Dynamics of Social-ecological Traps: The Case of Small-scale Fisheries in the Philippines

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### State of SSF: Global Scenario

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Large-scale</th>
<th>Small-scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual catch</td>
<td>$5-$7 million</td>
<td>$&lt; 2 million</td>
</tr>
<tr>
<td>Annual catch reduced to</td>
<td>~200 million</td>
<td>~20 million</td>
</tr>
<tr>
<td>Annual fossil fuel</td>
<td>~26 million</td>
<td>Almost none</td>
</tr>
<tr>
<td>Annual catch per ton</td>
<td>~87 million</td>
<td>~6 million</td>
</tr>
<tr>
<td>Small catch per ton</td>
<td>~2.4 million</td>
<td>~4.4 million</td>
</tr>
</tbody>
</table>

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Source: Pauly, 2006

Photo Credits: Mark Atole, Blacksmith Institute
**Small-scale fisheries (SSF): No universal definition**

<table>
<thead>
<tr>
<th>Country</th>
<th>Small-scale fishery definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei Darussalam</td>
<td>Artisanal; boats up to 60 ft. (18.3 m) LOA (.3nm)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Small-scale: vessels &lt;5 GT/10 HP engine (0-3 nm); and &lt; 25 GT/50 HP engine (3-7 nm)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Inshore or traditional: boats &lt;10 GT (within 3 nm)</td>
</tr>
<tr>
<td>Philippines</td>
<td><strong>Municipal / capture fisheries: Boats &lt;3 GT (&lt;15 KM, ~8 NM)</strong></td>
</tr>
<tr>
<td></td>
<td>Fishponds: &lt;5 hectare fishponds</td>
</tr>
<tr>
<td></td>
<td>Mariculture parks: Bamboo fish cages 5x5 m or 10x10m</td>
</tr>
<tr>
<td>Thailand</td>
<td>&lt;12 nm mainly gillnets</td>
</tr>
</tbody>
</table>

Source: SEAFDEC

Photo Credits: Mark Atole, Blacksmith Institute
State of SSF in the Philippines

One of the top fish producers in the world

Fish production increasing particularly from aquaculture

Philippine fishers still poorer compared to other sectors

Early adopter of co-management in fisheries governance; national fisheries plan and policies in place

Annual Fisheries Production (1980-2012), Philippines
Source: Bureau of Agricultural Statistics, Country Stat
Social-ecological traps

Situations in which there are strong reinforcing controls that prevent the flexibility needed for adaptation and leads to undesirable and persistent maladaptive situations

(Carpenter and Brock, 2008; Steneck et al., 2011)
Systems-based Human Ecology Framework

Cultural Adaptation Template

Dyball and Newell, 2014: 126
Attributes of Traps (adapted from Barry and Bateman, 1996)

- **Constituency**: Stakeholders’ perception of SES and SET
- **Temporality**: Time element (recognition, effects, action)
- **Scalarity**: Scale SET is felt, act upon
- **Symmetry**: Type of action and changes
- **Cognizance**: Difference in effects/impacts to different stakeholders
- **Exclusivity**: Awareness of the SET; social learning
- **Control and power to identify and act on the SET**
Case Study Sites (Philippines SSF)

- Marilao-Meycauayan-Obando River System (MMORS), Bulacan, Philippines
- Balingasag, Misamis Oriental, Philippines
- Iligan Bay, Misamis Occidental, Philippines
Case Study Sites (Philippines SSF)

Predominance of small-scale fisheries and coastal areas
Issues on multiple use of the ecosystem
Primary interventions were done

- Freshwater and brackish water fish farming
- Mariculture park
- Capture fishing Mariculture park
- Macalajjar Bay
- MISAMIS ORIENTAL
Types of fish ponds and fish cages

- HDPE circular fish cage (Norwegian cage) in Lopez Jaena mariculture park, Misamis Occidental
- Bamboo fish cage in Lopez Jaena mariculture park, Misamis Occidental
- Earth-diked fish ponds in Bulacan
- Local design of the Norwegian cage in Balingasag mariculture park, Misamis Occidental
- Netted fishponds in Bulacan
Fishponds developed even pre-colonial times
Obando was formerly known as “Catanghalan”

1900s

1940

1950

1960

1970

1980

1990

2000

2010—present

Focus on production

Freshwater aquaculture progressed

First batch of tilapia (O.mossambicus) from Thailand (Dr. Deogracias Villadolid)

Promotion of mariculture parks development

Co-management and NRM

Agriculture and Fisheries Modernization Act (1997)

MTFMDP

National Fisheries Policy and Plan

Fisheries Industry Production Plan

Agrikulturang Maka-masa

GMA for Fisheries

UNCLOS / EEZ

Bangkok Dec of Strat for Aquaculture Devt

Fishery infrastructure and aquaculture

Large-scale fishery devt

Philippine Fisheries management plans and policies: Timeline
Cultural adaptation template (left) translated into a livelihood security problem space (right)
Cultural adaptation template (left) translated into a specific-system-of-interest in MMORS based on the livelihood security problem space (right)
## Trap Attributes in MMORS

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constituency</td>
<td>• Upstream-downstream dynamics</td>
</tr>
<tr>
<td>Temporality</td>
<td>• Legacy pollution / slow variables</td>
</tr>
<tr>
<td>Symmetry</td>
<td>• Hierarchy in decisions in fish farms</td>
</tr>
<tr>
<td>Cognizance</td>
<td>• Aware of pollution problem; solution “not from my end”</td>
</tr>
<tr>
<td>Exclusivity</td>
<td>• Technical knowledge limited to certain sectors / traditional know-how</td>
</tr>
<tr>
<td>Scality</td>
<td>• Mismatch between river management and fisheries management</td>
</tr>
<tr>
<td>Action/response</td>
<td>• Adaptation; “slider effect” (loans, remittances from relatives)</td>
</tr>
</tbody>
</table>
Cultural adaptation template (left) translated into a specific-system-of-interest in mariculture parks based on the livelihood security problem space (right).
### Trap Attributes in Mariculture Parks

<table>
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<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constituency</td>
<td>• Absentee fish cage operators; fish cage caretakers – labour</td>
</tr>
<tr>
<td>Temporality</td>
<td>• Slow and fast variables</td>
</tr>
<tr>
<td>Symmetry</td>
<td>• Hierarchy in decisions in fish farms</td>
</tr>
<tr>
<td>Cognizance</td>
<td>• New project; disasters made them aware of their vulnerability</td>
</tr>
<tr>
<td>Exclusivity</td>
<td>• Unaware of technical data/ traditional know-how</td>
</tr>
<tr>
<td>Scality</td>
<td>• Mismatch mariculture management</td>
</tr>
<tr>
<td>Action/response</td>
<td>• Focus on material side of poverty – income/employment</td>
</tr>
</tbody>
</table>
Social-ecological trap structure

Systemic structure
- Weak and missing feedback links
- Time lags
- “limits to growth” and “success to the successful”

System archetypes

Adaptation
- Short term, “slider effect”

Focus on material side of poverty
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Thank you very much.  
*Maraming salamat po.*

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References


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• PHILIPPINE STATISTICS AUTHORITY 2014. Fishermen, Farmers and Children remain the poorest basic sectors.