The Ocean Health Index: Global and regional applications and future directions

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Our coasts and ocean are changing in unprecedented ways
Policies strive for healthy oceans, without a tool to measure health
You can’t manage what you don’t measure

Lord Kelvin
What is ‘healthy’?

DOES HEALTHY MEAN PRISTINE?
People are a part of marine ecosystems Everywhere.
A healthy ocean delivers a range of benefits to people now and in the future.
Key attributes of the Ocean Health Index

• Coupled social-ecological systems, focused on benefits/services to people

• Clearly defined reference points

• Current state + likely future condition

• Neutral and scientific; not prescriptive
10 Public Goals and Sub-goals

- Food Provision
  - Fisheries
  - Mariculture
- Artisanal Fishing Opportunities
- Natural Products
- Carbon Storage
- Coastal Protection
- Tourism and Recreation
- Livelihoods & Economies
- Livelihoods Economies
- Sense of Place
  - Iconic Spp Places
- Clean Waters
- Biodiversity
  - Species
  - Habitats
Establishing reference points

1. Decide what to measure
2. Decide what to compare it to

Samhouri et al. 2012 Ecosphere
Types of reference points

1. Functional relationships
2. Spatial comparisons
3. Temporal comparisons
4. Established benchmark

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Food Provision: Wildcaught Fisheries

Supporting Figures

Figure S1: Effects of increasing exploitation rate on model fish communities. Averaged results of ECOSIM models are displayed, shades refer to 95% confidence bounds.

Multi-species MSY
Types of reference points

1. Functional relationships
2. Spatial comparisons
3. Temporal comparisons
4. Established benchmark

Livelihoods: wages
Types of reference points

1. Functional relationships
2. Spatial comparisons
3. Temporal comparisons
4. Established benchmark

Change in mangrove area extent

Carbon Storage
Types of reference points

1. Functional relationships
2. Spatial comparisons
3. Temporal comparisons
4. Established benchmark

Biodiversity:
Species

- Least concern
- Near threatened
- Vulnerable
- Endangered
- Critically endangered
- Extinct
Selecting the right type of reference point

1. The gold standard: functional relationship
2. Otherwise, be SMART
   - Specific
   - Measurable
   - Ambitious
   - Realistic
   - Time-bound
Reference Points for the Global Analysis

- Established Targets
- Spatial Comparison
- Functional Relationship
- Time Series
Coastal Livelihoods & Economies

**LIVELIHOODS**
- **STATUS**
  - (Average wages and # of jobs)
- **TRENDS, PRESSURES, RESILIENCE**
- **Sub-goal score**

**ECONOMIES**
- **STATUS**
  - (Direct and indirect revenue)
- **TRENDS, PRESSURES, RESILIENCE**
- **Sub-goal score**

**INTEGRATED GOAL SCORE**
- Average of sub-goals
<table>
<thead>
<tr>
<th>Pressures</th>
<th>Resilience</th>
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<tr>
<td>• Chemical pollution</td>
<td>• CBD habitat signatories</td>
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<tr>
<td>• Nutrient pollution</td>
<td>• Percent of EEZ in MPAs</td>
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<td>• Habitat destruction</td>
<td>• Fisheries management effectiveness</td>
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<tr>
<td>• Alien species</td>
<td>• Ecological integrity</td>
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<tr>
<td>• Genetic escapes</td>
<td>• Quality of governance (World Governance Indicators)</td>
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<tr>
<td>• Commercial fishing (high and low bycatch)</td>
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<tr>
<td>• Artisanal fishing</td>
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<td>• Social pressures</td>
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Global Ocean Health Index
NP = Natural Products
AO = Artisanal Opportunities
MAR = Mariculture
FIS = Fisheries
SPP = Species
HAB = Habitats
CW = Clean Waters
LSP = Lasting Special Places
ICO = Iconic Species
ECO = Economies
LIV = Livelihoods
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Jarvis Island

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Current Activities and Next Steps

• Regional Applications
Brazil

- unique score for each of 17 coastal states
- best available regional data
Added Features

- updated goal models
- >80% regional data
- better temporal assessment
Regional applications we are conducting, or will be conducting
Governments adopted and applying the Index
Governmental or organizational interest in applying Index
Current Activities and Next Steps

• Regional Applications

• International Applications
  • LMEs/High Seas, Transboundary Water Assessment Project
  • UN’s World Ocean Assessment
  • Biodiversity indicators Partnership (Aichi target 10)
Current Activities and Next Steps

• Diving deeper into some goals
Biodiversity

Selig et al. 2013 PLoS One
Species

Habitats

Selig et al. 2013 PLoS One
Weighting the consequence of threat categories

Selig et al. 2013 PLoS One
# of species in each category

- LC: 1453
- NT: 61
- VU: 90
- EN: 37
- CR: 5
- EX: 1
Current Activities and Next Steps

• Diving deeper into some goals
• Updating/refining global assessment
Global update 2013

• New goal models for Food Provision and Tourism & Recreation
• ~10 new data layers (e.g. for global domestic tourism)
• ~85% of all layers updated
• High Seas (early 2014)
• Antarctica (early 2014)
Current Activities and Next Steps

• Diving deeper into some goals
• Updating/refining global assessment
• Toolbox
Building a Toolbox

- Allow for anyone to calculate the Index at any scale and any location
- Allow for exploration of Index results
- Assess implications of management scenarios