

OVERVIEW OF ECOSYSTEM-BASED MANAGEMENT AND INTEGRATED ECOSYSTEM ASSESSMENTS

JASON S. LINK
NMFS NEFSC
Woods Hole, MA 02543

EXTENDED ABSTRACT

The rationale, justification, and simple definition of ecosystem-based management (EBM) are noted. This EBM policy and technical background forms the context for a definition, delineation, and evaluation of Integrated Ecosystem Assessments (IEAs). The challenges associated with IEAs, particularly regarding their multiple roles or overlap with other efforts, are duly noted. In lieu of specific technical details and examples for each element of an IEA, a conceptual treatment of each facet of the six step IEA process is provided. A schema is highlighted to denote the important principles of applying IEAs. The contribution of scientific endeavors (modeling, indicators, thresholds, assessment, risk analyses, and management simulation evaluations), stakeholder outreach, and monitoring are mapped to the IEA process, identifying key roles each can play in the success of an IEA. Important lessons learned and affirmation from international arenas adopting this approach, as well as identification of important steps remaining delineate what is still a nascent, but certainly a maturing development of IEAs.

EXTENDED INFORMATION

There are a plethora of policy documents now espousing ecosystem-based management (EBM) as a preferred way to manage the natural resources found in the oceans. The national ocean policy of 2010 states that EBM is the guiding principle for ocean resource management in the United States. One of the key ways to implement EBM is to execute Integrated Ecosystem Assessments (IEAs). We note that IEAs are a tool and process to accomplish EBM. Adapting the Levin et al. diagram (fig. 1), we note the adaptive nature of IEAs when implemented, and also the importance of involving—often and early—a wide range of stakeholders in the process.

From the scoping and involvement with stakeholders, key storylines can be developed. Those can then be populated with important indicators to track. Once those indicators are initially established, a suite of analytical approaches (modeling, indicators, thresholds, assessment, risk analyses, and management simulation evaluations

[MSE]) can be employed in an IEA process to assess ecosystem status relative to the stated EBM goals.

Multiple facets of outreach are required in all areas of the IEA process. Adopting webpages, regular reports, short “glossies,” and a suite of meetings are all necessary to usefully conduct interaction among all interested parties. This facet of IEAs should not be underestimated in terms of time or value to the process.

Some of the key lessons learned in the nascent development of IEAs thus far include:

- Multidisciplinary expertise essential
 - Jacks of all trades helpful (i.e., jargon-swapping capabilities)
- Communicate
 - Internally, externally, frequently
- Set target timelines and goals
 - Keep up the full court press

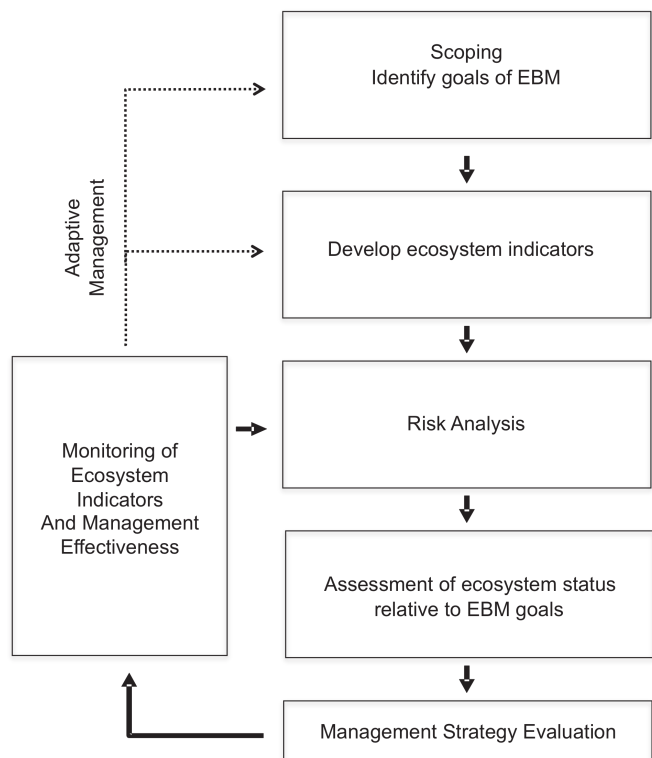


Figure 1. A modified Levin diagram of the IEA process.

- Ensure elements of an IEA have champions
 - Give ownership
- Not every bit of science or research, although inherently may be of interest, is germane for IEAs
 - Needs to map onto IEA process (i.e., the Levin diagram; fig. 1)
- International vetting and best practices testing is ongoing and useful
 - EBM is now being implemented...all around the world
- There is a strong need to cull from among myriads of indicators

- For indicators to be useful they need to be:
 - Integrative
 - Aggregative
 - Relevant
 - Multidisciplinary
 - Representative
 - Based on well-established data series
 - Defensible, as likely to be used in further research and management thresholds
 - All denoting the need to map back to a storyline (fig. 2)
- For modeling and analytical efforts
 - Multi-model inference preferred
 - MSE and testing required
 - Match model type with appropriate model use
 - Rigor up front helps confidence in outputs

To conclude, some of the key lessons learned from the beginnings of implementing IEAs highlight the need for continued and ongoing scoping sessions. Some of the key analytical needs remaining are establishing pressure-response thresholds used for decision criteria among indicators, as well as multivariate integration. Operating models to match ocean and human aspects of ecosystems and management simulations (MSE) need continued development. Risk assessment methods and applications, even qualitative approaches, will continue to emerge in the implementation of IEAs.

As EBM is implemented in ocean use management, IEAs will be an important tool and process to do so.

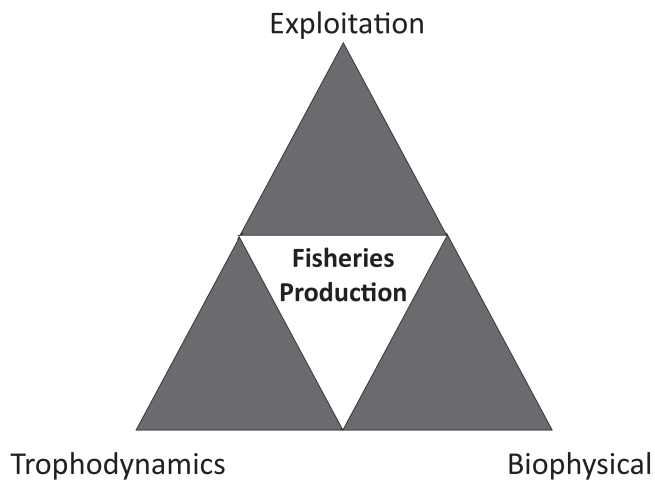


Figure 2. The triad of drivers, indicating the overlap of processes and the need for adequate and pertinent indicators.