

Improving Applications of Science in MPA Design and Management

Last month, MPA News presented findings from a November 2001 workshop to discuss the role of socioeconomic concerns in successful MPAs, convened at the 54th annual meeting of the Gulf and Caribbean Fisheries Institute ([MPA News 3:8](#)). This month, we present findings from a parallel workshop that discussed how to improve the application of science in MPA design and management. This latter workshop - involving more than 30 individuals from 10 countries - identified several priority areas for filling gaps in the use of MPA science.

The science workshop *Improving Applications of Science in MPA Design and Management* identified the absence of clear goal-setting and subsequent hypothesis-testing as obstacles to determining long-term MPA effectiveness. The report, available online at the website of the Gulf and Caribbean Fisheries Institute (<http://www.gcfi.org>), suggests tips for better integrating science in MPA practice. In light of the report's usefulness to practitioners both inside and outside the Caribbean region, MPA News has summarized its highlights below.

I. Establish explicit and realistic protocols for measuring effectiveness

- Managers: Provide explicit goals for measuring effectiveness. Scientists: Work with managers to develop measurable attributes of the key goals.
- Consider a broad array of metrics, familiar to both scientists and managers. Identify the ones that are critical, and monitor these over appropriate time scales.
- Recognize the confounding effects of both natural and anthropogenic variables. This task is complicated as political timelines (e.g., election cycles, sunset clauses) are commonly incompatible with biological response timelines needed to identify management results in the presence of many confounding variables.
- Recognize that management effectiveness may not always be best measured at typical confidence levels, particularly in the face of 1) 500 years of prior marine anthropogenic impacts in the Caribbean and the many generations of shifting - i.e., lowered - management baselines, and 2) extremely disconnected cause-and-effect responses from management actions over short time scales.

II. Identify key population linkages

- Conduct long-term research on populations and habitats, including the collection of basic biological information, much of which is often limited (e.g., home ranges of adults and younger life stages; habitat dependency, opportunism, and shift timing with maturation across the shelf; growth variation correlated with fecundity; details of trophic patterns; and geographic variations within all of these attributes).
- Find the resources (financial and otherwise) to conduct and process vertically stratified plankton surveys. Direct empirical information on larval behavior is almost non-existent.
- Standardize commercial fisheries data at the species level.
- Evaluate impacts of commercial fishing gear, recreational fishing gear, and recreational diving on habitats.

III. Build political insight to accommodate scientific time and spatial scales

- Better educate managers and fishermen on cascade effects over multiple time and spatial scales, and the difficulties and delays in predicting outcomes.
- Provide adaptive management alternatives upfront and educate managers that it is not a failure to modify the alternatives as new information becomes available.
- Bring commercial and recreational fishermen more directly into the information-gathering process.
- Develop ways to standardize monitoring and enforcement within and among MPAs, allowing for easier determination of effectiveness.

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Box: Make science more applicable - Bonaire perspective

Of the myriad research projects conducted in MPAs around the world, relatively few may be of direct value to the management of those sites. Kalli De Meyer, former manager of the Bonaire Marine Park (BMP), would like to see science made more applicable to MPA management. "Science is most useful when it is providing support for resource management and addressing management issues," she told the *Sustaining Seascapes* symposium in New York City in March (<http://research.amnh.org/biodiversity/symposia/seascapes/>).

De Meyer cited three studies that had proven to be very useful to BMP, in terms of both aiding management and steering local governmental response to threats. These studies, she said, had the following qualities:

- Management-related conclusions were clear;
- Results were delivered to the park in a timely fashion;
- The science did not necessarily have to be rigorous to be valuable; and
- The park was involved throughout, so that the resulting discussion and presentation had the maximum impact on policy.

There is plenty of room for improved collaboration between managers and scientists, said De Meyer, including in the choice of subject matter and experimental design. She estimates that in her nine years at BMP, less than 5% of the research conducted there by external scientists was of value to the MPA.

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