PROS IN PROCRASTINATION?

Consequences of delaying marine management

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THE PROBLEM

33%
of global fish stocks are overfished
3 billion
people rely on fish as a primary source of protein
50%
of reported catch comes from small-scale fisheries
90%
of fishing jobs are in the small-scale sector

MARINE RESERVES

Marine reserves are a management tool used to address overfishing, among other issues. Marine reserves close off areas of the ocean to fishing, allowing fish inside the reserves to increase in size and number. Theoretically, spillover eventually occurs when fish move across the boundary of a reserve where fishers can benefit.

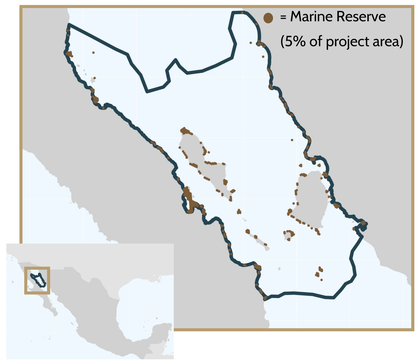
MIDRIFF ISLANDS, MEXICO

Regional status of fishers and fish populations:

- Historically characterized by high levels of marine biodiversity and productivity
- More than 600 small-scale fishers
- Overfishing has likely driven a precipitous decrease in the amount of fish caught in the past decade

Proposed marine reserve network:

- Reserve network: Comunidad y Biodiversidad (COBI) presented a marine reserve network design in 2015 to the Mexican government
- Design: would protect 5% of the Midriff Islands
- Goal: help protect small-scale fisheries and local ecosystems by addressing overfishing
- Current status: marine reserve network has NOT been implemented as of 2019
- Possible cause for delay: initial economic losses and threats to food security are a deterrent



RESEARCH QUESTION

What are the consequences of delaying the implementation of the marine reserve network in the Midriff Islands?

ACKNOWLEDGMENTS

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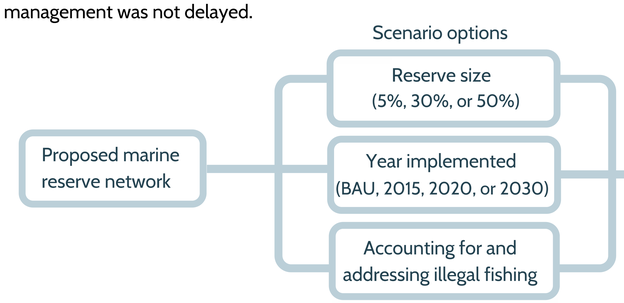
APPROACH

We developed a bioeconomic model to simulate changes in fish biomass and catch over a 50-year time frame in response to the implementation of a marine reserve network. Our model allowed us to estimate the regional impacts of the proposed marine reserve network, as well as the regional impacts if the size of the marine reserve was increased, illegal fishing was addressed, and management was not delayed.



KEY FINDINGS

1. A marine reserve network can provide substantial benefits to conservation, food security, and livelihoods in the Midriff Islands under specific implementation year and size scenarios, and when illegal fishing pressures are accounted for and/or addressed.

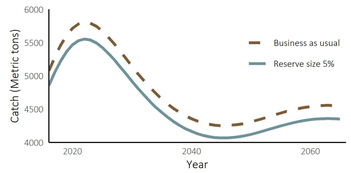
2. COBI's proposed reserve network is not large enough to provide the expected benefits. However, protecting 30% of the area in marine reserves can help rebuild depleted fisheries, achieving conservation goals, as well as increases in long-term catch to support food security.

3. The Midriff Islands region can still benefit from future implementation of a marine reserve network that protects 30% of the region. However, the benefits in regional fish biomass and catch relative to business as usual is projected to decrease as implementation continues to be delayed. Benefits are maximized at earliest implementation.

SCENARIOS

5%

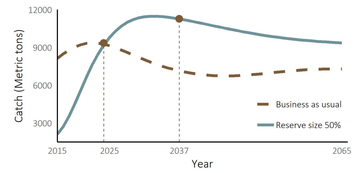
COBI's design: the proposed design is a 5% marine reserve network that is implemented in 2015, where illegal fishing is neither accounted for nor addressed. Implementation of the reserve never pays off, and changes in biomass and catch are not substantial.



Total Biomass: 49 thousand metric tons (7%)

Total Catch: -11 thousand metric tons (-4%)

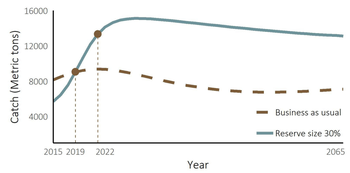
Conservation: if the proposed design is increased to protect 50% of the region, implemented in 2015, and illegal fishing is accounted for and addressed, the transition period ends in 2025, and the lost catch due to the closure of fishing grounds will be recovered by 2037.



Total Biomass: 1,857 thousand metric tons (164%)

Total Catch: 88 thousand metric tons (23%)

Livelihood and Food Security: if the proposed design is increased to protect 30% of the region, implemented in 2015, and illegal fishing is accounted for but not addressed, the transition period ends in 2019, and the lost catch due to the closure of fishing grounds will be recovered by 2022.



Total Biomass: 1,058 thousand metric tons (93%)

Total Catch: 275 thousand metric tons (71%)

Note: Absolute and percent change of biomass and catch are aggregated from 2015-2065 relative to the business as usual result scenario (i.e. when the reserve network is not implemented).

POLICY RECOMMENDATIONS

It is crucial to note that there is a window of time in all evaluated marine reserve network scenarios where catch is less than the business as usual scenario, also known as the transition period. This period will likely be challenging for local communities where small-scale fishing is a common form of employment and critical to local livelihoods. We suggest a portfolio of responses to help alleviate this inevitably challenging transition period below, but expert knowledge of local policymakers should be called upon to proactively address this transition period.

Portfolio of Responses:

1. Coupled management
2. Improve monitoring and enforcement
3. Alternative livelihoods
4. Technology updates