

# The Ocean Health Index 2012-2015

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National Center for Ecological Analysis and Synthesis, UCSB  
Conservation International



# Ocean Health Index: 2012 recap

## An index to assess the health and benefits of the global ocean

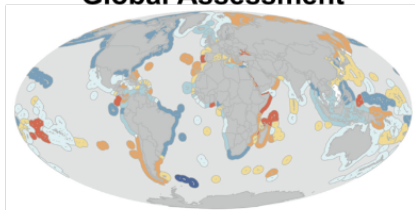
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***Nature*, 2012**

# Ocean Health Index: 2012 recap

## OHI Framework

## Global Assessment



# Ocean Health Index: 2012 recap

## **OHI Framework**

*conceptual design and structure, including 'ocean health' definition*

# Ocean Health Index: 2012 recap

## OHI Framework

*conceptual design and structure, including 'ocean health' definition*

***“A healthy ocean sustainably delivers a range of benefits to people now and in the future”***

# Ocean Health Index: 2012 recap

## OHI Framework

*conceptual design and structure, including 'ocean health' definition*

### **core**

*standardized, familiar*

### **tailored**

*flexible to the local context*

# Ocean Health Index: 2012 recap

## OHI Framework

*conceptual design and structure, including 'ocean health' definition*

### **core**

*standardized, familiar*

1. How scores are calculated
2. Reference points are required

### **tailored**

*flexible to the local context*

1. What is scored
2. How reference points are set



# Ocean Health Index: 2012 recap

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*conceptual design and structure, including 'ocean health' definition*

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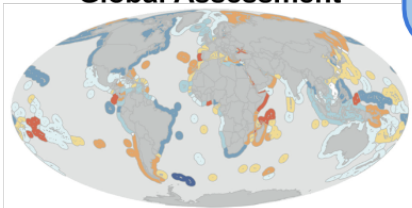
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### tailored: Global

*flexible to the local context*

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## Global Assessment



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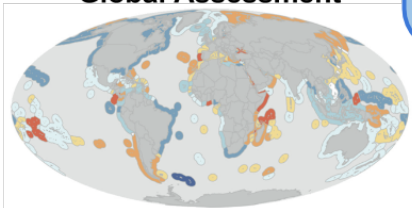
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*flexible to the local context*

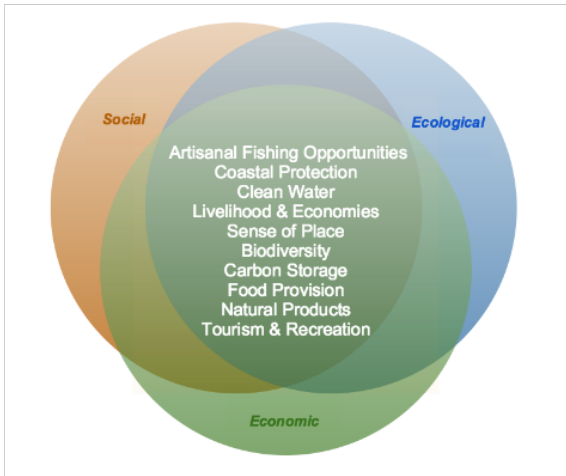
1. What is scored
  - 10 benefits ('goals')
  - all coastal nations/territories
2. How reference points are set
  - used freely available data

## Global Assessment



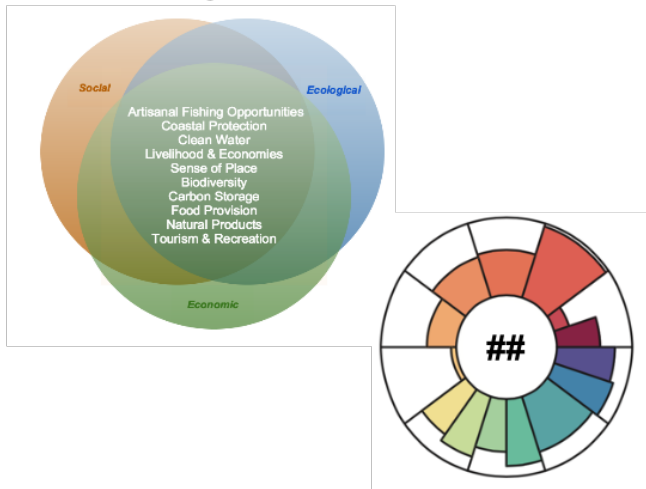
# Ocean Health Index: 2012 recap

## Goals in the global assessment



# Ocean Health Index: 2012 recap

## Goals in the global assessment



# Ocean Health Index: 2012 recap

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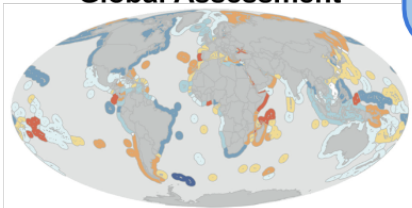
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## Global Assessment



# OHI: 2012-2015 overview

# OHI: 2012-2015 overview



# OHI: 2012-2015 overview



## Toolbox

open-source  
software

visualization  
tools

training program



# OHI: 2012-2015 overview



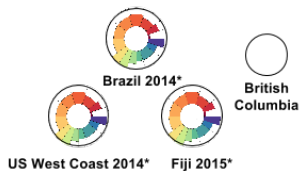
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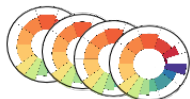
visualization  
tools

training program

## Small-scale Assessments



# OHI: 2012-2015 overview



## Global Assessments

2012\*, 2013\*, 2014, 2015

\* published

## Independent Assessments (OHI+)



Canada 2013



Israel 2014\*



Gulf of  
Guayaquil 2015



China 2014



Peru



Spain



Arctic



Hawaii



Colombia



Chile



Baltic Sea

## Toolbox

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training program

## Small-scale Assessments



Brazil 2014\*



British  
Columbia

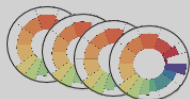


US West Coast 2014\*



Fiji 2015\*

# OHI: 2012-2015 overview



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2012\*, 2013\*, 2014, 2015

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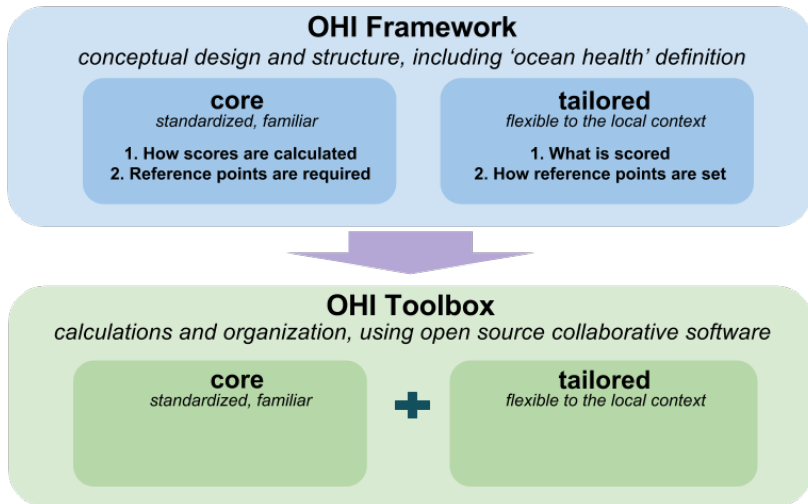


US West Coast 2014\*

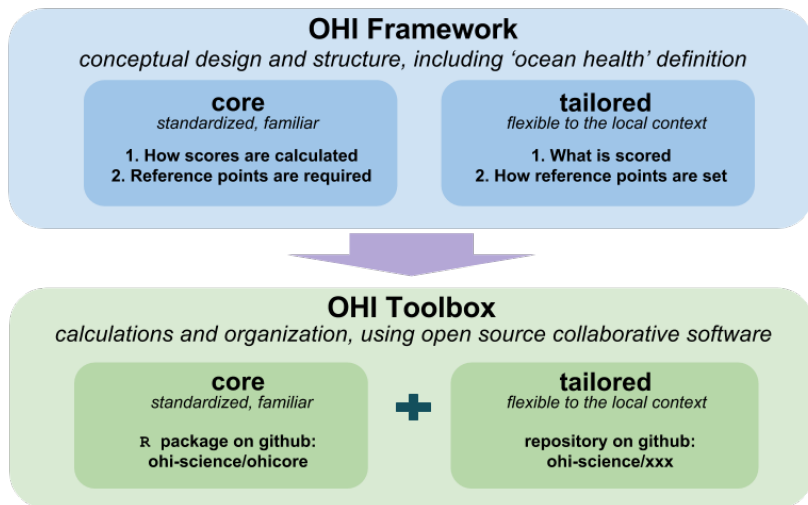


Fiji 2015\*

# OHI Toolbox



# OHI Toolbox



# OHI Toolbox

## OHI Toolbox

*calculations and organization, using open source collaborative software*

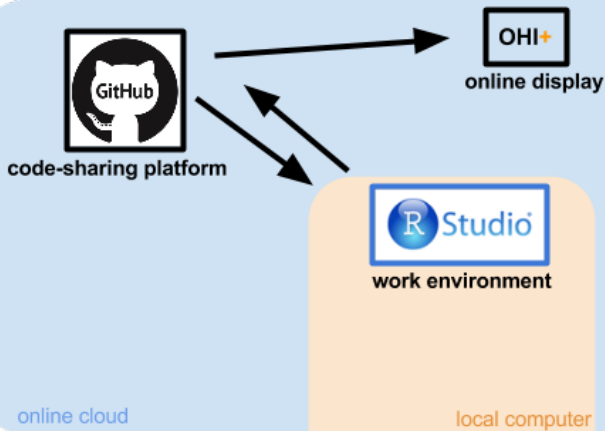
### core

*standardized, familiar*  
R package on github:  
ohi-science/ohicore



### tailored

*flexible to the local context*  
repository on github: ohi-  
science/xxx



# OHI Toolbox

## OHI Toolbox

*calculations and organization, using open source collaborative software*

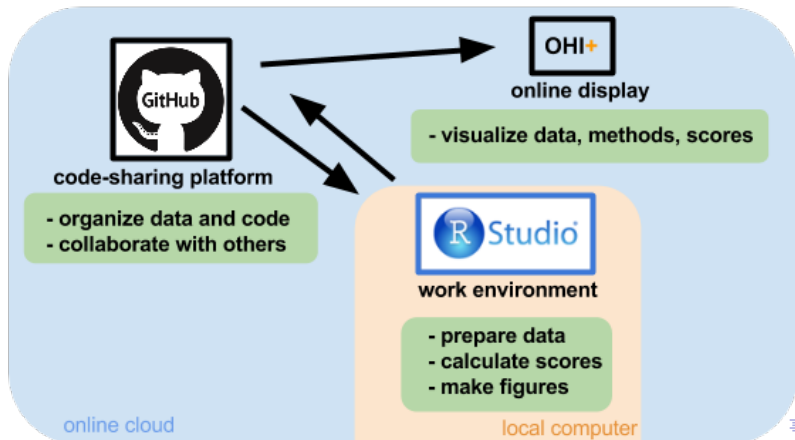
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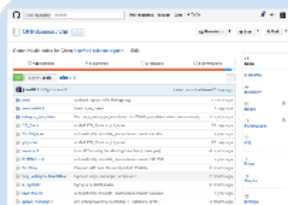
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[ohi-science/ohi-core](https://github.com/ohi-science/ohi-core)



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**DEMO:**

[github.com/ohi-science/bhi](https://github.com/ohi-science/bhi)  
[ohi-science.org/bhi](https://ohi-science.org/bhi)

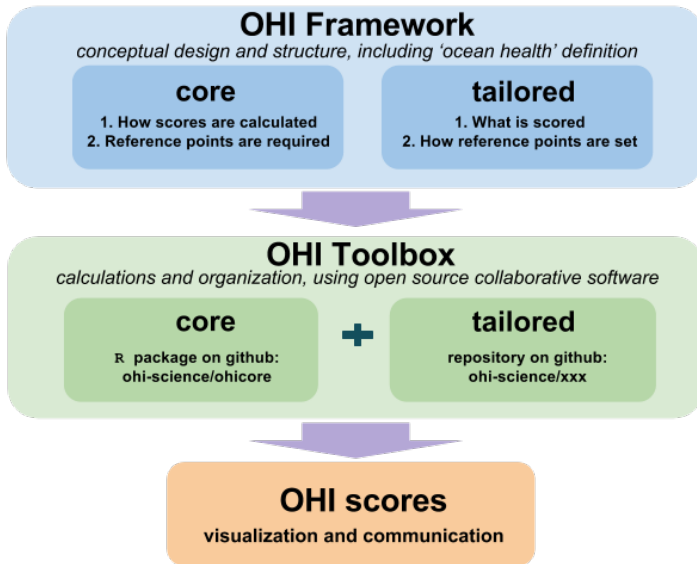


online cloud

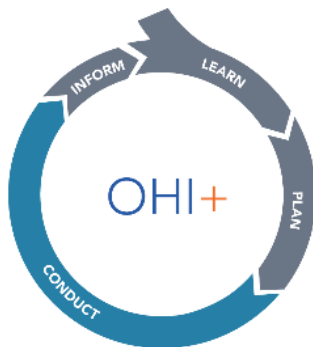
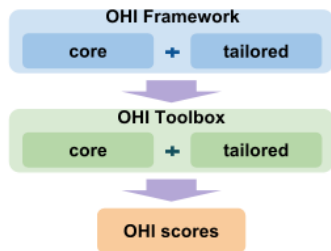
local computer



# OHI assessment process



# OHI assessment process



# OHI+: independent assessments



# Examples of OHI+ assessments



**Baltic Sea**



**Israel**



**Ecuador**

# OHI+ assessment: Baltic Sea



**Baltic Sea - in progress**



## **Framework: tailored**

- 9 benefits ('goals')
- 42 biogeographic/political regions

## **Toolbox: tailored**

- incorporate cultural places  
(old fishing villages, islands)

## **Scores**

- will be aggregated to basin-level  
and political-level

# OHI+ assessment: Israel



Israel



## Framework: tailored

- 9 benefits ('goals')
- 6 coastal districts (Med)

## Toolbox: tailored

- included desalination

## Scores

- academic-government pilot assessment

# OHI+ assessment: Ecuador



**Ecuador**



## **Framework: tailored**

- 10 benefits ('goals')
- 3 regions (Gulf of Guayaquil)

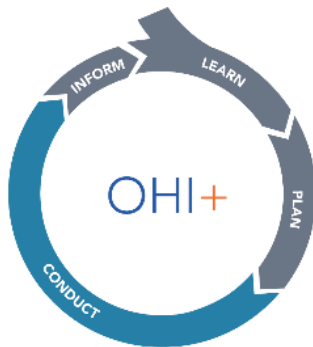
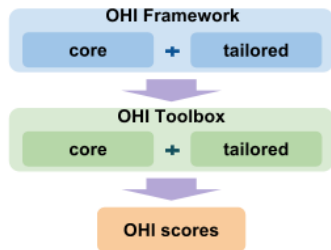
## **Toolbox: tailored**

- technical team's workflow

## **Scores**

- government-led; Phase 2 Ecuador-scale assessment planned

# OHI assessment process

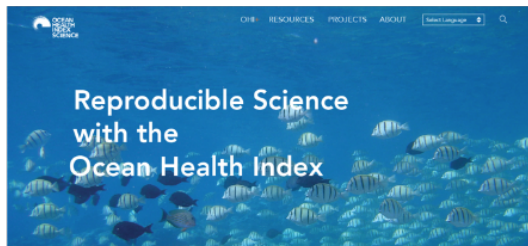




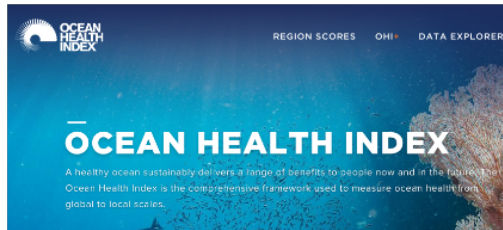
# Community resources



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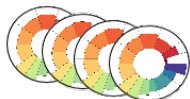


**ohi-science.org**



**www.oceanhealthindex.org**

# Next steps



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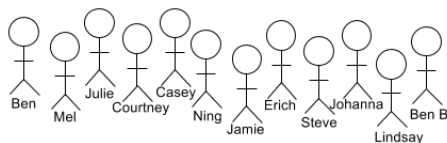


US West Coast 2014\*



Fiji 2015\*

# OHI team



**Thank you funders, open-source developers, data providers!**

Pacific Life Foundation, Gordon and Betty Moore Foundation

**Contact us about OHI+ assessments**

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Erich Pacheco: [epacheco@conservation.org](mailto:epacheco@conservation.org)

## Appendix 1: references

- Halpern et al. 2012, *Nature*. An index to assess the health and benefits of the global ocean.
- Halpern et al. 2015, *PLoS ONE*. Patterns and emerging trends in global ocean health.
- Halpern et al. 2014, *PLoS ONE*. Assessing the health of the U.S. West Coast with a regional-scale application of the OHI.
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- Selig et al. 2015, *Ecosystem Services*. Measuring indicators of ocean health for an island nation: The OHI for Fiji.
- Halpern et al. 2008, *Science*. A global map of human impact on marine ecosystems.
- Halpern et al. 2015, *Nature Communications*. Spatial and temporal changes in cumulative human impacts on the world's ocean.
- Lowndes et al. in revision. Best practices for assessing ocean health in multiple contexts using tailorable frameworks

## Appendix 2: Talk abstract part 1/2

The Ocean Health Index (OHI) is a framework to assess the state of our marine systems. With a definition of 'healthy' that includes sustainable human use, the OHI scores locations from 0-100 depending on how sustainably their waters provide a suite of benefits to people. The OHI framework was first used to assess all coastal nations globally, and was published in 2012 (Halpern et al. 2012, Nature).

Following the 2012 publication, the OHI framework has been used to assess smaller-scale locations, most often states or provinces within a single nation. These smaller spatial scales often have information that better represents local characteristics of marine systems and are also often the scale at which policy decisions are made.

## Appendix 2: Talk abstract part 2/2

To date, eleven assessments using the OHI framework have been completed at global, national, and regional scales, four of which have been led by independent academic or government groups. To facilitate these assessments, we have developed a suite of open-source tools and instruction. The OHI Toolbox provides structure for data organization and storage, with data processing and goal modeling done in the programming language R and RStudio for reproducibility and repeatability. The OHI Toolbox is stored on the open-source online platform GitHub, which allows for transparency and collaboration and also houses websites to display and communicate methods and results with interactive visualizations. More information can be found at [ohi-science.org](http://ohi-science.org) (currently under a major restructuring and improvement, stay tuned!).