Tram Chim Wetland
Vulnerability and Climate Change

Regional Workshop
Phnom Penh Feb 2-3, 2012

Situated within the Plain of Reeds—a depression of 700,000 ha. Most converted to rice. One of the last remnants.

Ecosystems shaped by and dependent on the annual flood pulse of Mekong.

6 main communities

- Quế xá xanh (Cymbopogon niger)
- Quế xà lá ma (Oryza rufipogon)
- Quế xà nùng (Eleocharis dulcis)
- Quế xà xuyên (Ischaemum rugosum)
- Quế xà cúc (Melaleuca cajuputi)
- Quế xà cam (Panicum repens)
Dry season inundation caused by offseason rains: Eleocharis cannot produce tubers.
Key Climate Change Threats

- Increased temperature by 0.9-1.05°C
- Decrease in wet season rainfall (4-5% or 40-70mm)
- Increased erratic rainfall
- Increase frequency of extreme floods (4.0m)
- Longer flood duration
- Increased river flows by 2-11% in the wet season
- Increased river flows by 18-30% in the dry season

Existing issues

- Mismanagement practices, rooted from the uniform policy applied across the Special Use Forest system resulting in degradation of the ecosystems:
  - High water stocking all year round in the park due to the fire intolerance policy of the Special Use Forest system
  - Construction of tall ring dykes to enable water stocking has resulted in limiting intakes of fish eggs and fingerlings from Mekong flood water
  - Construction of internal dykes for fire control purposes causing fragmentation of habitat and impediment of internal flows
  - Protectionist approach barring involvement of local communities in resource use has led to resentment of locals toward the park, unsustainable use of resources, and arson
- Invasion of Mimosa Pigra

Other threats/upstream development

<table>
<thead>
<tr>
<th>In the high flow season</th>
<th>In the low flow season</th>
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</thead>
<tbody>
<tr>
<td>Under the same climate conditions as in 1985 - 2000, development brings about a decrease of 8-17% in river flow</td>
<td>Under the same climate conditions as in 1985 - 2000, development brings about an increase of 30-60% of in river discharge</td>
</tr>
<tr>
<td>The combined effects of development and climate change may cause a decrease in discharge of up to 13% at one station, but an increase of 3% at another, depending on the climate change scenarios and the location of stations</td>
<td>The effect of both climate change and development may cause an increase in discharge of up to 40-76%</td>
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</table>
Other threats: The 11 proposed mainstream dams in LMB

- The 11 proposed hydropower projects on the mainstream Mekong in the LMB will be the biggest threat to the survival of the wetland ecosystem of Tram Chim.
- With the accumulated retention time of the 12 projects, the timing of the annual flood and dry cycle that the ecosystem at Tram Chim has been shaped and depends on will be altered.
- Biodiversity of the park, comprising mainly waterfowls, will be threatened as the dams will prevent white fish from migrating to upstream of the Mekong to spawn.
- Further studies are needed on the impacts of the proposed dams in the LMB.

Implications for hydrology

- **Increased temperature** => increased evaporation => reduced ground water level in the dry season
- **Reduced wet season rainfall** => not likely a key driver for reducing wet season flooding.
- **Increased erratic rainfall** => short duration, localized ponding in low & medium areas.
- **Increased depth and duration of flooding** => increased depth and duration of standing water in the wetland.
- The combined effect of the above system to climate change can be summarised as:
  - (a) a longer flood season with greater flood depths,
  - (b) a shorter dry season with increased water losses through evapo-transpiration and
  - (c) increased erratic rainfall that causes short-term, localized ponding.

Implications for habitats (Melaleuca tree, seasonally inundated grassland, aquatic plant communities)

- More fire risk at the end of the dry season due to increased temperature
- Lessened annual growth of melaleuca with shortened annual dry period.
- More dead biomass accumulation with shorter annual dry period for decomposition
- Degraded water quality & aquatic life through lower D.O
- Reduced food availability for Sarus Crane.
- Expansion of emergent & floating plant communities

Implications for biodiversity (Sarus crane, waterfowls, fish)

- Reduced population of Sarus Crane due to shortage of food, shortened feeding season.
- Reduced fish diversity and productivity.
  Fishery productivity might increase with increase flood depth. However, shortened dry period will lead to accumulation of dead organic matters, lowering D.O. Combined effect is reduction of fish diversity and productivity.
- Proposed dams: reduce fish productivity and water birds
Adaptation measures

Goal:
Increase resilience of wetland ecosystem through maintaining integrity and health of the wetland ecosystem.

Objectives:
1. Addressing “adaptation deficit” (existing issues and other threats).
2. Addressing predicted climate change issues

Indicative costs for adaptations:
$750,000 upfront for addressing existing issues
$100,000/year for CC adaptation

<table>
<thead>
<tr>
<th>Pressure/Threat</th>
<th>Recommended Action</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Hydrology mismanagement</td>
<td>Permanent adoption of the Integrated Fire &amp; Water Management Strategy</td>
<td>10,000/year</td>
</tr>
<tr>
<td>1.2 Tall ring dykes</td>
<td>Lower dykes or build spillways</td>
<td>500,000</td>
</tr>
<tr>
<td>1.3 Inner dykes</td>
<td>Demolish or make dyke cuts</td>
<td>20,000</td>
</tr>
<tr>
<td>2. Unsustainable use of resources</td>
<td>Continue with Resource Users Groups</td>
<td>10,000/year</td>
</tr>
<tr>
<td>3 Invasion of alien species</td>
<td>Continue with mimosa control program</td>
<td>50,000/year</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Climate change threat</th>
<th>Recommended Action</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increased evaporation</td>
<td>Compensate for water loss</td>
<td>2,000/year</td>
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<tr>
<td>2 Increased erratic rainfall</td>
<td>Drainage of surface ponded water in the dry season</td>
<td>500,000</td>
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<tr>
<td>3 Lack of data on climate change</td>
<td>Monitor</td>
<td>20,000/year</td>
</tr>
<tr>
<td>4 Increased in flood depth and duration</td>
<td>Operate sluice gates to facilitate water exchange to improve water quality (D.O)</td>
<td>2,000/year</td>
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</tbody>
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Proposed LMB dams: No local adaptations possible