TURFtools: A Community Inclusive Management Design Tool for Small-Scale Fisheries

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The Problem Facing Small Scale Fisheries

Small-scale fisheries provide roughly half of the global fish catch and contribute the primary source of protein for 3 billion people worldwide. Yet, they tend to be in relatively poorer condition than larger, more thoroughly managed fisheries.

These fisheries are particularly vulnerable to overfishing due to limited regulations and minimal enforcement in developing nations where they most often occur.

Improving the management of these fisheries presents a significant opportunity to increase the productivity and health of marine ecosystems and build more resilient communities.

One Proposed Solution: TURF-Reserves

- **Territorial Use Rights for Fishing (TURF)** paired with marine reserves (TURF-Reserves) have been proposed as a viable management strategy to combat overfishing in many small-scale fisheries.

What are TURF-Reserves?

TURF-Reserves are an exclusive long-term access to defined fishing areas (TURF), while restricting critical areas from fishing pressures (Reserve), allowing fishers to benefit from exclusive fishing rights and spillower from reserves. This form of management has been shown to incentivize stewardship of marine resources.

The Importance of Design

A critical challenge in TURF-Reserve implementation is design. Community participation in the design process is valuable, however, incorporating key elements into a science-based decision-making framework is difficult. While a wealth of scientific marine spatial planning tools exist, no comparable fisheries management schemes similar to TURF-Reserves have been proposed as a viable management strategy to combat overfishing in many small-scale fisheries. TURFtools aims to help provide long-term security for both fishers and the resources on which they rely.

Project Objectives

- Provide a tool to support TURF-Reserve design decision-making, including:
  - A spatially explicit bio-economic model that evaluates tradeoffs between TURF-Reserve design options, and
  - An integrated, user-friendly interface and communication platform

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- **Species Information**
  - The model considers biological, spatial, and economic characteristics of up to five (5) target species, utilizing local ecological knowledge supplemented with a life history database from scientific literature.

- **Habitat Characterization**
  - Community habitat maps, including critical species habitats and dispersal patterns, are translated into the model as a color-coded 10x10 grid

Design Options

Up to five (5) community-driven TURF-Reserve spatial design options may be explored and saved in the model.

In each design, non-land patches are assigned a management scheme (Reserve, Open Access, or TURF) that corresponds with specific fishing policy. These designs will be evaluated relative to a stock quo, or no design scenario.

How TURFtools Works

1. **Species Information**
   - The model considers biological, spatial, and economic characteristics of up to five (5) target species, utilizing local ecological knowledge supplemented with a life history database from scientific literature.

2. **Run the Model**
   - TURFtools utilizes a system of equations based on those commonly found in fisheries modeling literature and useful data source scenarios.

3. **View Outputs to Evaluate Design**
   - The model evaluates the relative performance of design options based on the biological, economic, and spatial inputs. Output metrics include species-specific harvest, abundance, and profit as well as design-specific metrics such as reserve size, spawners protected, among others. Metrics are communicated through the following icons:

   - **Abundance**
   - **Harvest**
   - **Profit**
   - **Design Metric**

   These visualizations, such as the charts above, are designed to facilitate community dialogue in the evaluation of tradeoffs between design options.

From Local Knowledge to Quantitative Analysis

- **TURF-Reserves** can encourage stewardship and empower fishers to better manage their resources, leading to increased catch, healthier marine ecosystems, and a more secure economic future. TURFtools incorporates specific biological, spatial, and economic data into a TURF-Reserve design process. The tool includes supplementary historical data that provides information for those inputs in which local data may not be available. Model outputs reflect the relative performance of different design drivers across a range of metrics and can be used to engage stakeholders in discussions regarding tradeoffs between determined goals and objectives. Each output is prioritized based on community interests and priorities. TURFtools uses an Microsoft Excel platform because of the program’s ease of adaptability, limited technological expertise barrier, and availability in the field, all of which support its incorporation into the community-driven design process.

Application in the Philippines

- Nearly half of the Philippines population lives on the coast, where fishers have shown signs of exploitation as far back as the 1960s. A total of 16 communities are currently engaging in TURF-Reserve design processes in the Philippines. As others begin the TURF-Reserve design and implementation process, TURFtools is expected to be used in other Fish Forever countries.

Fish Forever is a global initiative between the Environmental Defense Fund (EDF), Rare, and the Sustainable Fisheries Group (SFG), seeking to utilize TURF-Reserves as a management tool to empower coastal communities to better manage fisheries resources. TURFtools is currently being integrated into the Fish Forever TURF-Reserve design processes in the Philippines. As others begin the TURF-Reserve design and implementation process, TURFtools is expected to be used in other Fish Forever countries.

Future Global Application

EDF’s Fisheries Solution Center (FSC) designs and develops innovative fisheries management tools and strategies that reduce overfishing and empower resource access to determine the model, interface, and accompanying guidance documentation to ensure TURFtools is appropriate and effective in the field.

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