Small-Scale Fisheries and Institutional Reform in Rural Tanzania

Paul Onyango¹ Matthew Reimer² Yaniv Stopnitzky³

¹University of Dar Es Salaam

²University of Alaska–Anchorage

³University of San Francisco

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Fisheries in Developing Countries

- Small-scale fisheries employ the majority of world fishers, providing food and livelihoods to 100s of millions of fishers and their families (FAO).
- In these institutional settings, "top-down" approaches from developed countries, which have successfully generated billions of dollars in new wealth, are not viable.
 - Physical and information infrastructure required for effective implementation and monitoring is absent.
- So understanding mechanisms that foster strong local institutions for small-scale fisheries management is of critical importance.

Preliminary Results

Fisheries in Developing Countries



Importance of Institutions in Development

- Growing interest in the role that institutions play in fostering development.
 - A new and growing body of work on this, such as, e.g. Acemoglu, Johnson, Robinson (2005); Casey, Glennester & Miguel (2011); Dell (2013); Sheely (2014).
- Despite their importance for economic development, little is known about how to design, reinforce, or reform institutions.
 - Too many contextual, endogenous factors (environment, culture, (in)formality, etc.)
 - Difficult to identify exogenous sources of variation in institutional quality.

Our Project

- General research question: Can institutional performance be improved "endogenously" following an "exogenous" structured learning experience?
 - In particular, is it possible to induce endogenous improvements in institutional quality of local fishery management institutions in Tanzania?

Our Project

- We use repeated game-based experiments to focus players/fishers' attention on critical aspects of how they affect (and are affected by) institutional performance.
 - Hypothesis: these games can alter real-world behaviors—such as cooperation, monitoring, patience—conducive to effective local resource management.
- We hope to evaluate this hypothesis with an RCT that plays these experimental games in a subset of existing Beach Management Units (BMUs) in rural Tanzania.

Beach Management Units (BMUs)

- Many governments and civil society groups around the world are engaging small-scale fishery users in co-management systems with a critical role for local institutions.
 - But evidence on effectiveness of this is (predictably) mixed.
- In Tanzania as well: for more than a decade, government and donors have been promoting co-management strategies based on community associations known as beach management units (BMUs).
- These are small elected councils of approximately 10 members from a particular village/landing site.
 - Duties include: endorsing a fisher so they can get a permit from district office, patrols, impose fines, gather data on catches and prices.

Dynamic Common Pool Resource Game

- Groups of 5 fishers, who play multiple rounds (mean number of rounds per cycle: 10). Do this 3 times.
- Individuals informed game will end randomly between 8 and 15 rounds. Avoids terminal stage effects.
- Individuals harvest beans (fish) from the common pool (bucket) for 30 seconds per round.
- Between rounds, fish stock grows (logistic); observed by individuals.
- In each round, weight of individual harvests is measured by scale, recorded by enumerator.
- After each cycle, players paid 1000 tz shillings per kg of beans.

Data Collection

Preliminary Results

Action Shot of Game Play



Dynamic CPR Game: Variations

- With cheating.
 - Each round players can opt to <u>secretly</u> "use illegal gear", which doubles their harvest for that round.
 - The group only finds out that at least one person cheated when extra beans are removed from the common pool between rounds.
- With cheating and enforcement.
 - Same as the cheating game, but each round there is a patrol, which reveals the cheating status of one fisher.
 - Group has the chance to punish them by missing rounds, verbal sanction, or fine beans.
- Individual vs. Social Learning
 - ► Treatment arm in which groups are re-randomized between cycles.

Experimental Design

- We selected two districts: Ukewere Island on Lake Victoria and Mafia Island, a marine setting.
- We obtained the universe of BMUs from the district fisheries officers, then randomly selected BMUs to play our game.
- We played each game simultaneously in each of the selected BMUs (i.e. block randomized at the BMU level) with a random sample of fishers who were present when we showed up.
- We also played an additional game to study whether any observed learning was happening via individual learning effects or social learning as a group.



Types of Data Collected

- *BMU-level data:* size, permits issued, revenues (including from fines), expenditures, patrols, punishments imposed, data collection.
- *Fisher characteristics*: household demographics, wealth, food security, migration, life evaluation/welfare, fishing experience, effort, gear type, etc.
- *Fish market characteristics*: types of fish caught, boat crew organization, experience with patrols, prices, etc.

Types of Data Collected

- Game data: harvest decisions for each of average of 10 rounds, 3 cycles per game; round-specific decisions to cheat; whether player caught by "patrol".
- Learning and knowledge: attitudes about fish catches, overfishing, externalities, limiting access to the fishery, illegal gear, etc.
 - These questions were asked both *before* and *after* the game was played.

Data Collection

Preliminary Results



Data Collection

Preliminary Results









Next Steps

- This summer we return to the field to play the game:
 - ► In the same BMUs as last year, with the same players.
 - ► In the same BMUs as last year, but with new players.
 - In new BMUs.
 - Focused on BMU members only?
- Will likely implement a version in which group sizes grow across cycles.
- In this pilot we are trying to find evidence that playing the game can affect learning and behavior as a first step to improving institutions.
- But the larger goal is improving BMU performance. We are using the pilot study to get first evidence on this in order to seek funding for the full project.

Feedback

- Any additional game variations to consider, with a focus on the effect of the game on behavior *outside* the game?
- Ideas for measuring institutional quality?
- Ideas for data collection?
- Suggestions for analysis? We have many interesting sources of variation: across BMUs, across games/treatments within BMUs, time-based variation within game type and across cycles, comparisons between coastal and lake resources...