

## A high-value Nile Perch fishery through limits on fishing pressure

### MultiTip Policy Brief #2

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The latest Nile Perch (NP) Fisheries Management Plan III (2021-2025) recommends limiting fishing pressure through capping the number of vessels and gears-per-boat. Based on a calibrated agent-based model, a new study finds that if implemented, these measures are likely to have a significant positive impact on the value of the fishery: Limiting vessel numbers and gears-per-boat brings the fishery to a more stable regime, associated with higher long-term incomes on the basis of an ecologically healthy fish stock. Three aspects characterize this high-value fishery regime: a fish stock dominated by large fish, fewer vessels and gears-per-boat, and a preference of fishers for targeting larger fish.

### Key Insights

1. **There are two fundamental exploitation regimes on the Lake, determined by fishing pressure (number of vessels times gears-per-boat):** (1) *High-value regime*: Low fishing pressure leads to a healthy stock with a high biomass dominated by large fish. Here, fishers preferentially harvest large fish, achieving high incomes. (2) *Low-value regime*: High fishing pressure decreases the stock level and diminishes large fish in particular. Here, fishers preferentially target small fish, resulting in a low-value fishery. The transition between the high-value and low-value regime is not linear, but characterized by a tipping point (see figure).
2. **Currently, the NP fishery is between the high value and low value regimes:** The current situation lies between the two regimes, as attested by the relative proportion of fishers using gillnets and longlines. This intermediate situation provides an opportunity window for policymakers to bring the fishery away from the tipping point and closer to the stable part of the high-value regime.

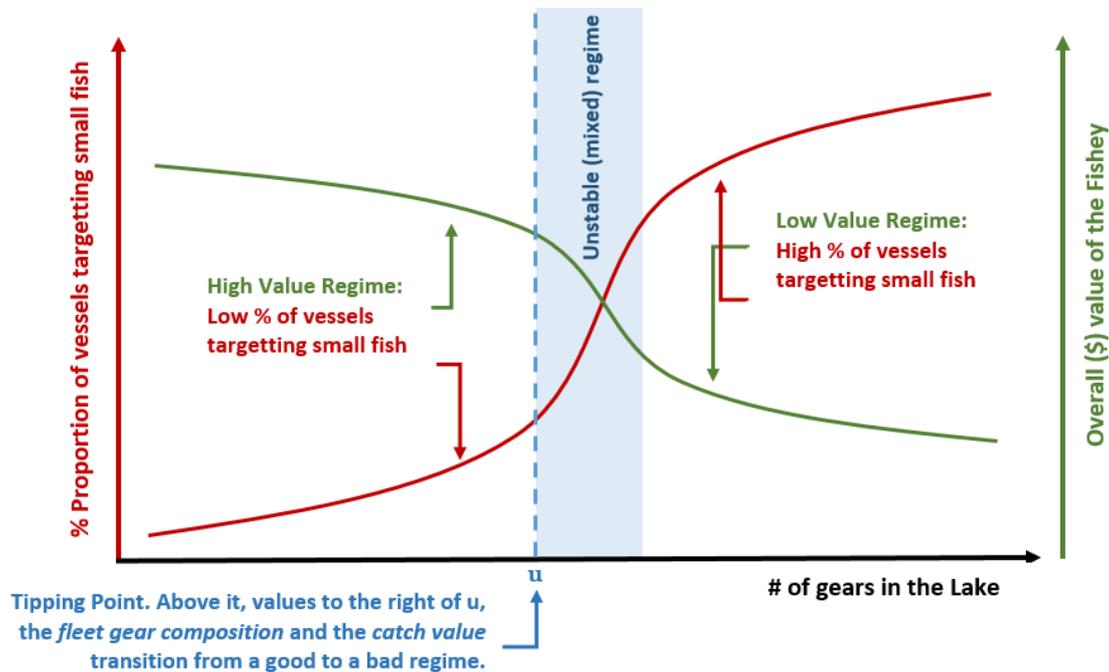


Figure: The high-value regime (left) is characterized by a small percentage of vessels targeting small fish (red) and a high income level (green). The transition to the low-value regime (right) is non-linear and involves a tipping point (vertical blue line). Reducing fishing pressure brings the fishery from the current state closer to the stable (less steep) part of the high-value regime.

3. **The NP Fishery can switch to or stay in a high-value regime by controlling the number of gears in the water:** Fishing pressure can be adjusted via regulation on the number of gears in the water, i.e. restrictions on the number of boats and the number of gears-per-boat. This helps achieve a high-value regime where fishers target larger fish. It is both more sustainable and increases the value of the fishery.
4. **Monitoring the proportion of boats targeting small fish is important:** An increasing proportion of boats targeting small fish is an indication of moving toward the low-value regime (and vice versa). The transition to the high-value regime can be induced by any combination of government interventions to reduce the number of vessels and gears-per-boat, by higher opportunity costs (i.e. profitable alternative economic activities like agriculture and trade) and by changes in the economic landscape (that affect the costs of fishing operations).

## Methodology

The study develops a new agent-based model (ABM) of the NP fishery. The ABM extends age-structured ecological models of the fishery with endogenously generated entry and gear choices by fishers, both of which come as a reaction to external economic forces and government interventions. This model enables us to give valuable fishery management recommendations by providing information on the relative effectiveness of policies under different economic conditions.