The Living Estuary

A Study of Developing Landscape Spatial Adaptive Strategies to Integrate the Water, Ecosystem and Anthropo-Dynamics in the Estuary of Volta Delta, Ghana

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Landscape Architecture MSc Thesis – July 2018
TU Delft
Volta Delta, Ghana

Mahakam Delta, Indonesia
COASTAL EROSION

(Appeaning-Addo et al., 2015)
Problem Field

#2

URBANIZATION
AND
NATURE BALANCE
2.5% per year
POPULATION GROWTH

NATURAL RESOURCES
INDUSTRIALIZATION

NO LONG-TERM
PLANNING
Volta Delta, Ghana
WATER DYNAMICS

ECOSYSTEM DYNAMICS

WATER DYNAMICS

ESTUARY
How to develop landscape architectonic design principles for a future adaptive strategy to integrate the water, ecosystem, and anthropodynamics, to enhance spatial and living quality in the estuary of Volta Delta?
LANDSCAPE AS PROCESSES

stage 1
Periodic higher river water discharge
ESTUARY WATER DYNAMICS

- Periodic higher river water discharge
ESTUARY WATER DYNAMICS

- Periodic higher river water discharge
- Integration with nature system
ESTUARY WATER DYNAMICS

- Periodic higher river water discharge
- Integration with nature system
- Give space for erosion
- Re-establish buffer zone
- Conserve turtle breeding beach by not constructing hard edge on the coastline
Relation between Human Settlements, Natural and Cultural Landscapes
Design Principles
Design Principles
ADAPTIVE DESIGN STRATEGY

Scenario Building

stage 2
Sea level rise - Coastal erosion

Constant Variable

Independent Variables

Dependent Variables

- Erosion Control
- Water management
- Food Production
- Settlement & Mobility
Comparing the Dependent Variables

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
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<tbody>
<tr>
<td><img src="image" alt="Erosion Control" /></td>
<td><img src="image" alt="Water management" /></td>
<td><img src="image" alt="Food Production" /></td>
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<td><img src="image" alt="Settlement &amp; Mobility" /></td>
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</tbody>
</table>

- **Erosion Control**
- **Water management**
- **Food Production**
- **Settlement & Mobility**
- Water management
- Food production
- Water management
- Food production
- Erosion control
- Water management
- Food production
- Erosion control
- Settlement and mobility
- Water management
- Food production
- Erosion control
- Settlement and mobility
1. Relation between the river and the sea, existing groynes, and fishing communities.
2. Relation between the river and the sea, settlement and tourism facilities, lost wetlands.
3. Water inlet from river, town fringe, settlements and floodplain agriculture.
DESIGN
IMPLEMENTATION

stage 3
Trigger & Restrain
Trigger & Restrain

Growing spaces
Trigger & Restrain

Growing spaces

Circular systems
SITE 1: Compromising the erosion
SITE 1: Compromising the erosion
SITE 2: Recovering the Wetlands
Re-profiling the topography
Re-profiling the topography
Opening new channel

Re-profiling the topography
new market & community center
SITE 3: Buffering the Edge

existing condition

design intention
Informal Education
VULNERABILITY