



## Feeding the Future

Towards a climate resilient rice production in the Mekong Delta of Vietnam

P5  
Ke Zhou  
563356  
28/06/2023

Introduction

-

Research question

-

Research framework

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Understanding

-

Pattern language

-

Implementation

-

Design exploration

-

Reflection

-

## -INTRODUCTION-





**32%**

total caloric intake

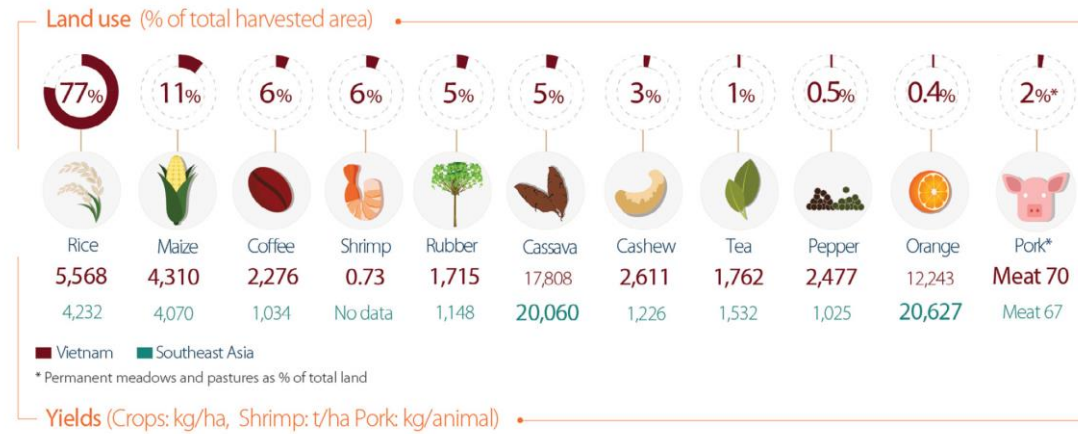


**75%**

take place in irrigated lowlands Asia

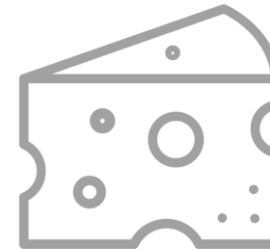


## | Dietary tradition and rice production





**Mekong Delta**



**Netherlands**



**Mekong Delta**

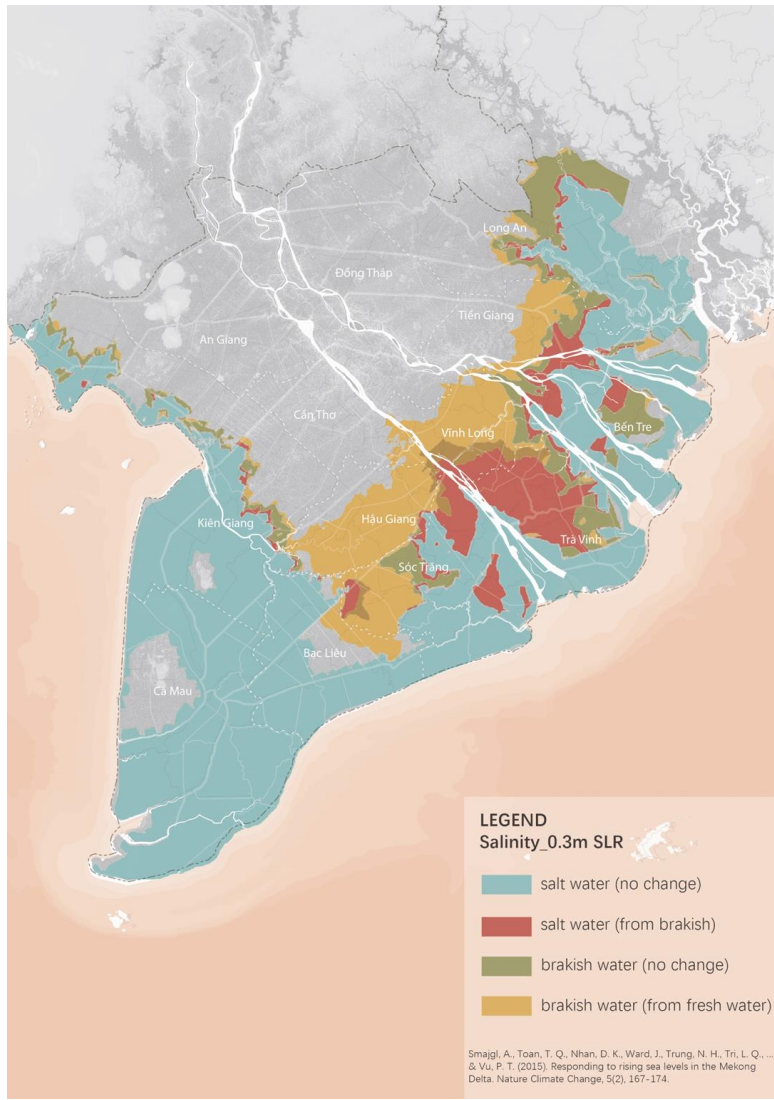
40,500 km<sup>2</sup>



**Netherlands**

41,543 km<sup>2</sup>

## | Threatened rice production



## Salinization

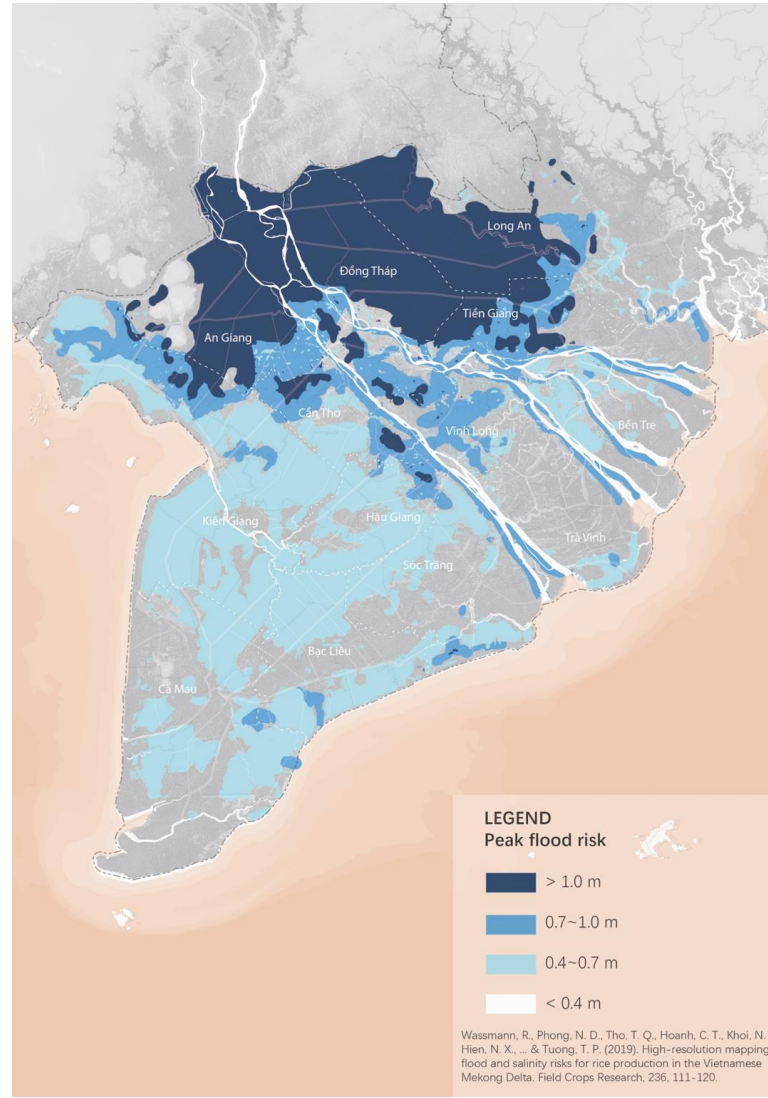
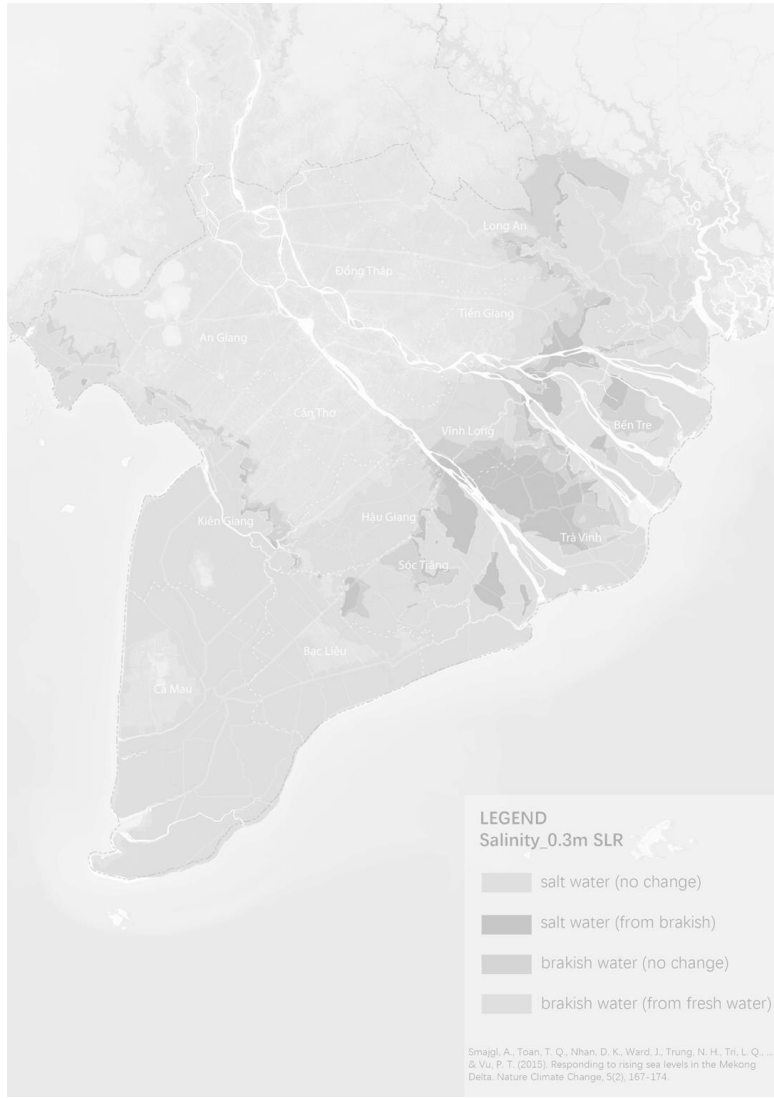


Source:  
<https://e.vnexpress.net/news/news/environment/saltwater-intrusion-in-mekong-delta-to-decrease-in-late-april-4597847.html>



Source: <https://e.vnexpress.net/news/news/mekong-delta-struggles-to-find-freshwater-as-drought-salt-intrusion-continue-4071219.html>

## | Threatened rice production



Source: Guillaume Lacombe/Cirad

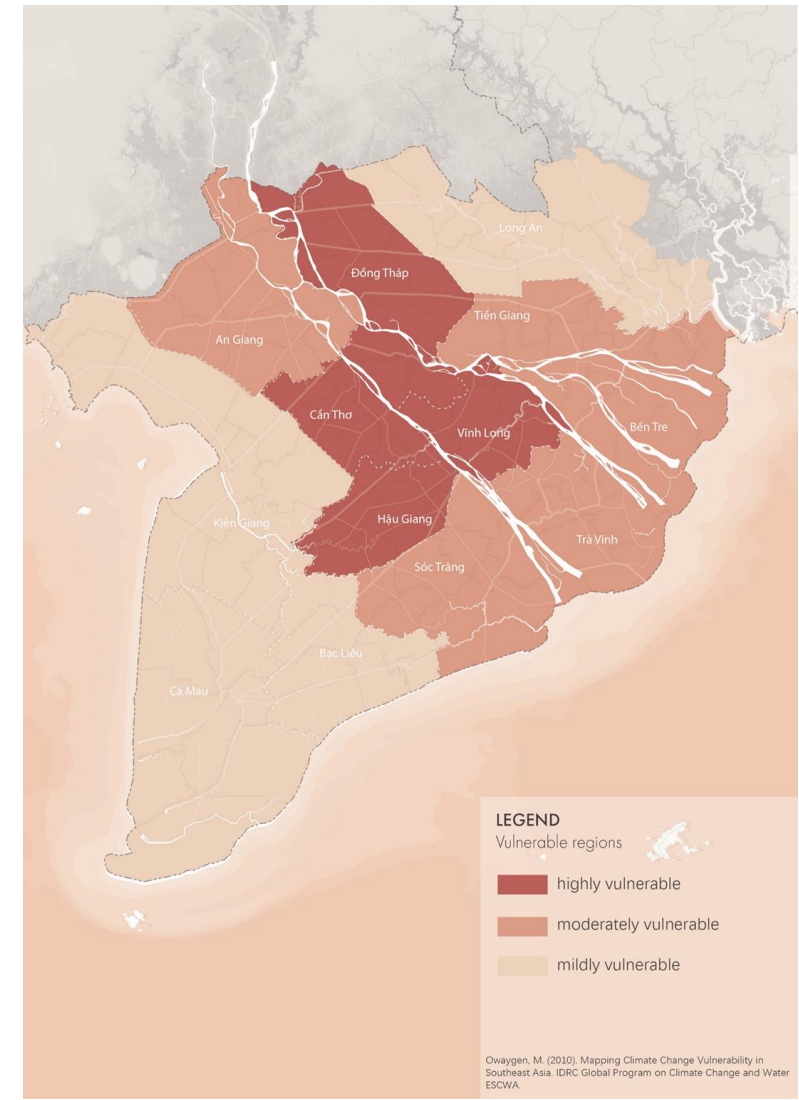
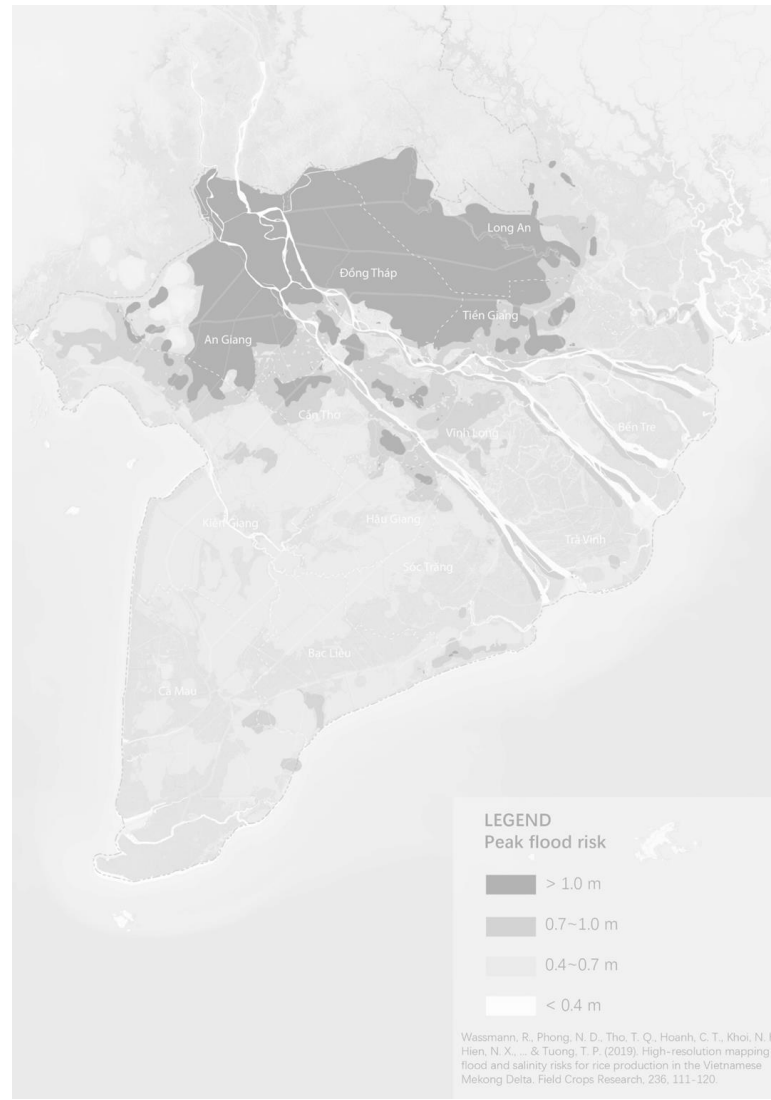
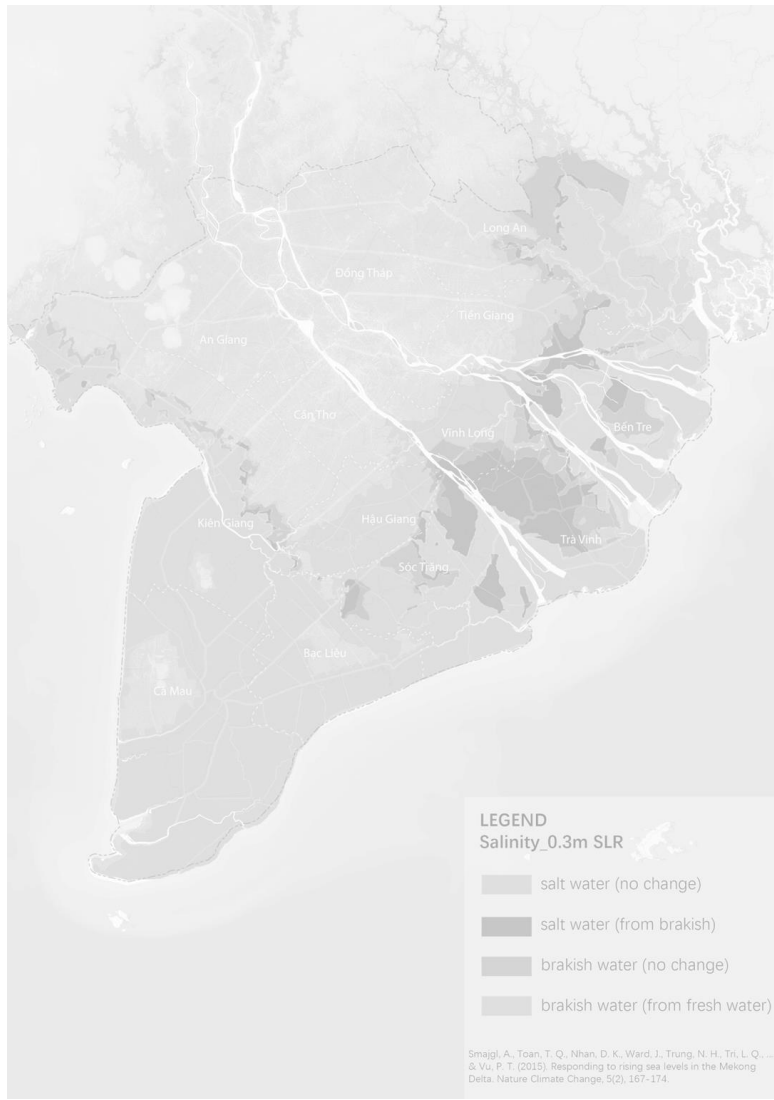


Source: <https://www.istockphoto.com/nl/foto/awful-flooded-street-at-ho-chi-minh-city-gm617602714-107304193>

## Flooding

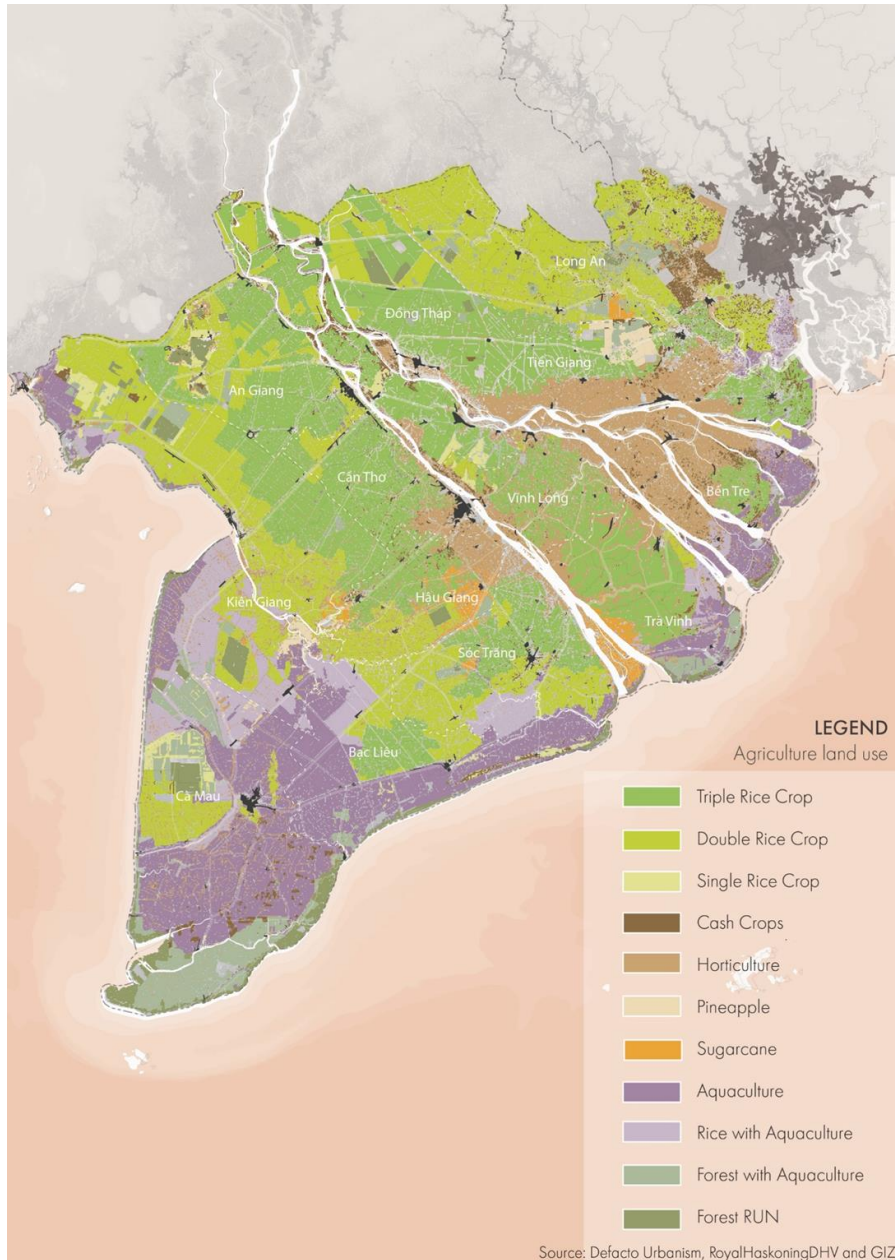


## | Threatened rice production



**Vulnerability**

## | Rice production threatening



### Double rice cropping

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
Rainy season							Peak					
Water rising season								Peak				
Crop 1 (Winter-Spring)												
Crop 2 (Summer-Autumn)												
Fishing or unemployment												
Flooded												

### Triple rice cropping

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
Rainy season							Peak					
Water rising season								Peak				
Crop 1 (Winter-Spring)												
Crop 2 (Summer-Autumn)												
Crop 3 (Autumn-Winter)												

Large areas in the upper delta flood in the wet season, double rice crops fit in this flood system.

While the growing triple rice in the upper delta requires flood protection taking retention area from the river system



Source: <https://en.dangcongsan.vn/daily-hot-news/mekong-delta-rice-farming-contribute-90-of-rice-exports-602704.html>

**1986**  
**“Rice first”**  
**policy**



## | Why triple rice?



Source: <https://en.dangcongsan.vn/daily-hot-news/mekong-delta-rice-farming-contribute-90-of-rice-exports-602704.html>



Source: [https://commons.wikimedia.org/wiki/File:Sai\\_gon\\_Rice\\_shop.jpg](https://commons.wikimedia.org/wiki/File:Sai_gon_Rice_shop.jpg)

**Economic  
benefits**

## | Why triple rice?



Source: <https://en.dangcongsan.vn/daily-hot-news/mekong-delta-rice-farming-contribute-90-of-rice-exports-602704.html>



Source: [https://commons.wikimedia.org/wiki/File:Sai\\_gon\\_Rice\\_shop.jpg](https://commons.wikimedia.org/wiki/File:Sai_gon_Rice_shop.jpg)



Source: <https://vietnamnet.vn/en/ministry-urges-green-waterway-passage-for-rice-from-mekong-delta-766768.html>

## | Why adaptation?



Source: File: Kham/Reuters



Source: Govi Snell/Al Jazeera



Source: File: Kham/Reuters

## -RESEARCH QUESTION-

How can **climate adaptation strategies** intervene in the agricultural production chain of rice and social engagement while creating **economic opportunities** and **environmental benefits** in the Mekong Delta of Vietnam?

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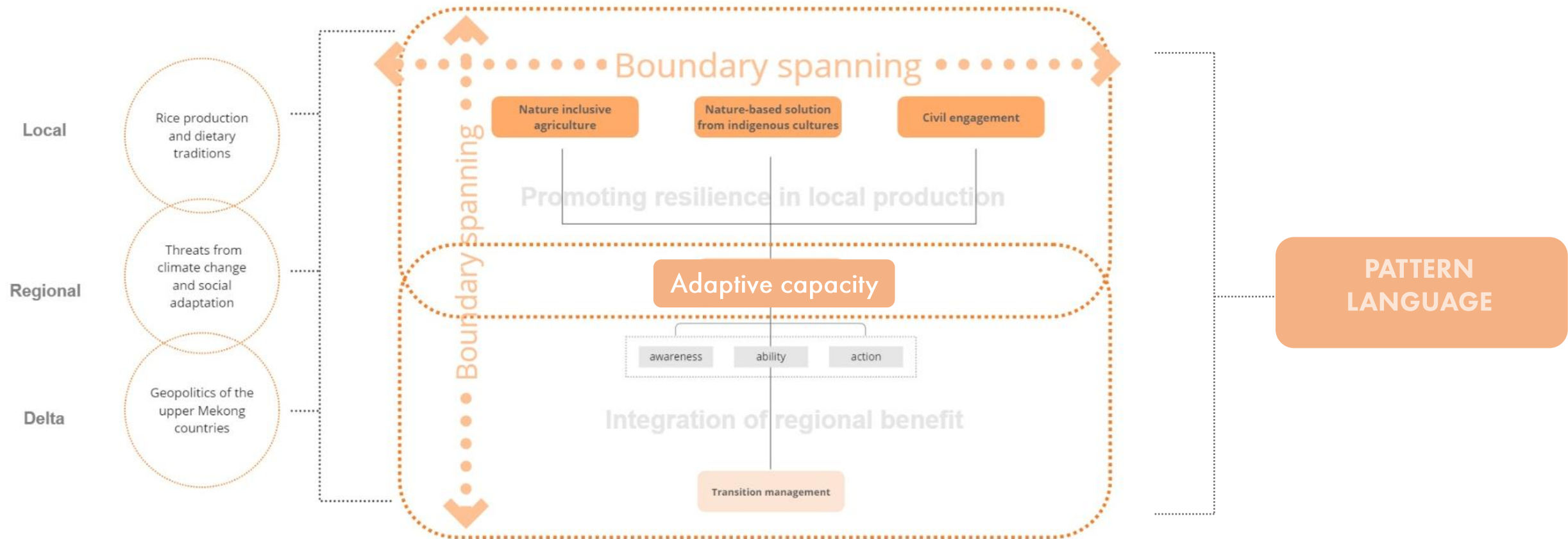
**Sub-RQ1:** What is the **development gap** between the current planning policies and research, and the problems in the agriculture system regarding climate change effect?

**Sub-RQ2:** What are the **challenges and potentials** for climate adaptation strategies?

**Sub-RQ3:** How can **local experiences of living with floods** guide the change in rice production and water management to improve resilience through agricultural transition?

**Sub-RQ4:** How can farmers and citizens adapt to climate change risk by developing a **climate-resilient agriculture system** while maintaining the quality of life in urban and rural areas?

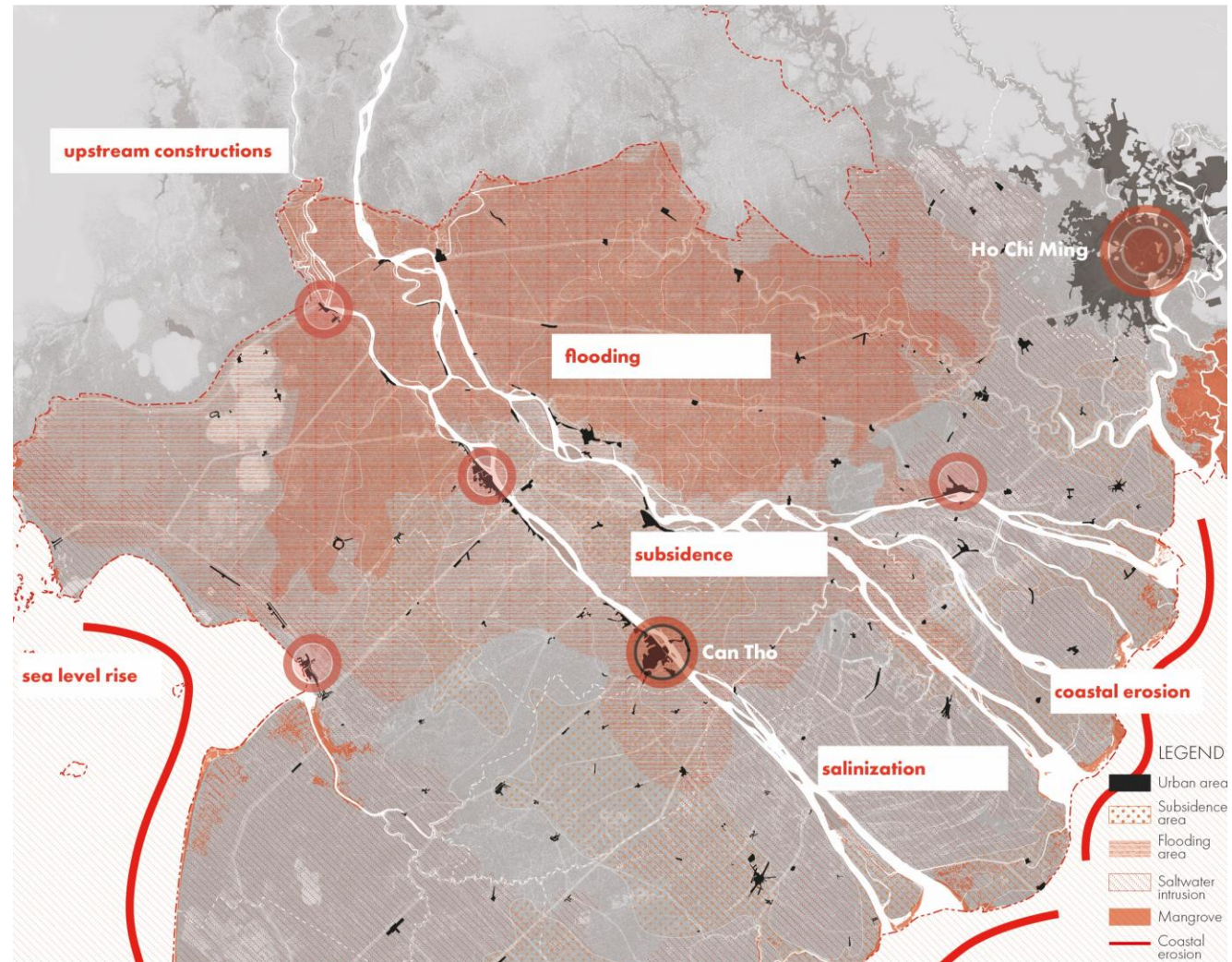
## -RESEARCH FRAMEWORK-



## -UNDERSTANDING THE DELTA-

Challenges | Potentials | Subareas





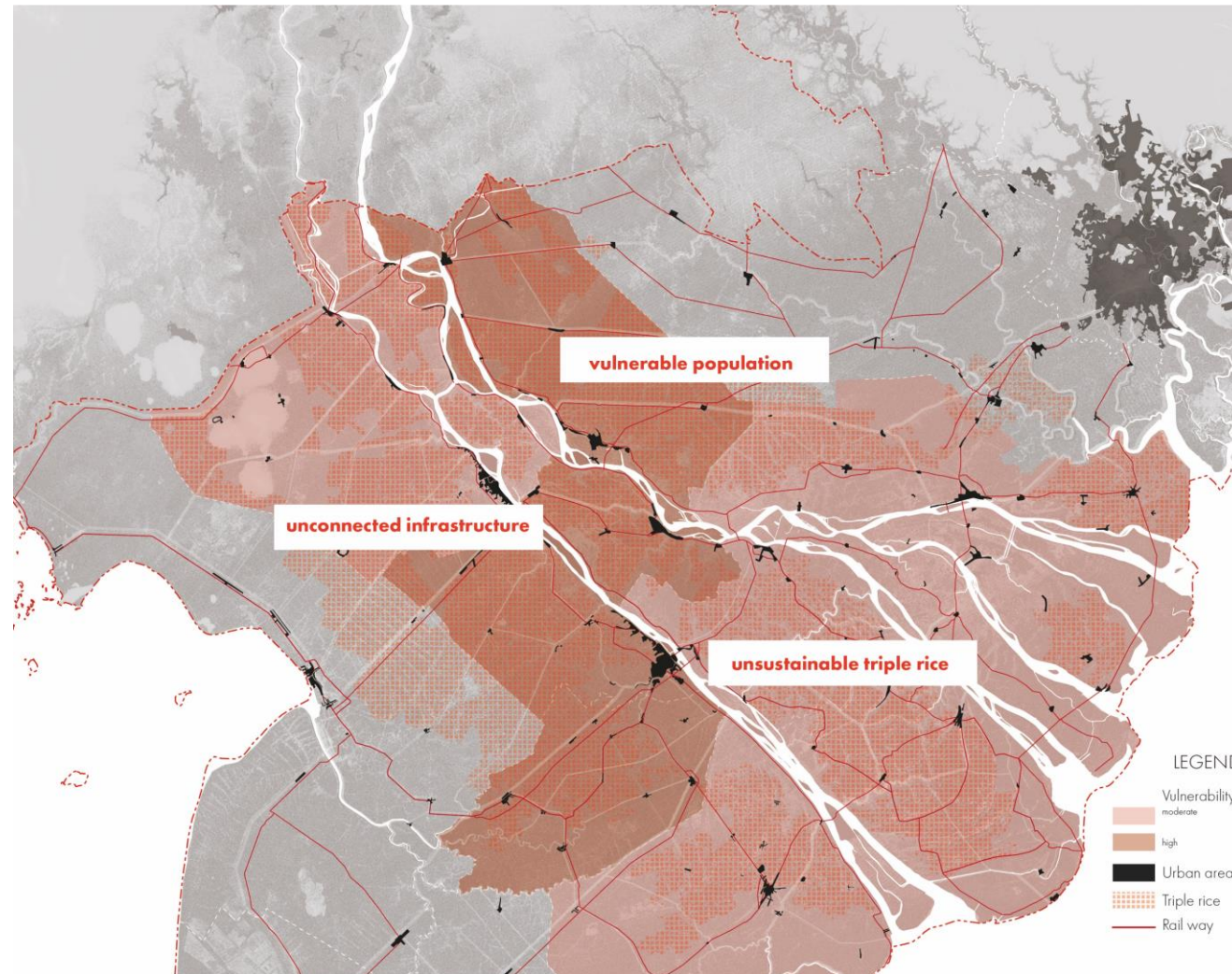




Source: [www.snexplores.org/article/explainer-why-sea-level-rise-rate-varies-globally](http://www.snexplores.org/article/explainer-why-sea-level-rise-rate-varies-globally)



Source: [vietnamnet.vn/en/salinity-intrusion-in-mekong-delta-exceeds-record-level-from-2016-616806.html](http://vietnamnet.vn/en/salinity-intrusion-in-mekong-delta-exceeds-record-level-from-2016-616806.html)



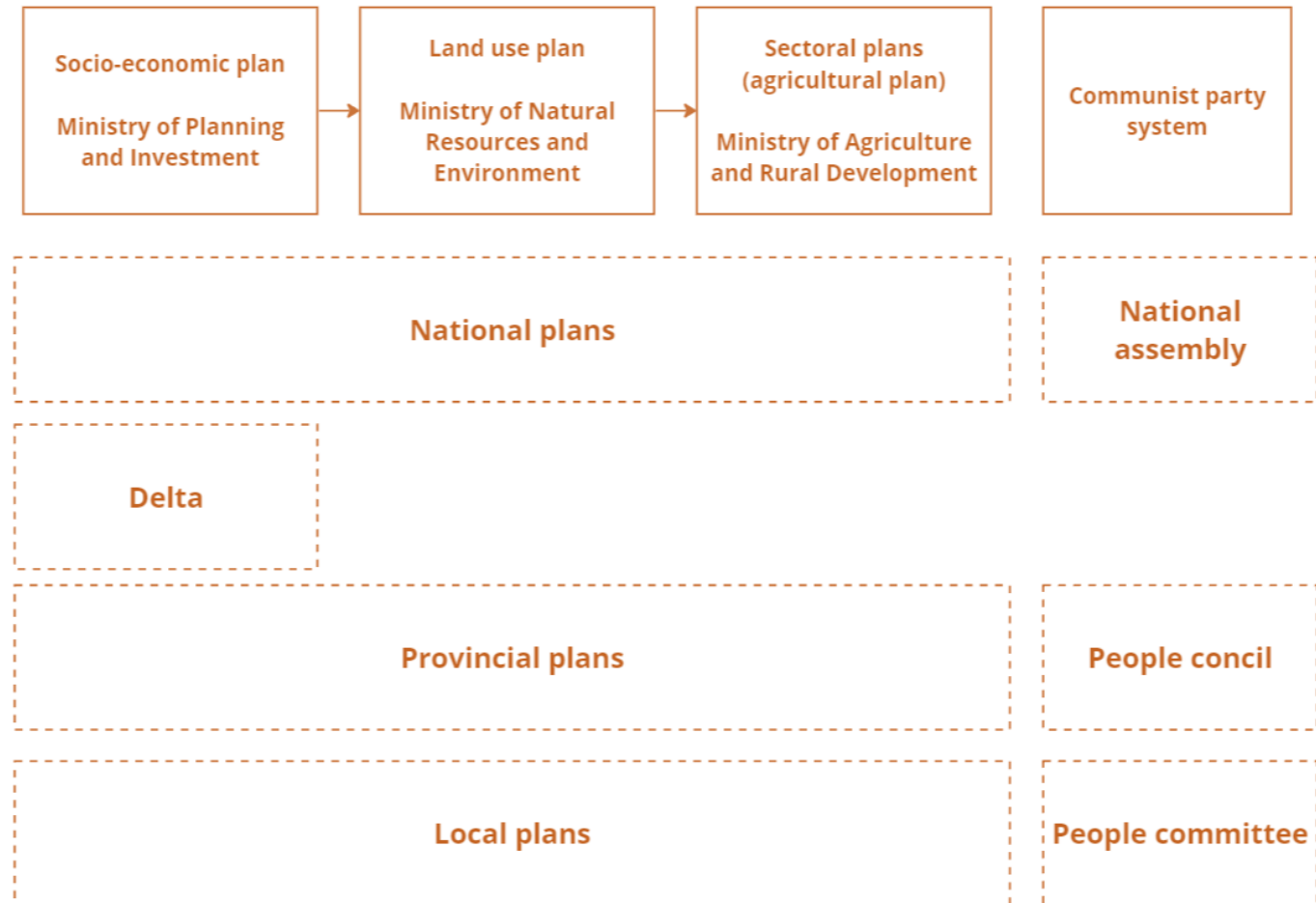


Source: [www.mrcmekong.org/news-and-events/articles-and-stories/living-on-the-edge-of-the-rising-sea/](http://www.mrcmekong.org/news-and-events/articles-and-stories/living-on-the-edge-of-the-rising-sea/)



Source: [en.vietnamplus.vn/mekong-delta-to-develop-1-million-hectares-of-highquality-rice/231572.vnp](http://en.vietnamplus.vn/mekong-delta-to-develop-1-million-hectares-of-highquality-rice/231572.vnp)







INSTITUTIONS	RESPONSIBILITIES	PLANNING
The Ministry of Planning and Investment (MPI)	oversees the overall national, regional, planning processes, and promotes and guides infrastructure investments	Socio-economic Plan
The Ministry of Natural Resources and Environment (MONRE)	managing the nation's land, air, and water resources, and is also Vietnam's lead ministry for climate change policy	Land-use Plan
The Ministry of Agriculture and Rural Development (MARD)	agriculture and rural development, water resource infrastructure including irrigation, flood control, and coastal defenses	Sectoral plan such as agricultural plan
The South-West Steering Committee	limited in its mandate from taking a stronger coordination role, especially with regard to the implementation of policies and investments	—



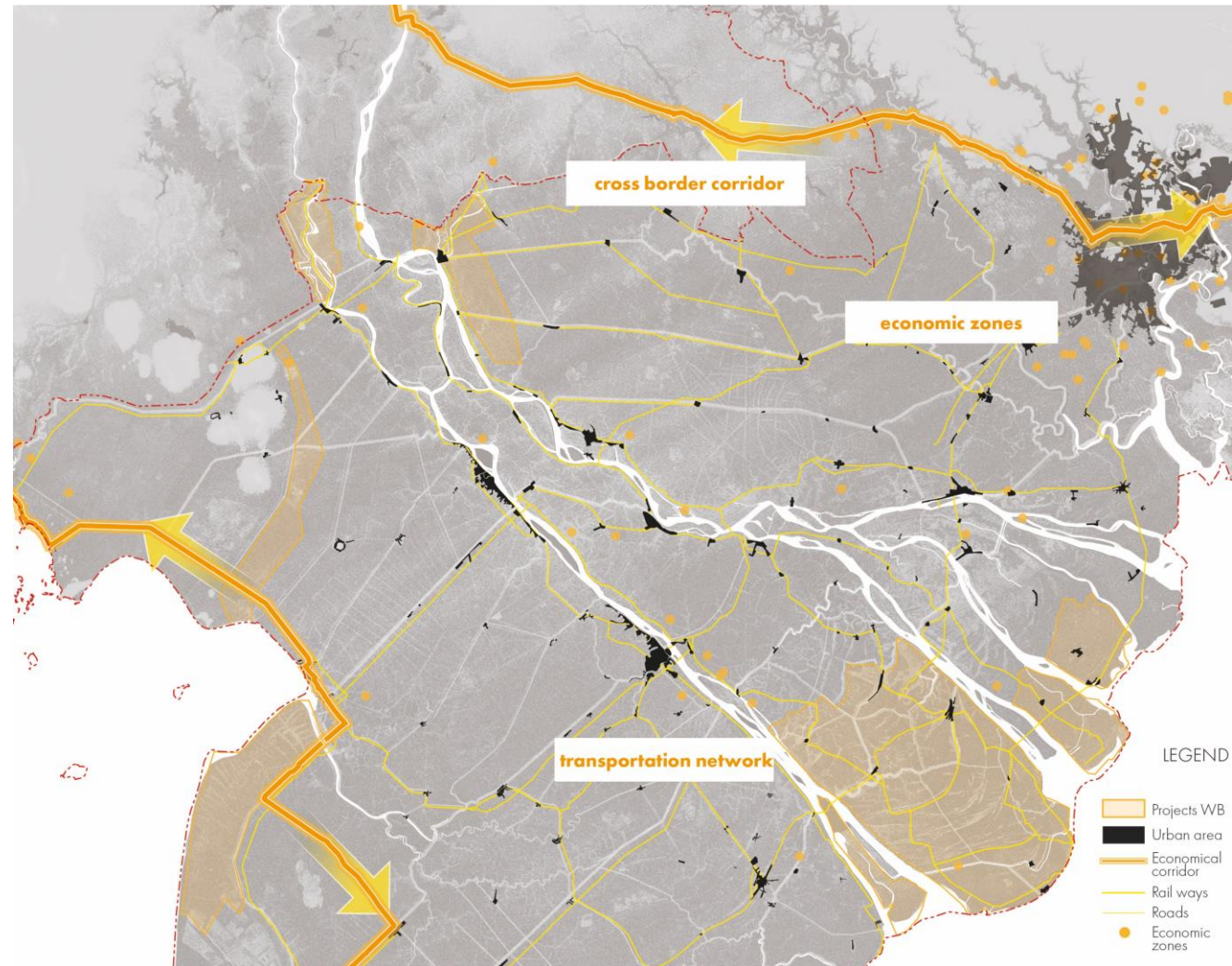


Source: [www.worldatlas.com/articles/longest-rivers-in-vietnam.html](http://www.worldatlas.com/articles/longest-rivers-in-vietnam.html)



Source: [www.traveller.com.au/from-saigon-to-siem-reap-seeing-the-delta-dawn-on-the-mekong-h19hqn](http://www.traveller.com.au/from-saigon-to-siem-reap-seeing-the-delta-dawn-on-the-mekong-h19hqn)







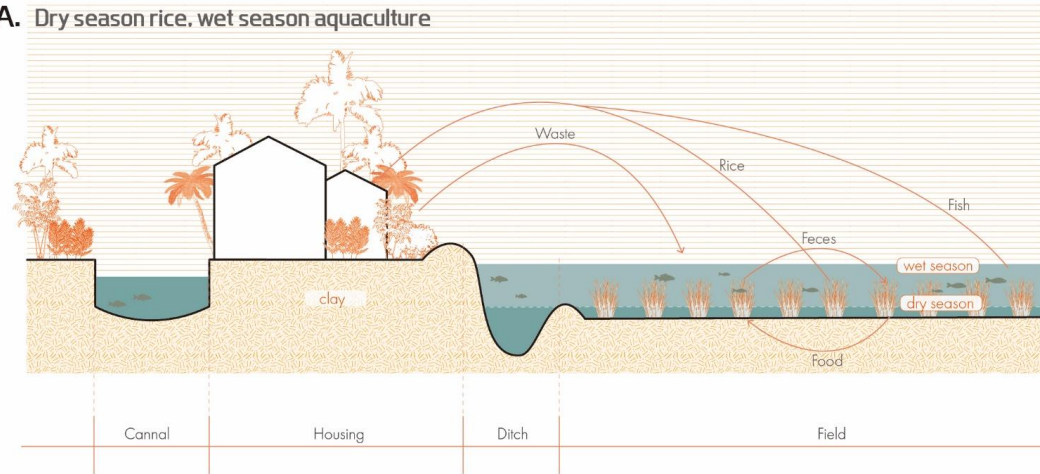


Source: [www.bangkokpost.com/business/1596078/isan-economic-corridor-requested-by-private-sector](http://www.bangkokpost.com/business/1596078/isan-economic-corridor-requested-by-private-sector)

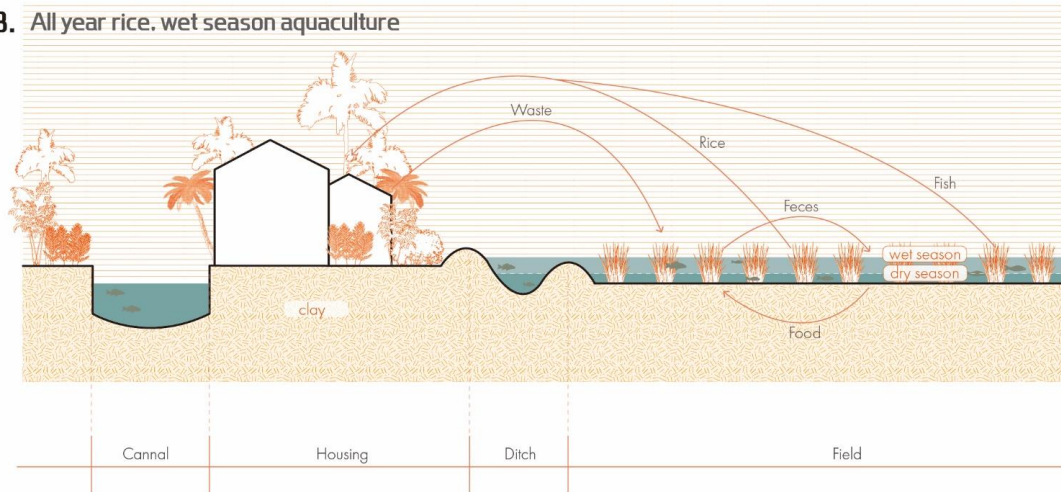


Source: [www.khmertimeskh.com/50963361/cambodia-to-establish-sihanoukville-multi-purpose-special-economiczone](http://www.khmertimeskh.com/50963361/cambodia-to-establish-sihanoukville-multi-purpose-special-economiczone)

**A. Dry season rice, wet season aquaculture**



**B. All year rice, wet season aquaculture**

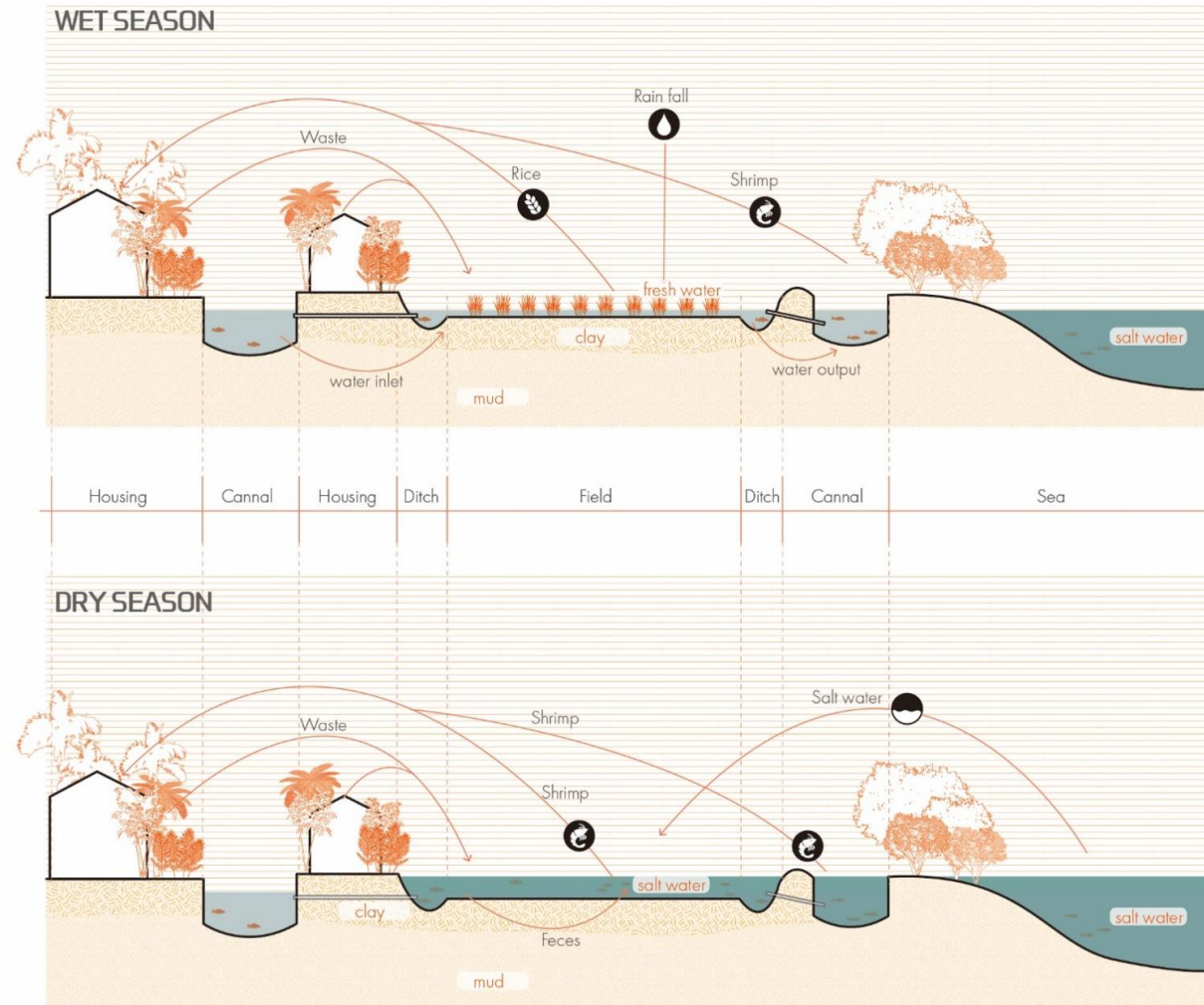


Rice-fish/prawn Aquaculture



Source: [www.agrifarming.in/rice-fish-farming](http://www.agrifarming.in/rice-fish-farming)

Rice-fish/prawn Aquaculture



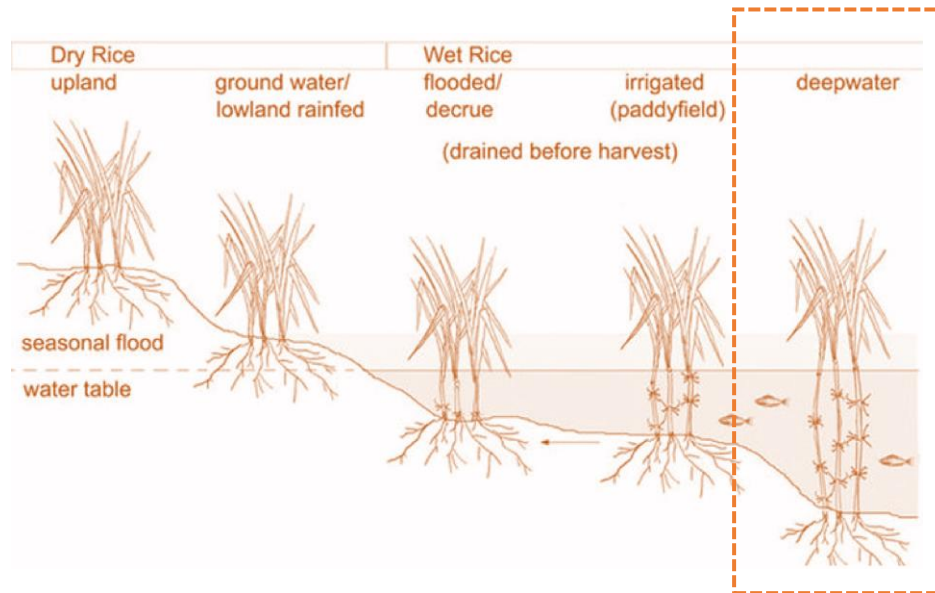
Mixed Rice-shrimp Aquaculture



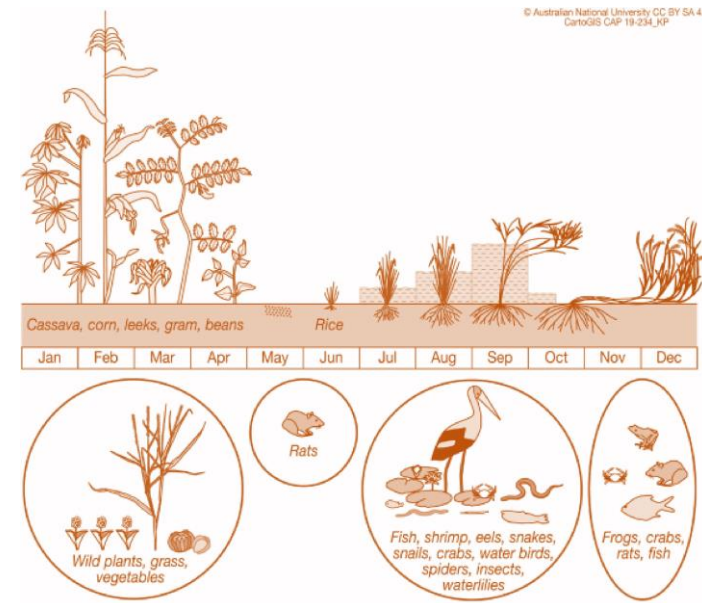
Source: [vietshrimp.net/ca-maus-organic-shrimp-solution-to-climate-change-adaptation/](http://vietshrimp.net/ca-maus-organic-shrimp-solution-to-climate-change-adaptation/)

## Mixed Rice-shrimp Aquaculture





Source: Dumaresq, D., van Nguyen, K., Pittock, J., Oo, M., Sok, K., van Hieu, T., & Blessington, L. (2020). The paradoxical values of traditional deep water floating rice systems. *Global Food Security*, 26, 100391.



Source: Fuller, D. Q., Van Etten, J., Manning, K., Castillo, C., Kingwell-Banham, E., Weisskopf, A., ... & Hijmans, R. J. (2011). The contribution of rice agriculture and livestock pastoralism to prehistoric methane levels: An archaeological assessment. *The Holocene*, 21(5), 743-759.

Floating rice



Source: [vietnamagriculture.nongnghiep.vn/floating-rice-the-unique-rice-variety-withinternodes-of-3--5m-long-d300152.html](http://vietnamagriculture.nongnghiep.vn/floating-rice-the-unique-rice-variety-withinternodes-of-3--5m-long-d300152.html)

## Floating rice



Stilt house of Mekong Delta

source: <https://www.singulart.com/zh/artworks/serge-horta-stilt-houses-of-the-mekong-delta-1-648943>



Floating villages

source: <https://chinadialogue.net/zh/4/44143/>

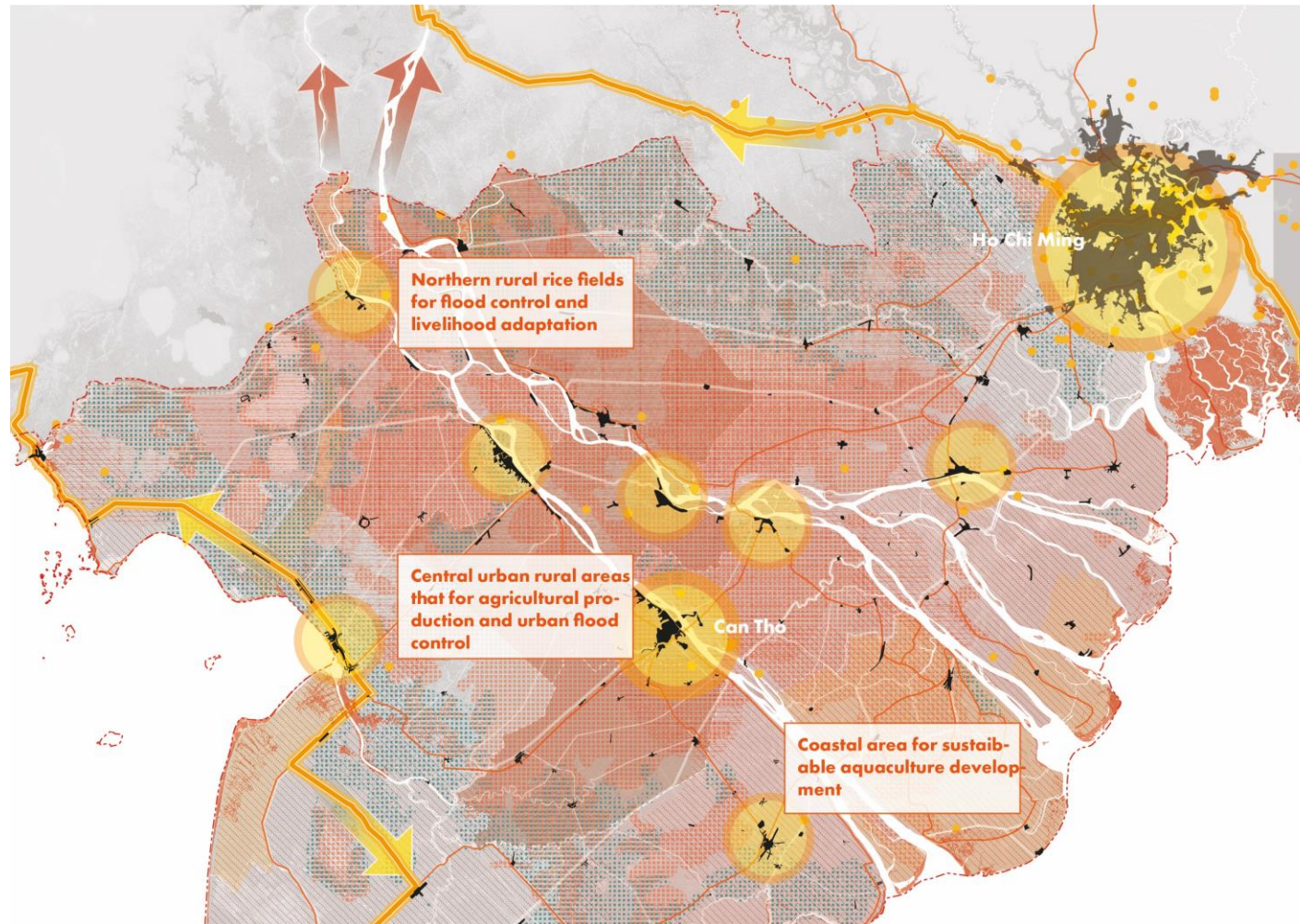


Housing by the riverbank

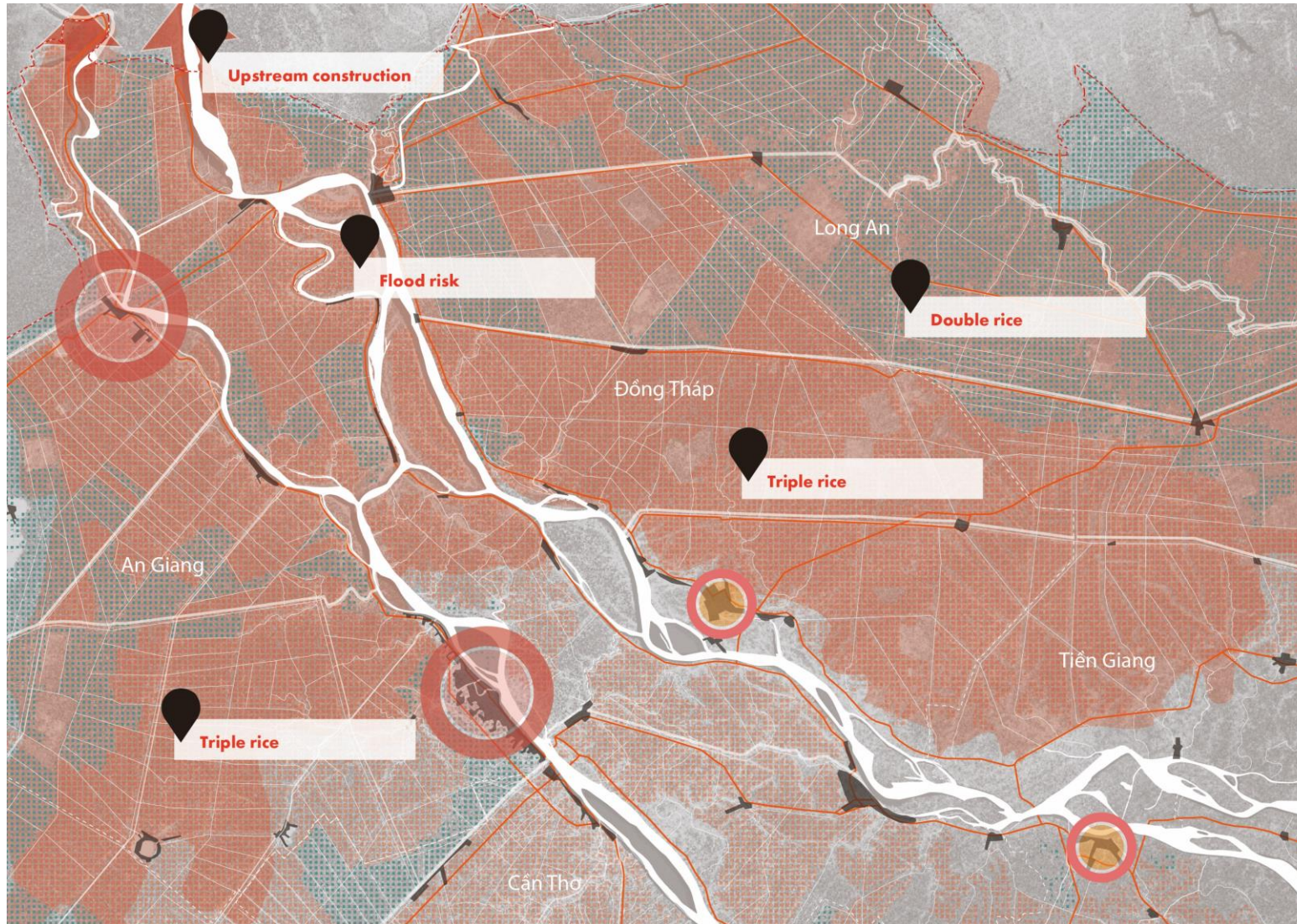
source: <https://www.theroadtoanywhere.com/riverside-houses-in-the-mekong-delta-vietnam-travel-photo/>

## Traditional housing

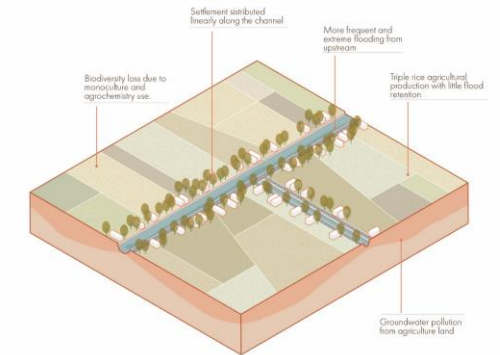






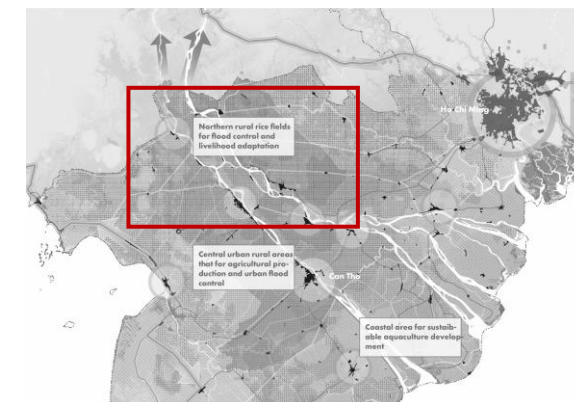


A. Northern rural rice fields for flood control and livelihood adaptation

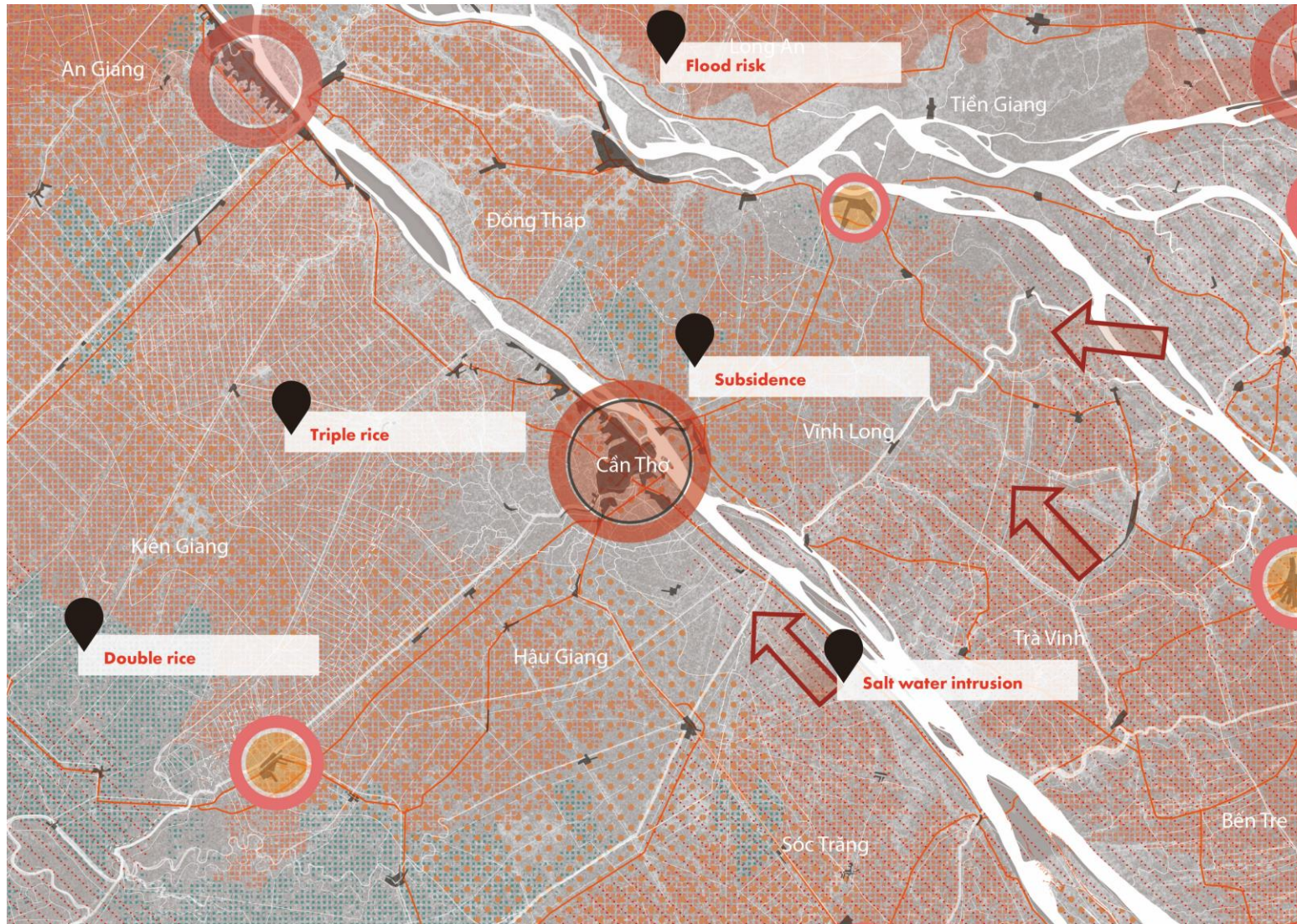


LEGEND

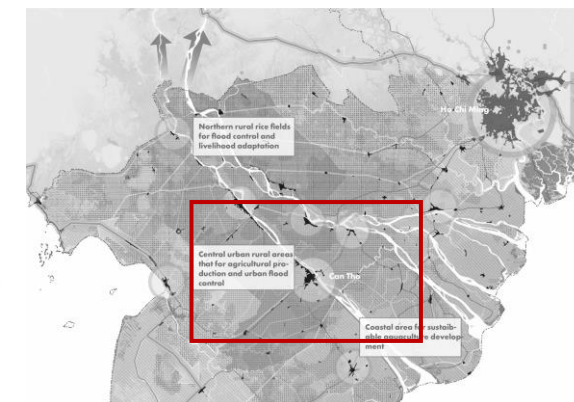
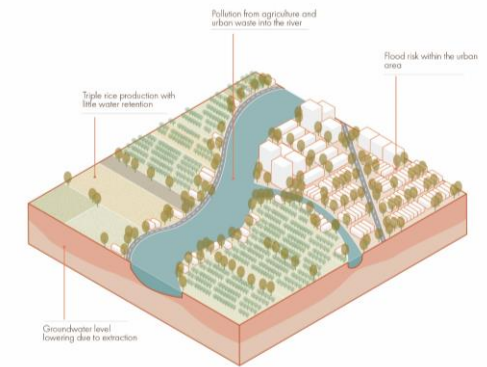
- City Grade
- City Grade II
- City Grade III
- Urban area
- Subsidence area
- Flooding area
- Saltwater intrusion
- Mangrove
- Water body
- Double rice
- Triple rice
- National road
- Economical corridor







B. Central urban rural areas that focus on agricultural production and urban flood control



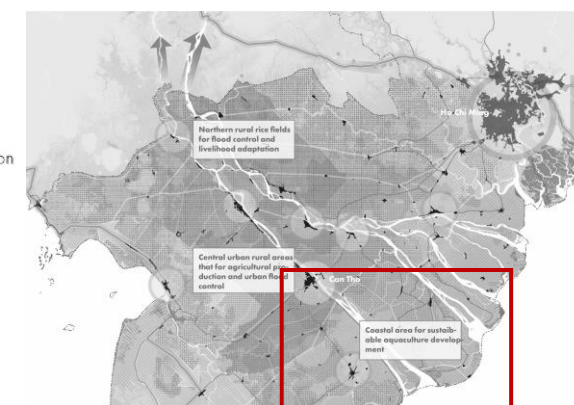
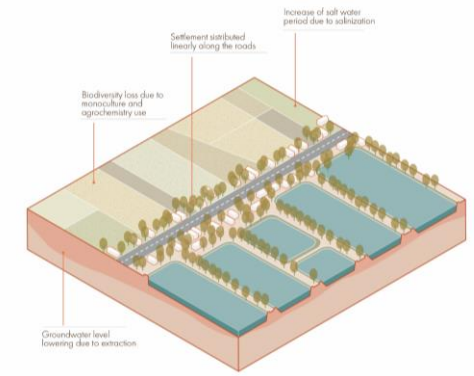




C. Coastal aquaculture areas for improved agricultural production of rice combined with aquatic products

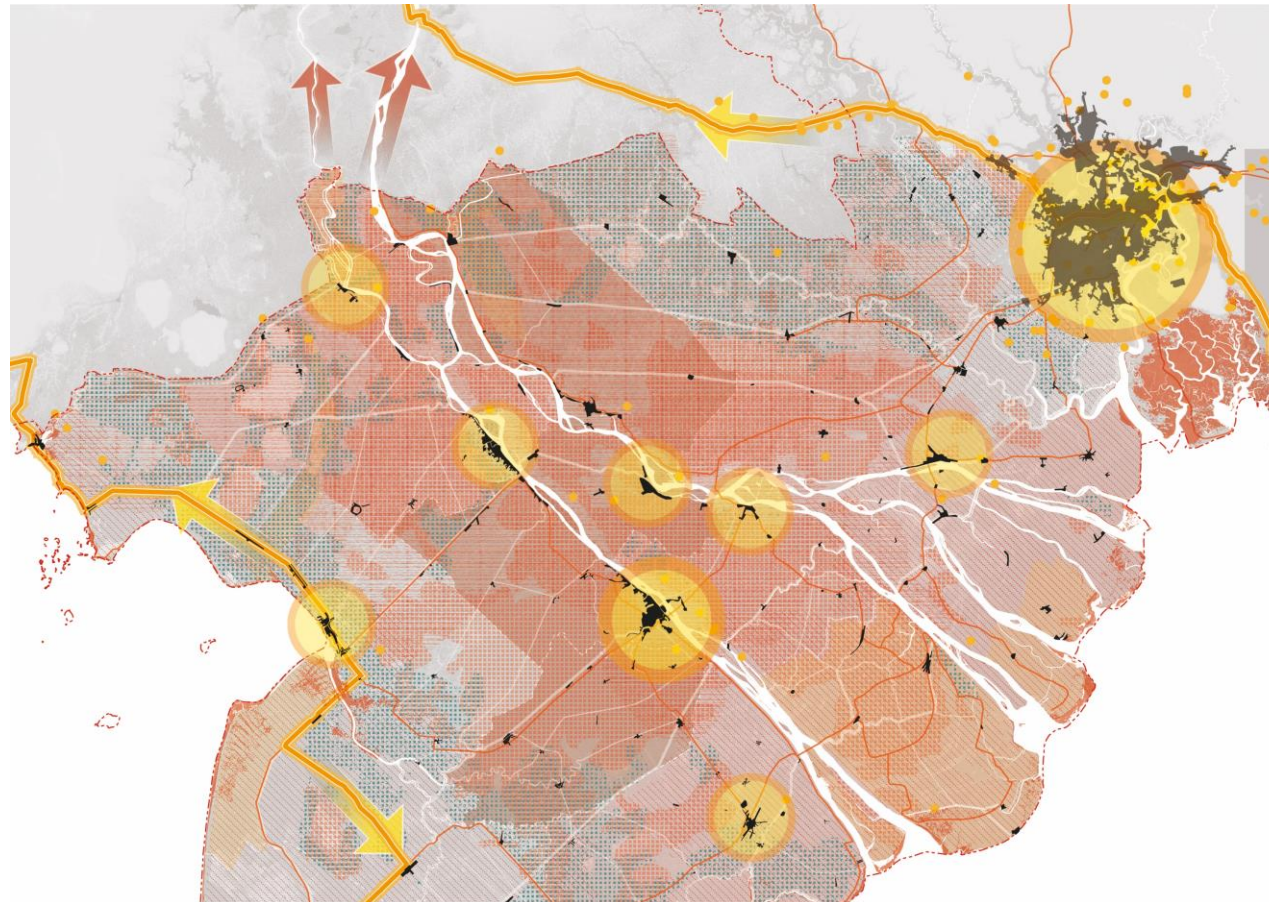
LEGEND

- City Grade I
- City Grade II
- Urban area
- Subsidence area
- Flooding area
- Saltwater intrusion
- Coastal erosion
- Mangrove
- Water body
- Double rice
- Triple rice
- National road
- Economical corridor





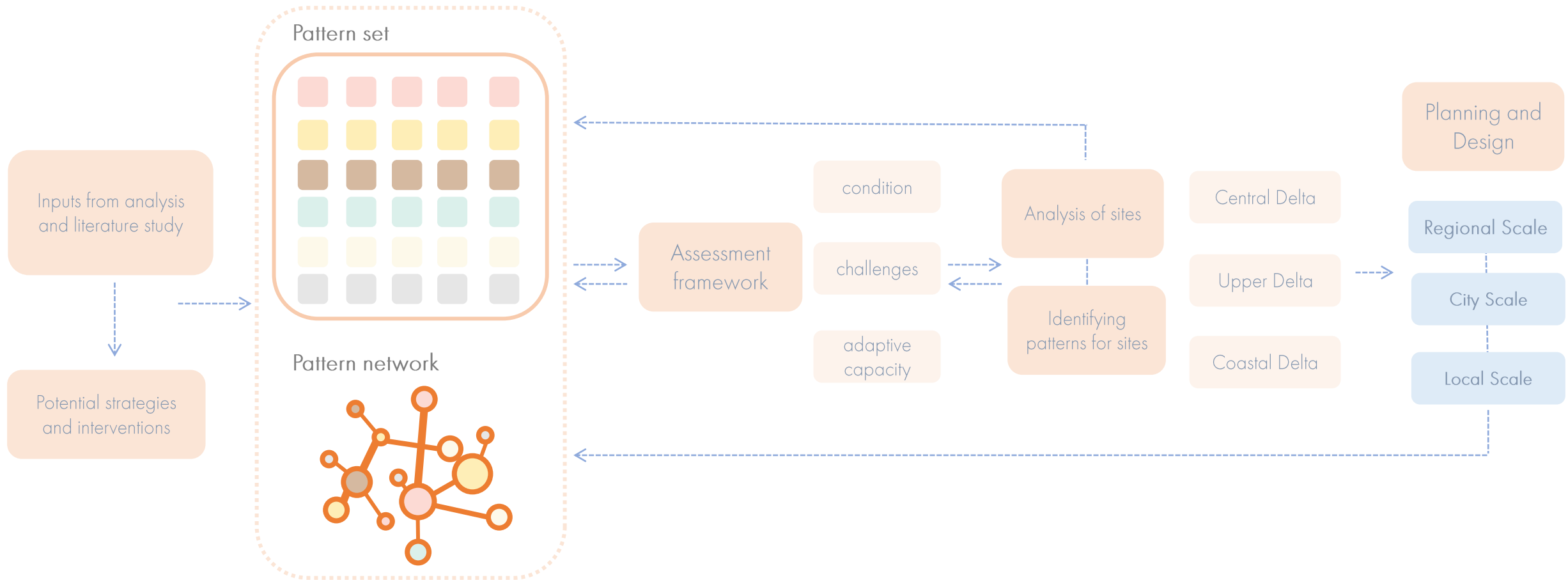
In 2060, the Mekong River Delta of Vietnam will move with the society, become **climate resilient, socially cohesive and economical vibrant**. The Delta's society and economy will adapt to climate change, bringing **economic opportunities** for different groups of people and **environmental benefits** through the framework of a sustainable nature-based agricultural solutions. This will be facilitated by the climate adaptation strategy for rice production.

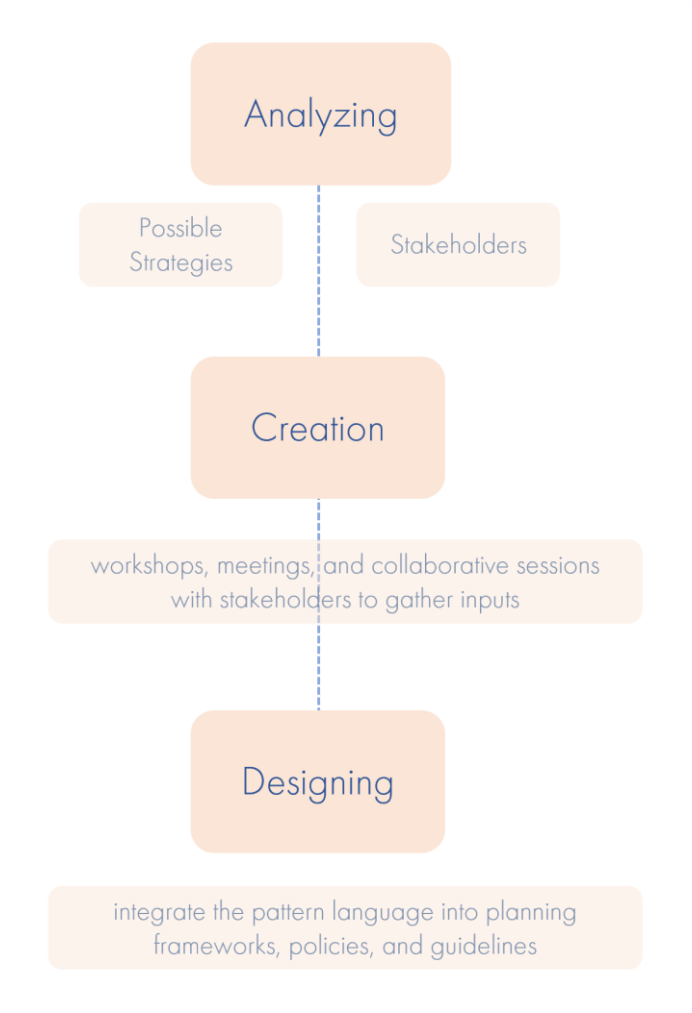


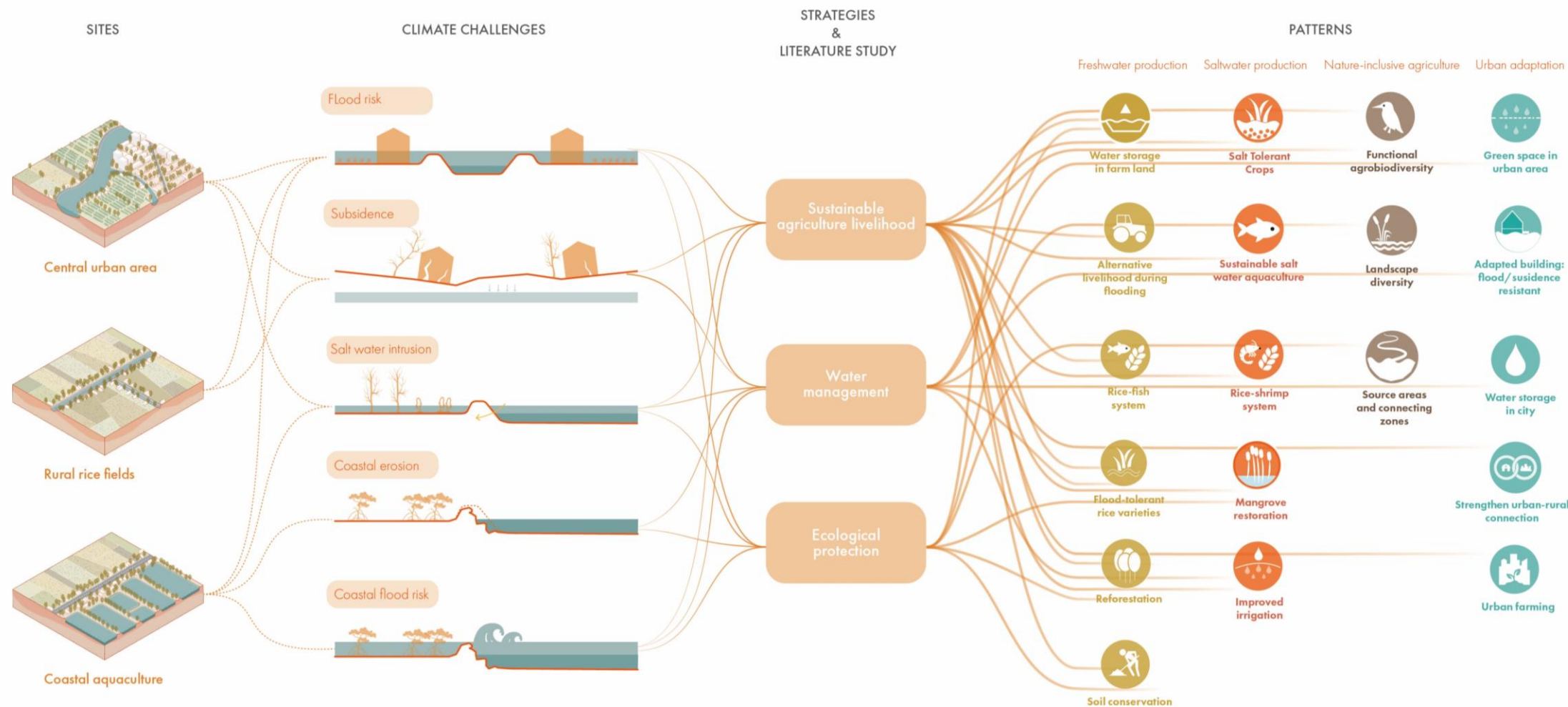




-PATTERN LANGUAGE-

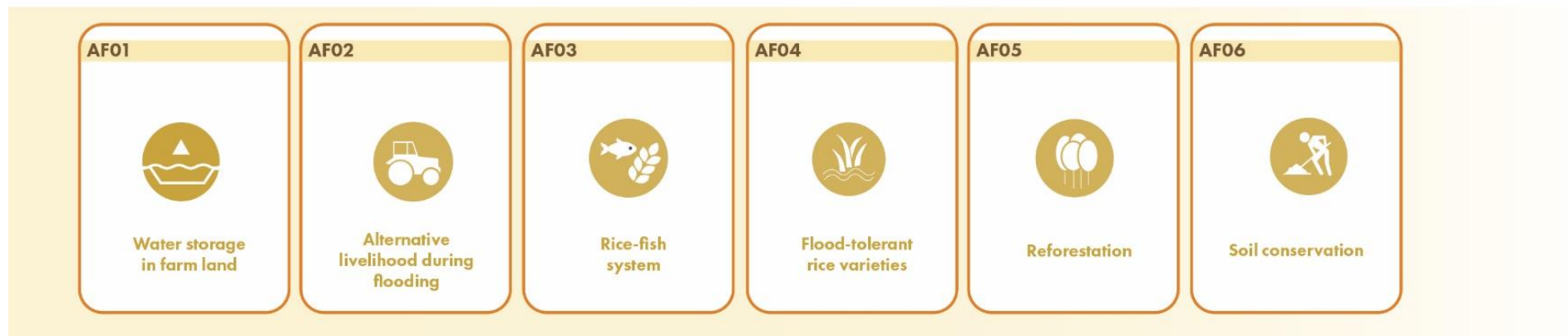








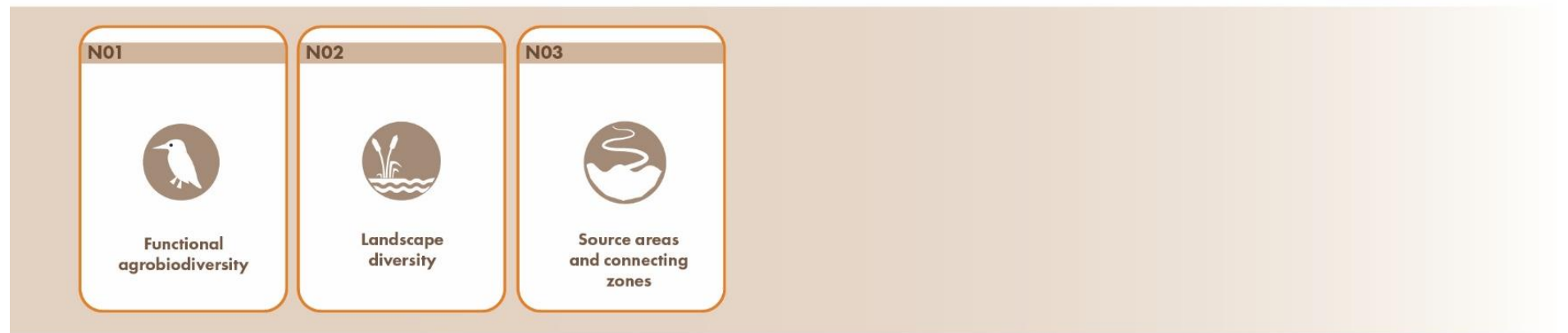
## Freshwater production



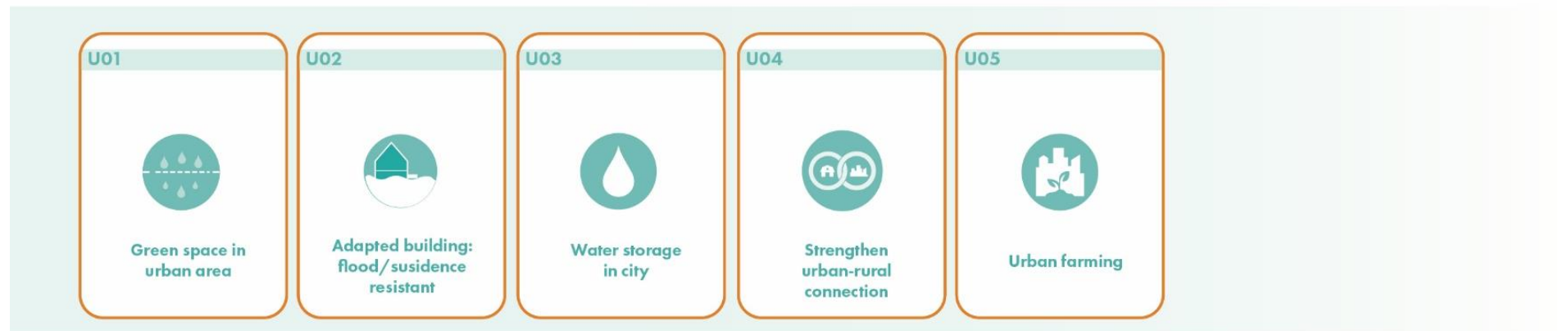
## Saltwater production



## Nature-inclusive agriculture



## Urban adaptation



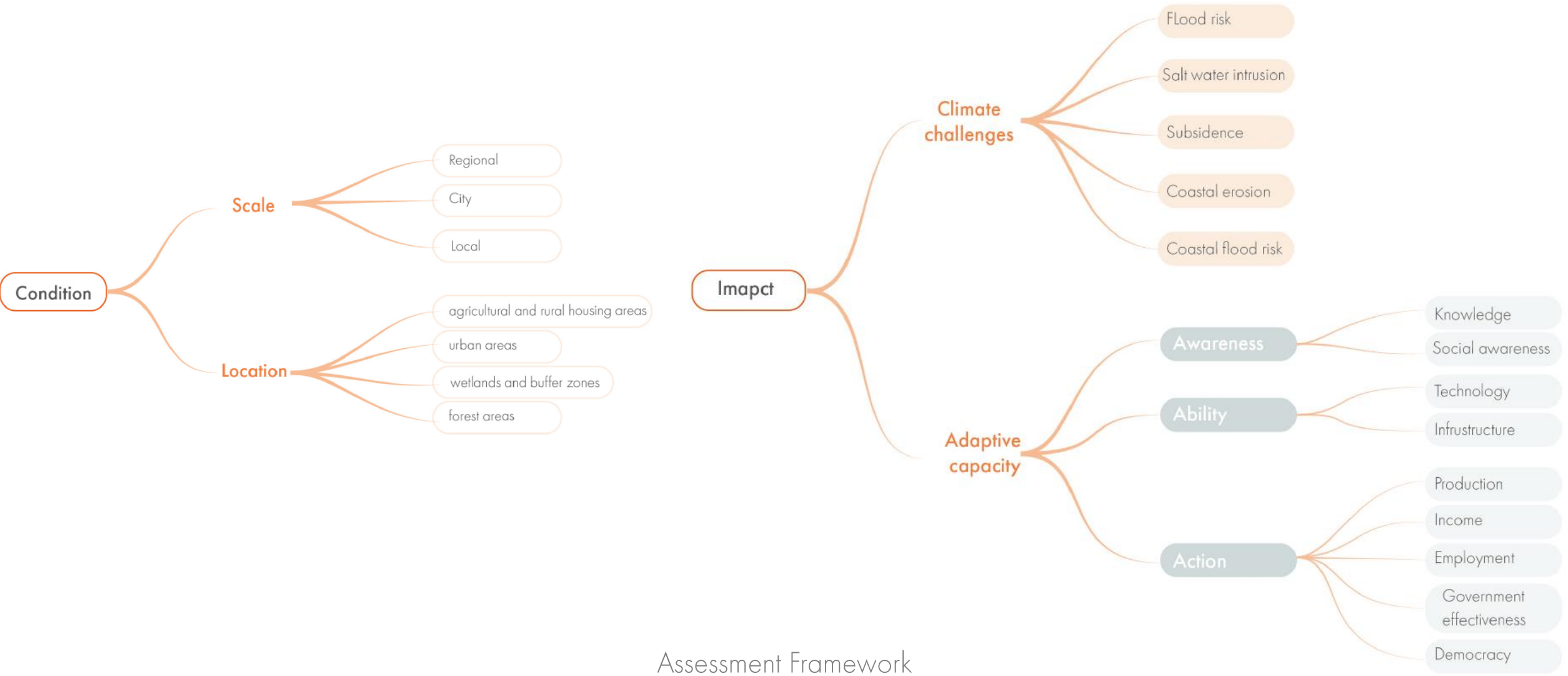


**Decision making  
and networks**

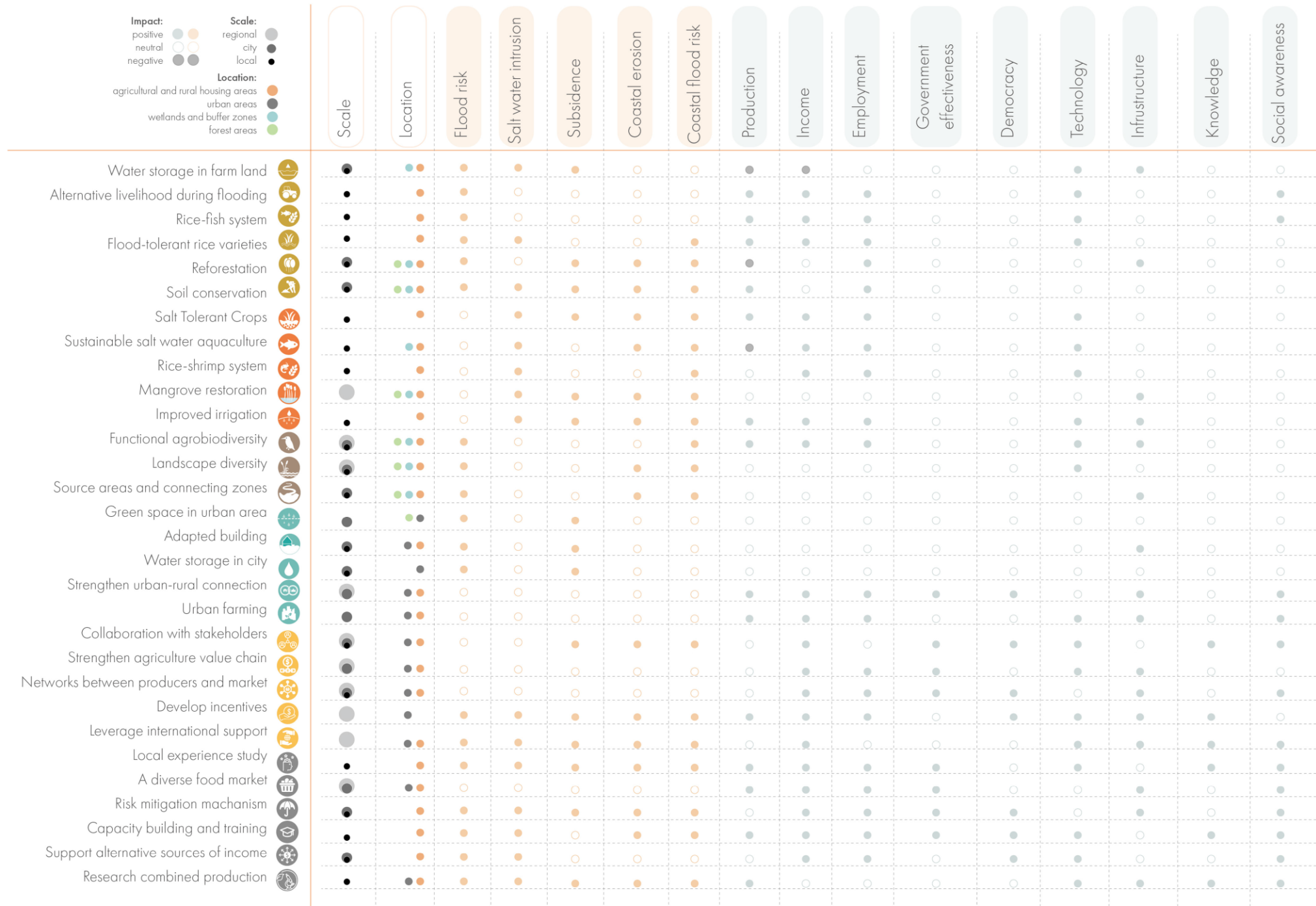


## Social adaptation of communities





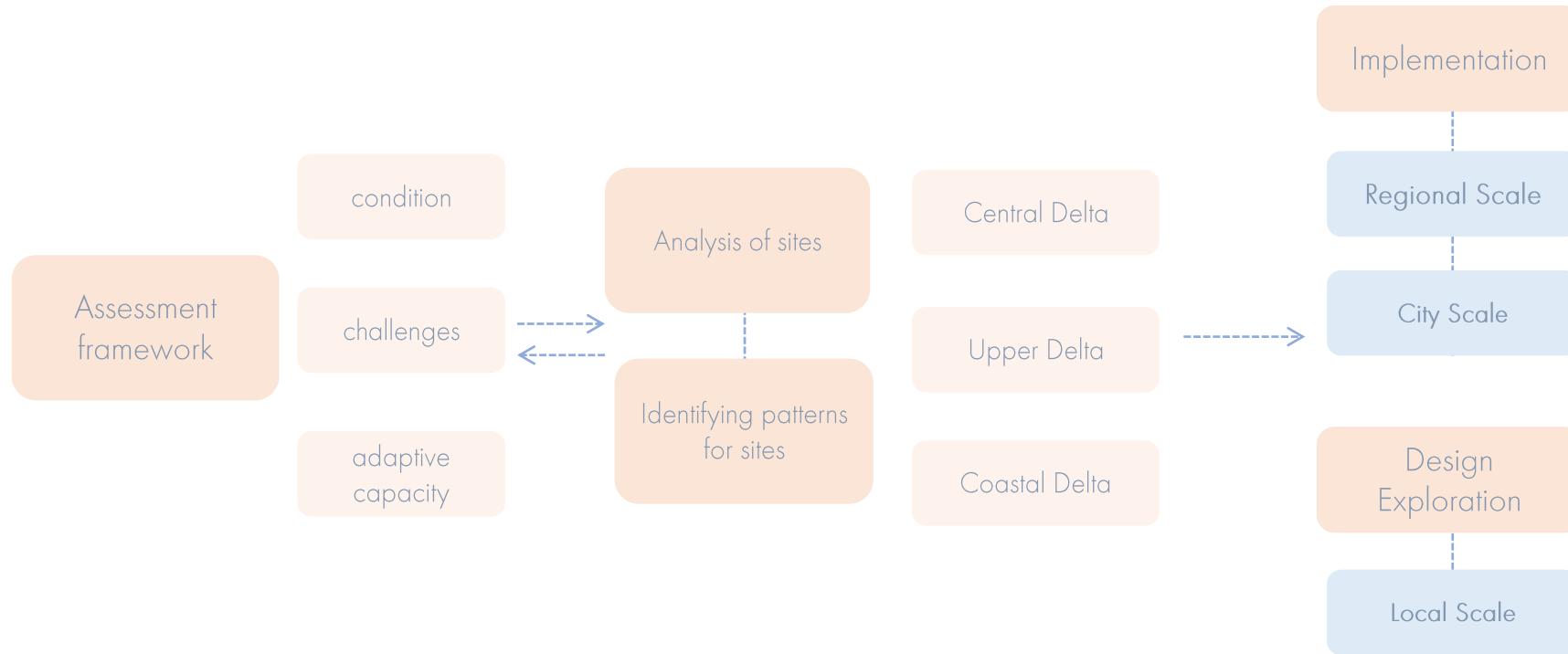
Assessment Framework



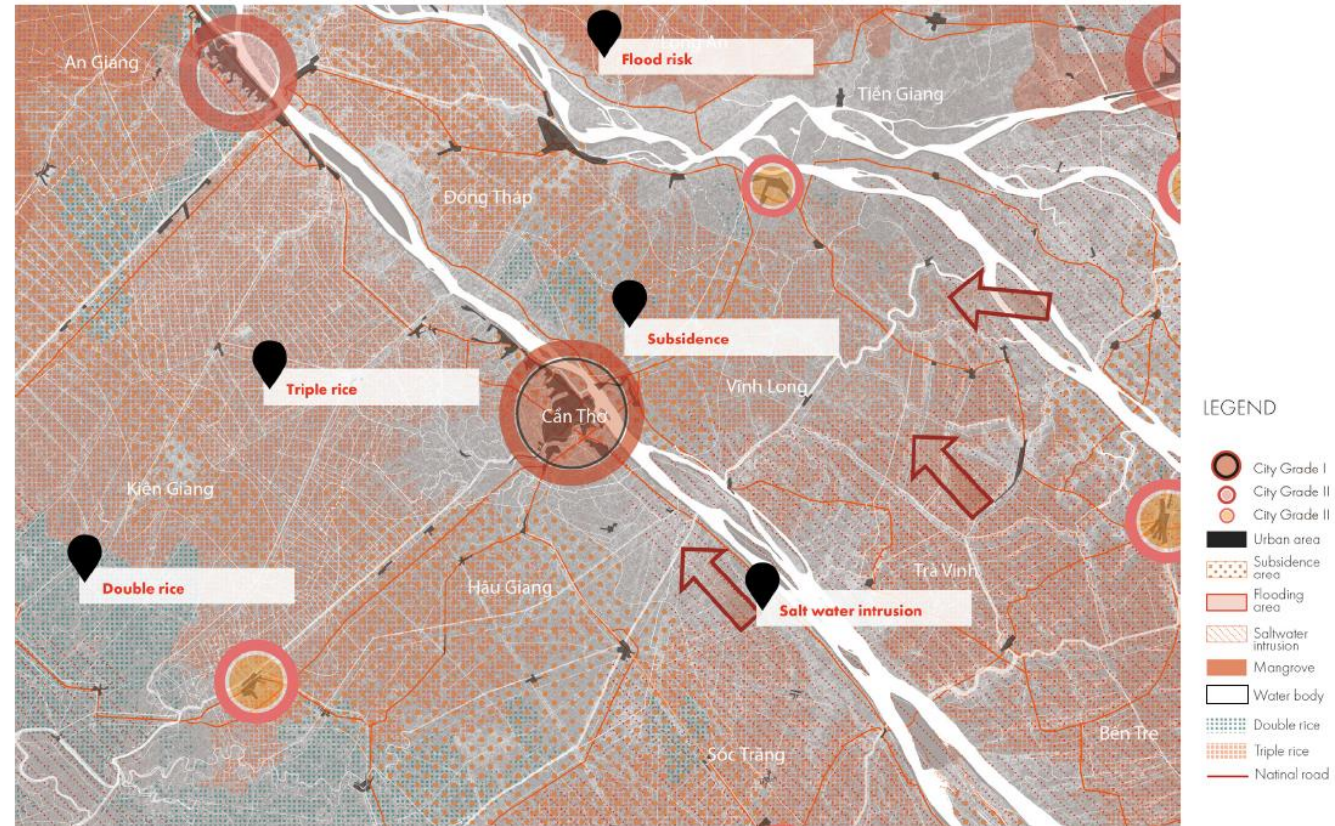


-IMPLEMENTATION-

## | Process of implementation



## | Central Delta – Regional scale



Regional

agricultural and rural housing areas

urban areas

wetlands and buffer zones

Flood risk

Subsidence

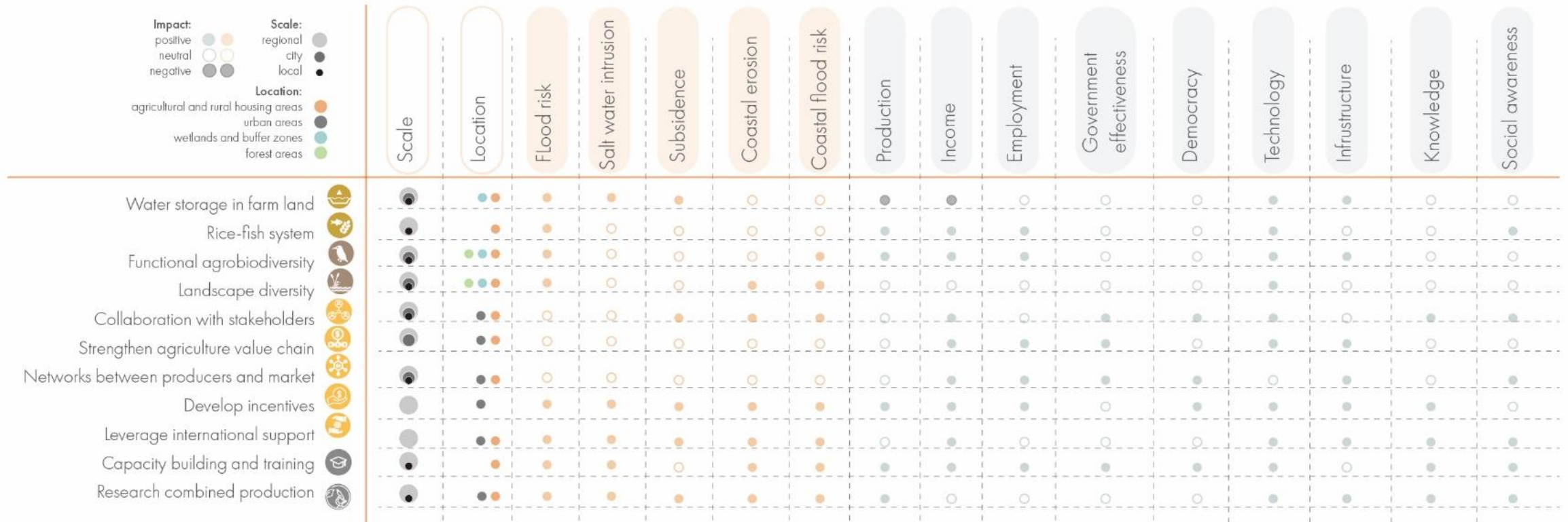
Salt water intrusion

Production

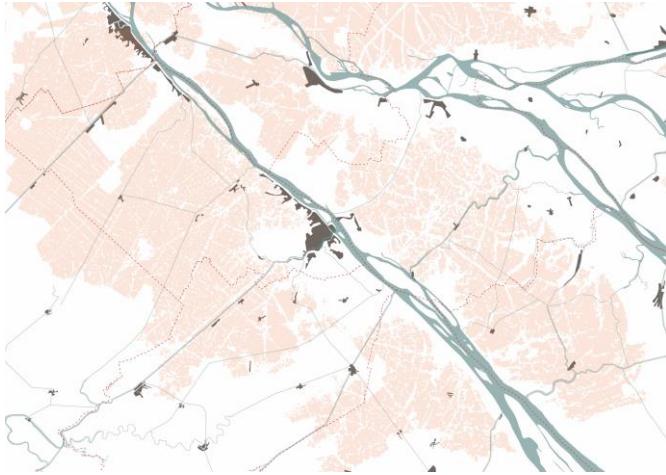
Social awareness

Technology

## | Central Delta – Regional scale







Triple rice area



Horticulture area



Subsidence

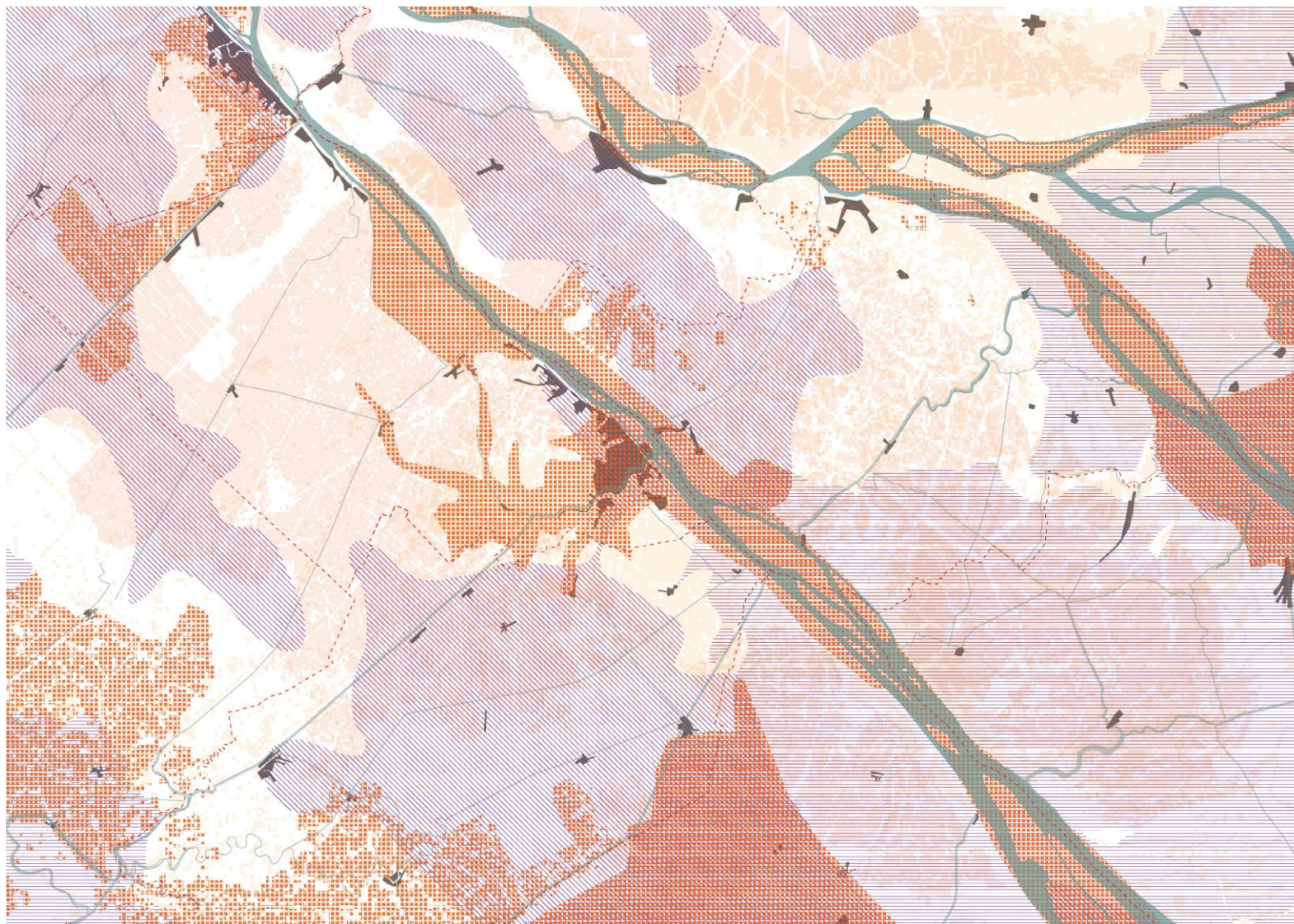


Double rice area



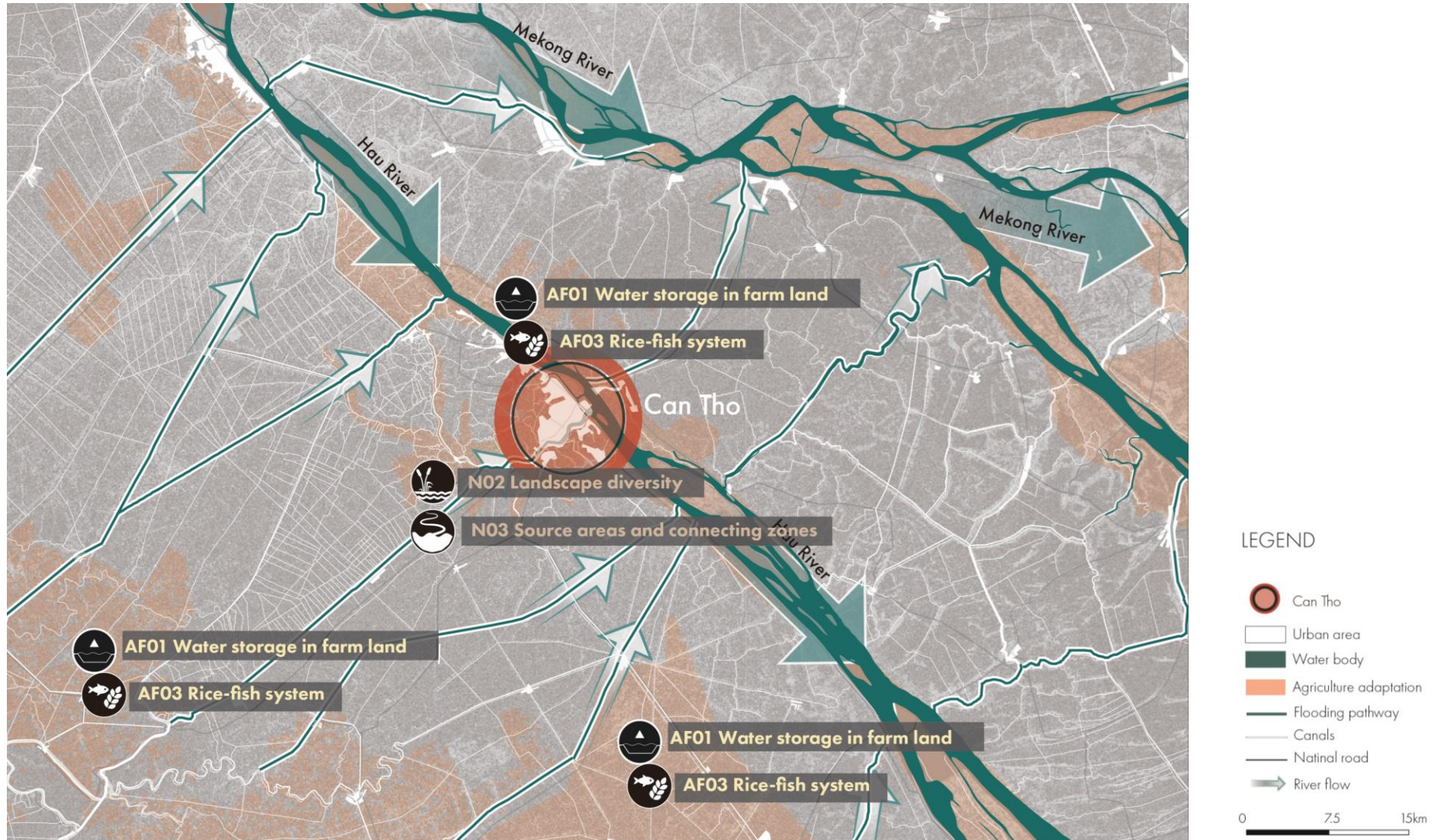
Salinization





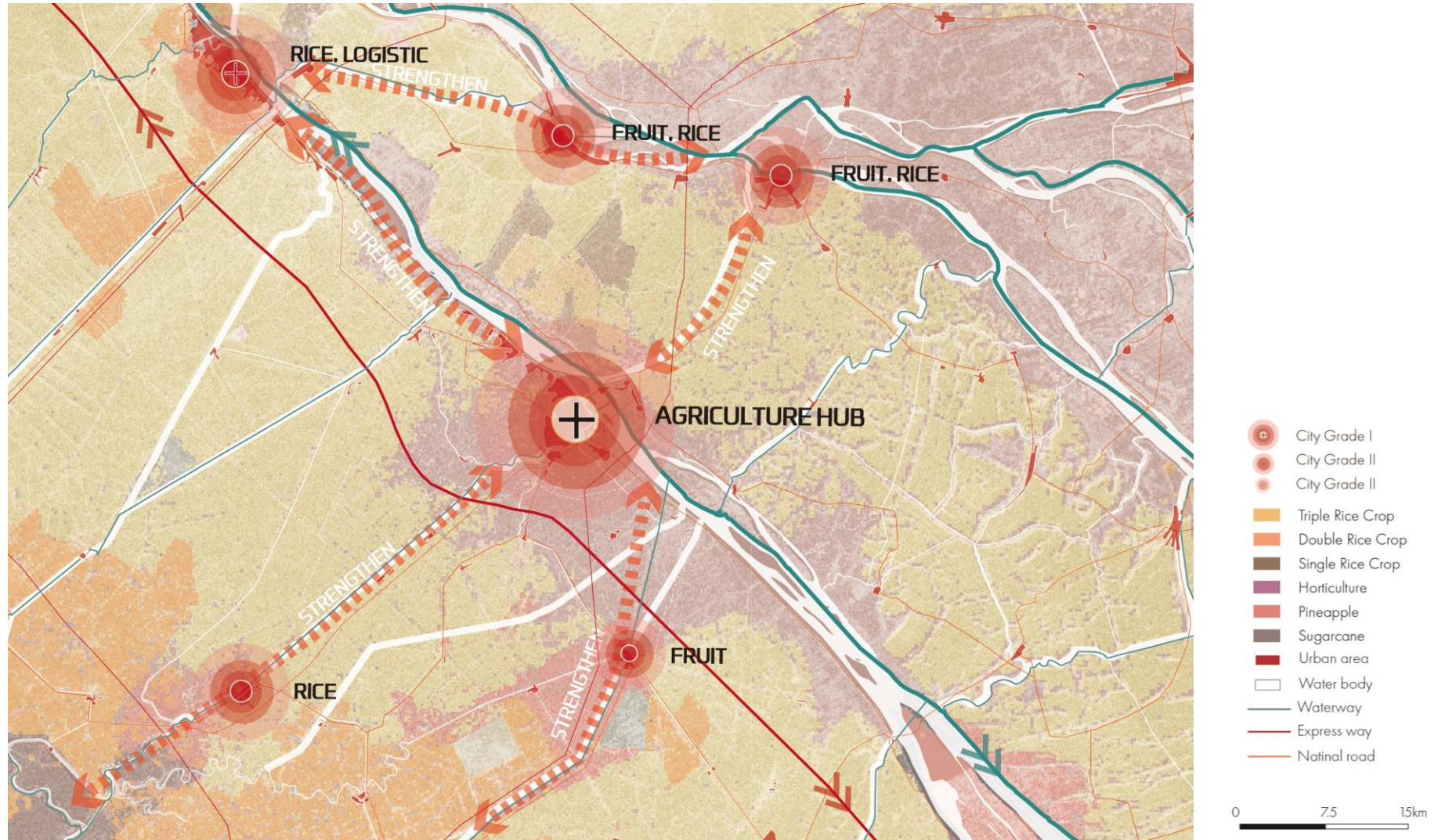
Agriculture adaptation area





River discharge and agriculture adaptation



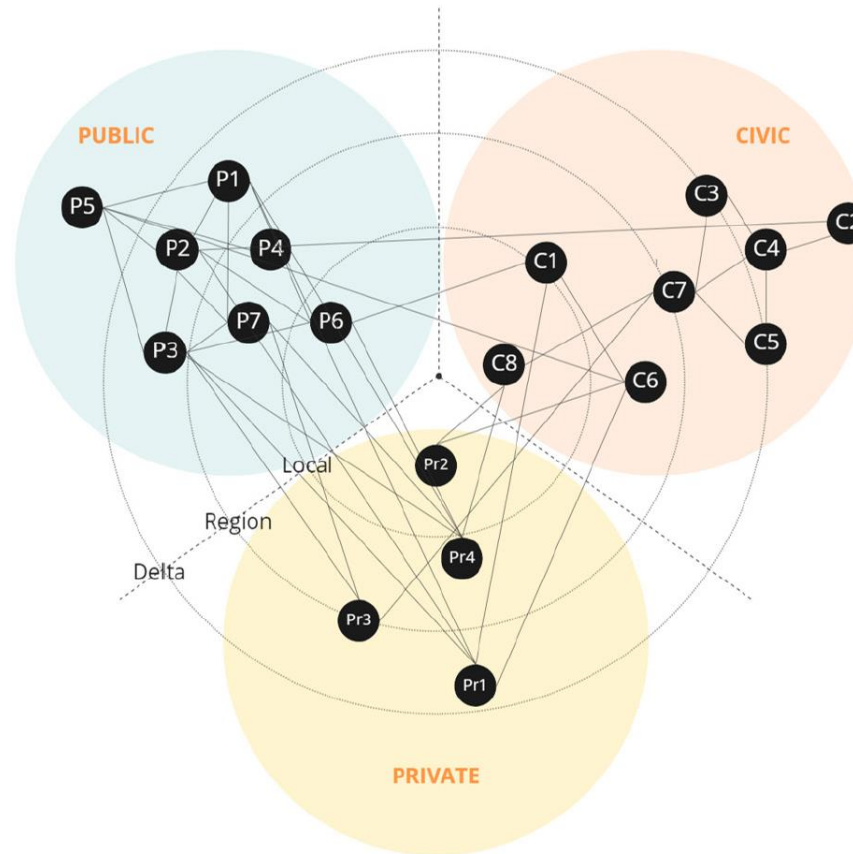


Regional agriculture connection strategy

- **PUBLIC**
  - 1 Ministry of Natural Resources and Environment
  - 2 Ministry of Planning and Investment
  - 3 Ministry of Agriculture and Rural Development
  - 4 South-West Steering Committee
  - 5 People's Committee
  - 6 Can Tho City administration
  - 7 Mekong delta provinces

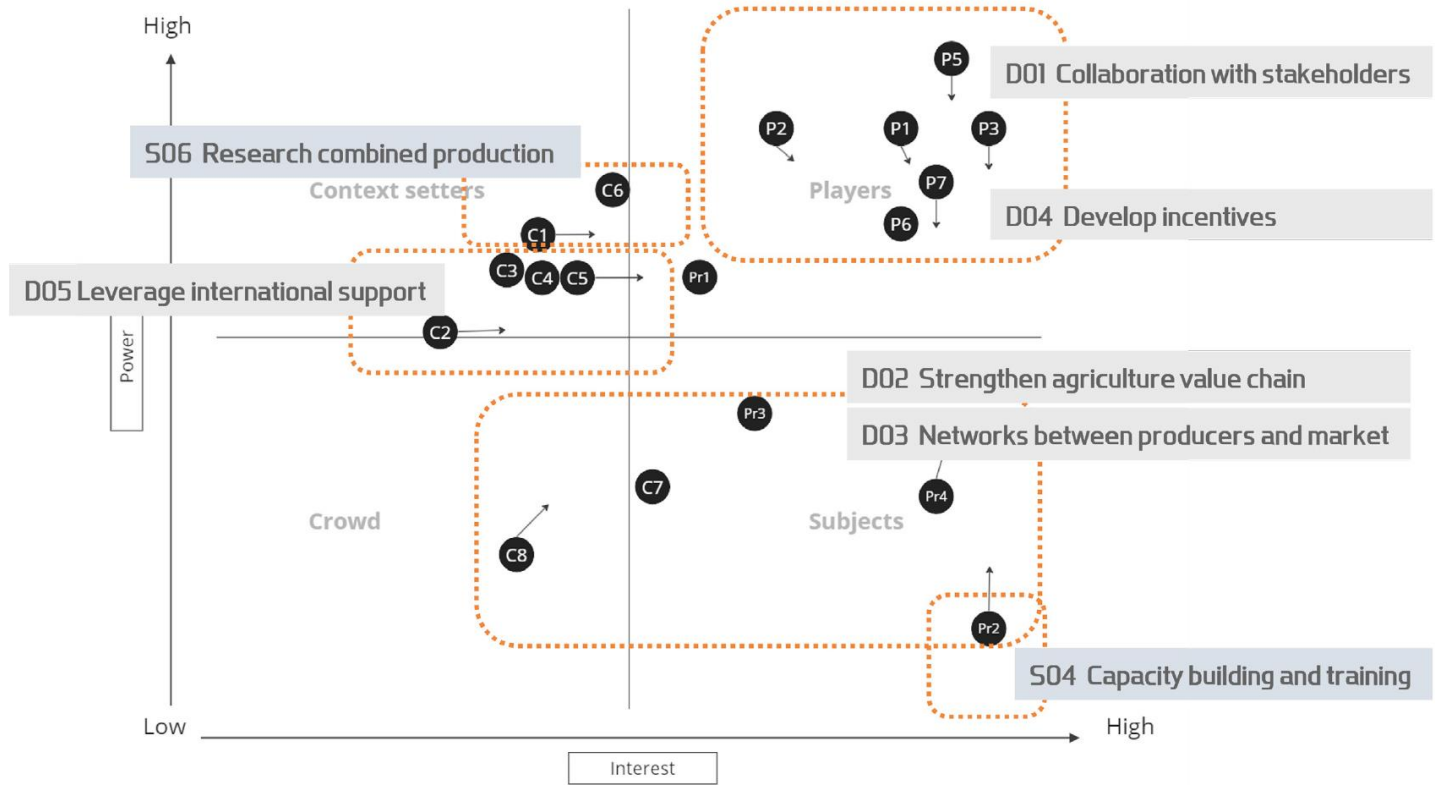
- **CIVIC**
  - 1 Can Tho University
  - 2 Development partners and NGOs
  - 3 Mekong River Commission
  - 4 Lancang-Mekong Cooperation
  - 5 Greater Mekong Subregion
  - 6 Institute of Water Resources Planning
  - 7 Media
  - 8 Consumers

- **PRIVATE**
  - 1 Irrigation Works Management and Exploitation Company
  - 2 Farmers
  - 3 Food retailers
  - 4 Land owners (usage rights)



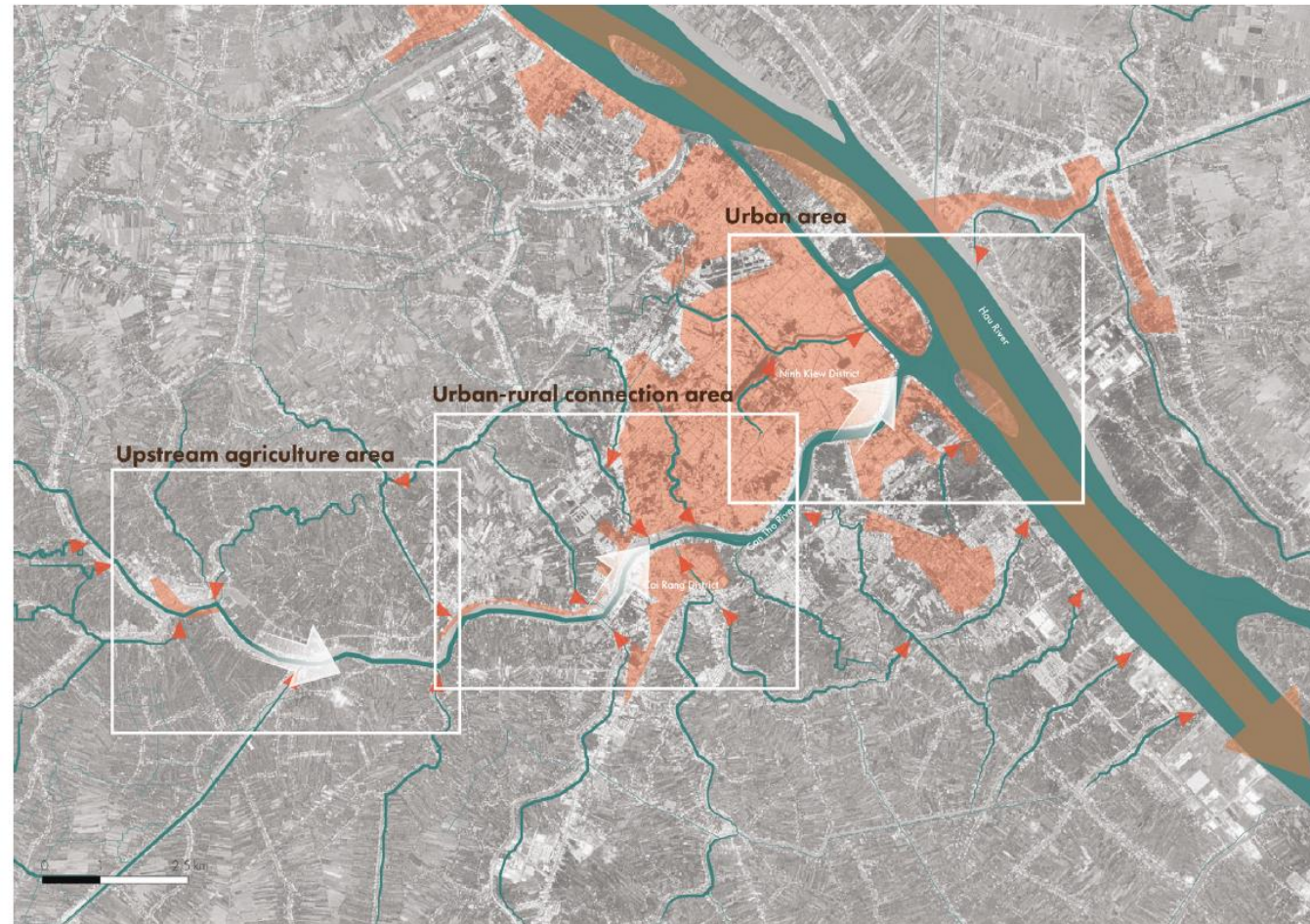
- **Conclusion:** public sector taking too much power, private and civic sectors are not fully connected

- PUBLIC**
  - 1 Ministry of Natural Resources and Environment
  - 2 Ministry of Planning and Investment
  - 3 Ministry of Agriculture and Rural Development
  - 4 South-West Steering Committee
  - 5 People's Committee
  - 6 Can Tho City administration
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  - 8 Consumers
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## | Central Delta – City scale



City

agricultural and rural housing areas

urban areas

wetlands and buffer zones

Flood risk

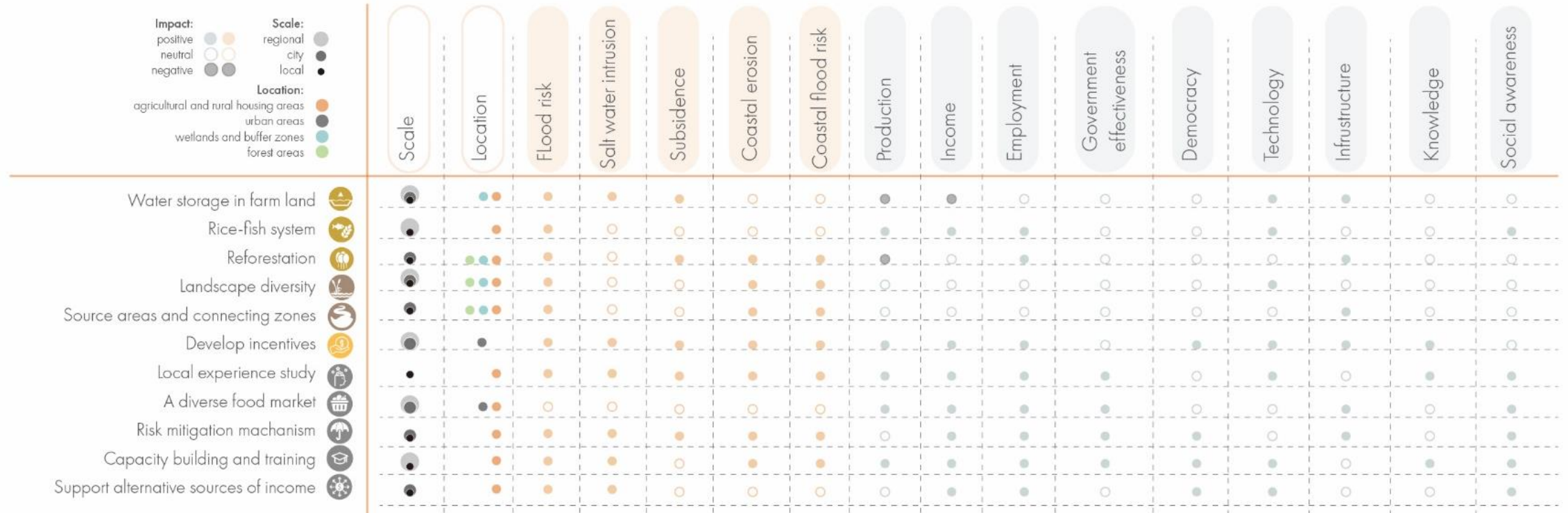
Subsidence

Production

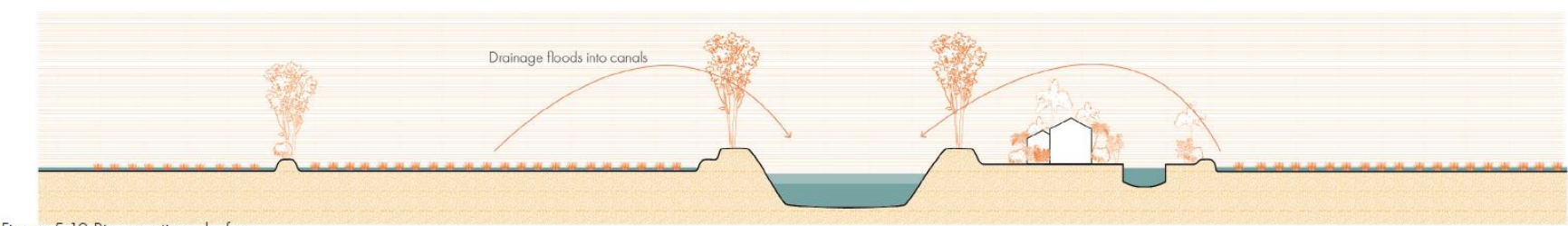
Social awareness

Technology

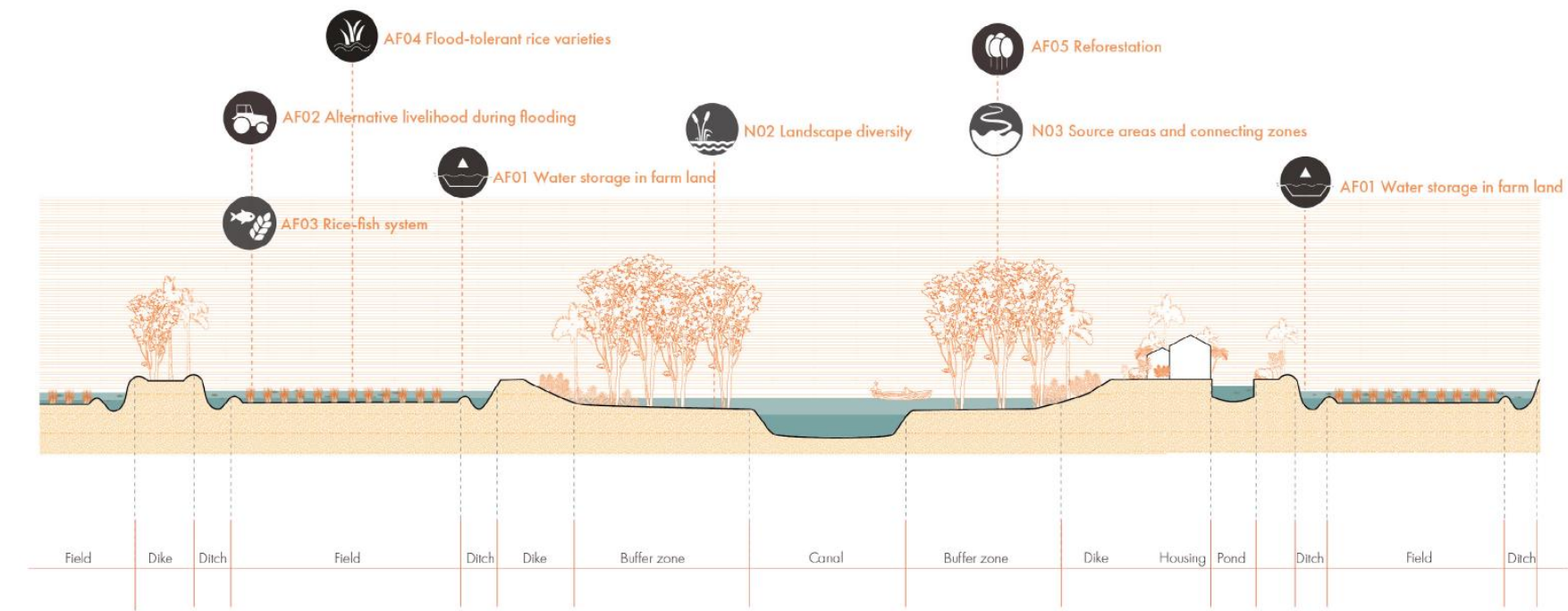
## | Central Delta – City scale



Before

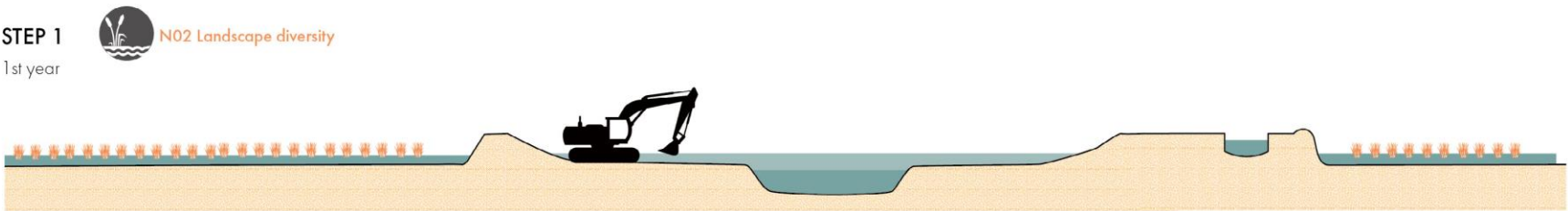


After

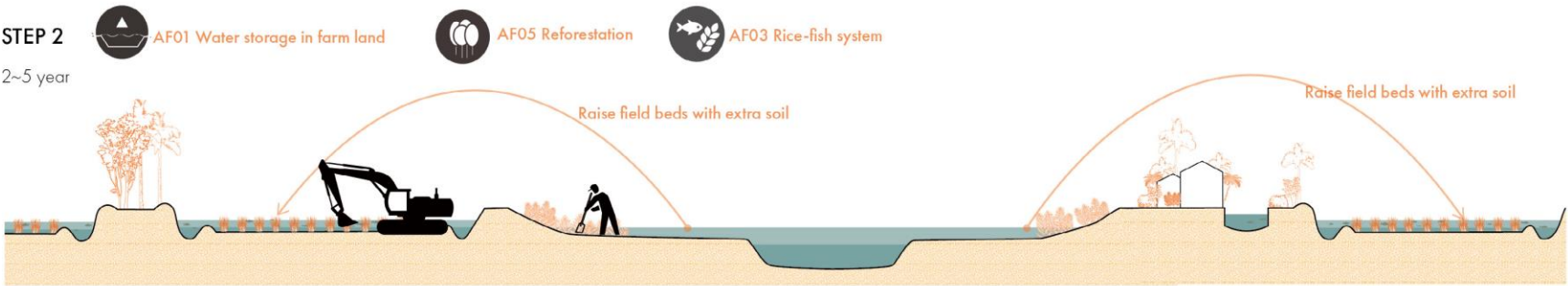




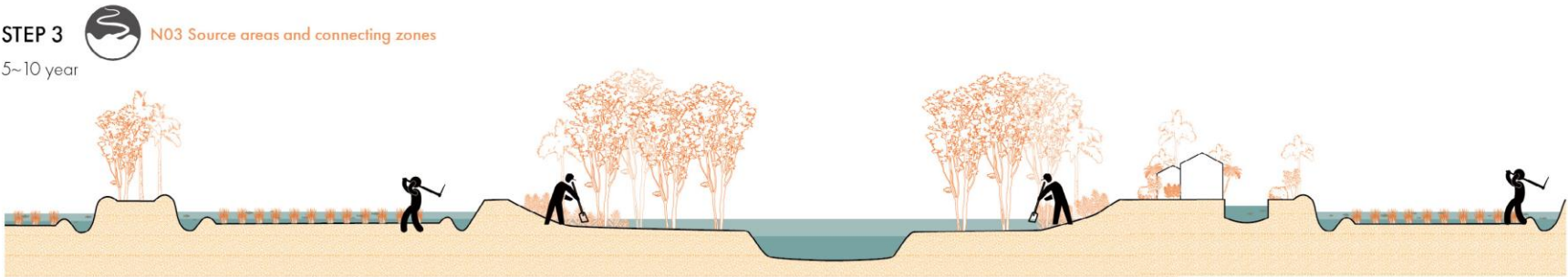
River construction

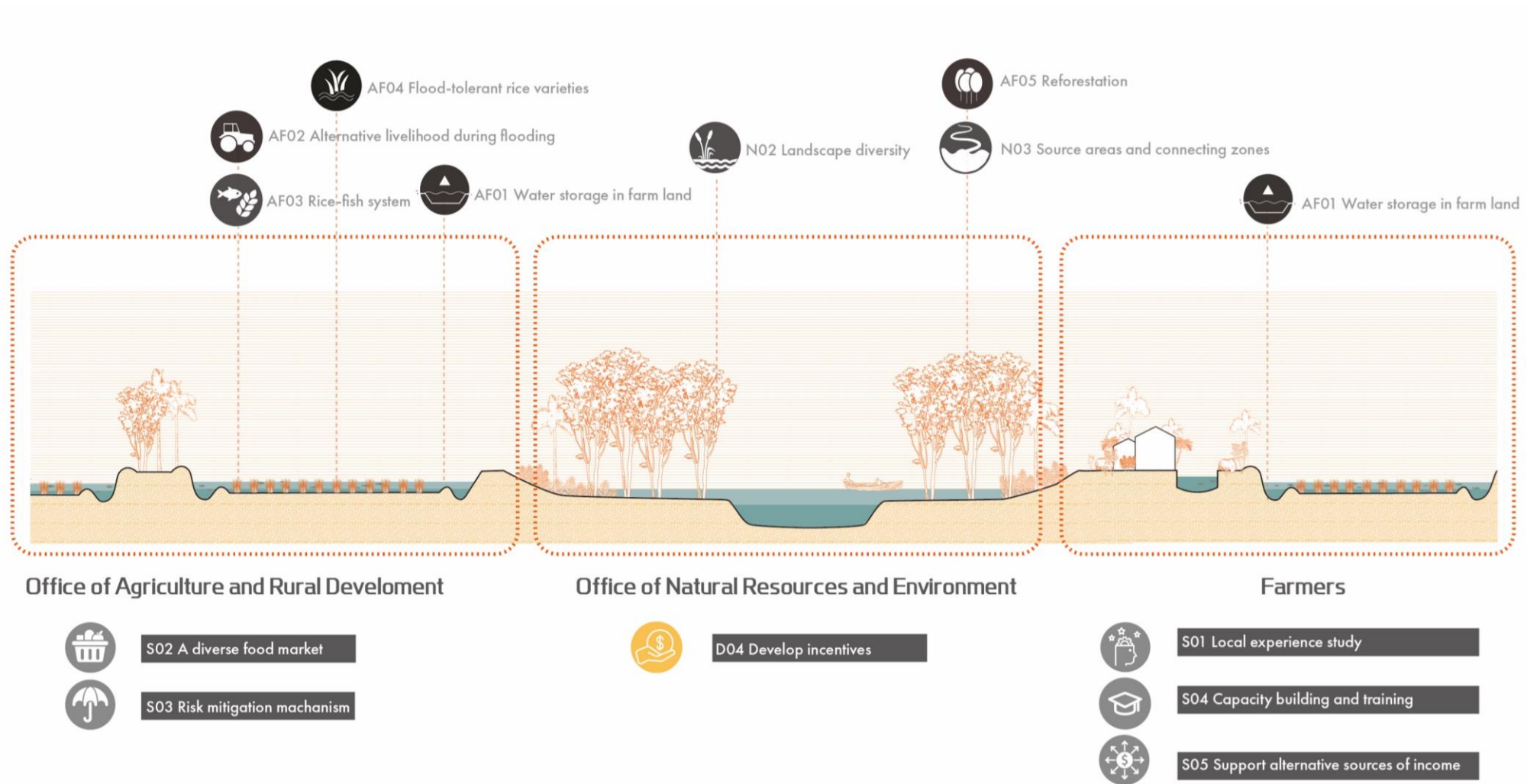


Rice field construction



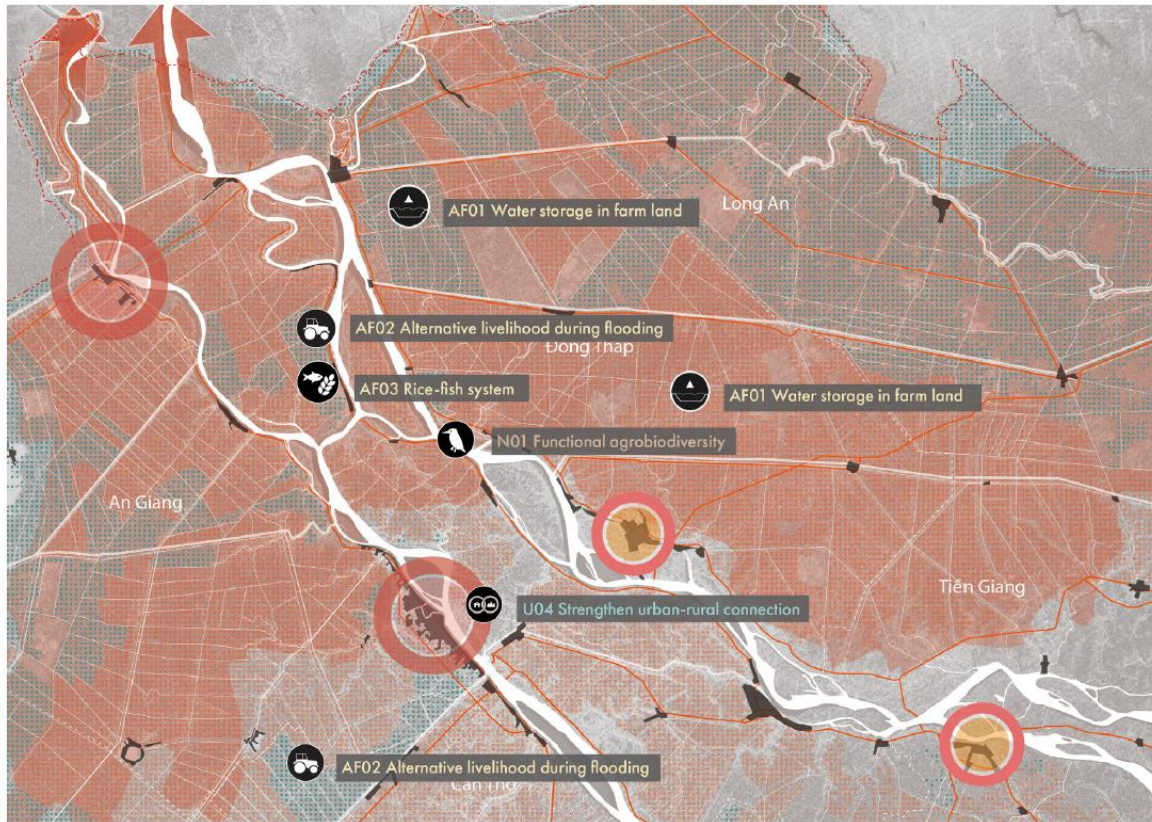
Reforestation







# | Upper Delta – Regional scale



	Scale	Location	Flood risk	Salt water intrusion	Subsidence	Coastal erosion	Coastal flood risk	Production	Income	Employment	Government effectiveness	Democracy	Technology	Infrastructure	Knowledge	Social awareness
Water storage in farm land	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Alternative livelihood during flooding	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rice-fish system	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional agrobiodiversity	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Strengthen urban-rural connection	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Develop incentives	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Leverage international support	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
A diverse food market	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Capacity building and training	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

## LEGEND

- City Grade I
- City Grade II
- City Grade II
- Urban area
- Subsidence area
- Flooding area
- Saltwater intrusion
- Mangrove
- Water body
- Double rice
- Triple rice
- National road

Regional

agricultural and rural housing areas

wetlands and buffer zones

Flood risk

Production

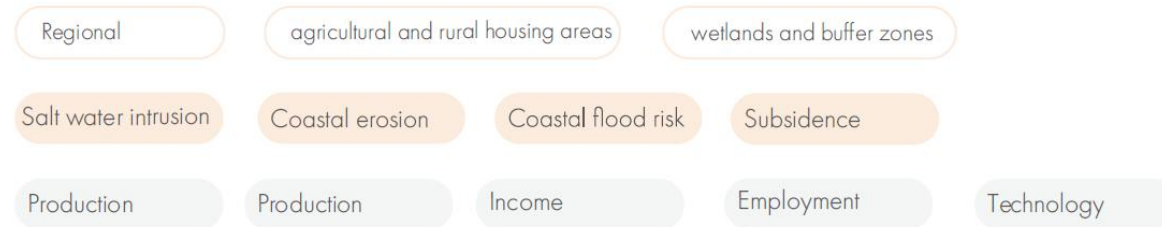
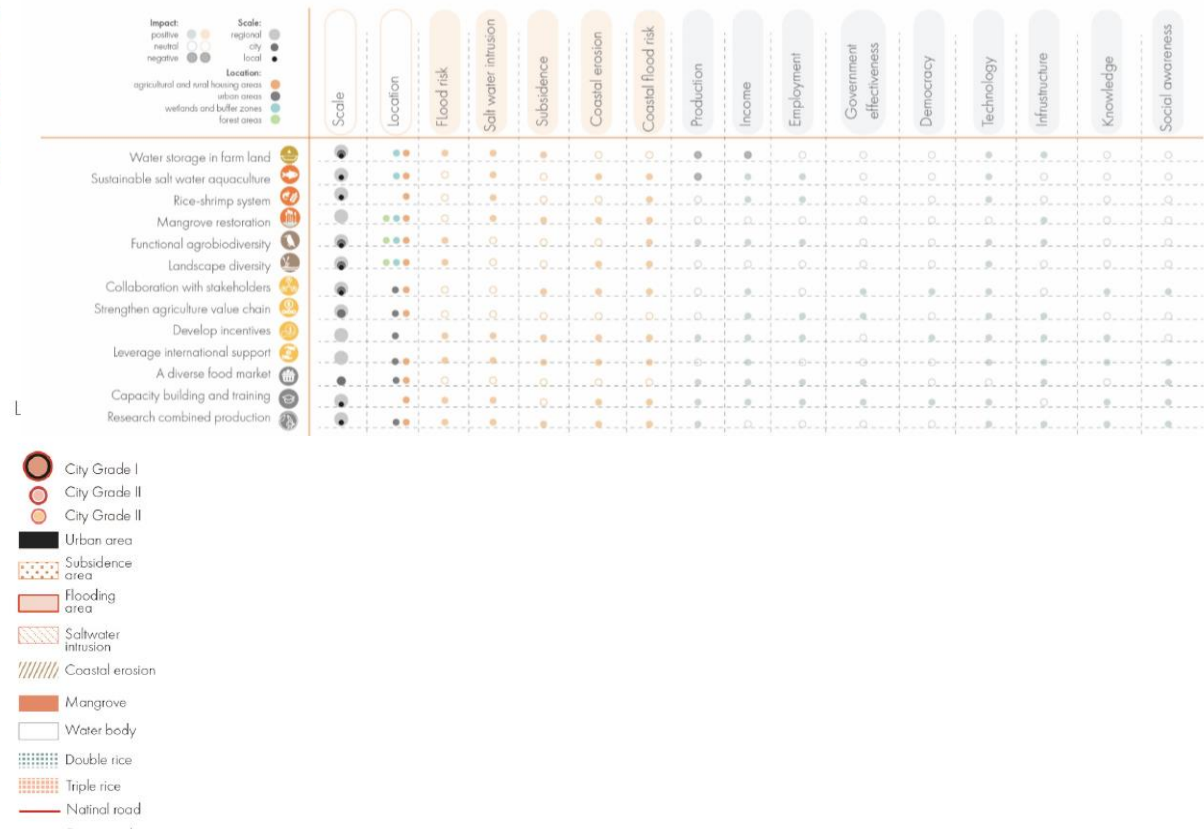
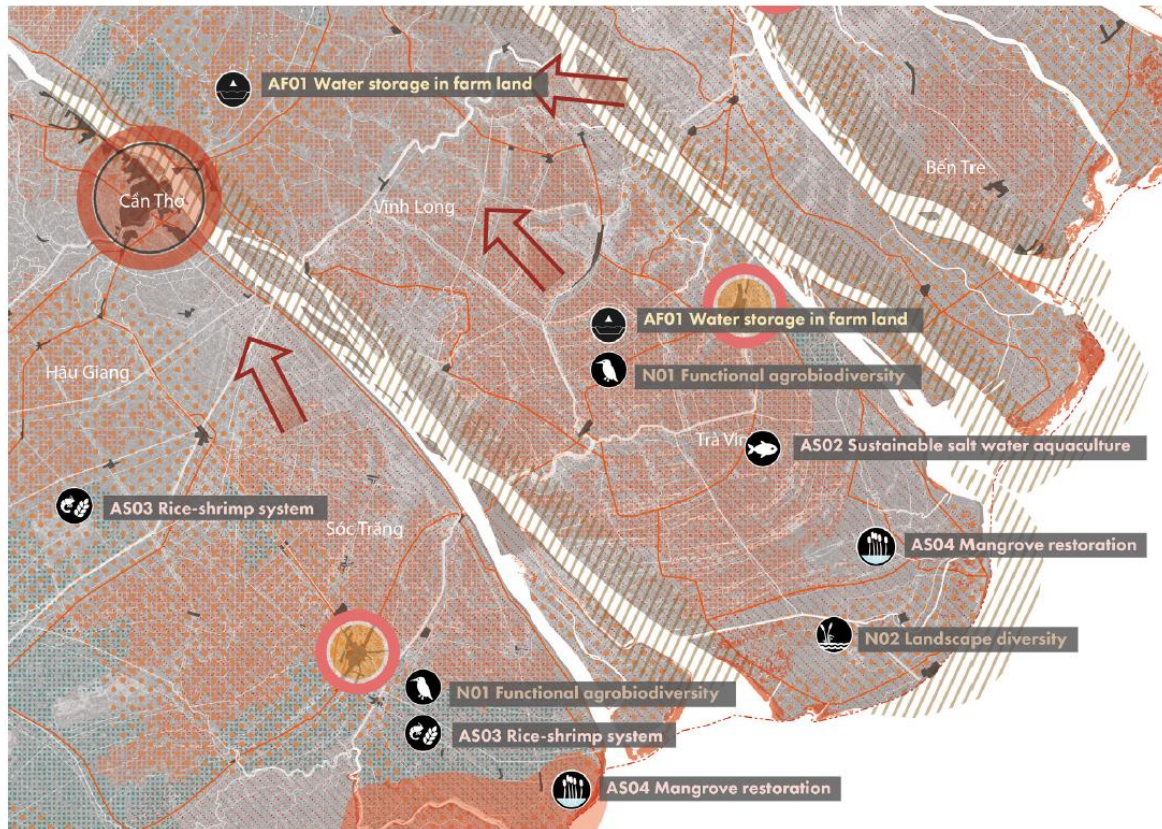
Income

Employment

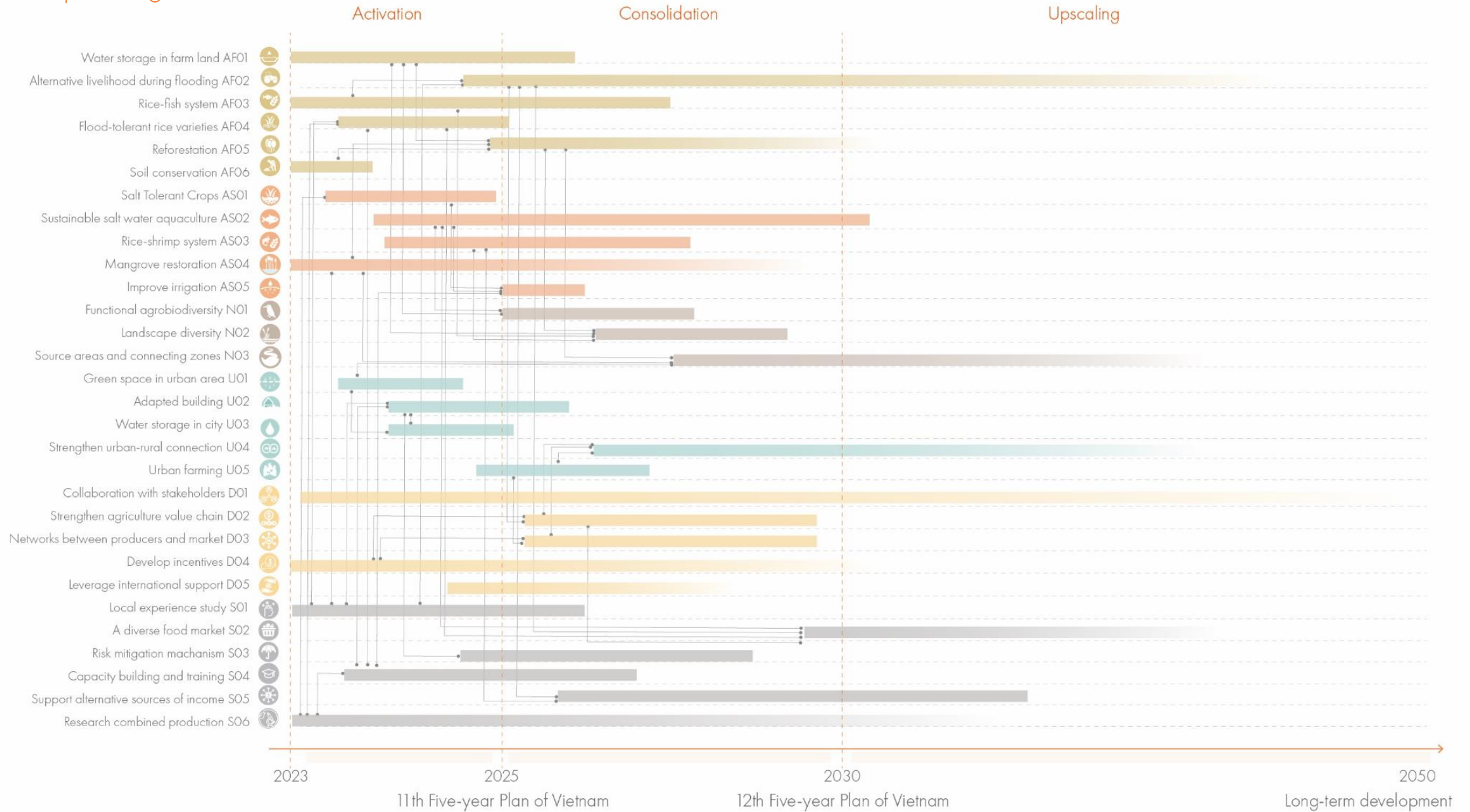
Infrastructure



# | Coastal Delta – Regional scale



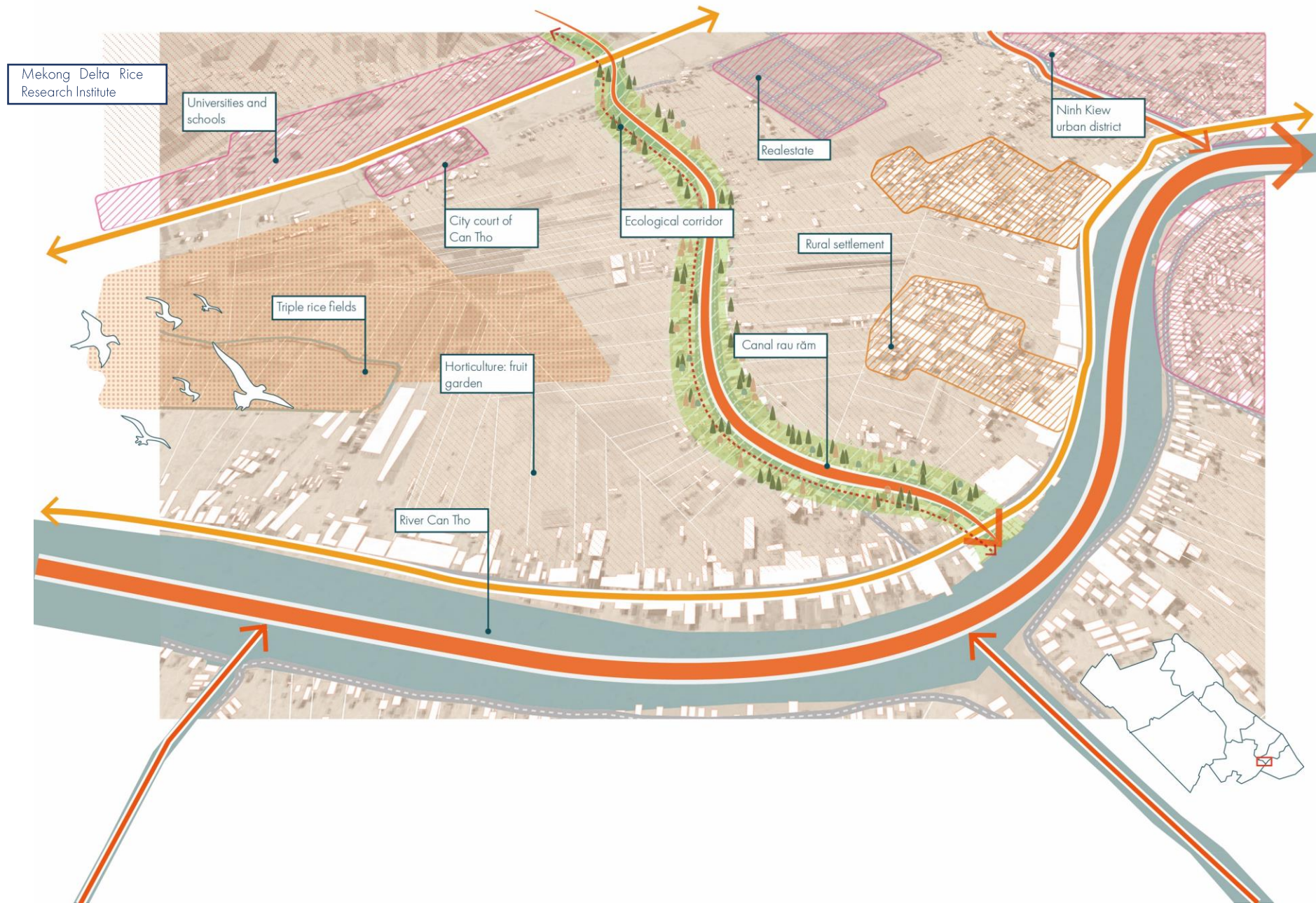
# | Phasing



## -DESIGN EXPLORATION-











Can Tho River

source: [www.google.com](http://www.google.com)



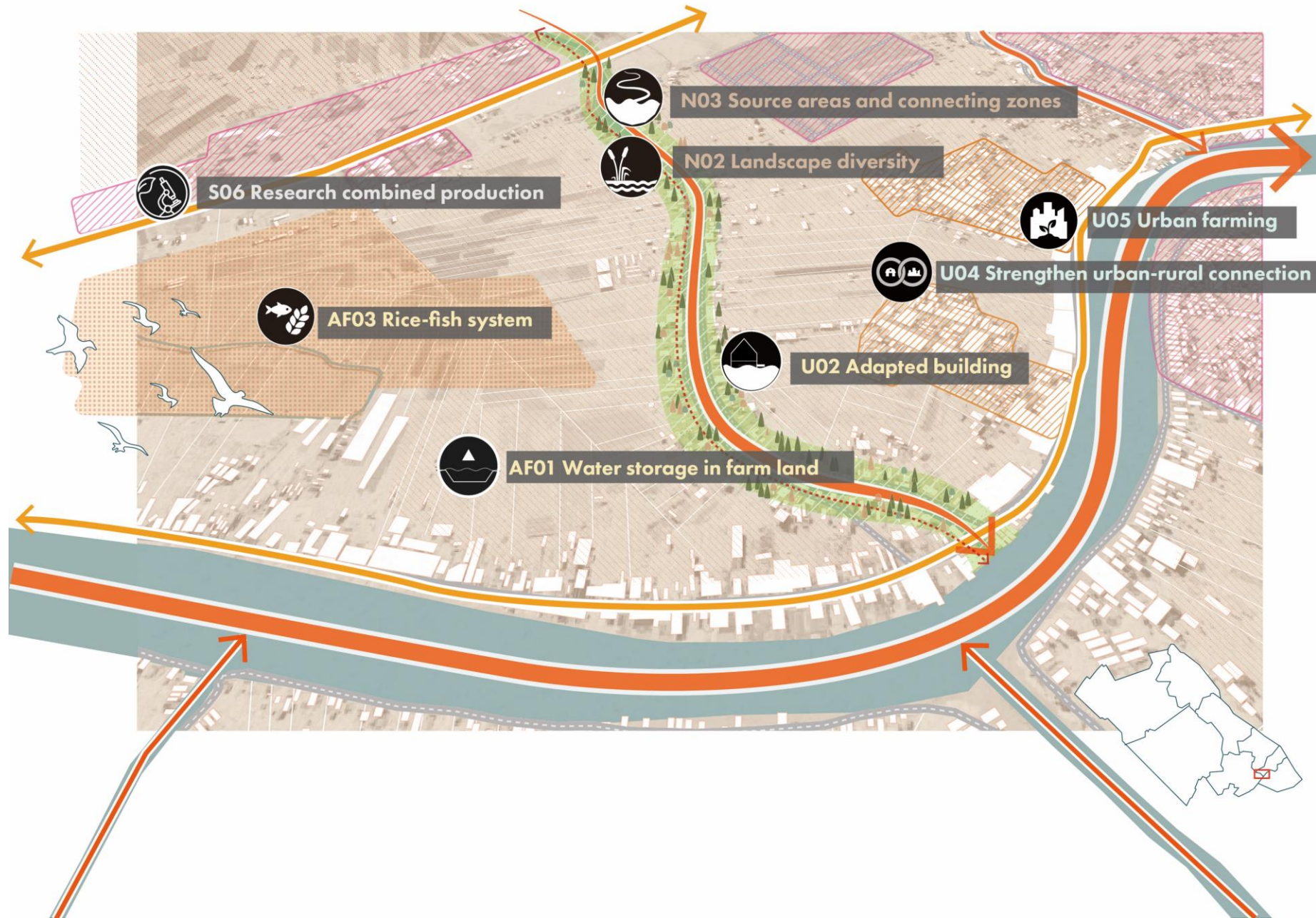
Fruit Gardens

source: [www.google.com](http://www.google.com)



Rice Fields

source: [www.google.com](http://www.google.com)







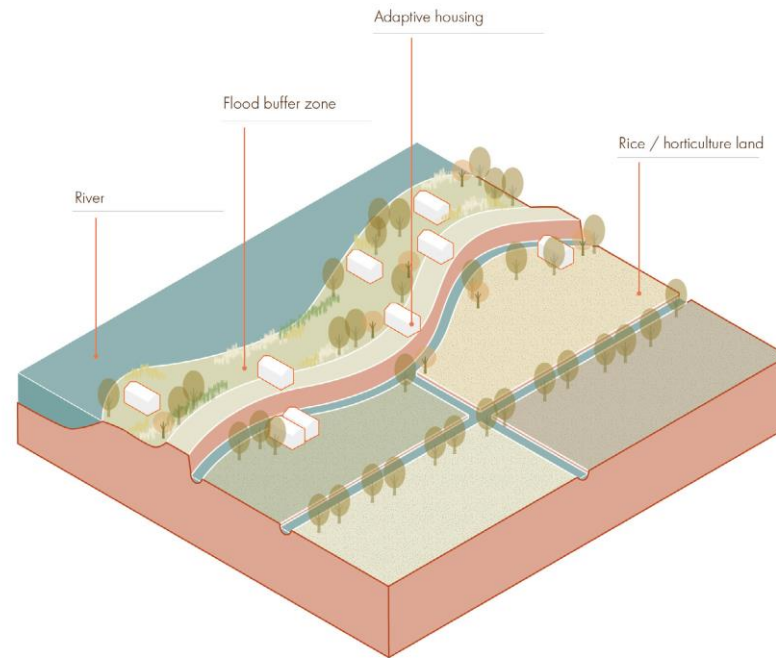
0 50 250 500 m



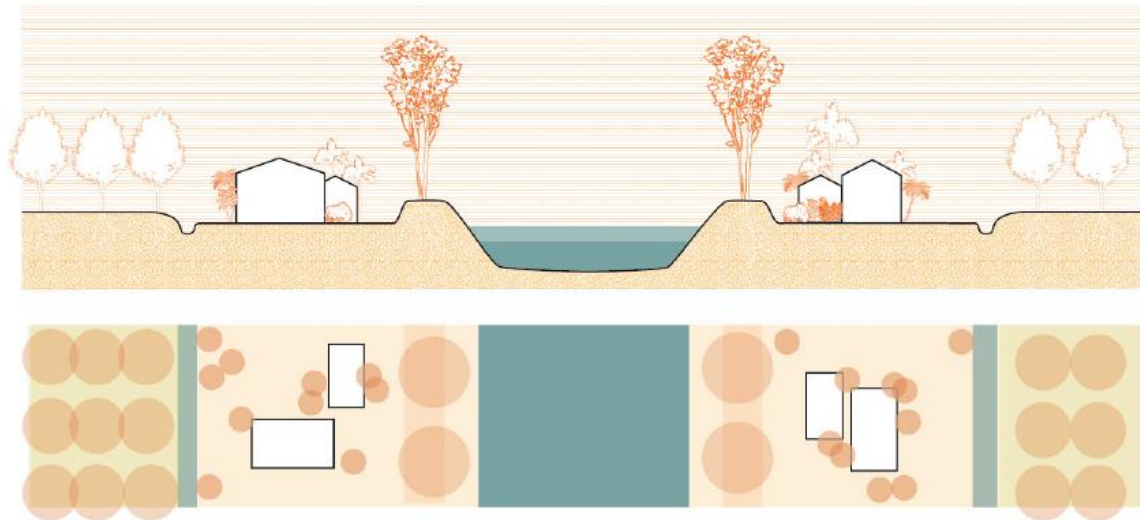


0 50 250 500 m

## | Room for river

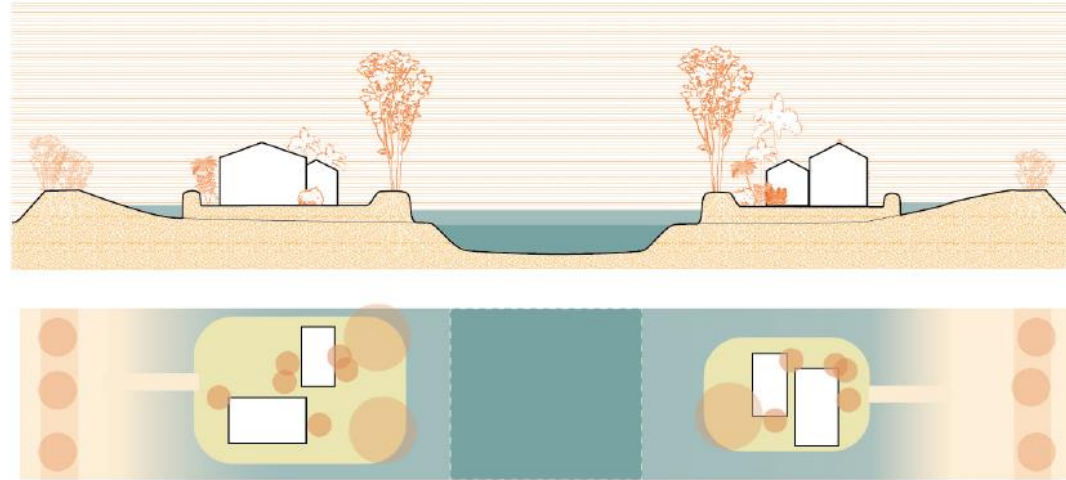


Before

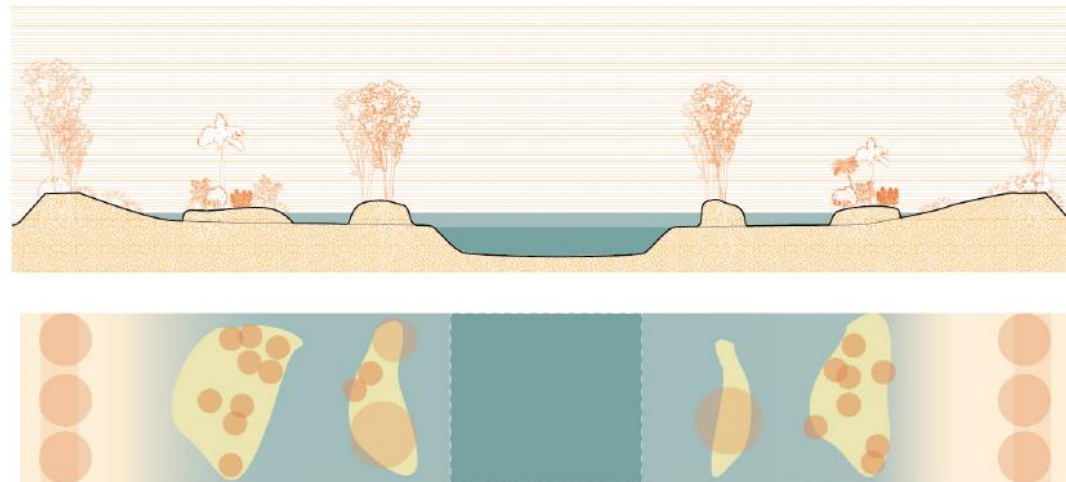




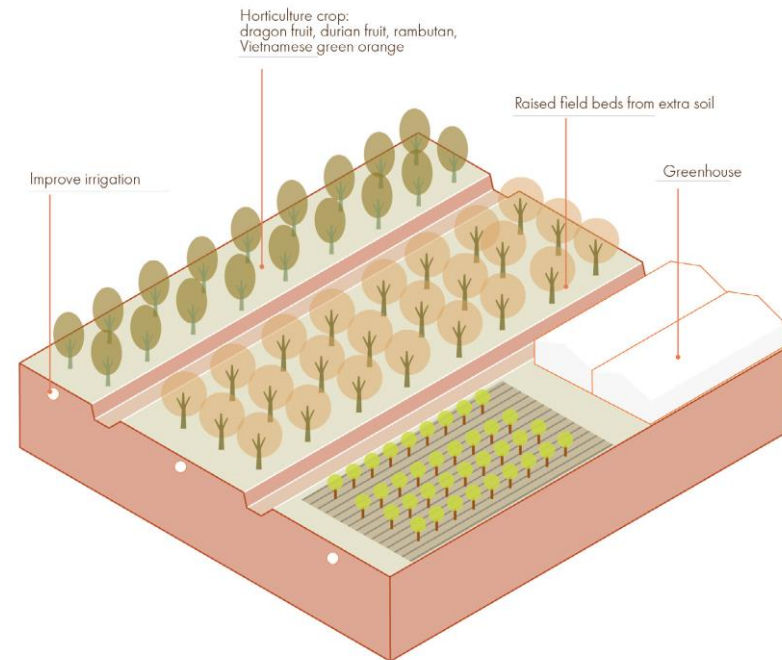
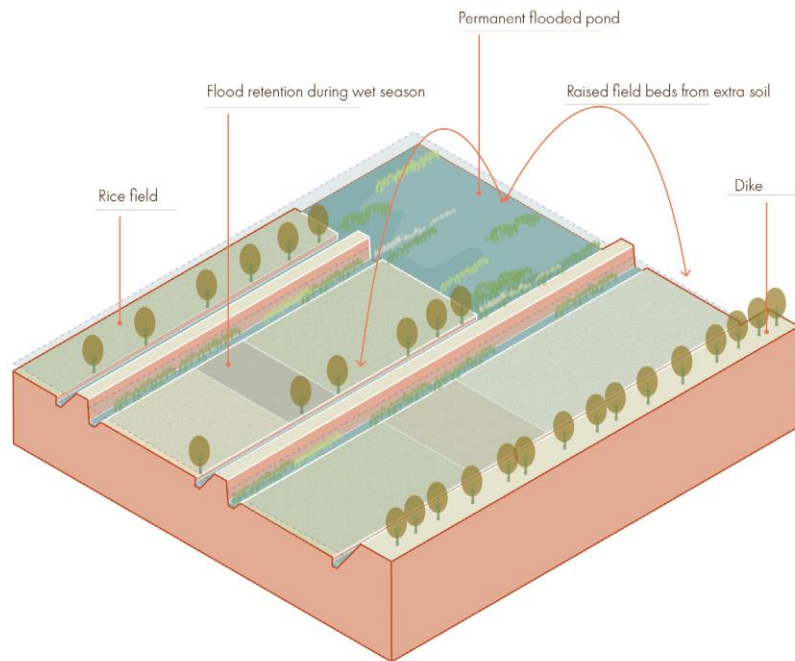
After - Adaptive housing



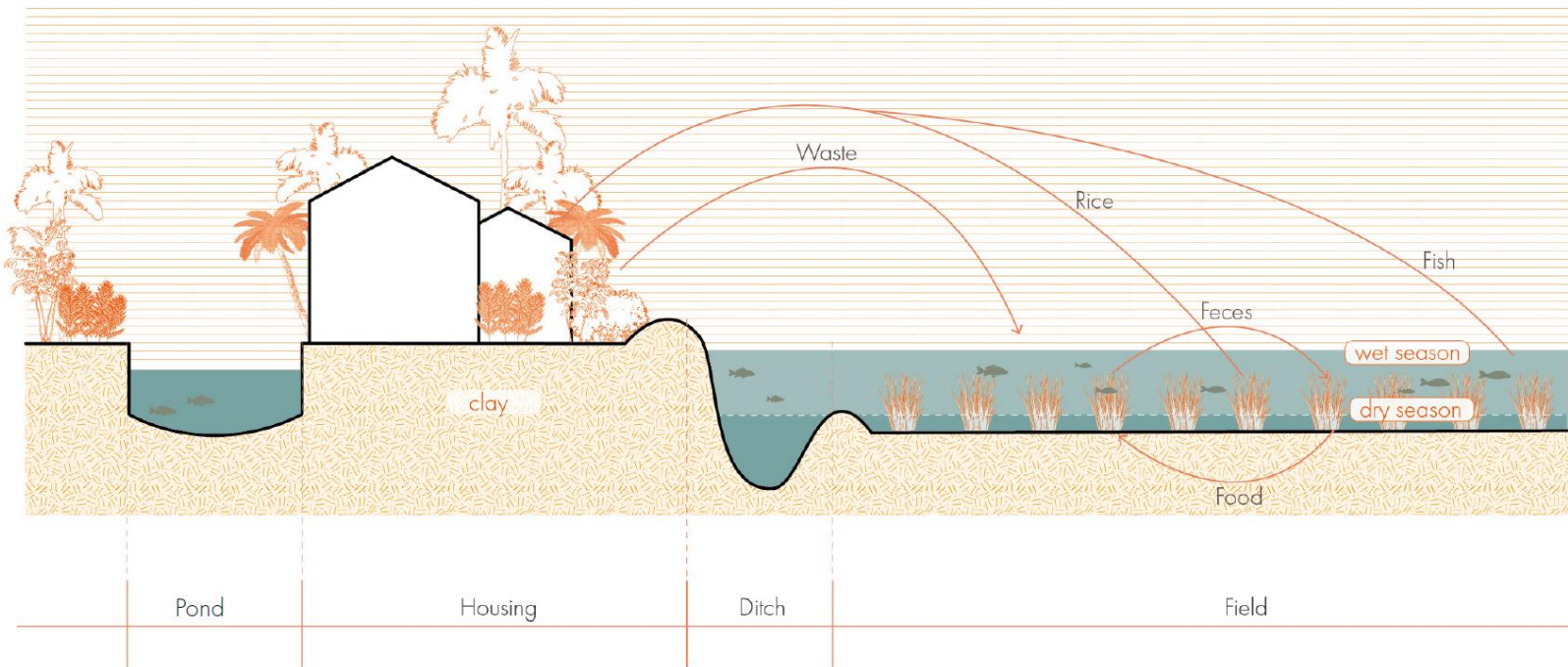
After - Ecological islands



## | Adaptive agriculture

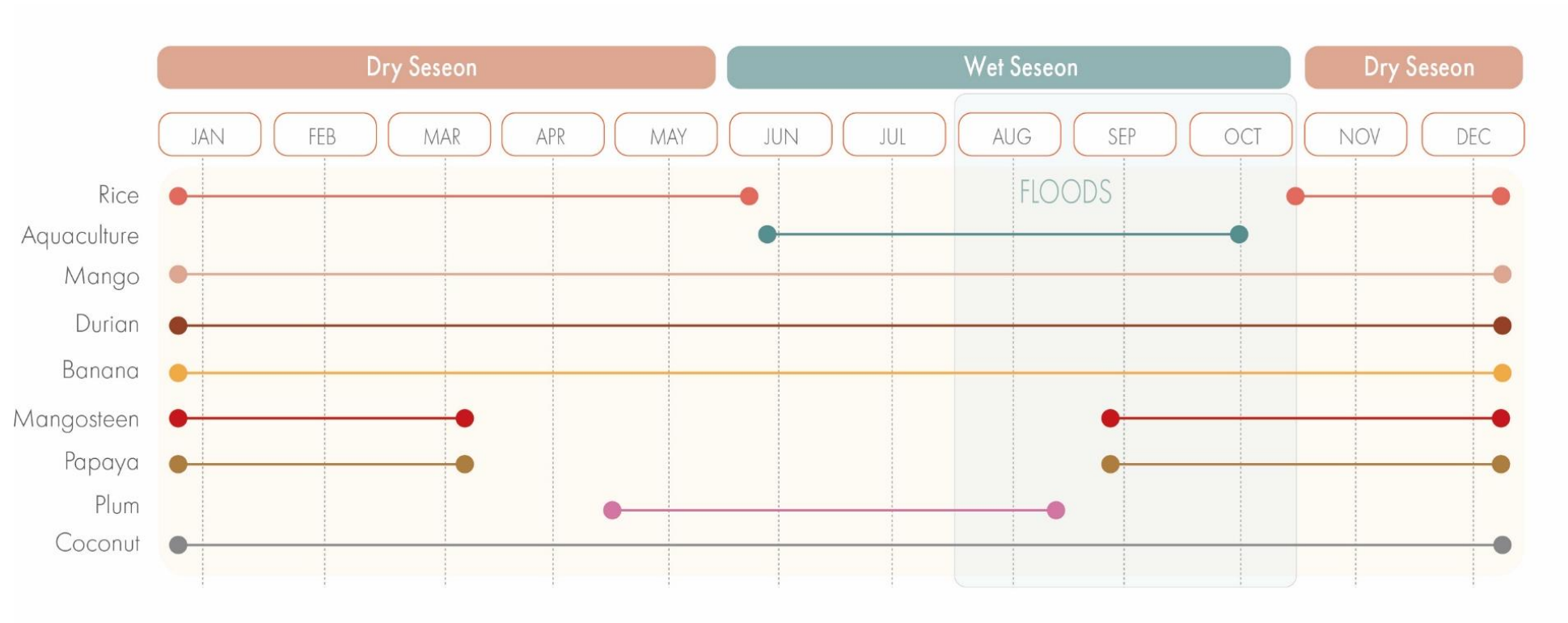


## | Adaptive agriculture





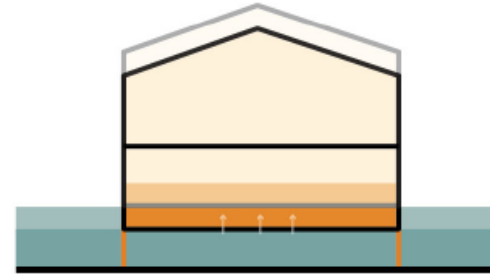
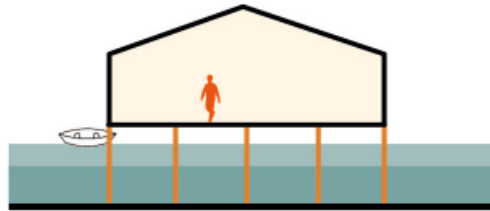
## | Adaptive agriculture



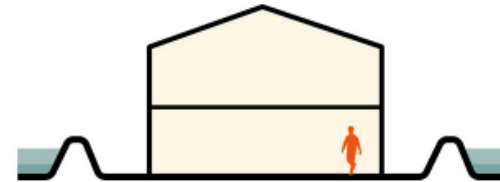
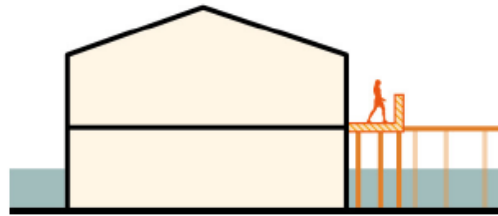
## | Adaptive housing



River Housing

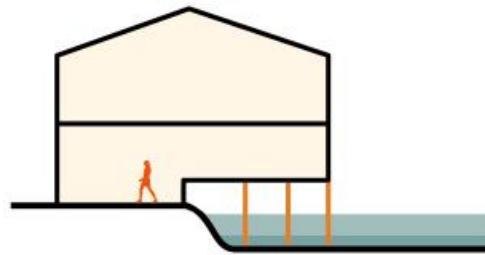


Island Housing

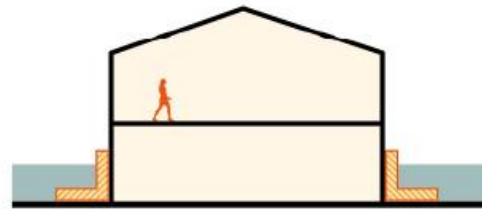




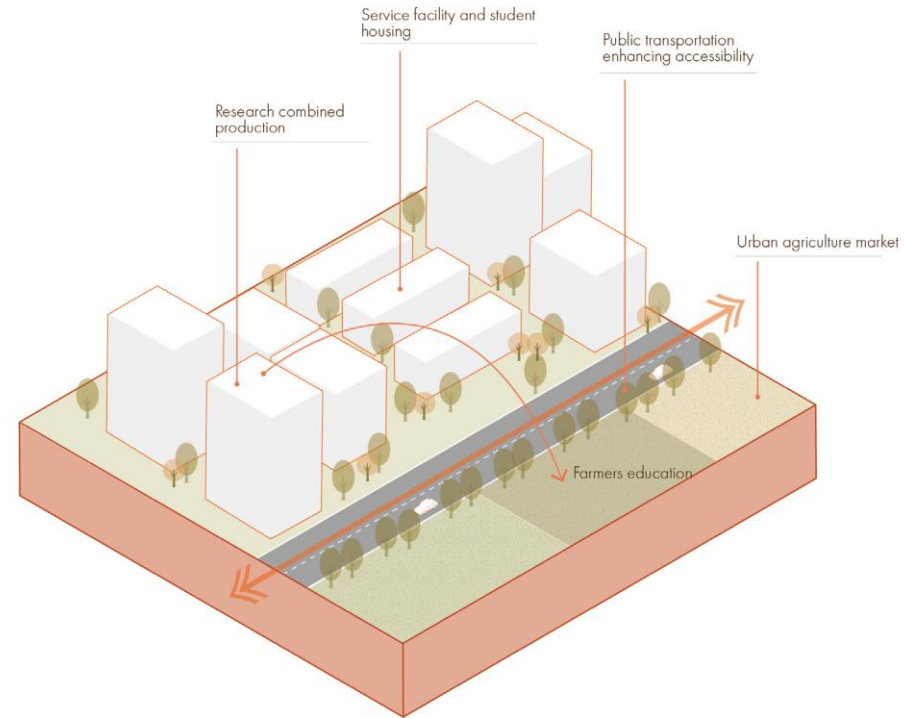
Dike Housing



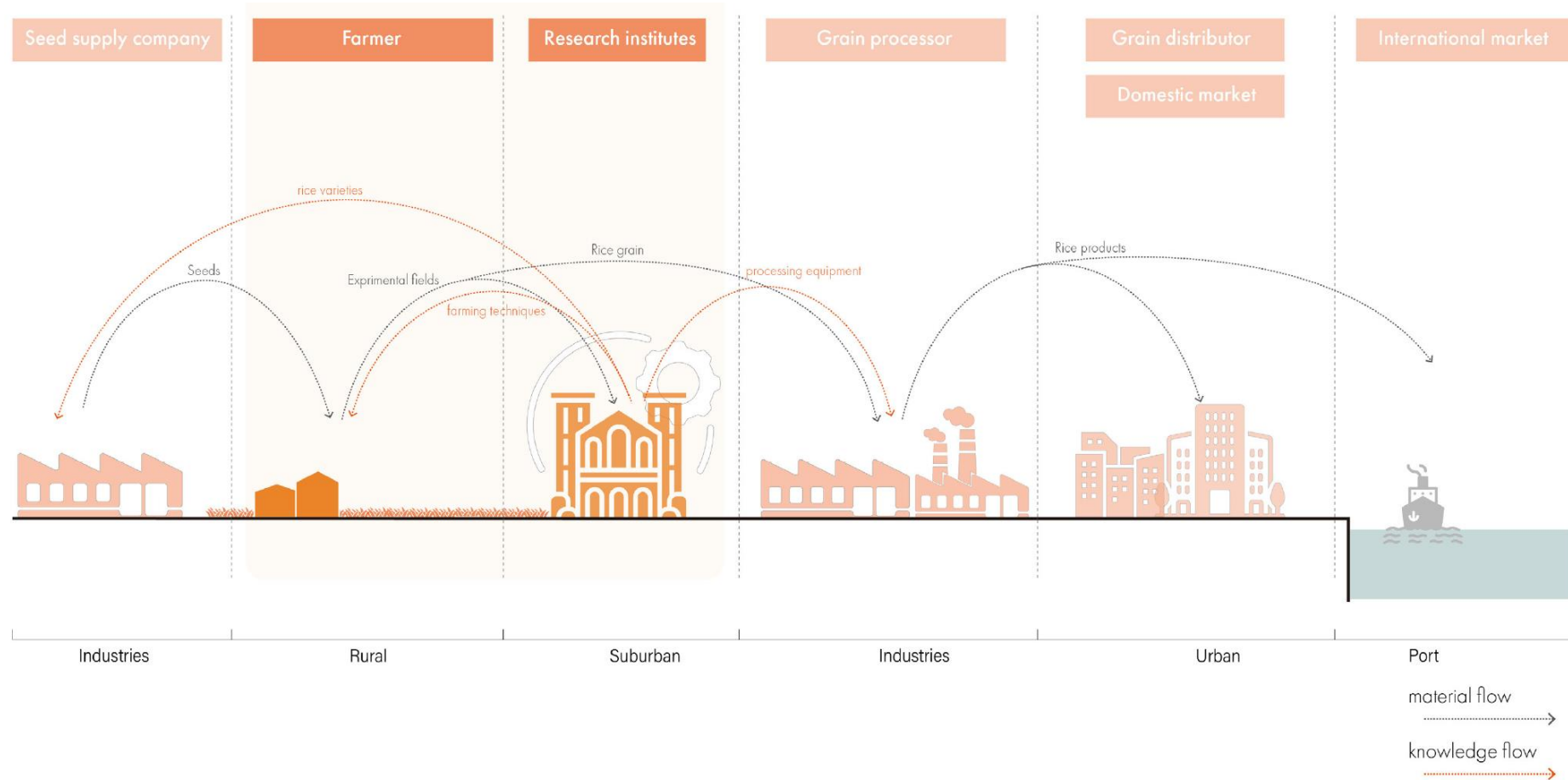
Buffer zone



## | Research embedded in rice production area



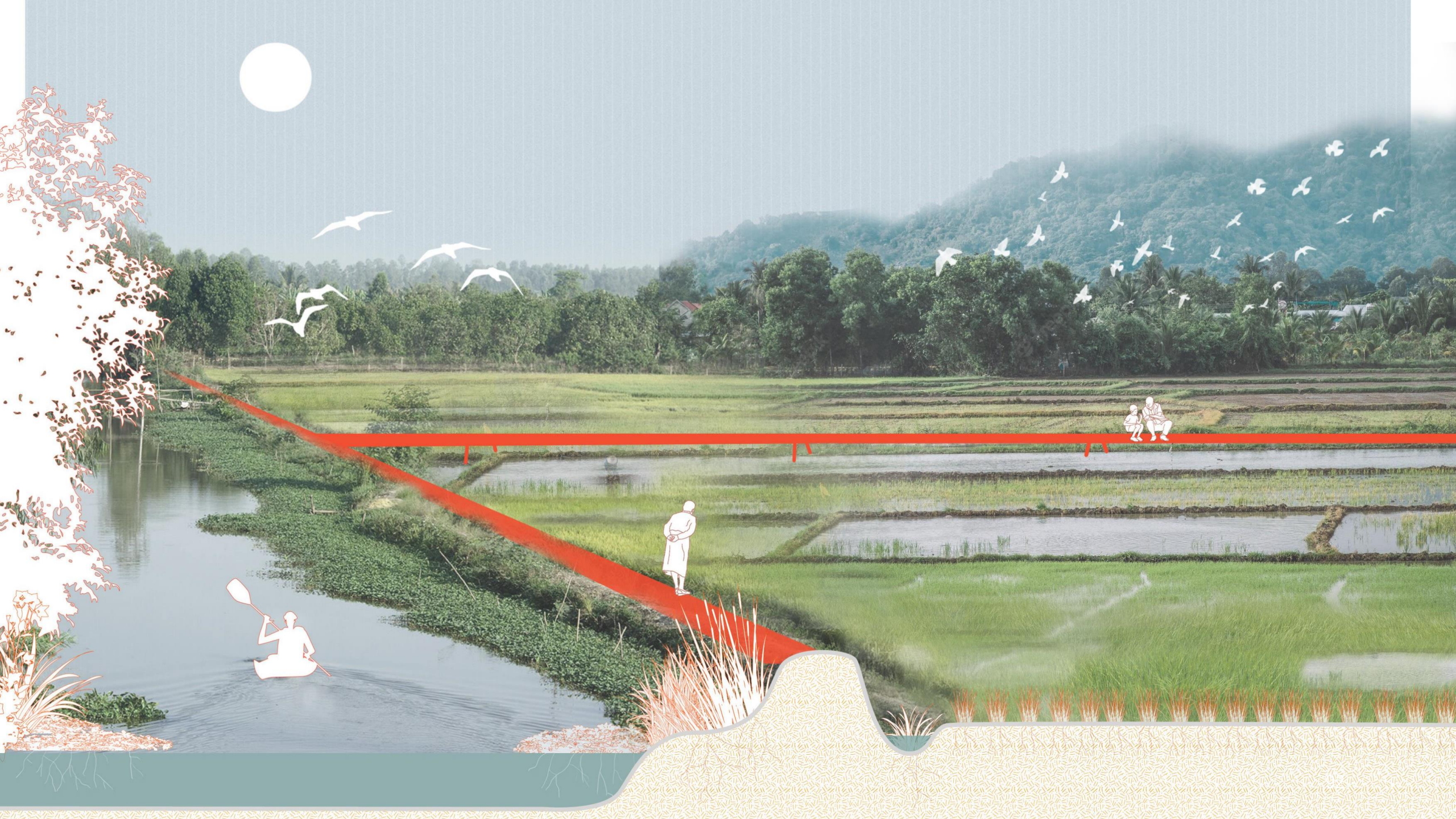
## | Research combined production



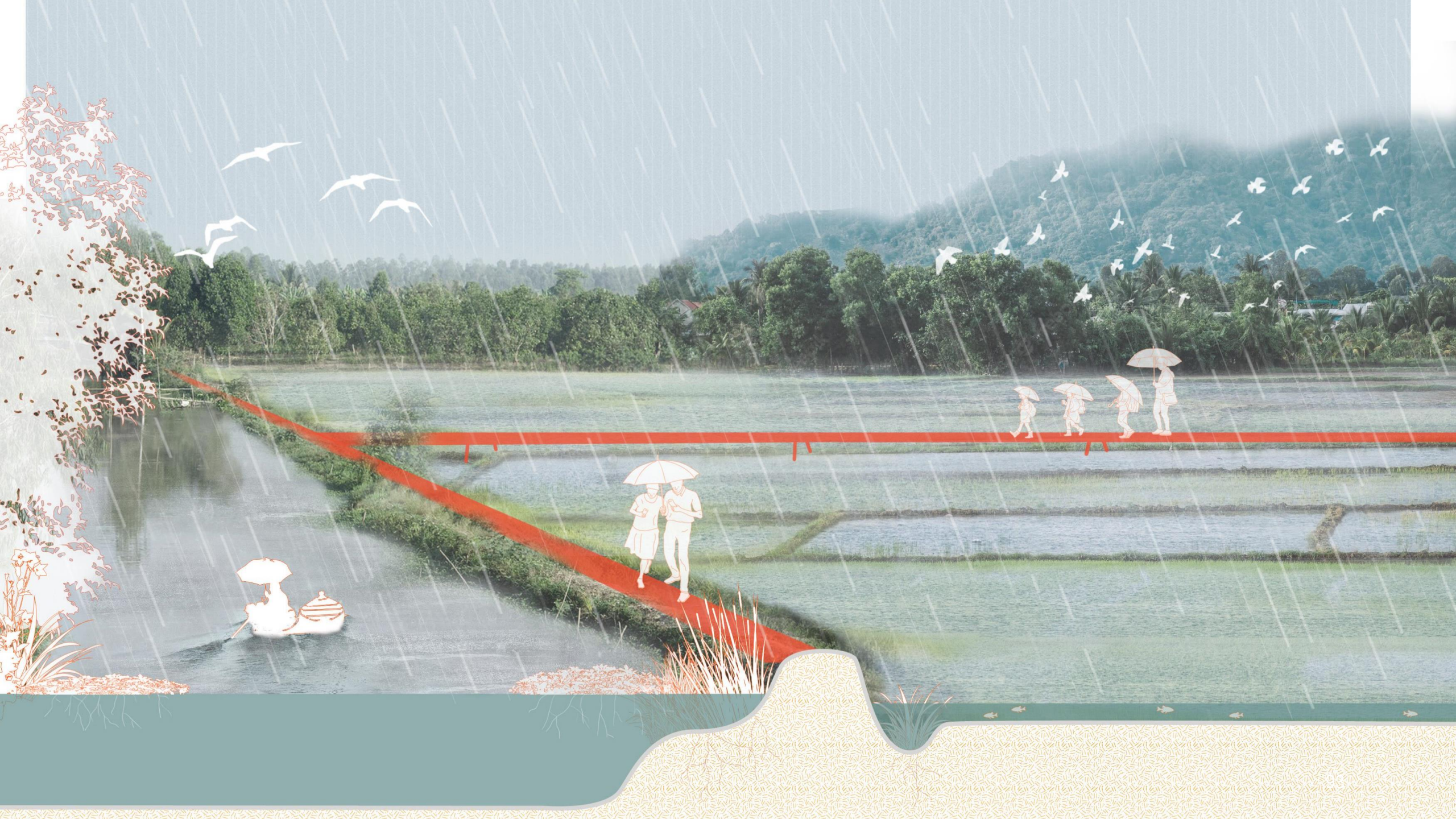




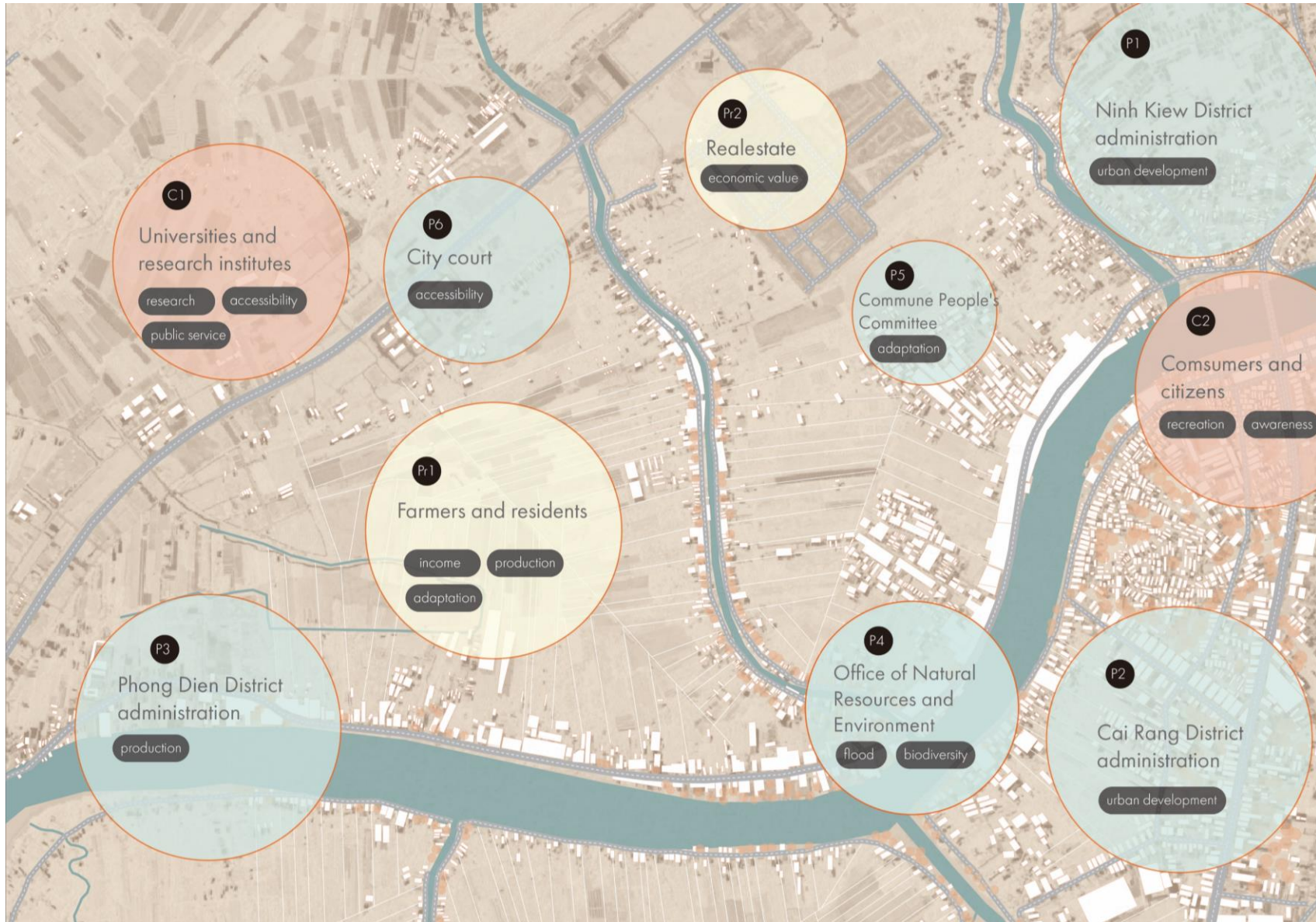


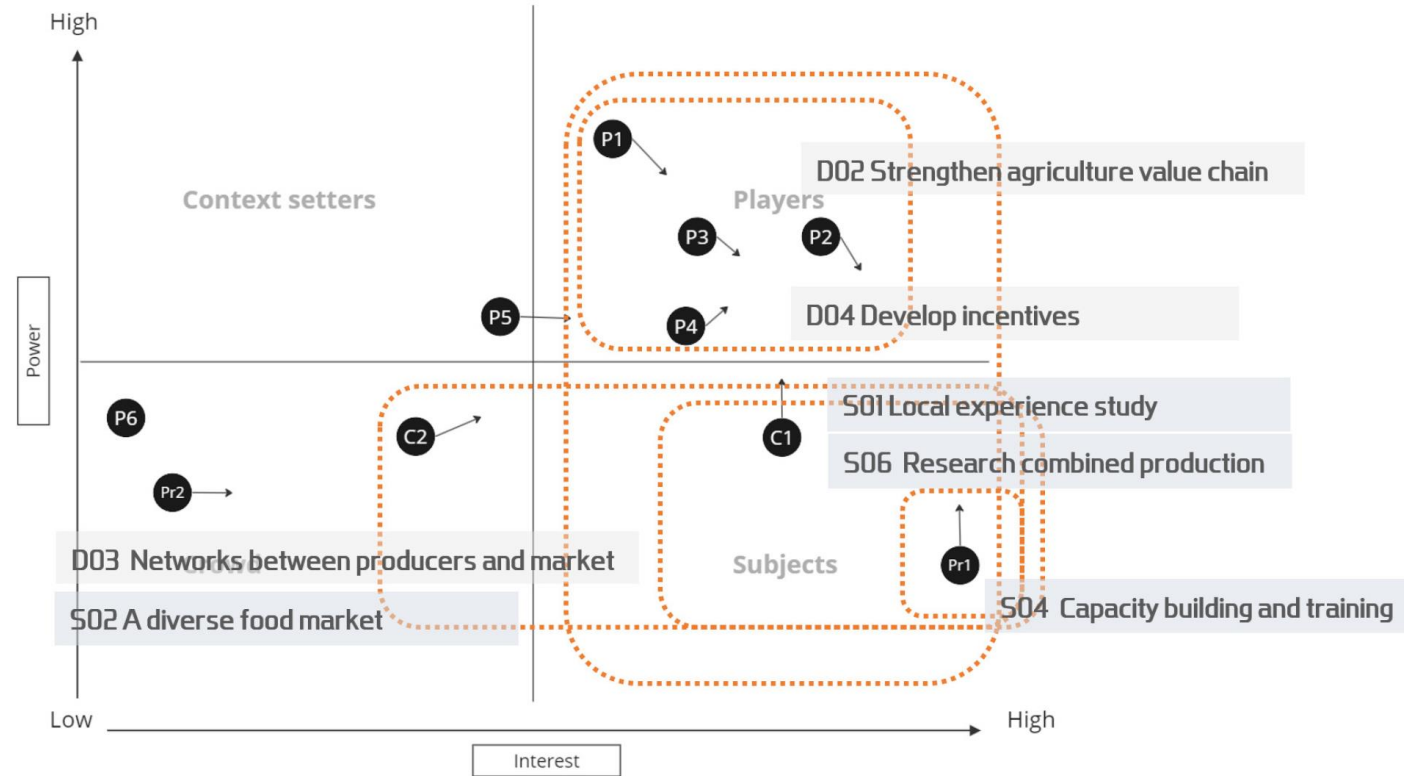


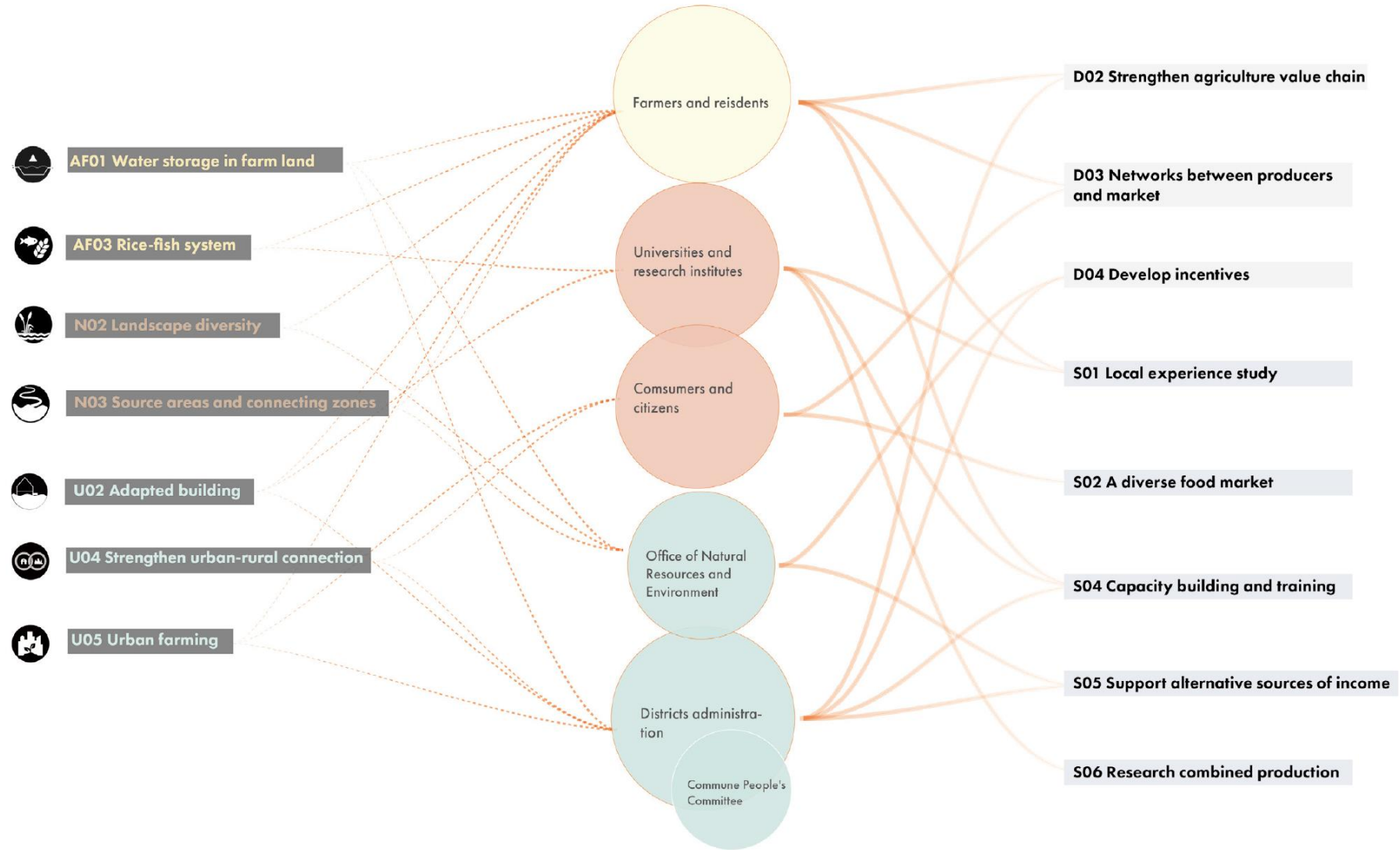






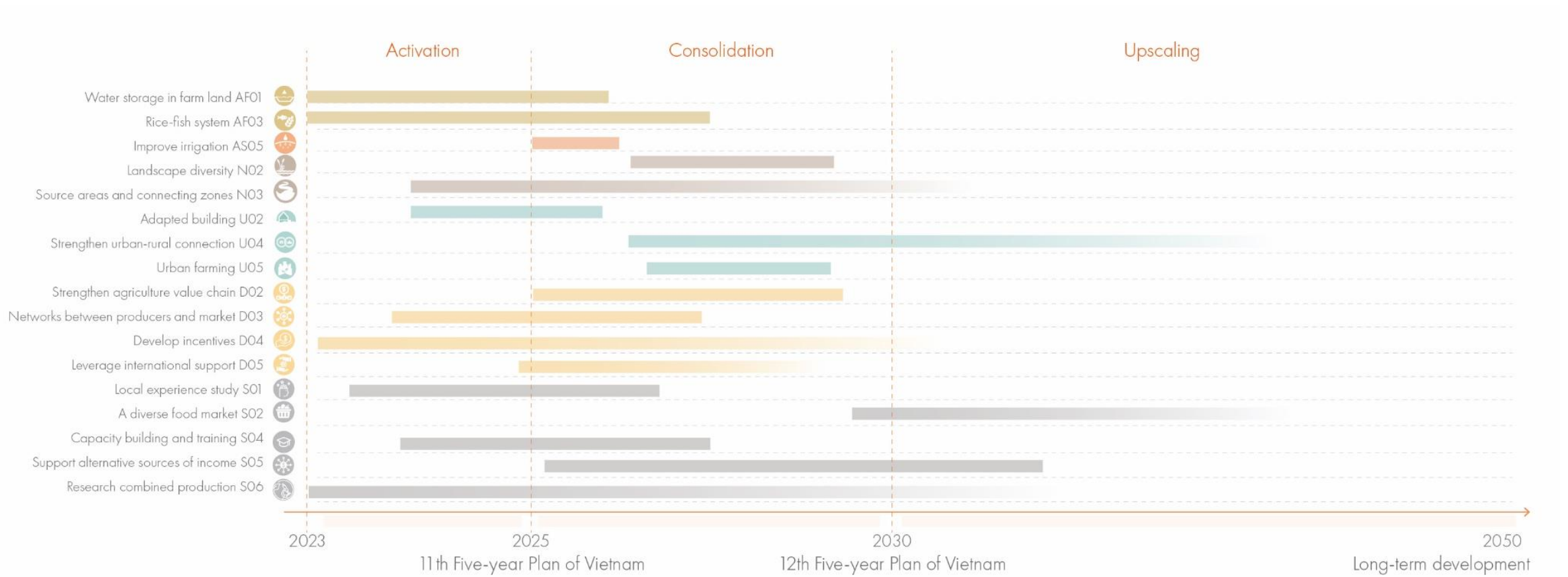








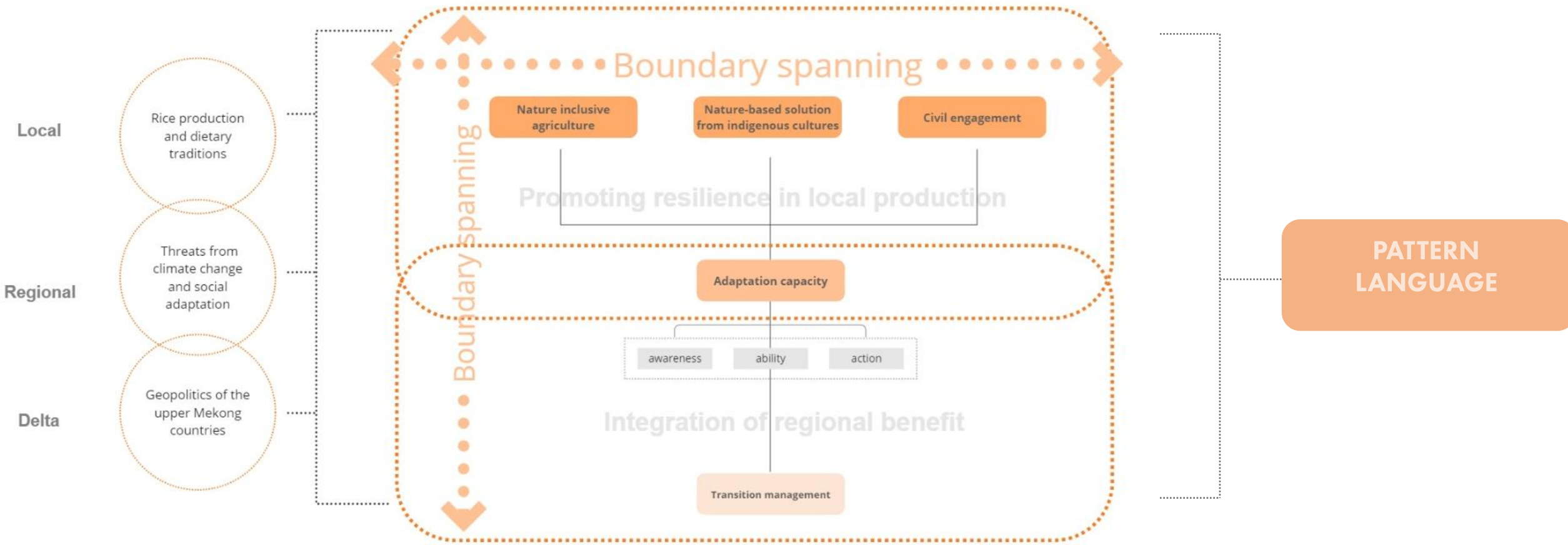
# | Phasing



-REFLECTION-

## Conclusion





## Scientific & Societal relevance

- Adaptive capacity
- Boundary spanning
- Engagement in the delta

Transferability





THANK YOU!

谢谢