Deterring Poaching from a Common Pool: Experimental Evidence from TURFs in Chile

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1. Objectives and motivation

Research focus:

• Protection of a common-pool resource from poaching by outsiders.

• We study how the ability of a group to manage their resource is affected by:
  – their ability to monitor and deter encroachment
  – the government’s role in enforcing CPR boundaries
1. Motivation

- Our study is motivated by a Chilean management system based on TURFs.
- Fishing organizations are responsible for developing a management and exploitation plan.
- Creation of TURF may exclude individuals who have a history of harvesting from that zone – they become “outsiders”.
- Success depends upon:
  (a) ability to resolve collective action problem, and
  (b) prevent poaching by “outsiders”.
Monitoring and Enforcement of Chilean TURFs:

- Chilean Navy and National Fisheries Service responsible for monitoring, **but rare**.
- TURF members can monitor themselves or hire a 3rd party.

Conflicts related to the use of territory and illegal extraction!!
2. Experimental design and Procedures

-The analysis is based on a framed field experiment conducted with artisanal fishermen in central-southern Chile (problem of extraction of loco, wild abalone).

-The experiment considers:

• 2 groups of fishers (“insiders”/“outsiders”) and 2 zones of extraction.
• “Insiders” manage a TURF (renewable CPR)
• “Outsiders” can poach from TURF
• Vary the mechanism for monitoring and enforcing poaching
T1. Baseline Treatment

- Blue: 70
- Yellow: 45
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T1. Baseline: key features

- 6 subjects per group: 3 blue + 3 yellow
- Each person can harvest up to 5 *locos* per round from his/her own zone
- Each *loco* is worth Ch$ 500
- Renewable resource
- Critical stocks: fishery could be closed permanently
- Max 10 rounds
- Blue can communicate, yellow cannot
2. Treatments...

**T1-Base line:** 2 groups, 2 zones; no enforcement/no poaching.

**T2-Poaching/No enforcement:** Similar to T1, but yellow can harvest blue locos, no enforcement.

**T3-Poaching with external enforcement:** Similar to T2, but authority can “patrol” de blue zone with some probability (1/9) and impose sanctions ($2,000 Ch$ per unit) conditional on detection of a yellow fisher with blue locos.

**T4-Poaching with local enforcement:** Similar to T2, but “insiders” could pay for monitoring and impose sanction.

- $250 → 1/6 probability that one of the 3 outsiders is monitored
- $500 → 2/6 probability that one of the 3 outsiders is monitored

**T5-Combination of external and local enforcement.** If someone monitored by both only pay one fine.
• Basic predictions

  – Local enforcement (T4) and Combined treatment (T5) should be same as Baseline (T1).
    • Local enforcement can fully deter poaching.

  – Weak external enforcement (T3) should be same as poaching (T2).
3. Experimental procedures

- Participants lives in 11 fishing villages in central-southern Chile. All members of organizations having TURFs.
- 210 fishermen participated in the experiments. Individuals were assigned to **35 groups**. *(Replicated with 204 university students, not presented here).*
- Each session consisted of a treatment with a maximum of 10 rounds.
Fishing Villages
4. Results

Ending biomass-blue zone

- Baseline “close” to cooperative outcome
- Insiders can communicate
Poaching does not destroy resource as quickly as predicted.
1. Baseline
2. Poaching
3. External

4. Local
5. Both

**Weak External Enforcement** reduces poaching, even though it should have no effect.
1. Baseline
2. Poaching
3. External
4. Local
5. Both

Graphs by treatmentid

- **Local & Both** not much different than External.
- Insufficient investment in deterrence.
Ending biomass-yellow zone

Yellow Zone (Outside)

1. Baseline
2. Poaching
3. External
4. Local
5. Both

Mean Ending Biomass Cooperative
Non-coop

Yellow zone harvests do not vary by treatment

Graphs by treatmentid
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<th>Treatment</th>
<th>Insiders in Outsiders' Zone</th>
<th>Outsiders in Outsiders' Zone</th>
<th>Total Outsiders</th>
<th>Mean Total Harvest</th>
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**Under-investment in monitoring**

**30%-50% of minimum investment needed to deter poachers**
5. Results summary

♦ The possibility of poaching in the absence of monitoring and enforcement do not destroy the resource as quickly as predicted.

♦ In T2 the insider’s zone is over-exploited and the fishery collapse.

♦ External (weak) enforcement (T3) did reduce poaching.

♦ There is no much difference between local enforcement with respect to external enforcement. There is under investment in local enforcement.

♦ Results suggests that insiders are able to coordinate harvest decision but not enforcement efforts.