Sustainable management of ecosystem services for wetland management, aquaculture development and climate change adaptation in the Mekong Delta

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High wetland biodiversity but limited awareness and information about their "values"

The high biodiversity and associated ecosystems services critical for peoples livelihoods and wellbeing

Trade-offs necessary in the future. How should these be assessed and managed? Need for good governance!
Need for a systems view - The MA Framework

Human Well-being and Poverty Reduction
- Basic material for a good life
- Health
- Good Social Relations
- Security
- Freedom of choice

Indirect Drivers of Change
- Demographic
- Economic (*globalization, trade, market and policy framework*)
- Sociopolitical (*governance and institutional framework*)
- Science and Technology
- Cultural and Religious

Direct Drivers of Change
- Changes in land use
- Species introduction or removal
- Technology adaptation and use
- External inputs (*e.g., irrigation*)
- Resource consumption
- Climate change
- Natural physical and biological drivers (*e.g., volcanoes*)

Ecosystem Services

LIFE ON EARTH - BIODIVERSITY

Strategies and interventions
Driver of change: Population growth, urbanisation and industrialisation
Agriculture and aquaculture intensification
Hydropower development and climate change

- Climate Change
- Biodiversity loss
- Chemical pollution (not yet quantified)
- Ocean acidification
- Stratospheric ozone depletion
- Nitrogen cycle (biogeochemical)
- Phosphorous cycle
- Global freshwater use
- Change in land use
- Atmospheric aerosol loading (not yet quantified)
A focus on enhanced biodiversity because it is crucial for peoples livelihoods, and probably enhance systems resilience....
Cultural non-material benefits obtained from ecosystems

...and provides ecosystem services

Provisioning
- Goods produced or provided by ecosystems

Regulating
- Benefits obtained from control of natural processes by ecosystems

Cultural
- ...and provides ecosystem services
Ecosystem Services provide a link between ecosystem functions and human well being

- **Ecosystem functions and processes**: e.g. nutrient and water cycling
- **Ecosystem Services**: e.g. Provision of clean water, production of rice and fish, water regulation and recreation
- **Human Well-being**: e.g. health, economic & social well being
A focus on wetlands and aquaculture in the Delta

Catfish farming along the Mekong River

Shrimp farming in mangroves and estuaries

Rice-fish farming in floodplains
Optimising "bundles" of ecosystem service

The trend

Intensive cropsystem

The challenge

Diversified cropsystem
<table>
<thead>
<tr>
<th>Ecosystem services</th>
<th>Extensive “sustainable” scenario</th>
<th>Intensive ”BaU” scenario</th>
<th>Going from from Scenario 1 to 2: who gains</th>
<th>who loses</th>
<th>Climate Change resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmed shrimp</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
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<tr>
<td>Climate regulation</td>
<td>![Image]</td>
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<td>![Image]</td>
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<tr>
<td>Storm protection</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
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<tr>
<td>Wild Fish</td>
<td>![Image]</td>
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<tr>
<td>Eco-tourism</td>
<td>![Image]</td>
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</table>

A proposed framework for measuring and monitoring ecosystem services at the site scale.

Stakeholder consultations a key part of the process

Thanh Phu resources planning

Can Gio preference choice discussions
Scenario preferences (%) pre (full line) and post-intervention (dashed line) for core area stakeholder groups.
Cross cutting themes discussed by stakeholder-groups:

1. Intensive shrimp aquaculture leads to conflicts between groups
2. Natural Resources are/have been decreasing
3. Importance of a healthy, clean and ‘happy’ living environment
4. Importance of storm and erosion mitigation services
5. Negative impacts of intensive aquaculture
Ongoing Projects and partners

- Sustainable management of ecosystem services for long term aquaculture production in the Mekong Delta. Nong Lam & An Giang univ. WWF, AIT.

- Mainstreaming an ecosystem based approach to climate change into biodiversity conservation planning in Vietnam. BCA (MONRE), WWF.

- Life under a new Climate: preparing rural livelihoods through ecosystem based adaptation at Lang Sen Wetland Reserve. WWF
Thank You!
How to optimize ES bundles and limit trade offs?

Natural ecosystem

Diversified cropsystem?

Good governance
Institutional change
Technical support

Degraded system

Intensive cropsystem

Provisional Ecosystem Services
Scenario preferences (%) pre (full line) and post-intervention (dashed line) for core area stakeholder-groups.
# Ecosystem services of Wetlands/paddy fields

<table>
<thead>
<tr>
<th>Ecosystem services</th>
<th>Livelihoods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water storage</td>
<td>Rice, crop farming</td>
</tr>
<tr>
<td>Fish</td>
<td>Fisheries and freshwater aquaculture</td>
</tr>
<tr>
<td>Sediment deposition / accumulation</td>
<td>Rice, crop farming</td>
</tr>
<tr>
<td>Nutrition</td>
<td>Rice, crop farming</td>
</tr>
<tr>
<td>Recharge groundwater</td>
<td>Supply of fresh water</td>
</tr>
</tbody>
</table>
**Ecosystem Services of River, stream**

<table>
<thead>
<tr>
<th>Ecosystem services</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Sediment transportation</td>
<td>Sand mining</td>
</tr>
<tr>
<td>Spawning, nursing grounds</td>
<td>Fishing</td>
</tr>
<tr>
<td>Migratory routes</td>
<td>Fishing</td>
</tr>
<tr>
<td>Waterway</td>
<td>Transport</td>
</tr>
<tr>
<td>Fresh water</td>
<td>Water supply for aquaculture, agriculture and living</td>
</tr>
</tbody>
</table>
## Ecosystem Services of Sand dune

<table>
<thead>
<tr>
<th>Ecosystem services</th>
<th>Livelihoods</th>
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</thead>
<tbody>
<tr>
<td>Sand dune, silt</td>
<td>crop farming (watermelon, peanut, cassava), Breeding</td>
</tr>
<tr>
<td>Coastal protection</td>
<td></td>
</tr>
<tr>
<td>Freshwater storage</td>
<td>Water supply for living, agricultural</td>
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<tr>
<td>Shelter</td>
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</tbody>
</table>
### Ecosystem services of tidal mudflat, brackishwater ponds

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<thead>
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<th>Ecosystem services</th>
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</thead>
<tbody>
<tr>
<td>Spawning, nursing ground of aquatic species</td>
<td>Fishing, breeding</td>
</tr>
<tr>
<td>Waterways</td>
<td>Transport</td>
</tr>
<tr>
<td>Ground, brackish water</td>
<td>Aquaculture (shrimp, crab, fish, oyster), salt</td>
</tr>
<tr>
<td>Sediment accumulation</td>
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</table>
## Ecosystem Services of Mangrove

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Against wind storms, anti-erosion</td>
<td></td>
</tr>
<tr>
<td>Coastal protection</td>
<td></td>
</tr>
<tr>
<td>Habitat of shrimps, crabs, fish, birds</td>
<td>Capture fisheries, wild seeds</td>
</tr>
<tr>
<td>Carbon Storage</td>
<td></td>
</tr>
<tr>
<td>Sediment retention</td>
<td></td>
</tr>
<tr>
<td>Water purification/</td>
<td></td>
</tr>
<tr>
<td>Timber</td>
<td>Forest plantation and maintenance</td>
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</table>