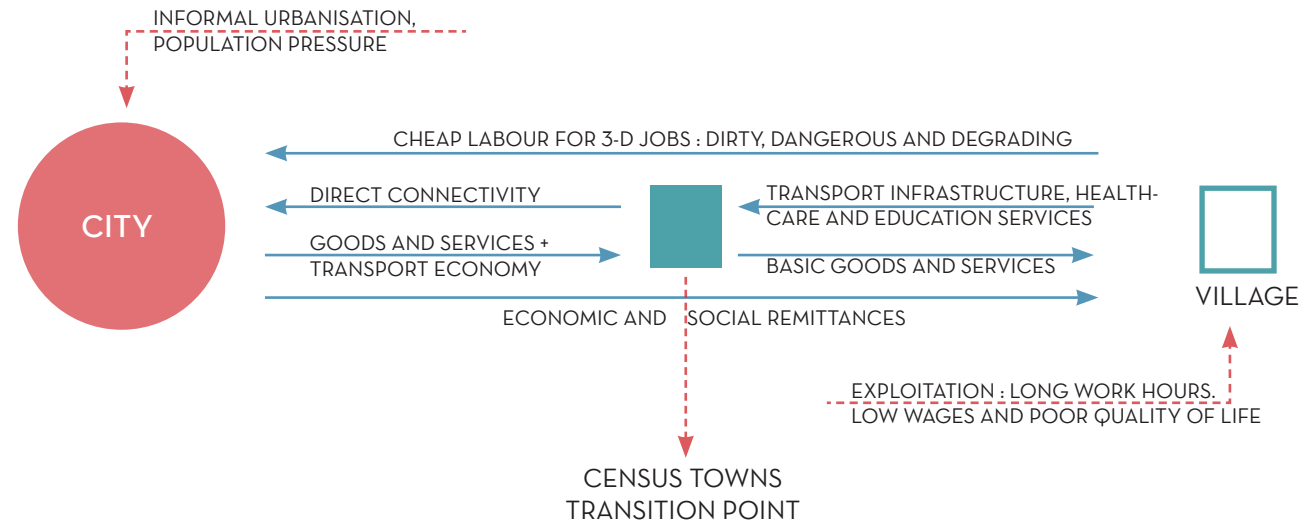


Women's collective built 12 km of brick roads



Community Fishing

REGIONAL IMPACT





RURAL

URBAN



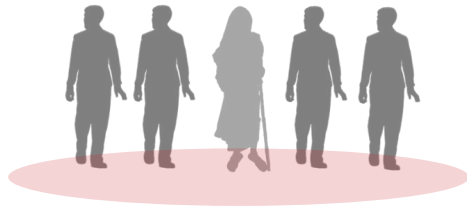
REGIONAL IMPACT

URBAN DEFINITION

Population > 5000

75% Population employed in non-agri activities

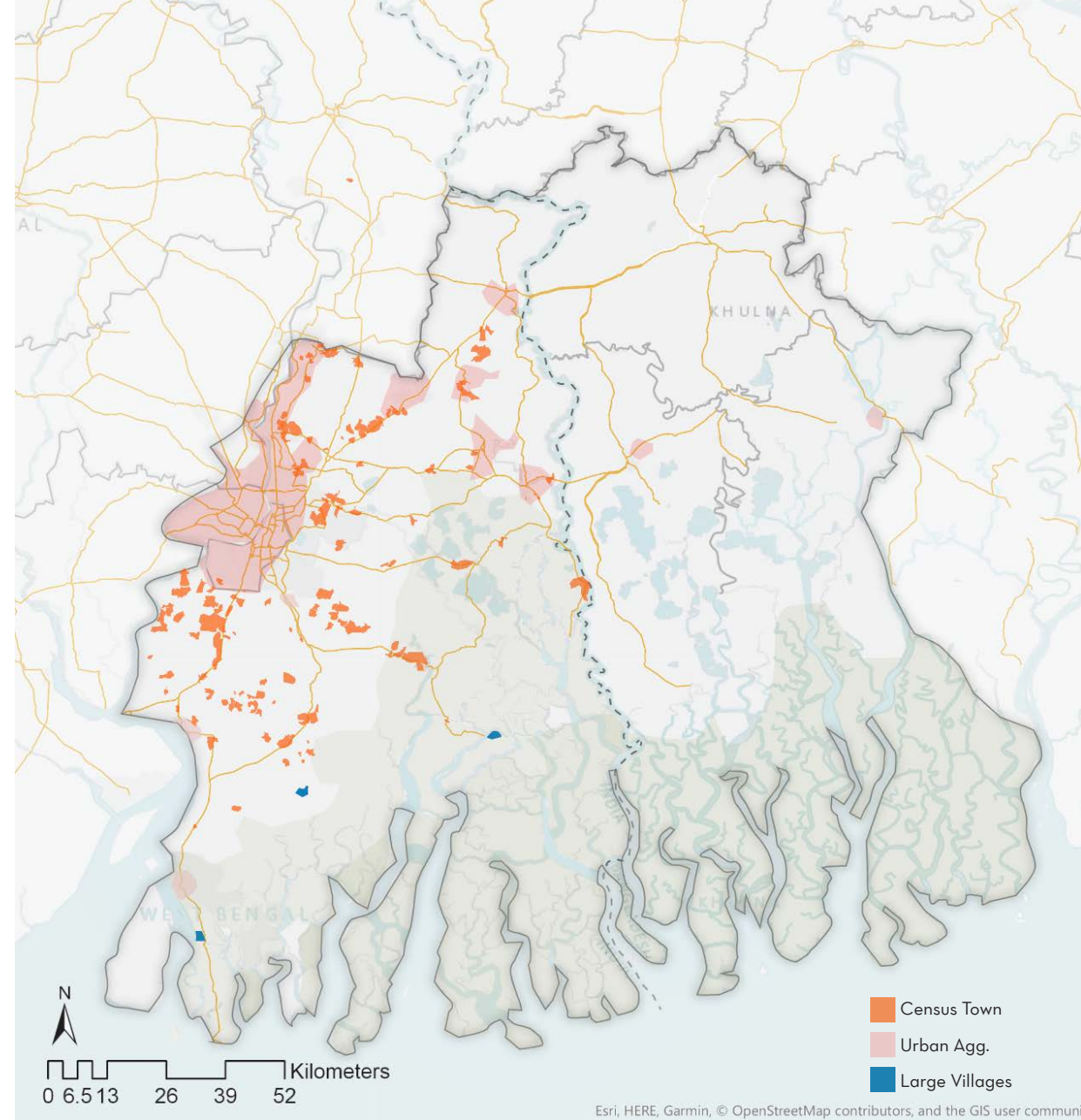
Population Density > 400 Persons/Sqkm



RURAL GOVERNANCE

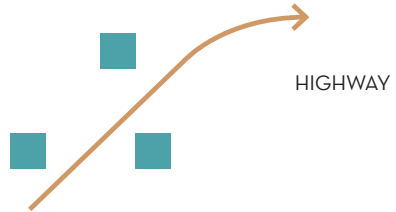
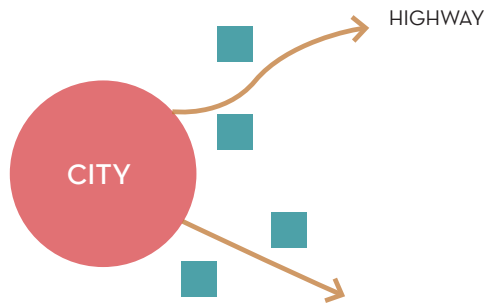
Governed by a democratically elected 'Panchayat'

Family presence and power play



Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

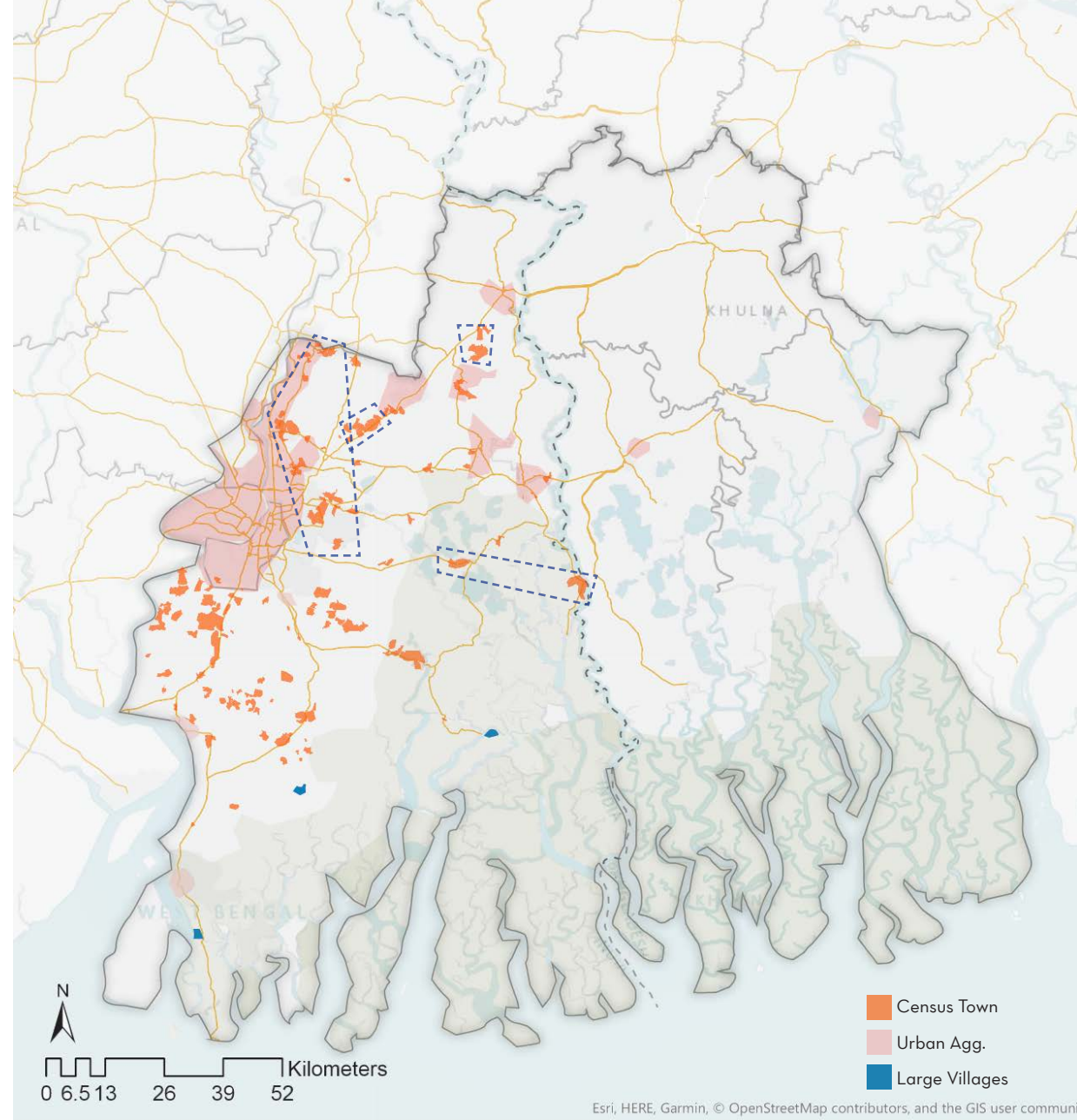
REGIONAL IMPACT



OUTGROWTH

CLUSTERED

ISOLATED



Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user communi

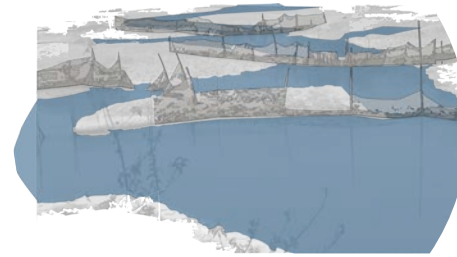
REGIONAL IMPACT



RURAL CHARACTER



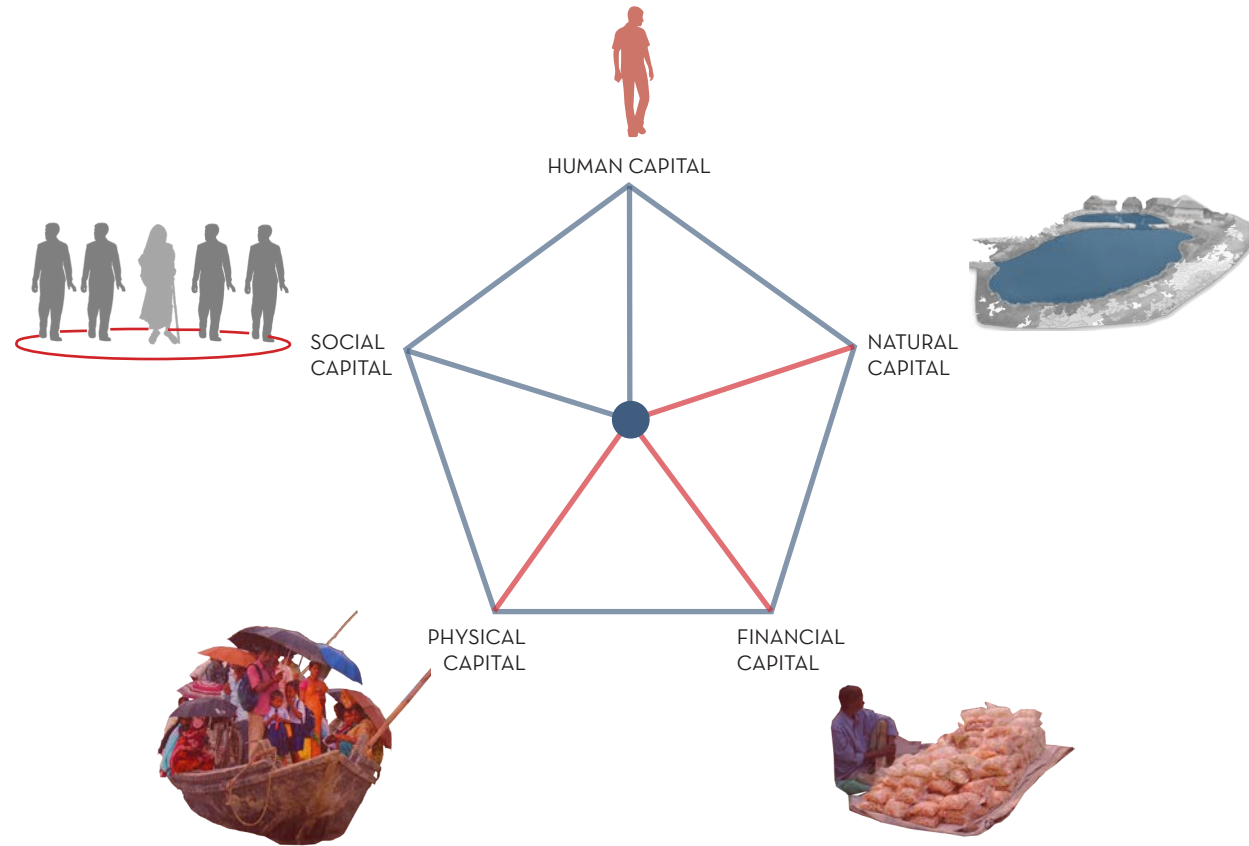
IMPROPER INFRASTRUCTURE



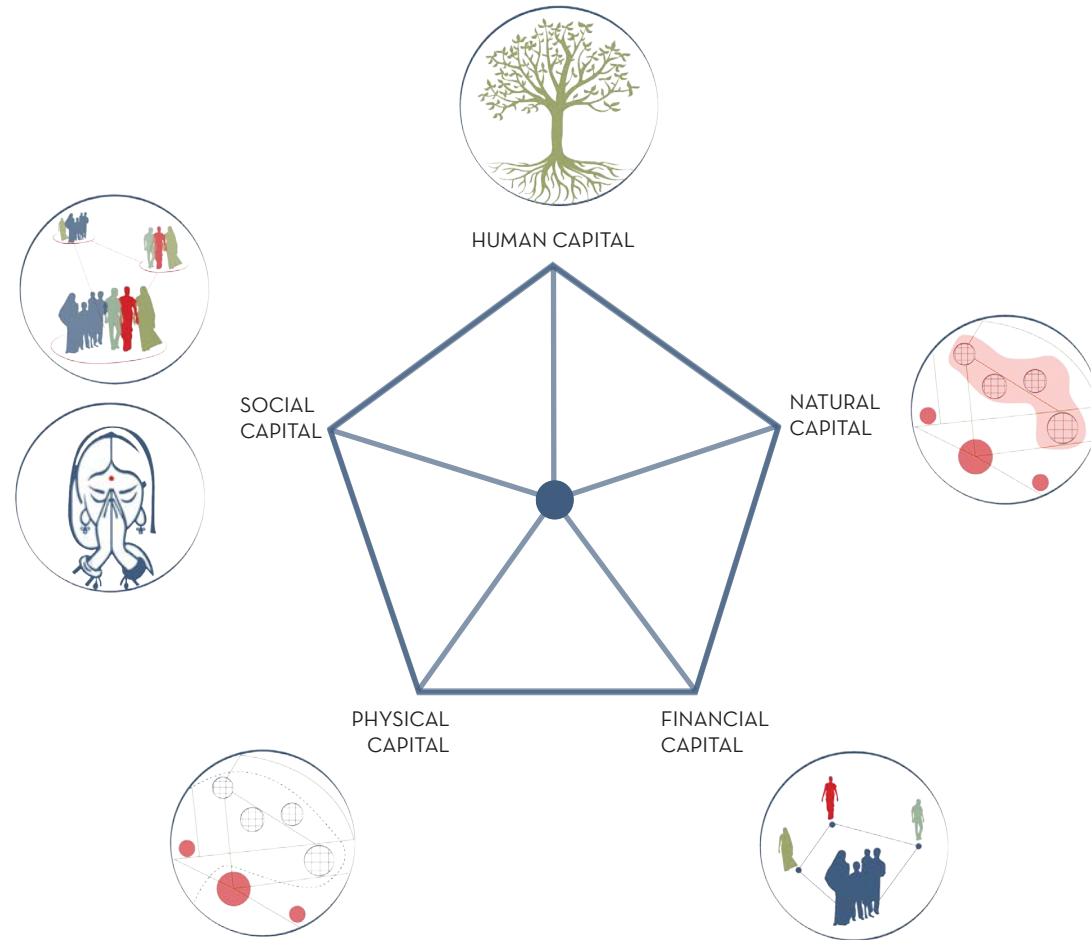
WETLAND DESTRUCTION



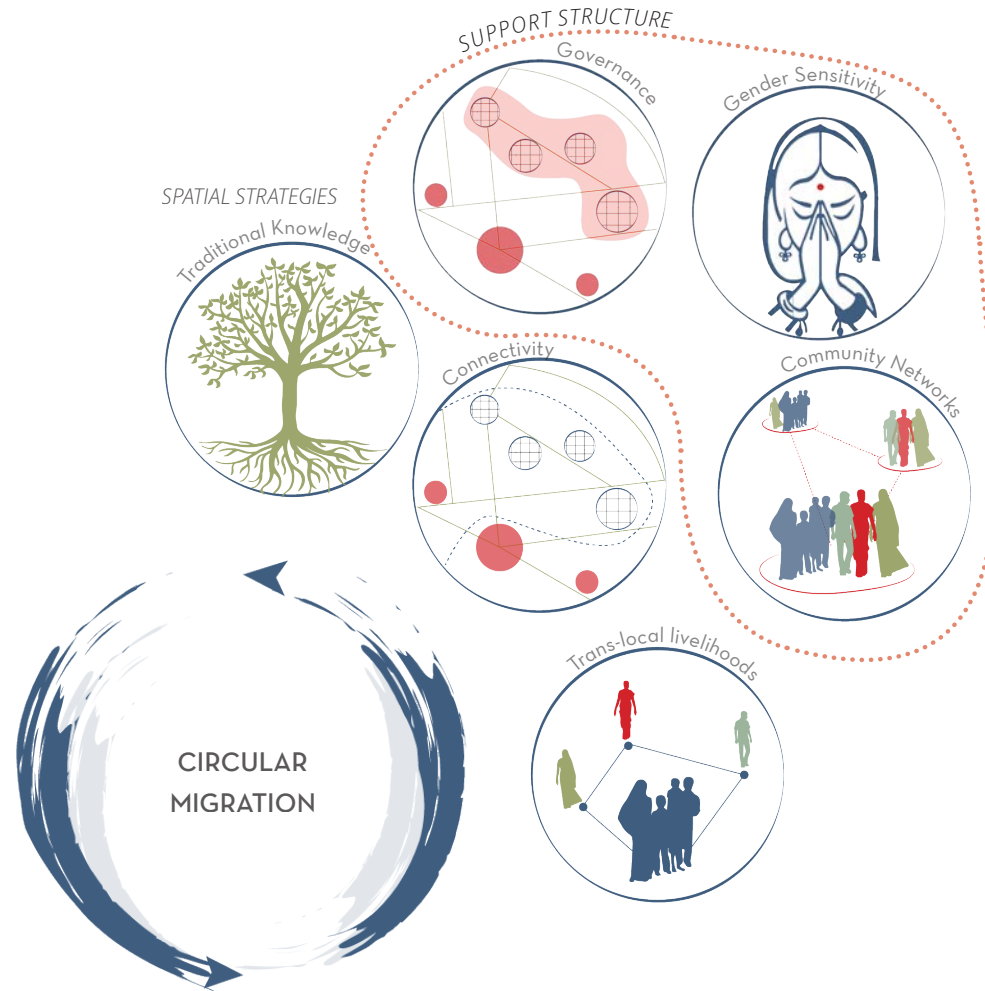
ADHOC ECONOMIES



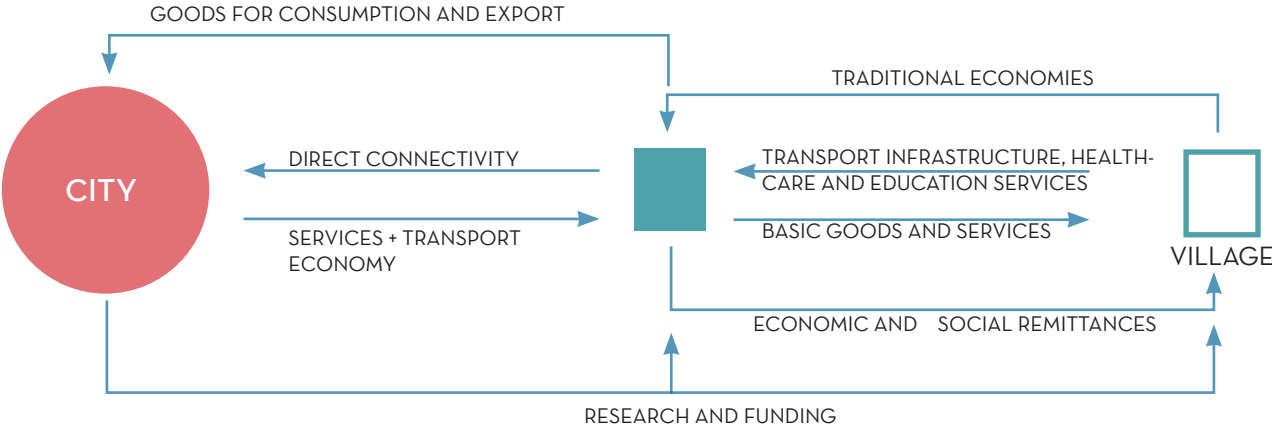
DESIGN THEMES



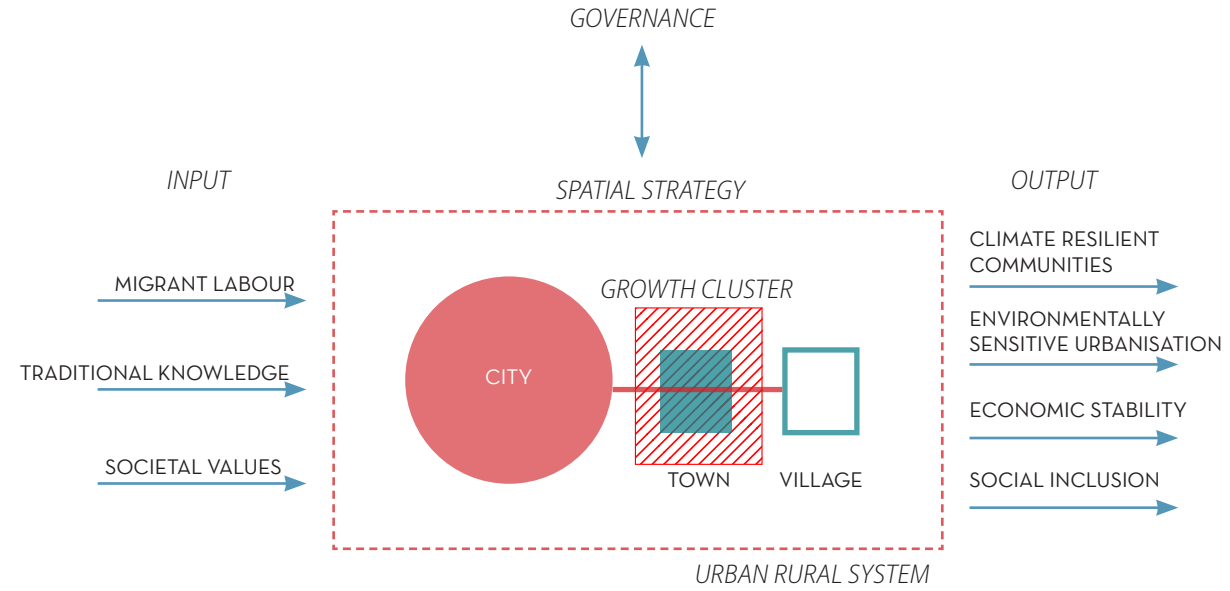
DESIGN THEMES



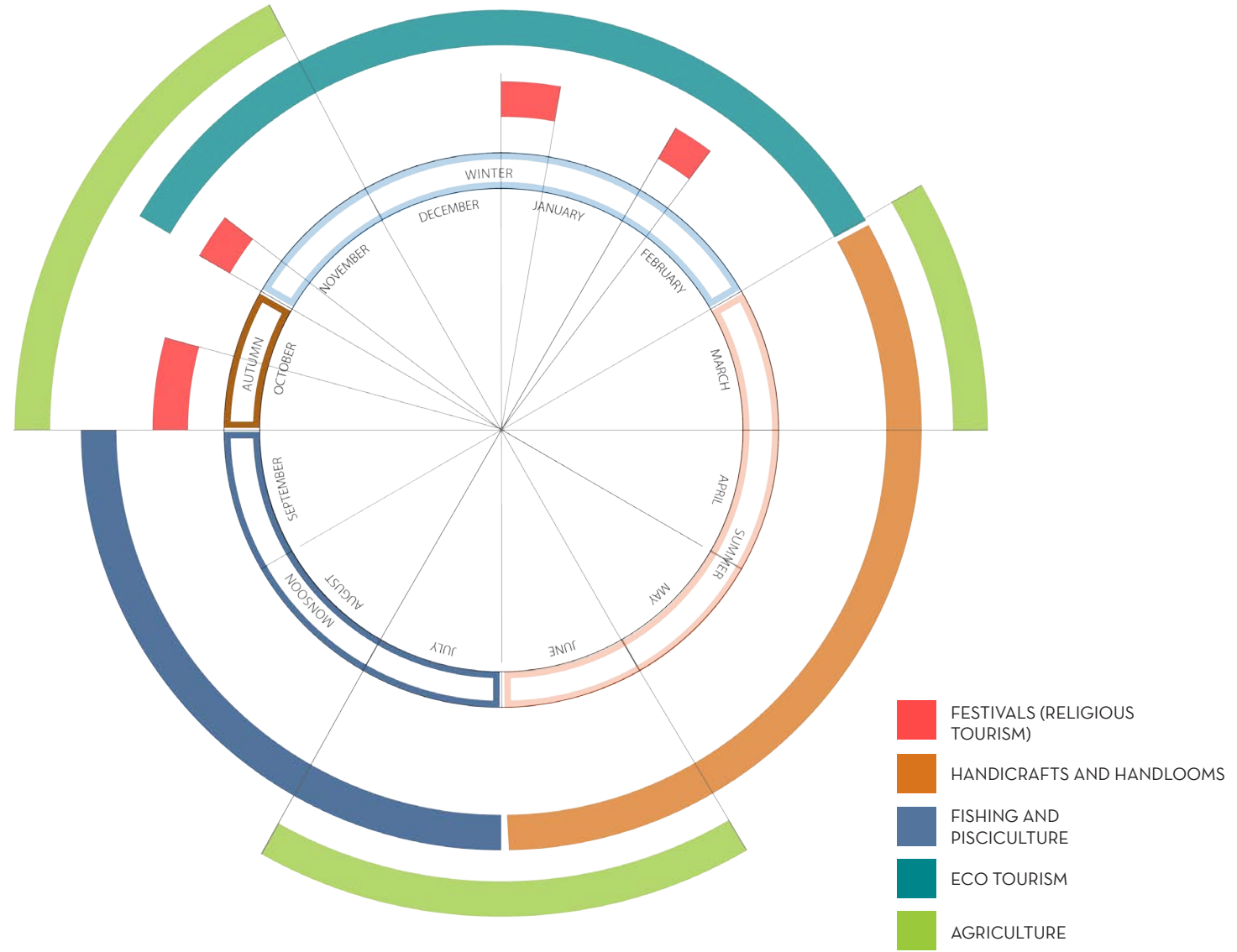
STRATEGIC FRAMEWORK







REGIONAL MODEL



SEASONALITY



VISION - SUSTAINABLE LIVELIHOODS

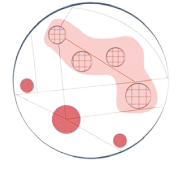
-  WATER NETWORK
-  GROWTH CLUSTERS
-  ONE YEAR CYCLE
-  TRANSPORT CONNECTION



Enhancing Connectivity



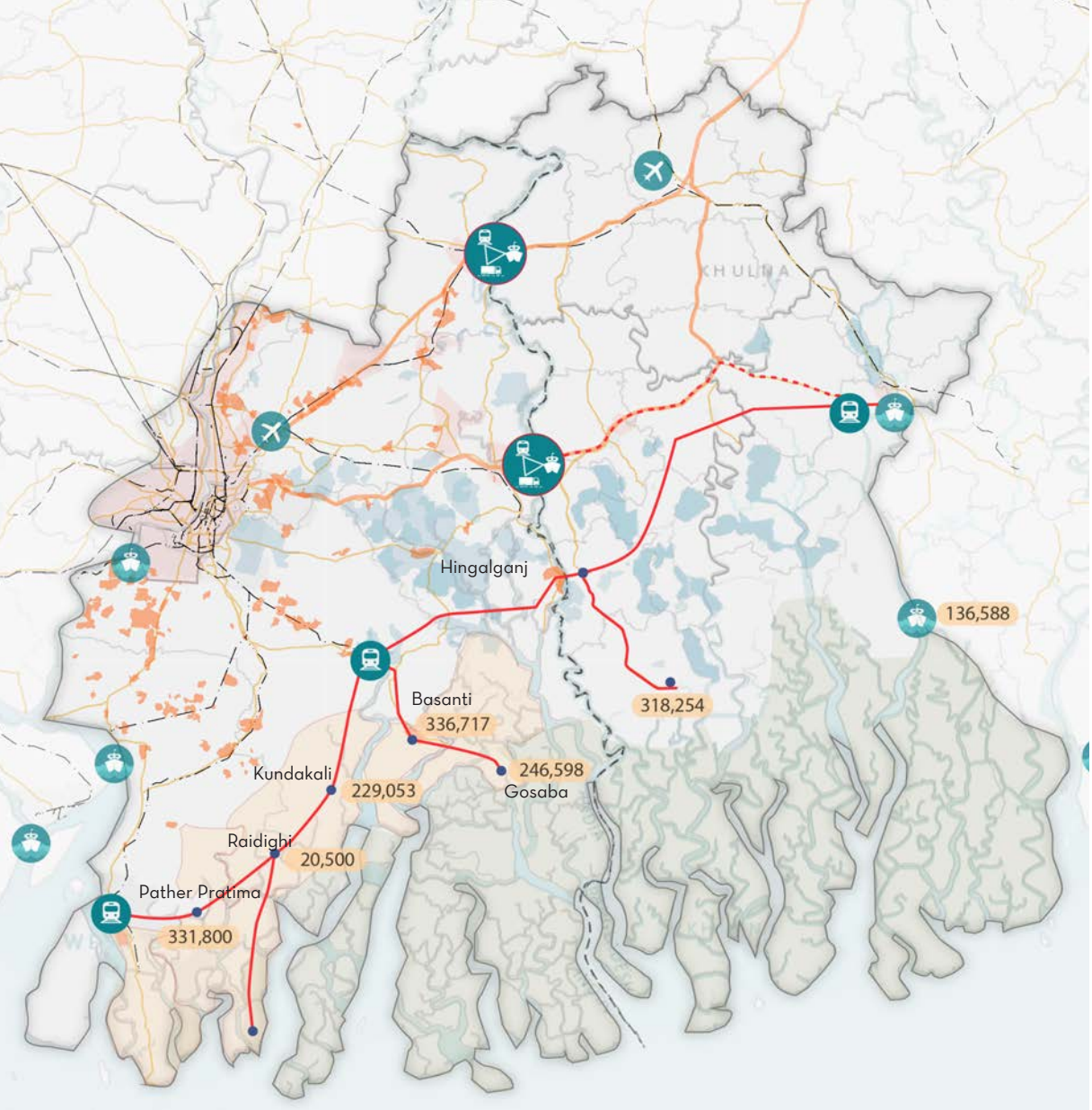
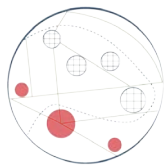
Wetland Conservation



Defining Growth Clusters



Traditional Knowledge Economies



- Proposed Multi-modal Hubs
- Census Towns
- Urban Centres
- Proposed Highway Link
- Under construction Rail Link

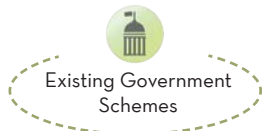


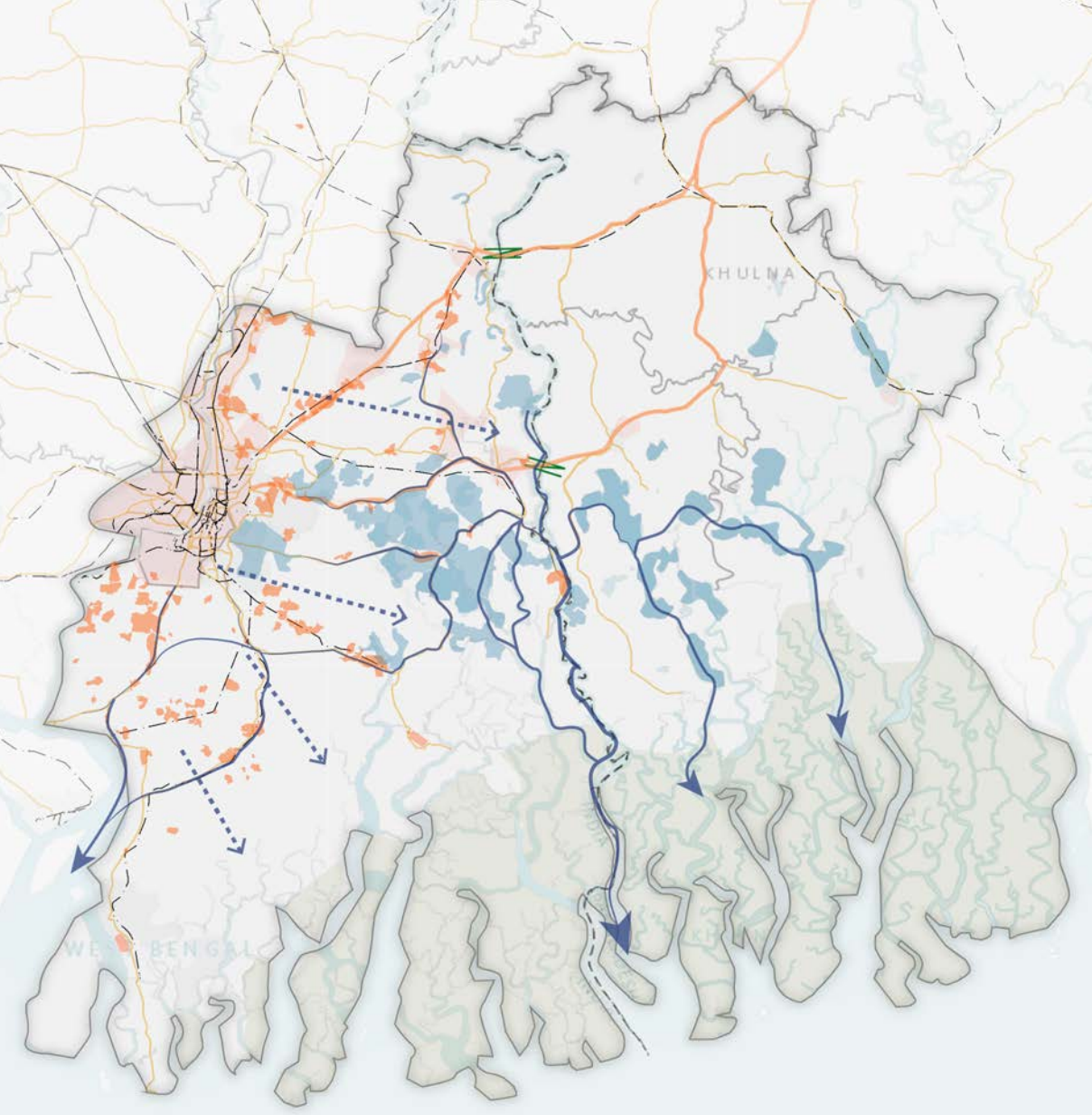
Voluntary enrolment and basic training

Labour and Maintenance



Implementation and Maintenance team to include technical experts

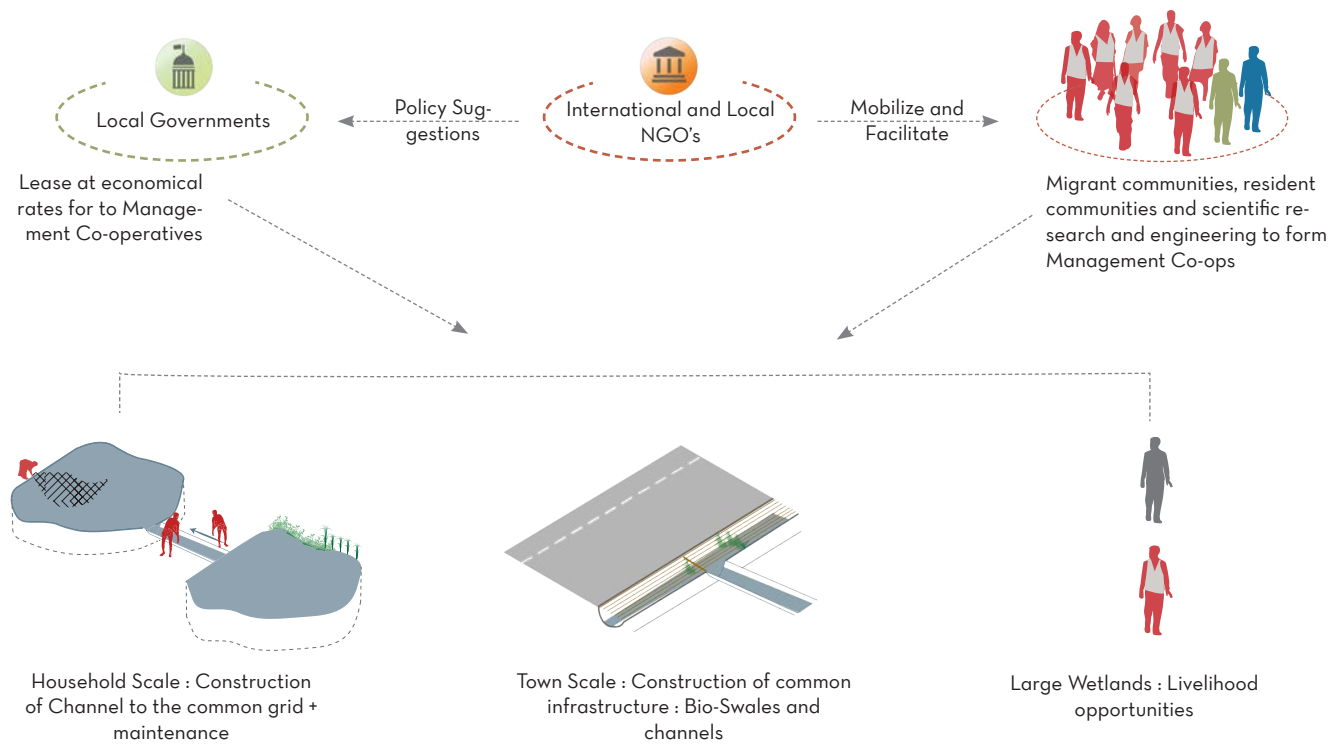
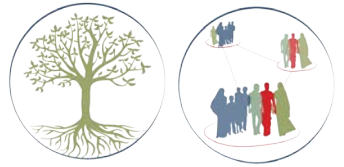


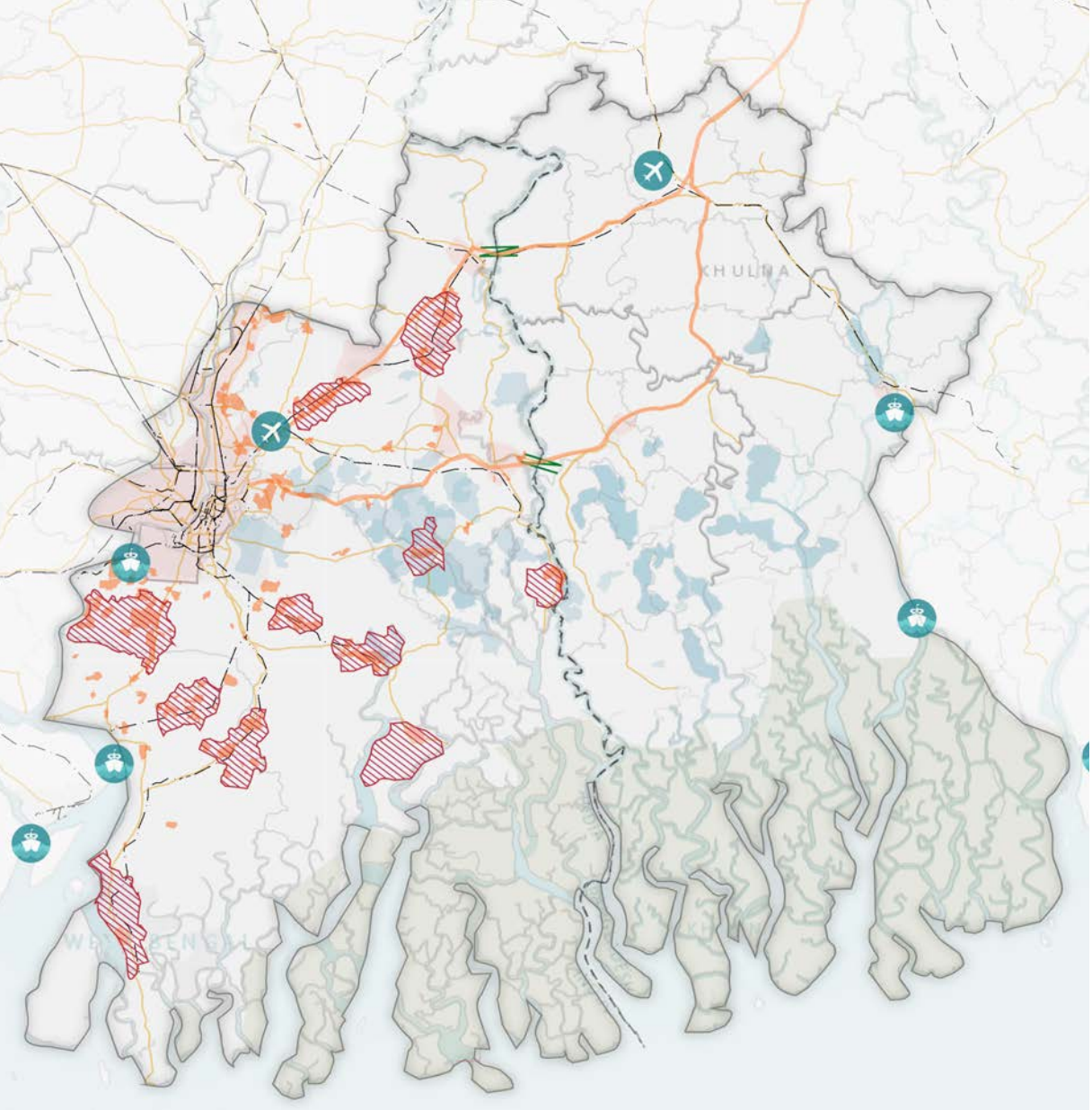







0 52 km

-----> Slope
 —————> Movement of Water

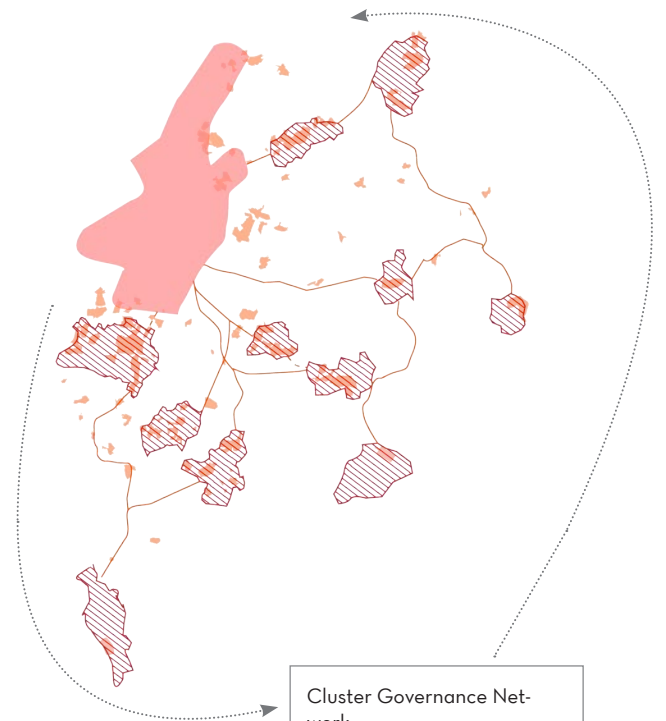
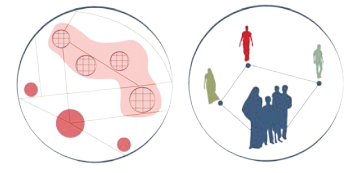
Wetland Conservation





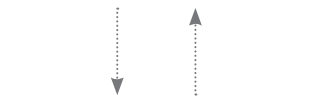
-  Growth Clusters
-  Census Towns
-  Urban Centres
-  Highway Network
-  Railway Network

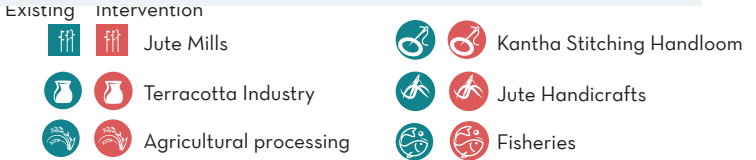
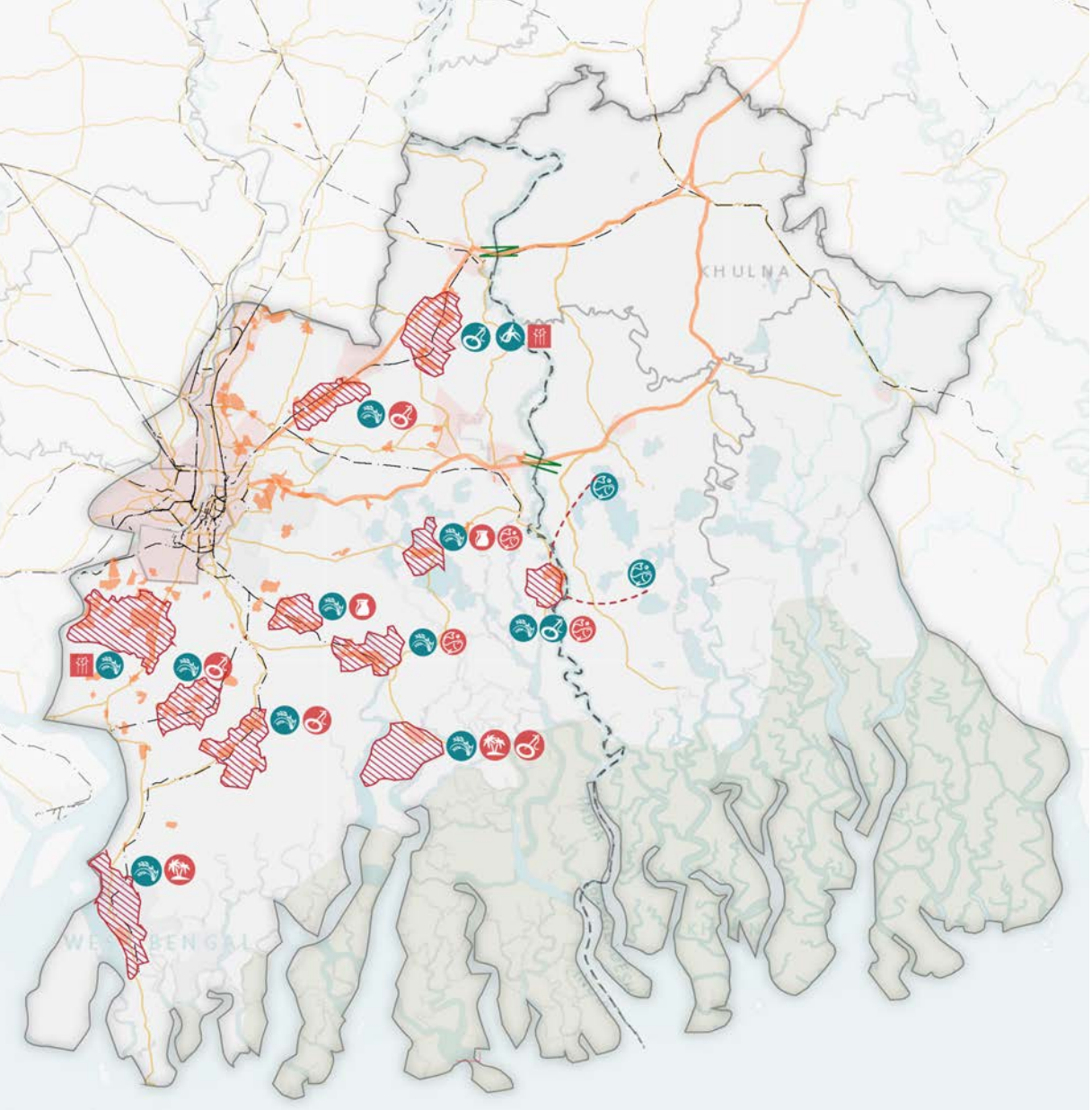
Defining Growth Clusters



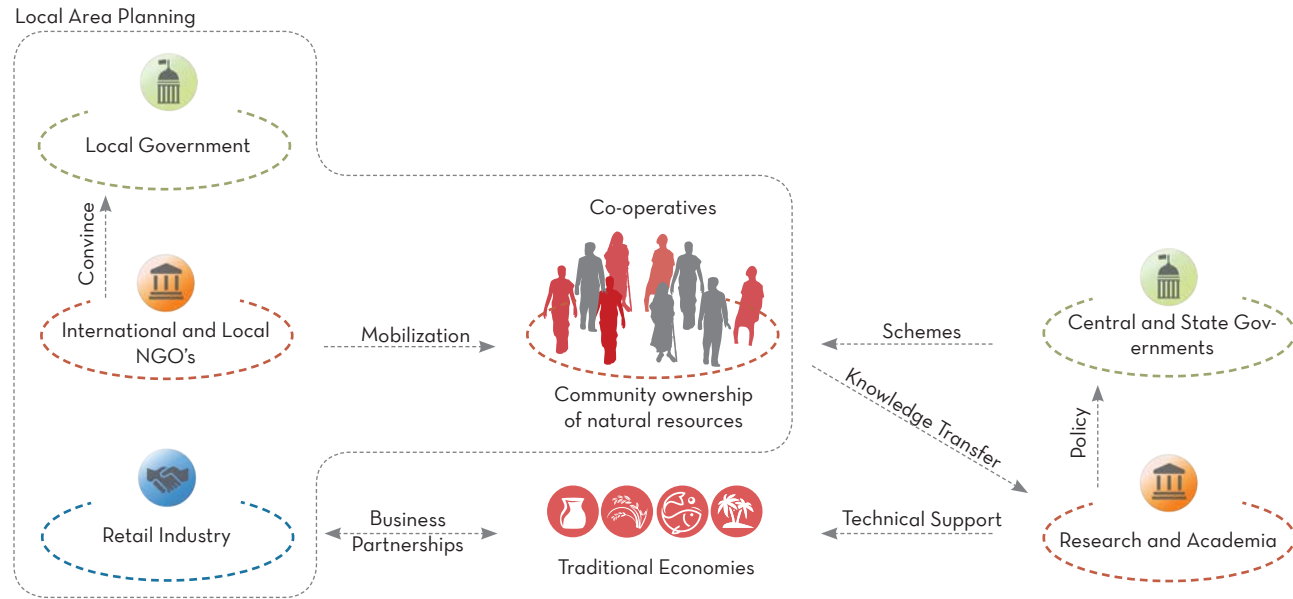
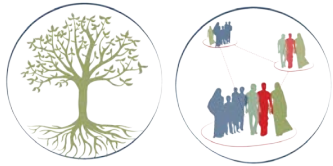
Cluster Governance Network

Ministry of Panchayati Raj +
Ministry of Commerce

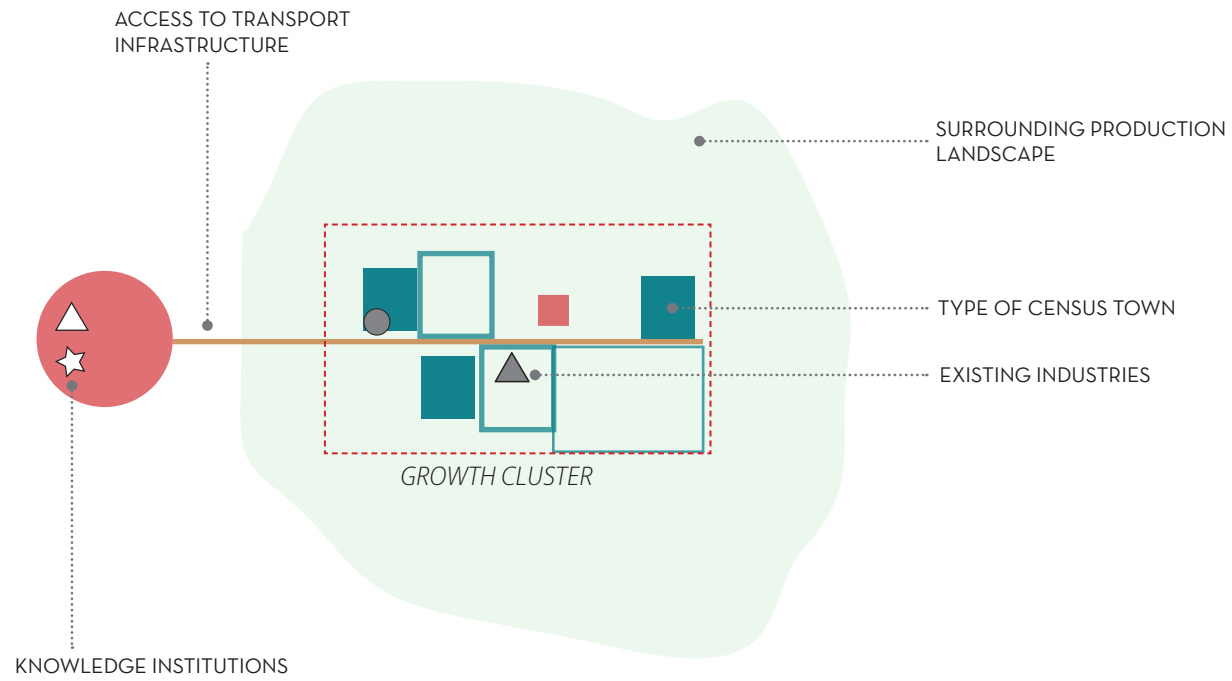




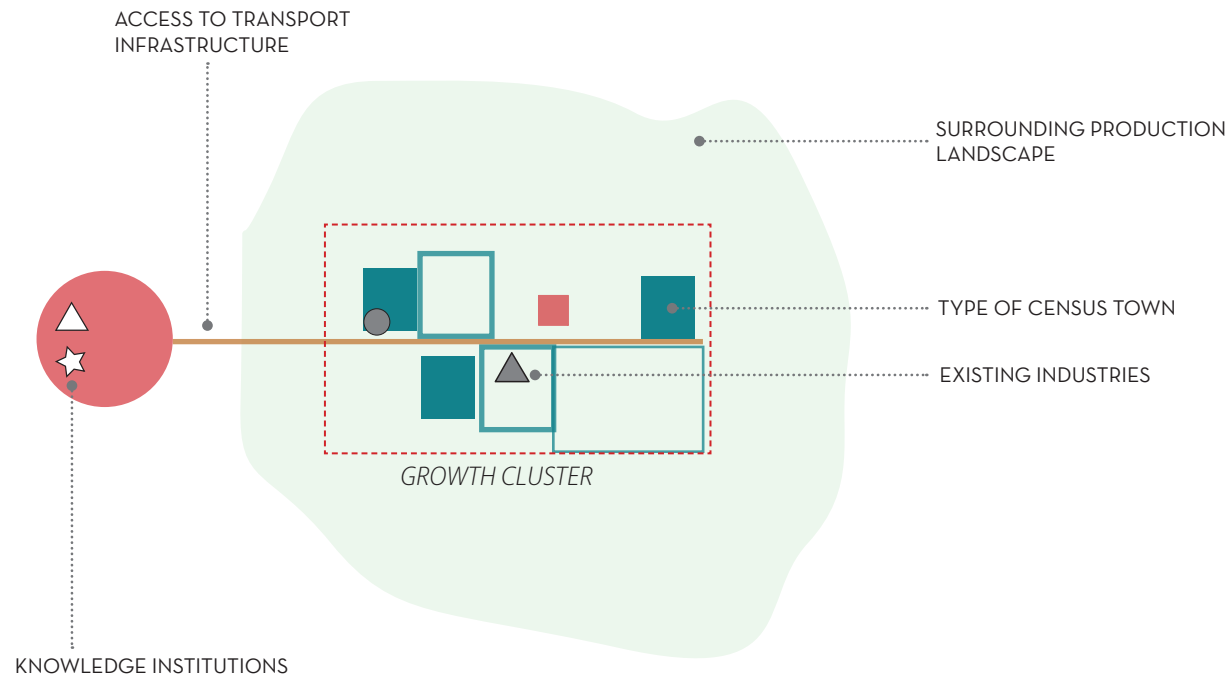
Traditional Knowledge Economies



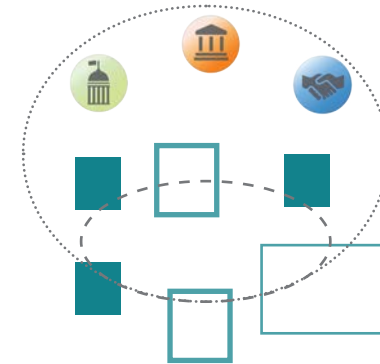
GROWTH CLUSTER MODEL

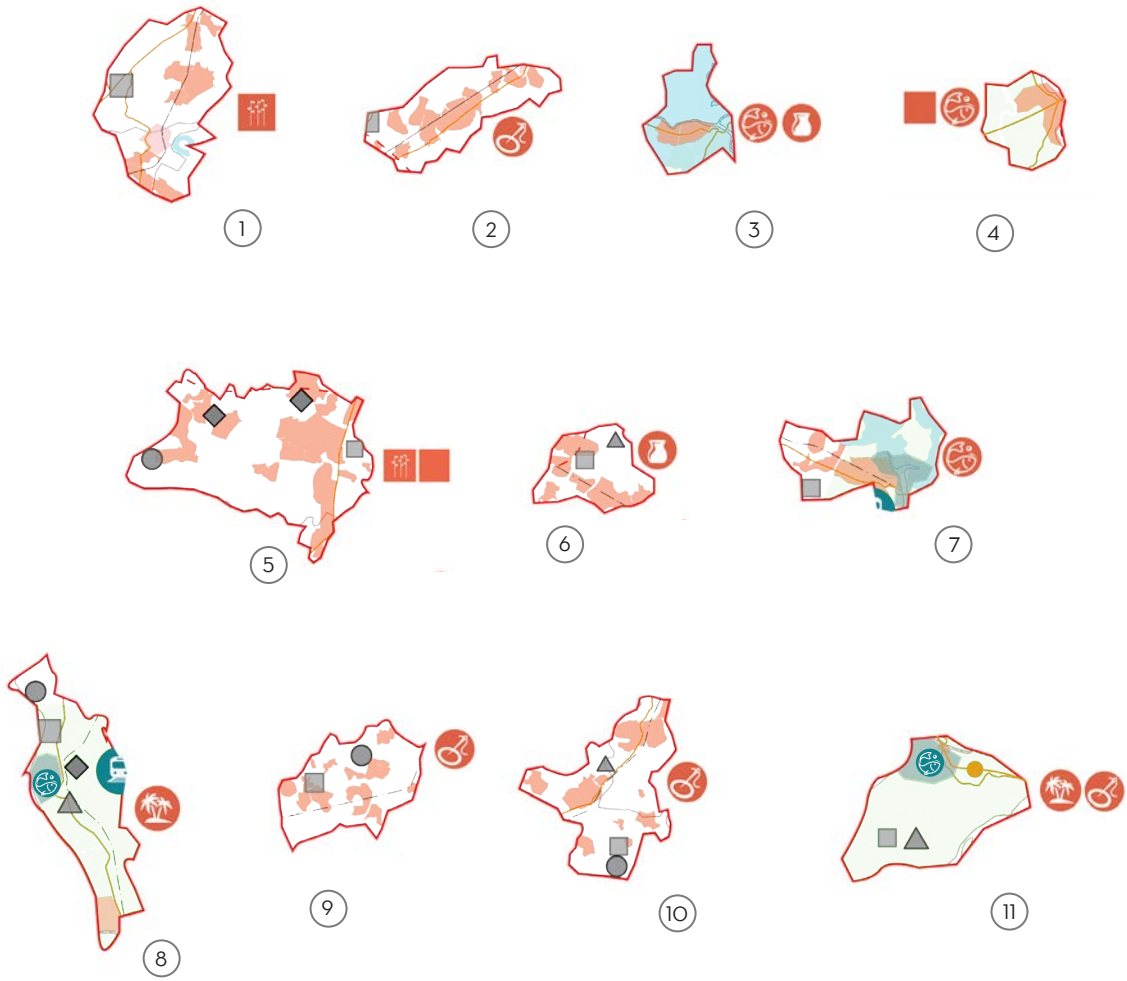


GROWTH CLUSTER MODEL









LOCAL AREA PARTNERSHIPS





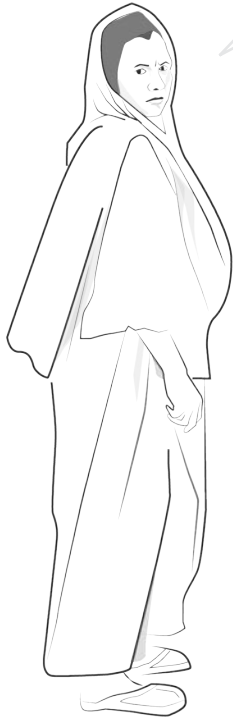
EXISTING PROCESSING UNITS

-  Jute Mills
-  Textile Mills
-  Leather Tannery
-  Growth Clusters
-  Household Industries
-  Food Processing Units

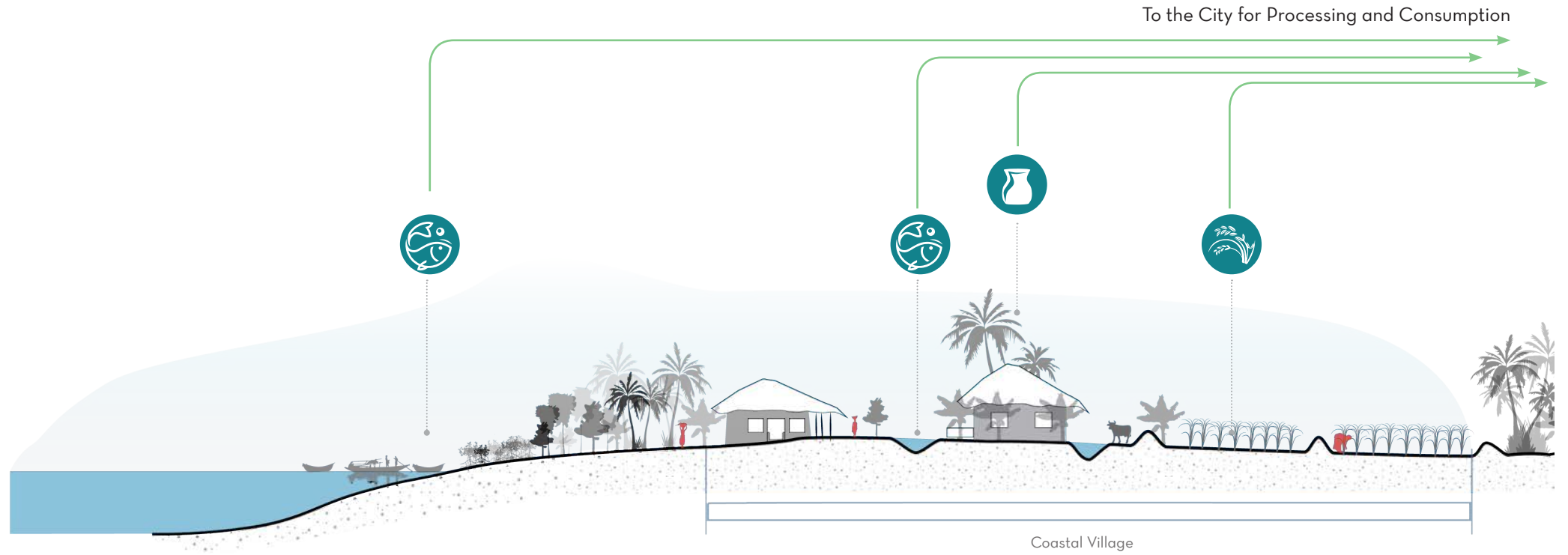
TRADITIONAL ECONOMIES



How does this work for me?

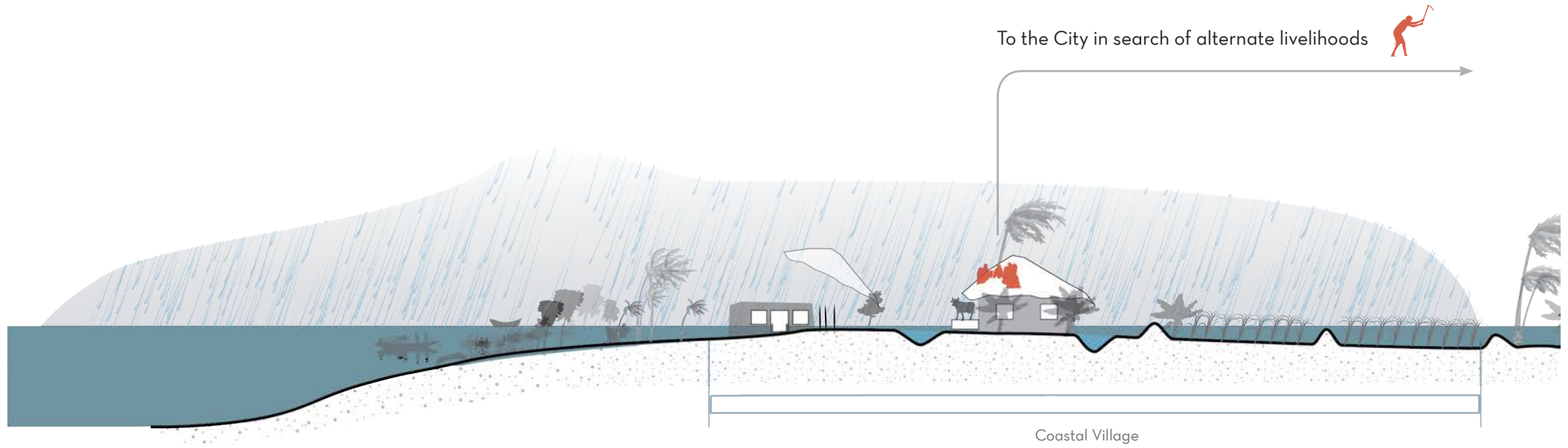


PRE - DISASTER SITUATION



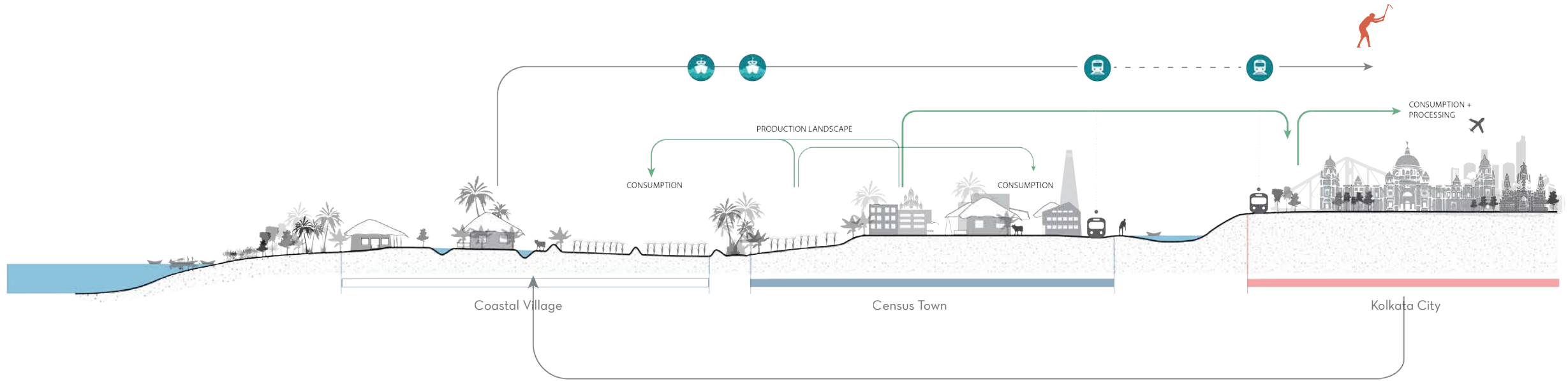
Dependant on Natural Livelihoods

POST - DISASTER SITUATION



Migration to the labour based informal economy

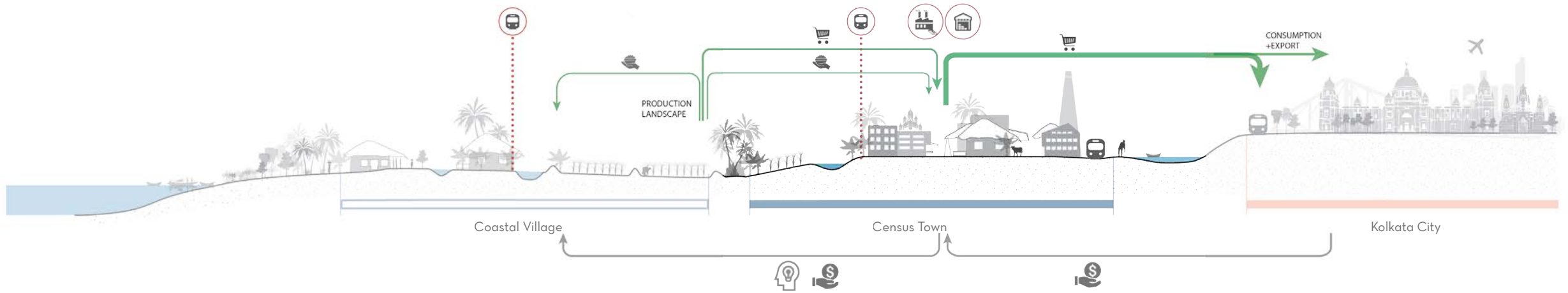
BROKEN LINKS



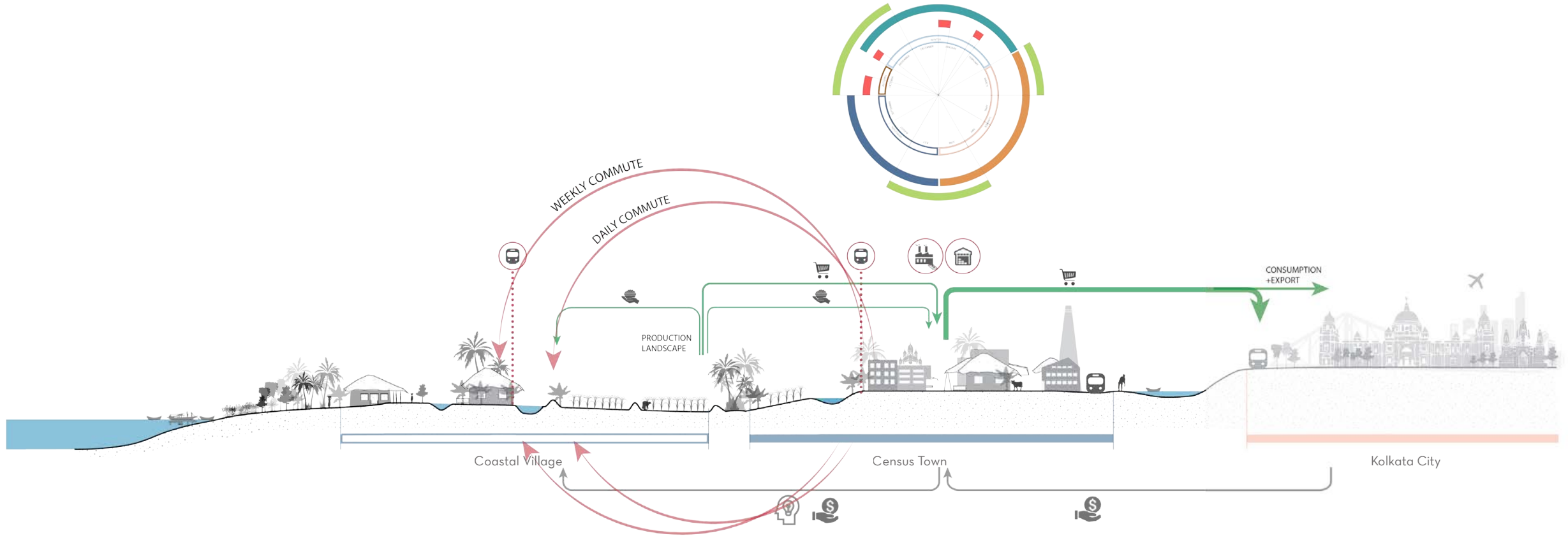
RESTRUCTURING OPPORTUNITIES



Equip the Town

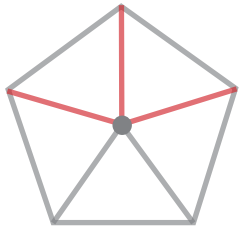


RESTRUCTURING OPPORTUNITIES

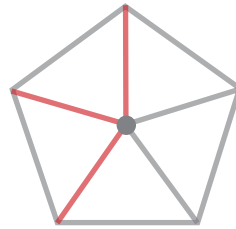


RESTRUCTURING OPPORTUNITIES

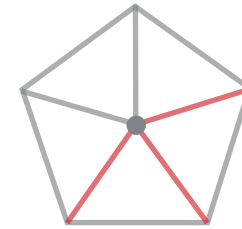
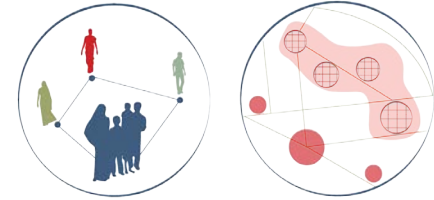
COMMUNITY OWNERSHIP OF NATURAL RESOURCES

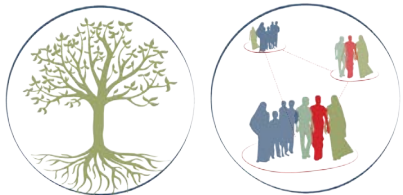


IDENTITY



COLLABORATIVE APPROACH



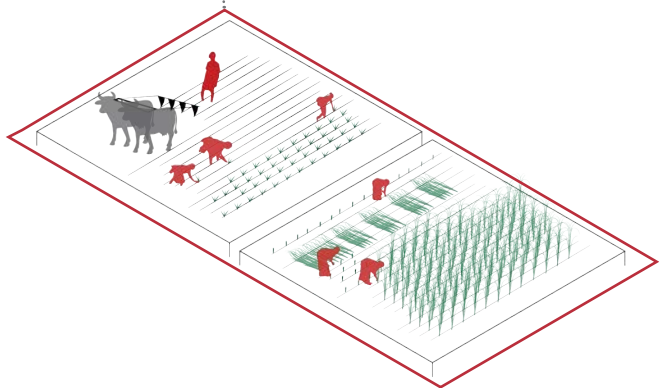


GOVERNANCE

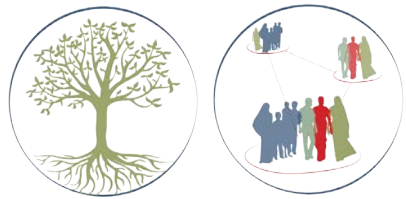


Farming Co-operatives

SPATIAL



Land Clubbing
Functions : Sowing,
Harvesting, Transport



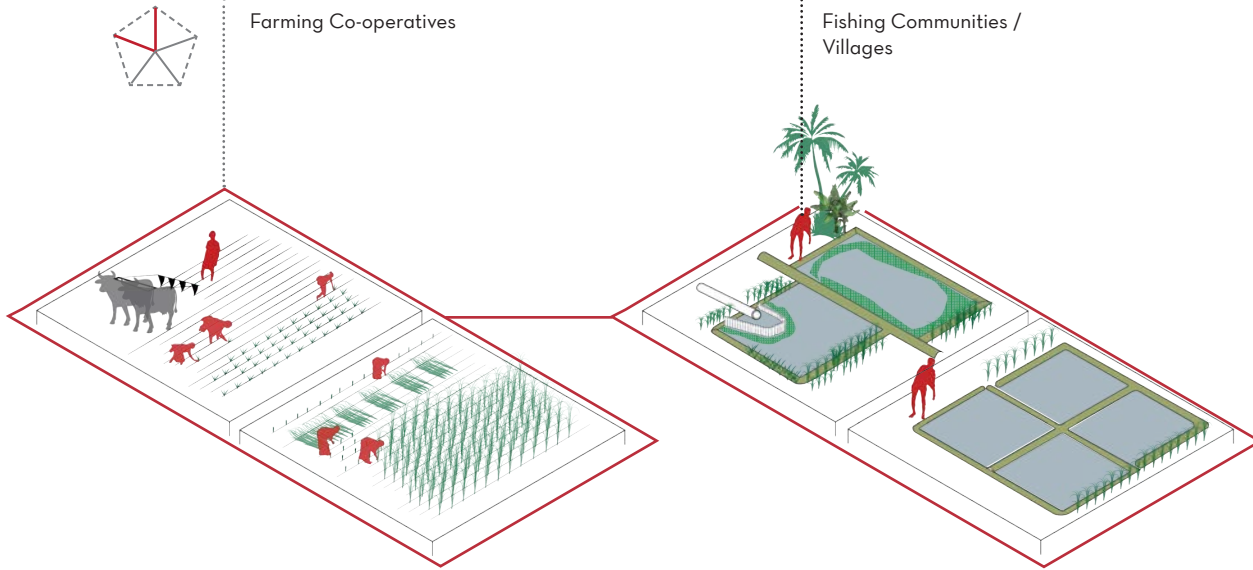
GOVERNANCE



Farming Co-operatives

Fishing Communities / Villages

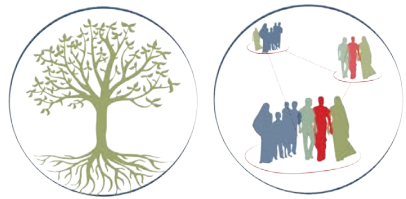
SPATIAL



Land Clubbing
Functions : Sowing,
Harvesting, Transport



Community-leased
wetlands and fisheries



GOVERNANCE

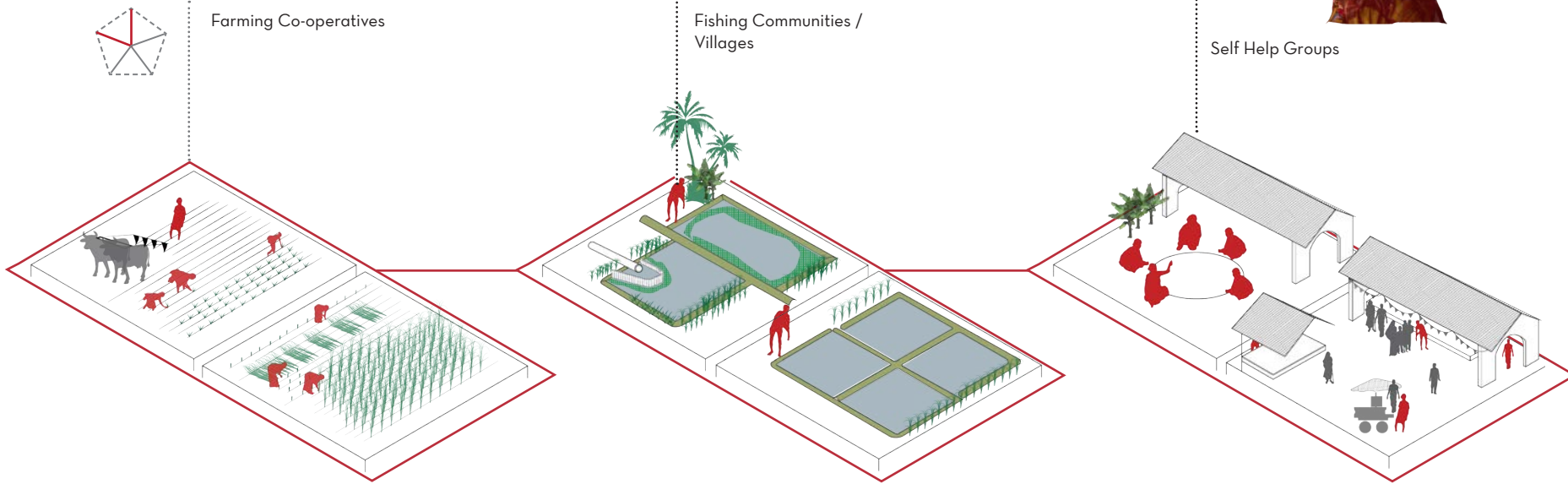


Farming Co-operatives

Fishing Communities / Villages

Self Help Groups

SPATIAL



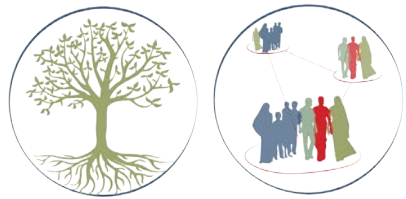
Land Clubbing
Functions : Sowing,
Harvesting, Transport



Community-leased
wetlands and fisheries



Space for work and
sale during peak
tourism season



GOVERNANCE



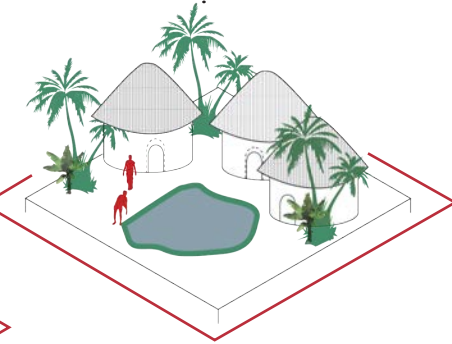
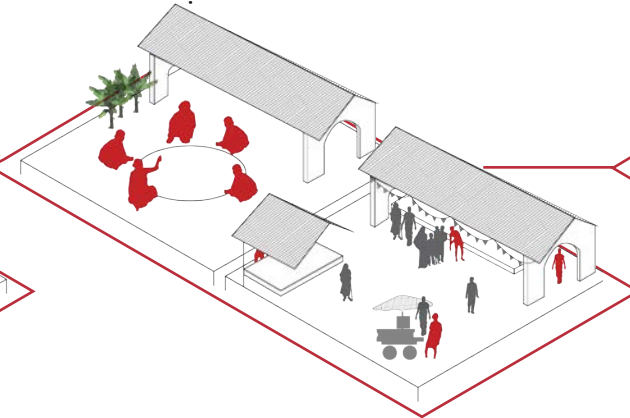
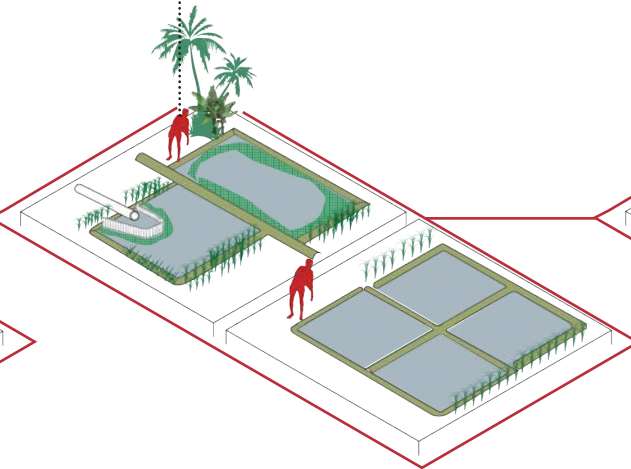
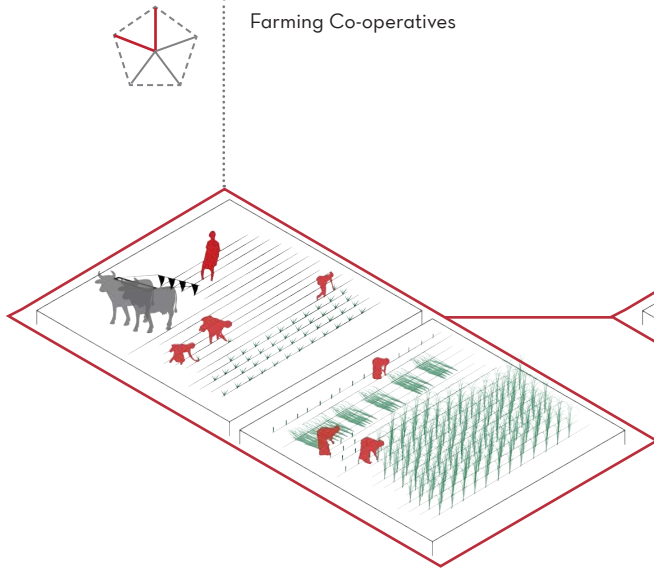
Farming Co-operatives

Fishing Communities / Villages

Self Help Groups

Self Help Groups

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

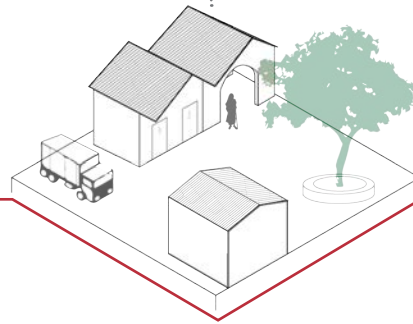


GOVERNANCE

SPATIAL



Skill Training



SAHYOG KENDRA

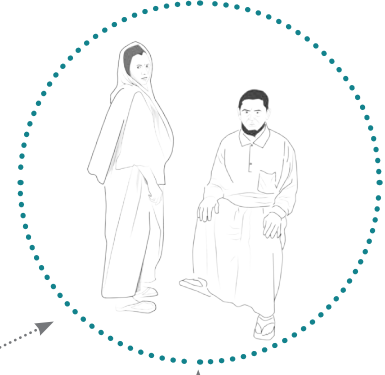


Efficient Connectivity



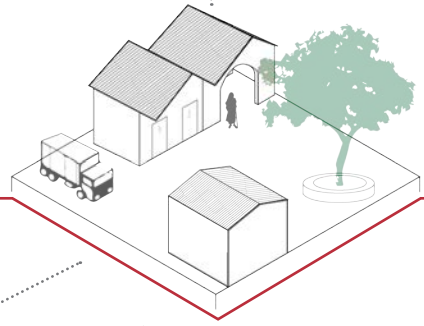
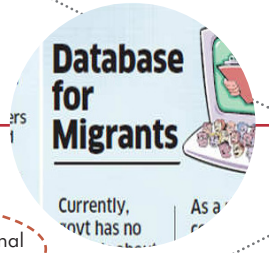
GOVERNANCE

SPATIAL



Opportunity

Skill Training





GOVERNANCE

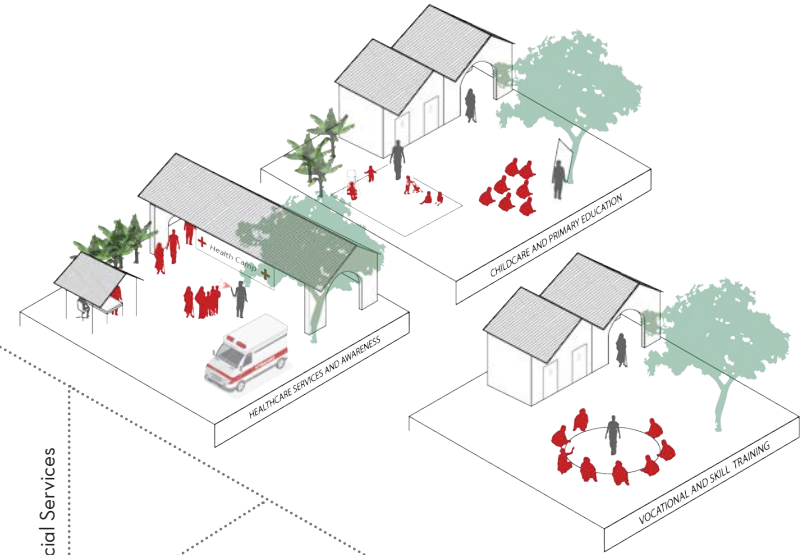
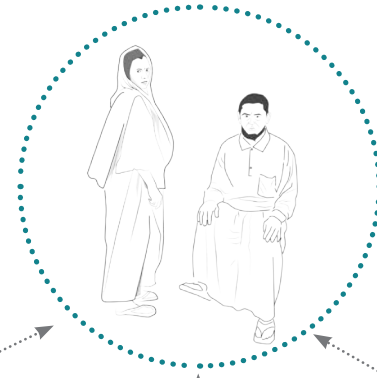
SPATIAL

Local Agri Collaborative

Research Institutes + NGO's

Fisheries Department

Database Innovation



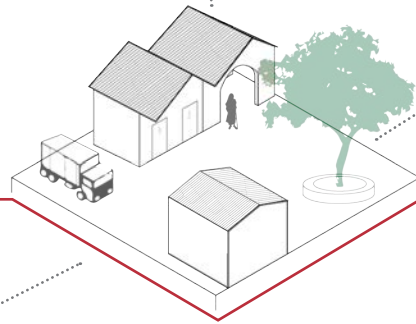
Opportunity

Skill Training

Social Services

Database for Migrants

Currently, govt has no As a



Local NGO's

Local and International NGO's

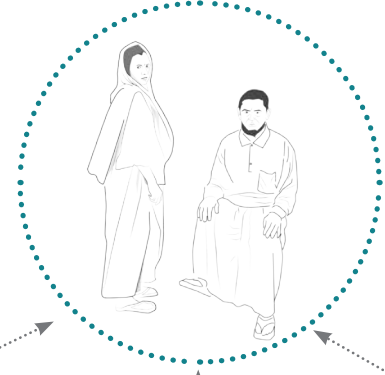
Co-operative Schemes





GOVERNANCE

SPATIAL



Local Agri Collaborative

Research Institutes + NGO's

Fisheries Department

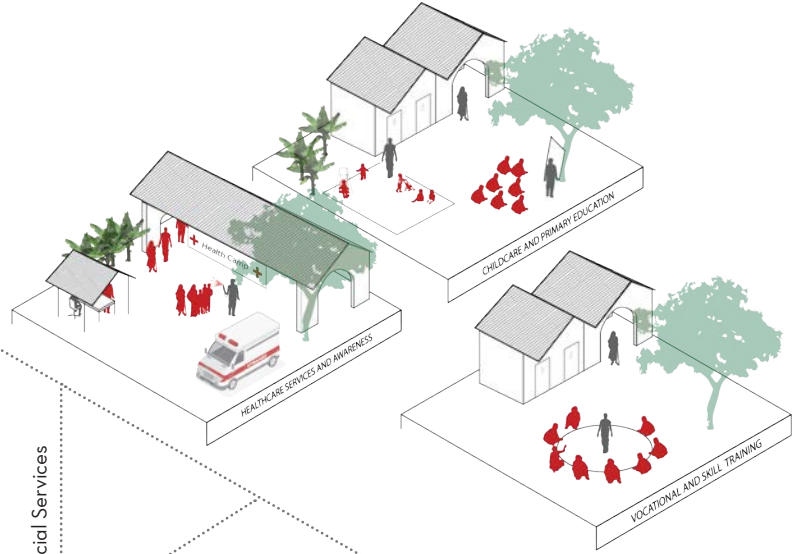
Database Innovation



Opportunity

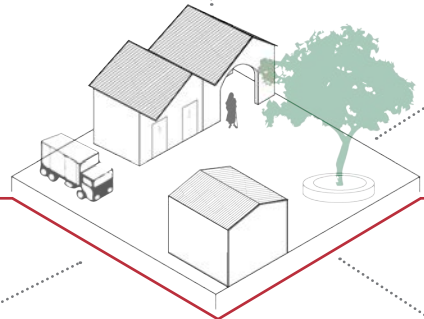
Skill Training

Social Services



Database for Migrants

Currently, govt has no As a

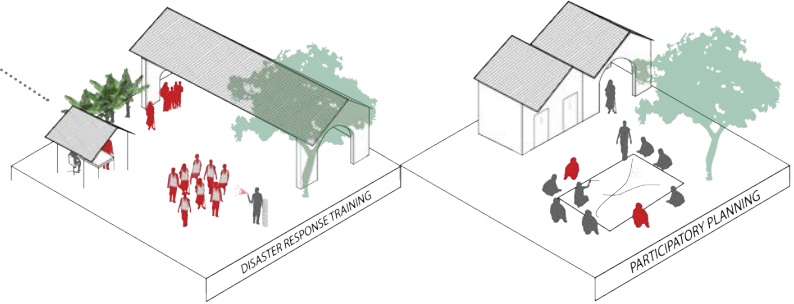


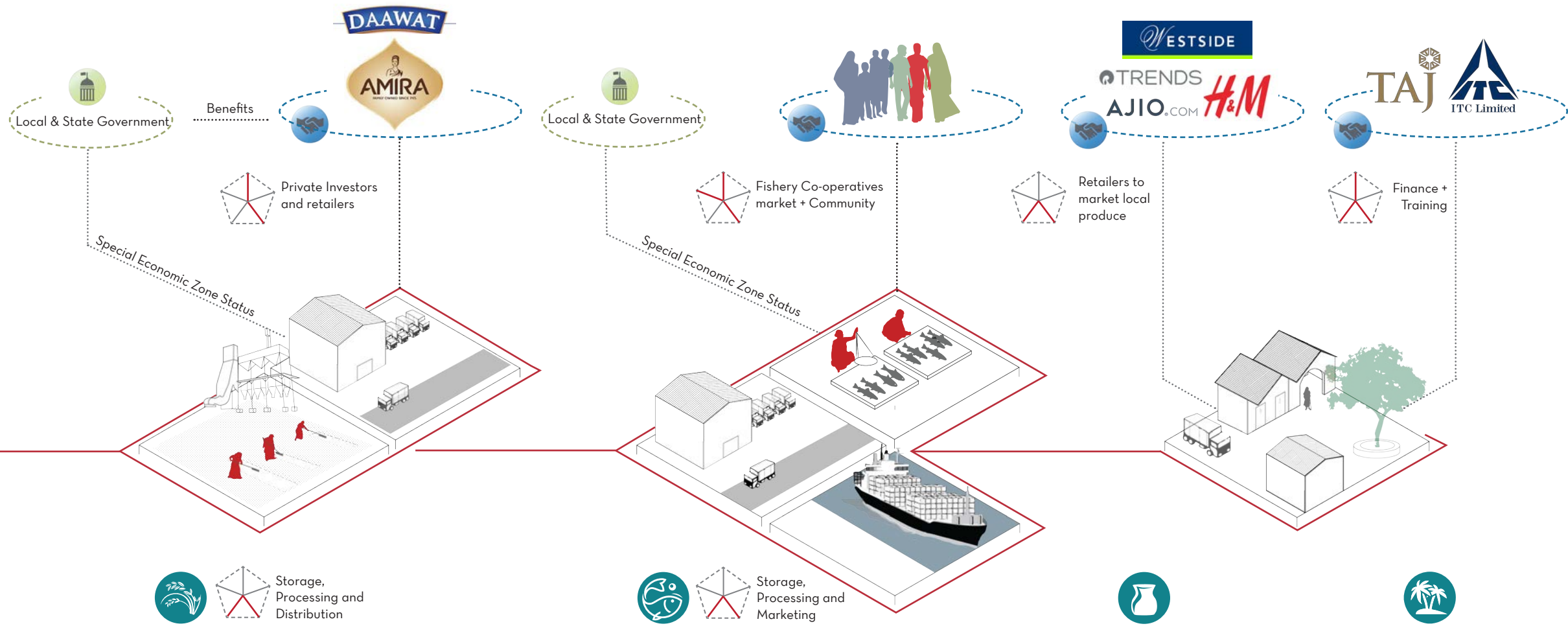
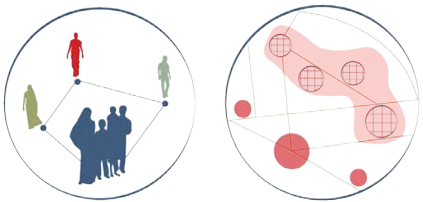
Efficient Connectivity

Local NGO's

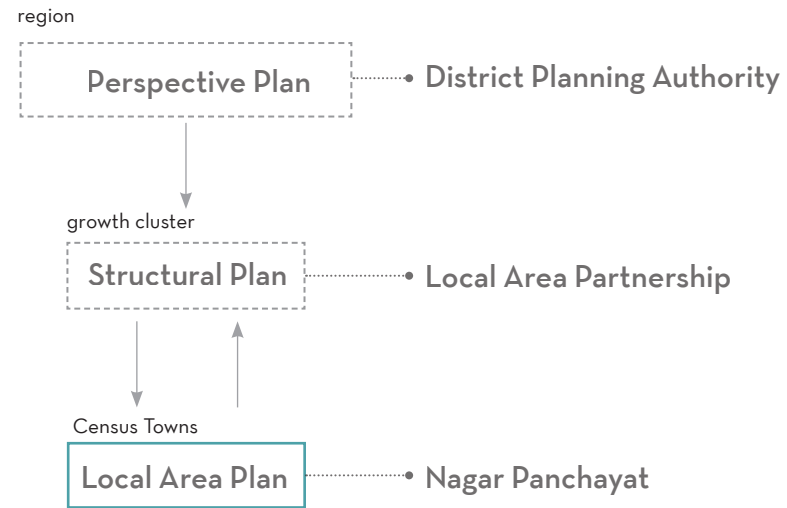
Local and International NGO's

Co-operative Schemes



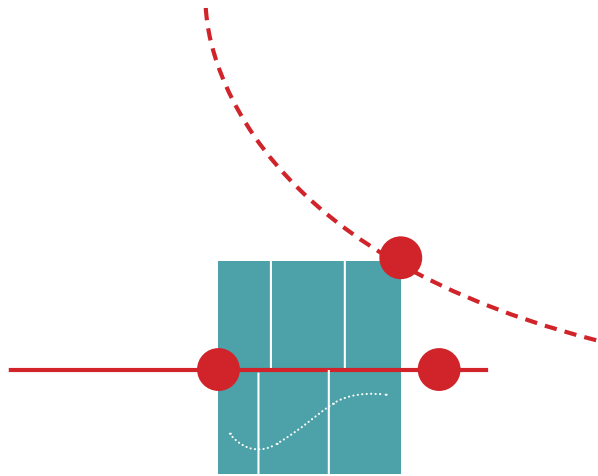


LOCAL AREA PLANS

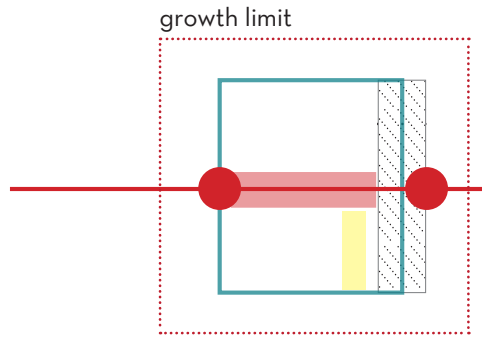


Incorporate Bottom Up collaborations into Top down Plans

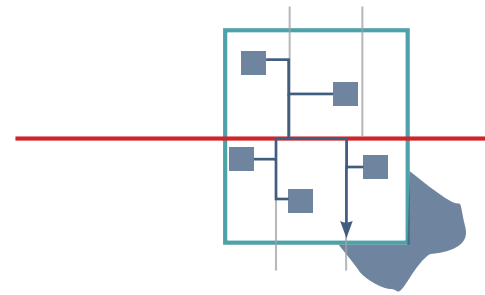
LOCAL AREA PLANS



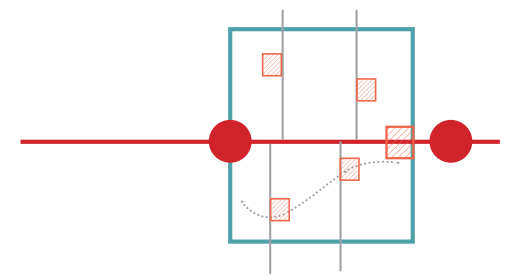
CONNECTIVITY



ZONING PLAN



WETLAND PRESERVATION AND ORGANIC SEWAGE TREATMENT



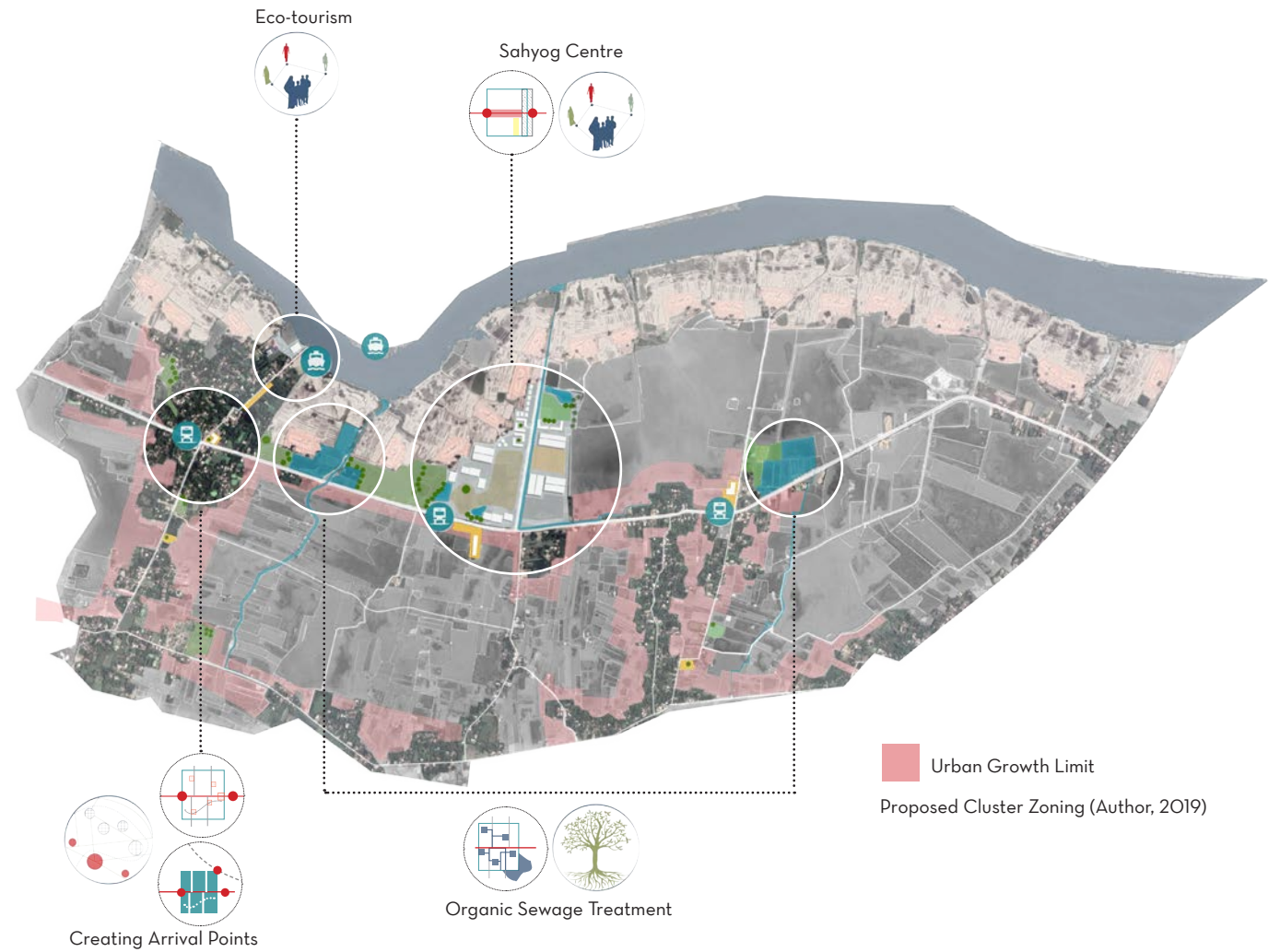
COMMUNITY SPACE

-  COMMUNITY
-  INDUSTRY
-  SOCIAL INFRA
-  COMMERCIAL
-  WETLANDS

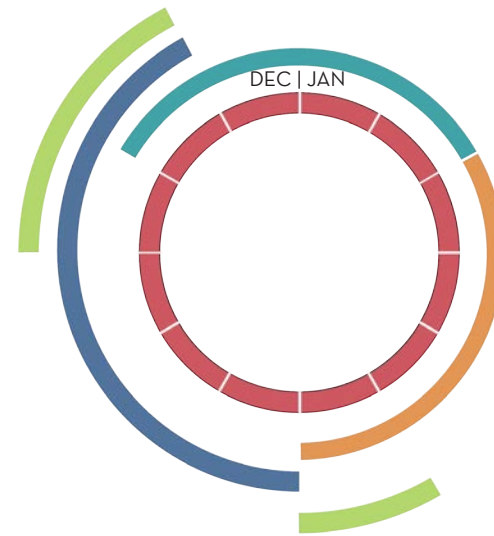
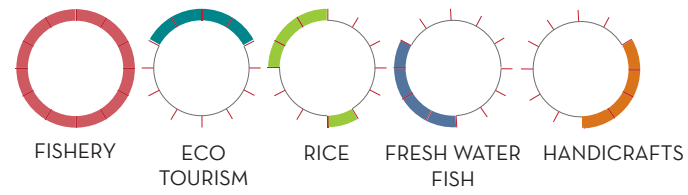
THE CASE OF MINAKHAN



Positioning the Minakhan Cluster



SEASONALITY

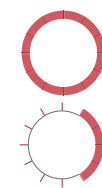
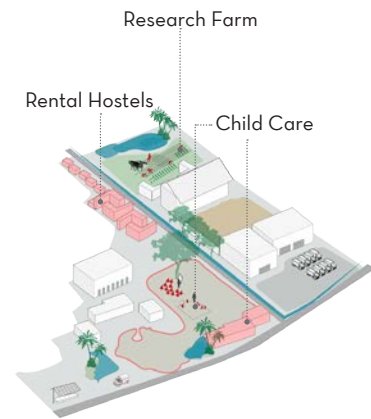




SAHYOG KENDRA



Schematic layout of a Sahyog Kendra (Author, 2019)





Processing



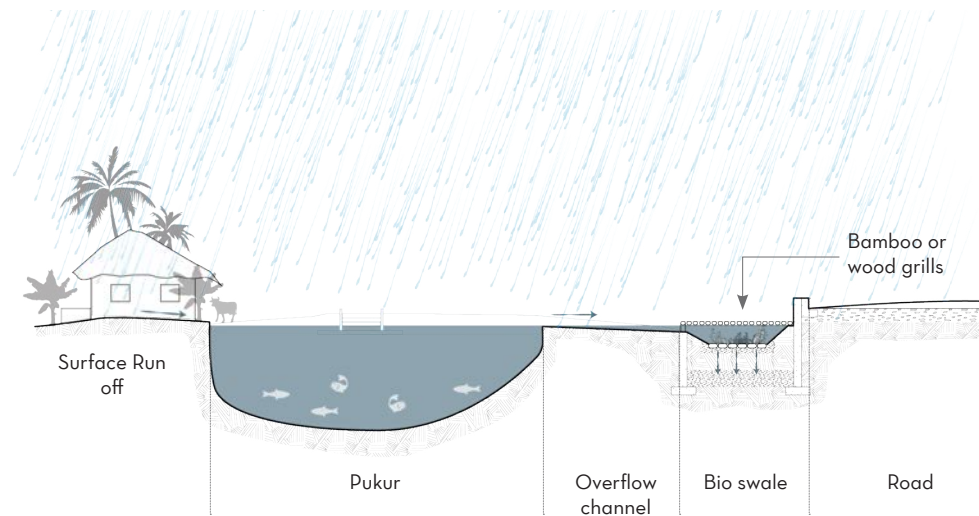
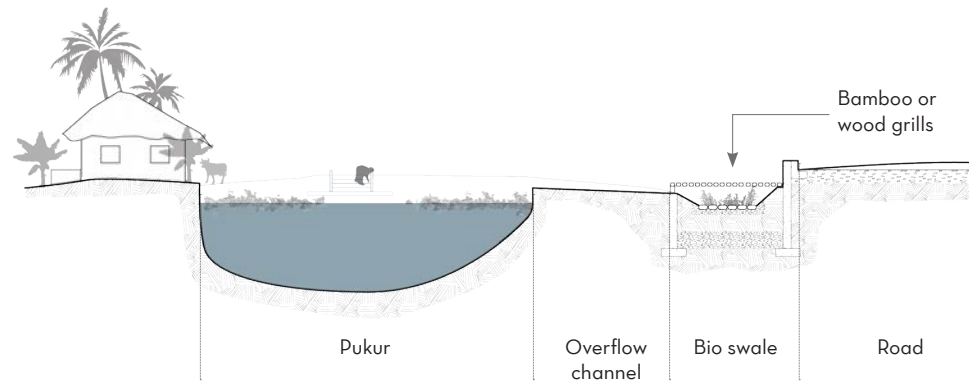
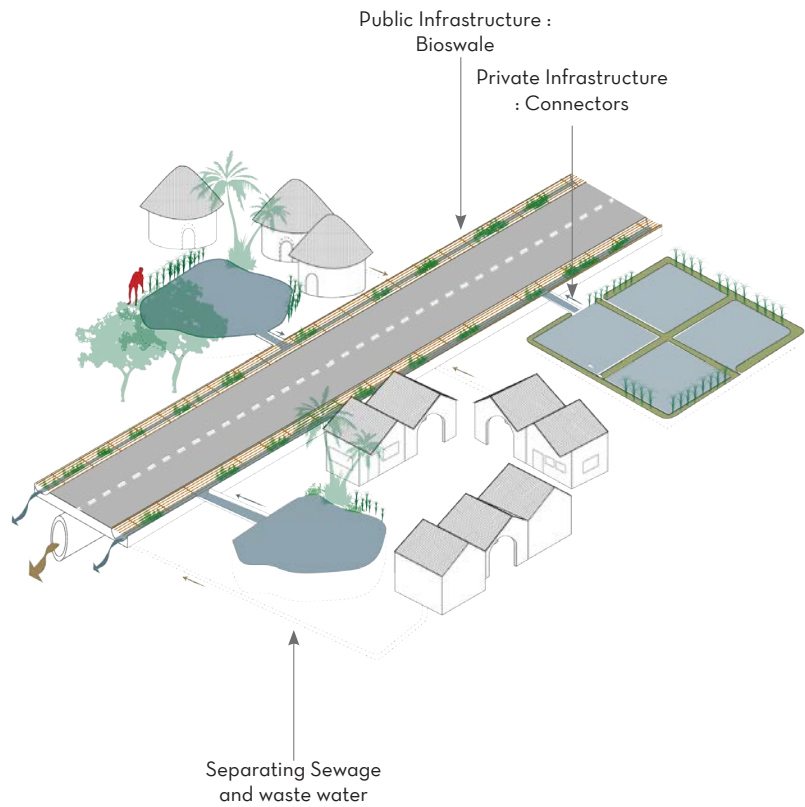
Social infrastructure for labourers on the fields



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

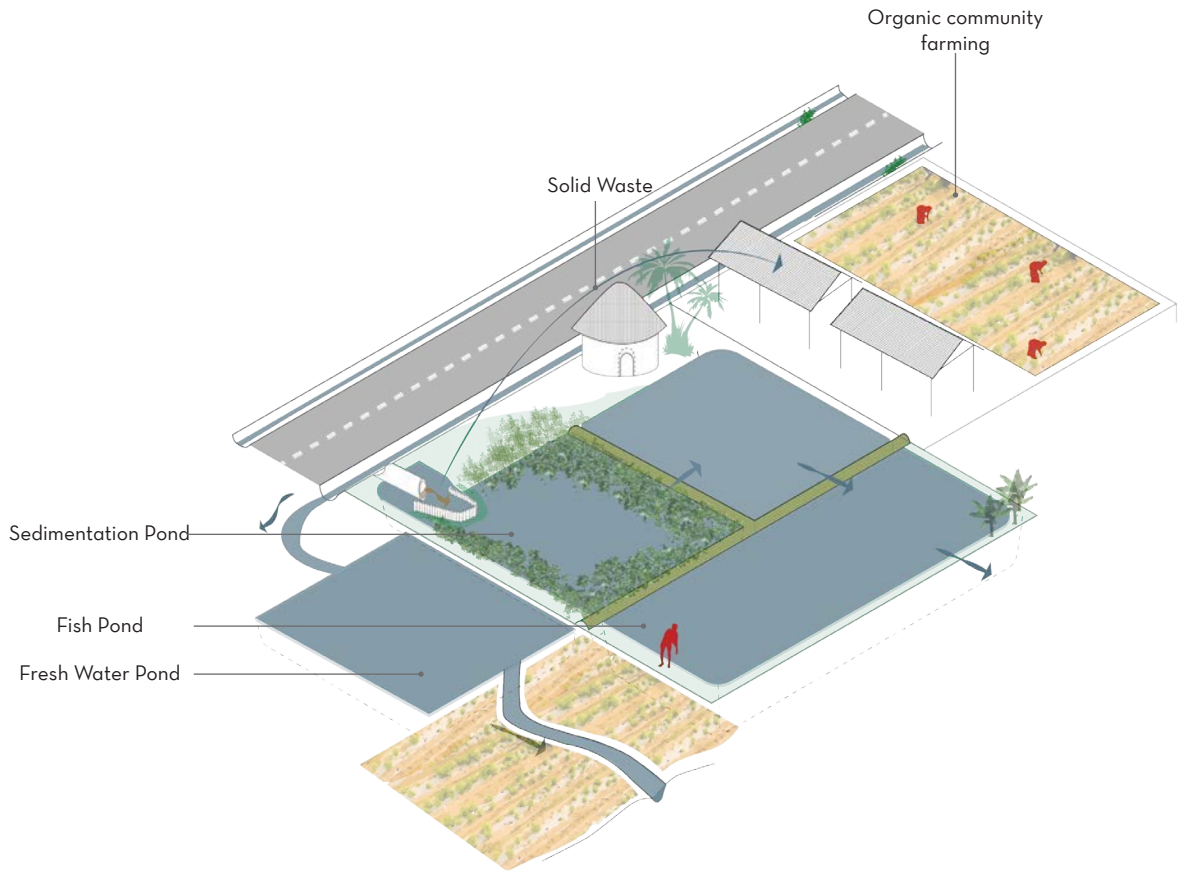


NATURAL RESOURCES : FLOOD RESILIENCE

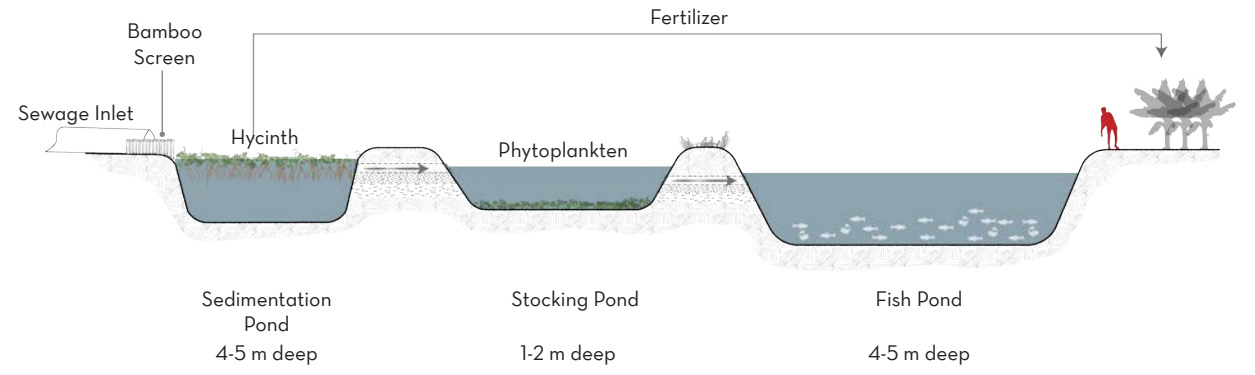




NATURAL RESOURCES : FLOOD RESILIENCE



Constructed Wetlands for Organic sewage treatment (Author, 2019)



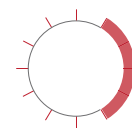
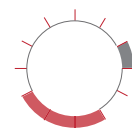
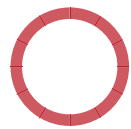
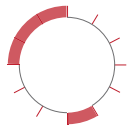


ARRIVAL POINTS



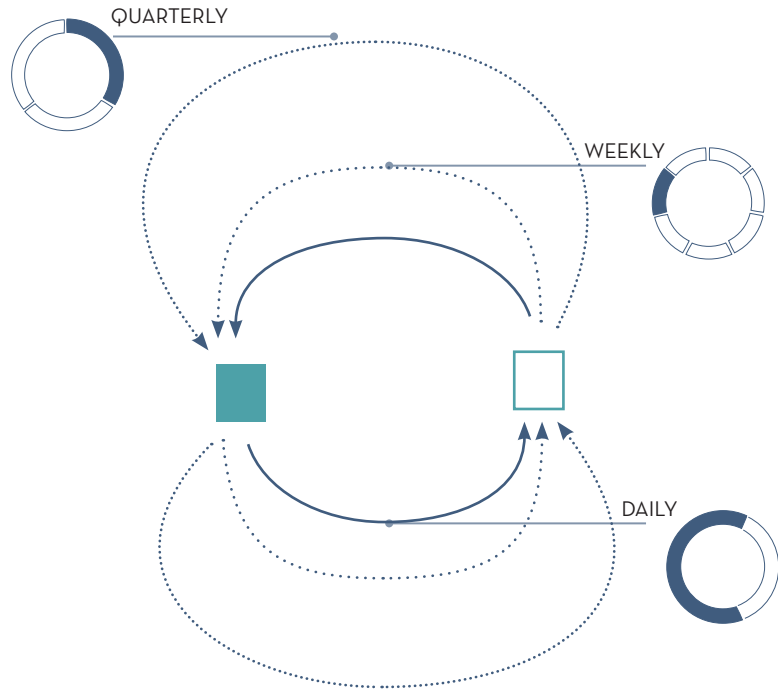
Integration with the existing fabric

IMPRESSIONS
MIGRANT OCCUPATIONS

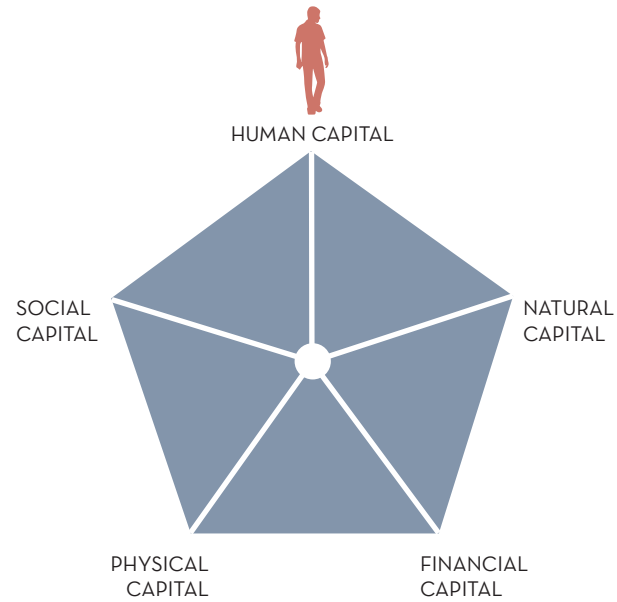


CONCLUSIONS

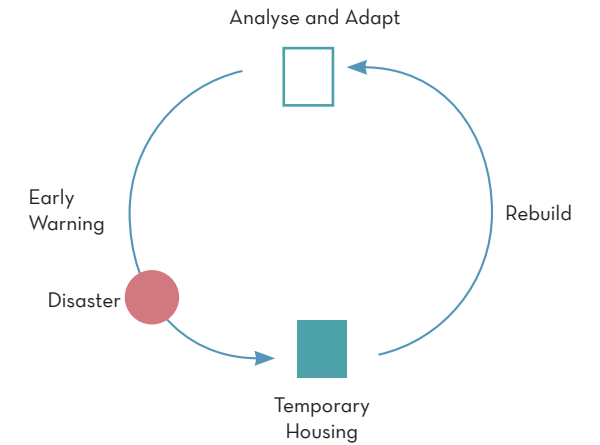
How can spatial planning and good governance be used as a tool to facilitate the use of climate-induced **MIGRATION AS an adaptation strategy for the sending regions AND for the development of the NEIGHBOURING REGION?**



LOCALISING CIRCULAR MOVEMENT



MIGRANTS AS LOCAL ASSETS



STABLE ZONE FOR DISASTER RESILIENCE



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

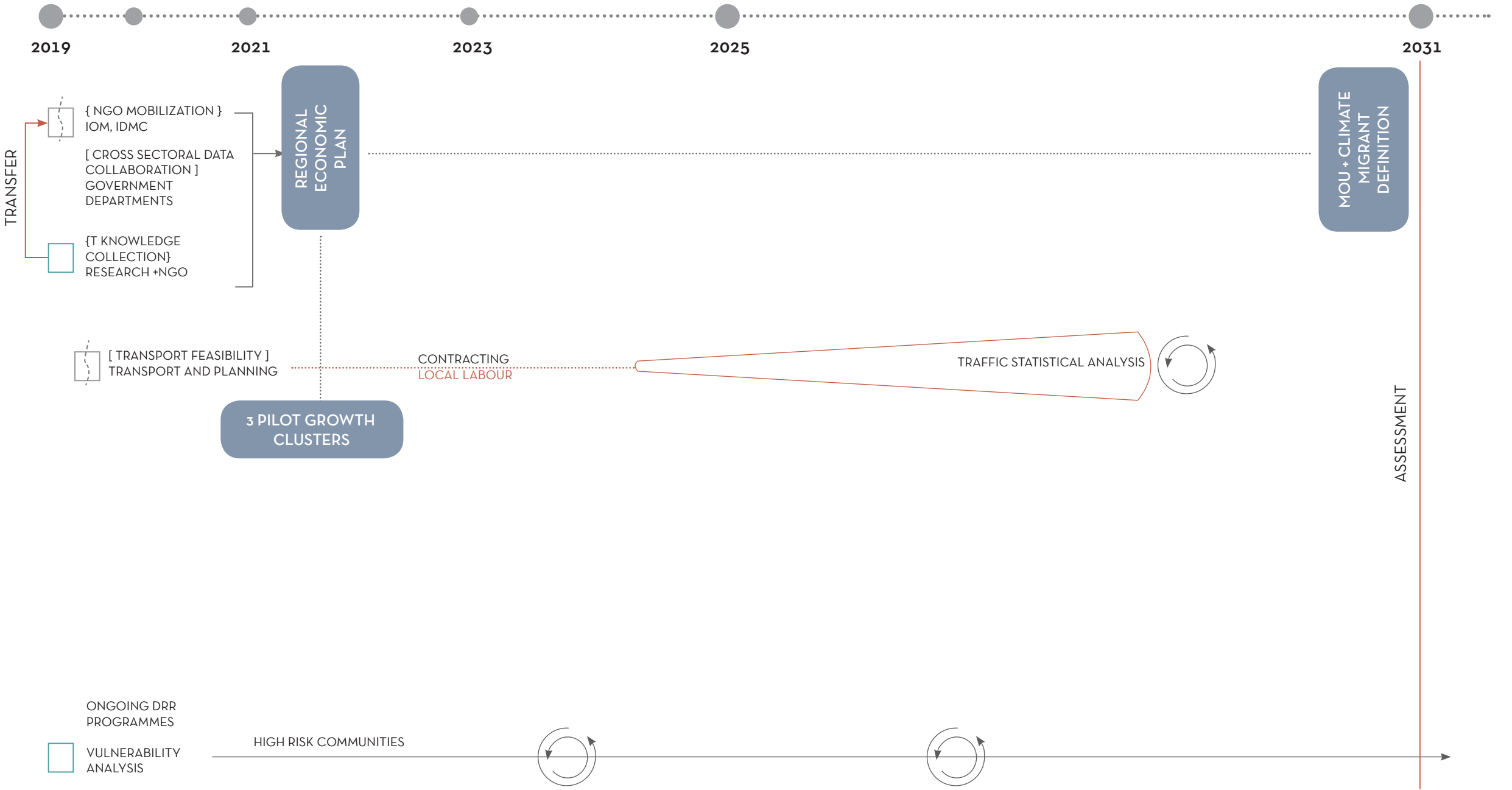


ধন্যবাদ!

THANK YOU!



QUESTIONS?





3 PILOT GROWTH CLUSTERS

{FORMATION OF CO-OPERATIVES}
RESEARCH +NGO

LOCAL AREA PARTNERSHIPS (LAP)

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

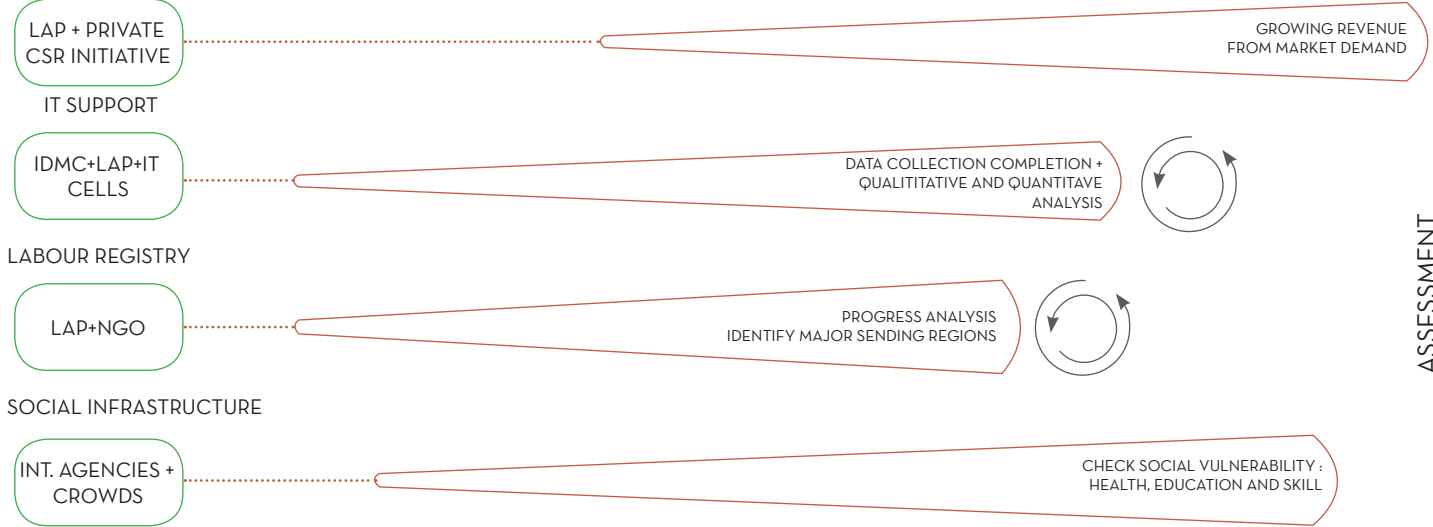
PARTICIPATION

NEEDS

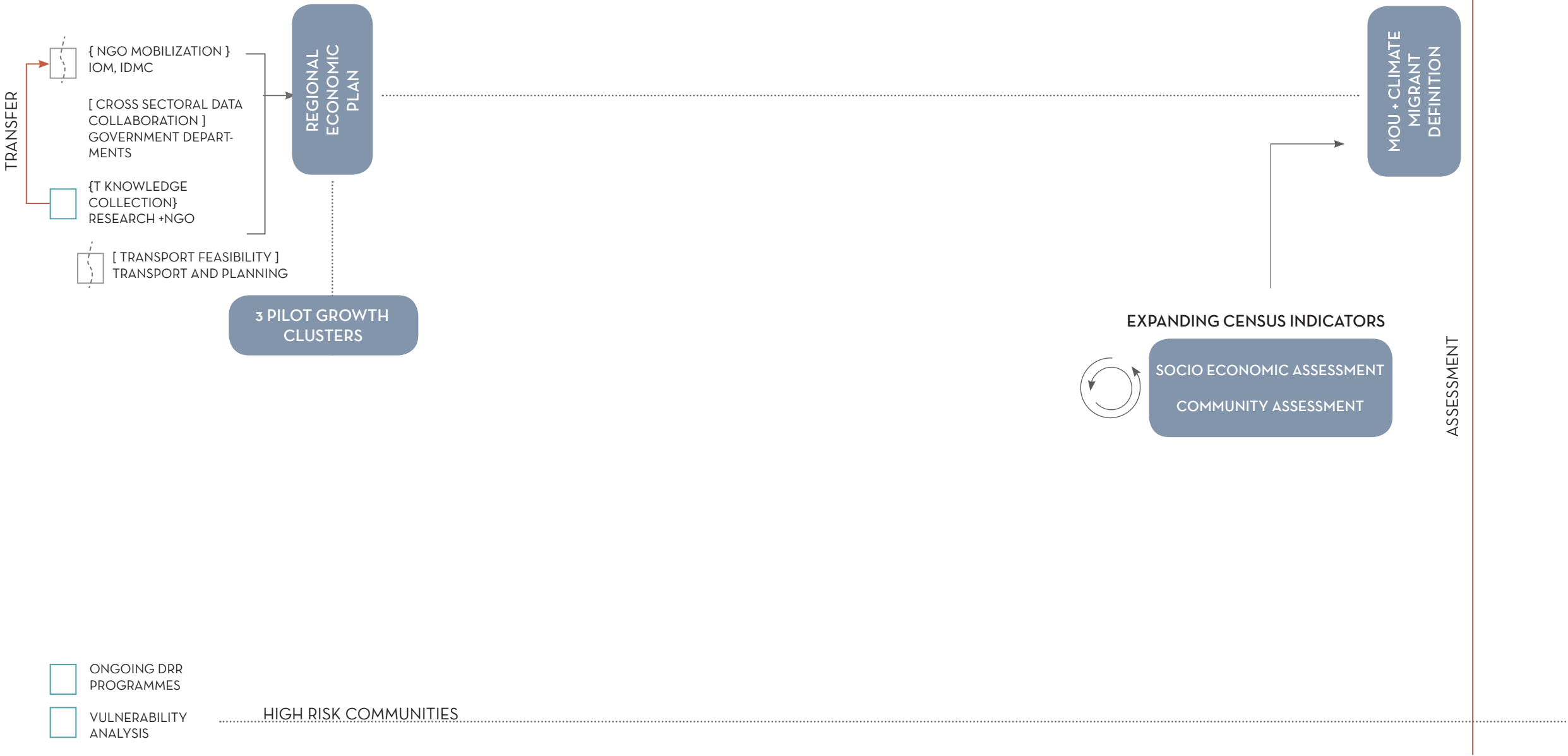
{SELF-HELP GROUPS+AWARENESS CAMPAIGNS}
RESEARCH +NGO

HIGH RISK COMMUNITIES

ONGOING DRR PROGRAMMES
VULNERABILITY ANALYSIS



ASSESSMENT



- ONGOING DRR PROGRAMMES
- VULNERABILITY ANALYSIS