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TITLE: Sea sick? Setting targets to assess ocean health and ecosystem services

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ABSTRACT:

The benefits provided by a healthy ocean are receiving increasing attention in policy and management spheres. A fundamental challenge with assessing ocean health and ecosystem services is that we lack a scientific framework for expressing ecosystem conditions quantitatively in relation to management goals. Here we outline and operationalize a conceptual framework for identifying meaningful reference points and quantifying the current ecosystem state relative to them. The framework requires clear articulation of management goals and is built on a review of current scientific understanding and assessment of data availability. It develops a structured approach for choosing among three classes of reference points, including: (1) functional relationships that establish the ocean state that can be produced and sustained under different environmental conditions, (2) time series approaches that compare current to previous capacities to obtain a particular ocean state in a specific location, and (3) spatial reference points that compare current capacities to achieve a desired ocean state across regional (or, if necessary, global) scales. We illustrate this general framework through the lens of ocean health defined in terms of a coupled social-ecological system, with examples from fisheries, marine livelihoods, and water quality in the USA. Assessment of ocean health and ecosystem services can be significantly influenced by the choice of indicators used to track changes in a management goal, the type of reference point selected, and how one measures the distance of the current state from the reference point. This framework provides flexible, standardized methods for evaluating ocean health and ecosystem services that can advance important components of ecosystem-based management, including marine spatial planning, ecosystem service valuation, and integrated ecosystem assessments.

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