How artisanal stake-net fishery survived for last ~300 years in the dynamic and competitive environment?

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Introduction

- Management of fisheries, especially coastal fisheries, provide unique challenges due to its **dynamic nature**

- Managing small-scale fisheries (**monitoring & enforcing regulations**) is much more challenging
  - high diversification & scattered nature (species; crafts; methods & fisher)
  - dynamic patterns in their spatial and temporal usage
  - supply landings directly to consumers

- **Equitable sharing of natural resources**, with the involvement of community, seems to be the most effective in managing these **common property resources**
Introduction

- In developing world these **catch sharing mechanisms ensure**,
  - equitable sharing of natural resources
  - equitable sharing of economic gains
  - poverty reduction

- Equitable sharing of aquatic resource, through a community based management system, is being practicing from 1721,
  - in the Negombo lagoon, Sri Lanka
  - for Stake-net fishery
Introduction

- **Negombo Lagoon**
  - 62.3 km² (with wetland system)
  - ~20,000 people depending

- **Shrimp resource**
  - Artisanal & commercial gear types
Introduction

**Stake-net**

- Stationary gear
- Operate in ~3.5 m depth
- Consists of a bag & two wings (15m) made of nylon nets.
- Nets are fixed, at night with the onset of tidal flow,
  - to target shrimp sub-adults migrate from lagoon to sea.
Introduction

Stake-net

- Designated **22 Stake-net fishing sites** at lagoon mouth
- Number of **gear units** - 65
Access right (*Pelle*) is tightly restricted to “**culturally homogeneous**” eligible members who are,

- fishermen from 4 Stake-net societies
- living close to the fishing sites
- Roman Catholic, Sinhalese
- married male descendents of a member of Stake-net association

TOTAL ~ 300 fishermen (nets)
Productivity differs among sites at different months.

Highly productive months a fisher earn US$ 600 over night.
Designated 22 fishing sites are allocated on a **rotational basis** by a **lots system**
- Once a year - “Big Pelle”
- Daily - “Small Pelle”

Each stake-net has **equal opportunity** to fish in all the fishing sites at least once a year

Fishery is well organized due to active involvement of the **Roman Catholic church**

Once the fishing sites have been allocated to Stake-nets, no other fishermen outside the rotational system nor a different gear can be used in that site.
Introduction

Previous studies

Detailed explanation of the stake-net management system and fishery had been reported by
- Amarasinghe et al. (1997)
- Gunawardena and Steele (2004)
Introduction

Objectives

➢ To identifying the key **features/conditions** of Stake-net fishery to survive for last ~300 years

➢ To findout the **present status** of the fishery and whether any **management reforms** to face **present-day challenges**
Data & information were collected from 2011 - 2013 by contacting,

- active fishermen
- community leaders
- shrimp collectors
- auctioneer
Results

Conditions contribute for the “success” (efficiency / equity and sustainability)

- Community level characteristics
- Fishing method characteristics
- Management structure and its characteristics
- Resource characteristics
Results

Community level characteristics

- Sharing **common norms**
  - Religion and nationality
  - Permanently resides near the fishing sites
  - Gear-type
  - Level of income

- **Minimal boundary conflicts**
  - Permanent residence near the fishing sites
  - Resource boundaries are well understood
  - Well defined fishing sites
Results

Community level characteristics

- **Small size** of fisher groups
  - Entire fishing resource → 4 different small societies → among individual members
  - High opportunities to engage in collective action

- **Accumulated indigenous knowledge** (social capital)
  - Dynamics of resource (catches)
  - Experience on handling critical crises/conflicts situations

- **Higher interdependence** among group members
  - Preventing access by outsiders
Highly productive shrimp fishing sites are accessed by Stake-net fishermen, thus, their income & level of dependency on shrimp resource are high compared to other fishers (gears)

CPUE variations among different fishing gears operate in Negombo lagoon & adjacent coast in 2011
SN: Stake-net; NMT: Non motorised trawling; MT: Motorised trawling; CN: cast net; BP: Brush part; TN1 Trammel net; GN: Gillnet; FN: Fyke-net
Results

Fishing method characteristics

- **Minimum boundary conflicts**
  - Fixed gear along the channels ➔ Low level of mobility
  - Pre-designated specific site for each fisher
  - Equal opportunities for each fisher

- **Opportunities for part-time jobs**
  - Night-time operational nature
Higher predictability of productive sites & months of a year
- Monsoon/Tide
- Decide whether to fish or not

Variation of mean monthly catch per unit effort of three shrimp species by Stake-net in 2011
Results

Management structure

- **Well defined & documented rules** in mother-tongue - Sinhalese
  - Basic rules are similar in all four societies
  - There is a provision for society specific differences

- **Autonomy & Flexibility**
  - Rules can be introduced; modified or removed at AGM with the consent of majority
    - Eg: 2012: - Fishing location & time changed (Pitipana)

- **Rules relevant to whole association** are made at integrated AGM

- Equal opportunities for each fisher
Strict **control over expanding fishing effort over generations**
- Ensure sustainable utilization & minimize conflicts among fishers

<table>
<thead>
<tr>
<th>Eligibility criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Only male fishers belong to member families</td>
</tr>
<tr>
<td>• Inheritance to youngest son of the family (after the death of member)</td>
</tr>
<tr>
<td>• Life membership</td>
</tr>
<tr>
<td>• New applicants need to demonstrate their understanding of the fishery and skills in operating gear for 6 month being on probation</td>
</tr>
<tr>
<td>• Married males – descended from members are eligible</td>
</tr>
<tr>
<td>• Only 2 new memberships per year since 1972</td>
</tr>
</tbody>
</table>
| Society              | No of Fishermen | 1997<sup>a</sup> | 2004<sup>b</sup> | 2013  
(Present study) |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Duwa-Pitipana Society</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Group A</td>
<td>50</td>
<td>48</td>
<td>65</td>
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</tr>
<tr>
<td>Group B</td>
<td>50</td>
<td>41</td>
<td>40</td>
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<tr>
<td><strong>Grand street Society</strong></td>
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<tr>
<td>Group A</td>
<td>51</td>
<td>50</td>
<td>48</td>
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</tr>
<tr>
<td>Group B</td>
<td>44</td>
<td>51</td>
<td>50</td>
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<tr>
<td><strong>Sea street Society</strong></td>
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<tr>
<td>Group A</td>
<td>36</td>
<td>40</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>36</td>
<td>40</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td><strong>Pitipana Society</strong></td>
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<tr>
<td></td>
<td>39</td>
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<td>40</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>306</td>
<td></td>
<td>319</td>
<td></td>
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</tbody>
</table>

<sup>a</sup> Amarasinghe et al. (1997)
<sup>b</sup> Gunawardena and Steel (2004)
## Results

### Management structure

- **Strict control over expanding fishing effort over generations**
  - Ensure sustainable utilization & minimize conflicts among fishers

### Rules and regulations

<table>
<thead>
<tr>
<th>Rule</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisher should have his own tools (net; canoe; stakes) for fishing</td>
<td></td>
</tr>
<tr>
<td>Fine and punitive actions for those who break rules</td>
<td></td>
</tr>
<tr>
<td>If a fisher found to be using someone else canoe, 2 fishing turns will</td>
<td>cancelled</td>
</tr>
<tr>
<td>If a canoe is damaged respective fisher will be given a period of 2</td>
<td>weeks to get it repaired, during this period he may use a borrowed canoe</td>
</tr>
<tr>
<td>weeks to get it repaired, during this period he may use a borrowed</td>
<td>canopy</td>
</tr>
</tbody>
</table>
Results

**Management structure**

- **Strict control over expanding fishing effort over generations**
  - Ensure sustainable utilization & minimize conflicts among fishers

<table>
<thead>
<tr>
<th>Cancellation of the membership</th>
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<tbody>
<tr>
<td>• If a member dies and have no sons to take over</td>
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<tr>
<td>• If a fisher doesn't operate his gear more than 10 times per year</td>
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<tr>
<td>- (Sea street)</td>
</tr>
<tr>
<td>• If fisher doesn’t fish continuously for 5 years</td>
</tr>
<tr>
<td>- (Grand street)</td>
</tr>
<tr>
<td>• Membership expiration due to absent for two consecutive years</td>
</tr>
<tr>
<td>- overseas jobs - (2008) - (Grand street)</td>
</tr>
</tbody>
</table>
Results

Management structure

- **Low coast surveillance mechanism**
  - Close proximity – easy monitoring
  - Fixed net — Specific time — could easily be detected

- **Low cost conflict resolving mechanism**
  - Roman catholic church – respect towards church & religion
  - Each society meets once in three days for 1hr followed by conflict resolution if there are any

Just before *Pelle* Meeting

*Pelle* Meeting
Results

Management structure

Financial strengthening of supportive network
- Funds collected through
  - Membership fee
  - Auctioning additional fishing sites
  - Through fines

  - Death donations
  - Payments for widows
  - Old and disabled members
  - Loan scheme to buy boats
  - Donation to church
Results

Resource characteristics

- Annual recruitment & daily movements via narrow lagoon mouth
  - more probability to be captured
  - results high yields

- Short life-span
  - Control over equitable sharing but low emphasis on status of the resource
  - Annual/bi-annual recruitment
Future challenges conclusions

- Lost of fishing sites due to siltation
  - introduction of new sites

- No guarantee that the cumulative past experience of a society will necessarily fit them to solve new problems & threats

- Provides a useful blueprint upon which the management of other fisheries might be based
Acknowledgements

- Department of Aquaculture and Fisheries, Faculty of Livestock; Fisheries and Nutrition Wayamba University of Sri Lanka

- Fisheries Training Programme
Resources


