The Ocean Health Index 2012-2015

Julia Stewart Lowndes, Ben Halpern, and the OHI team
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

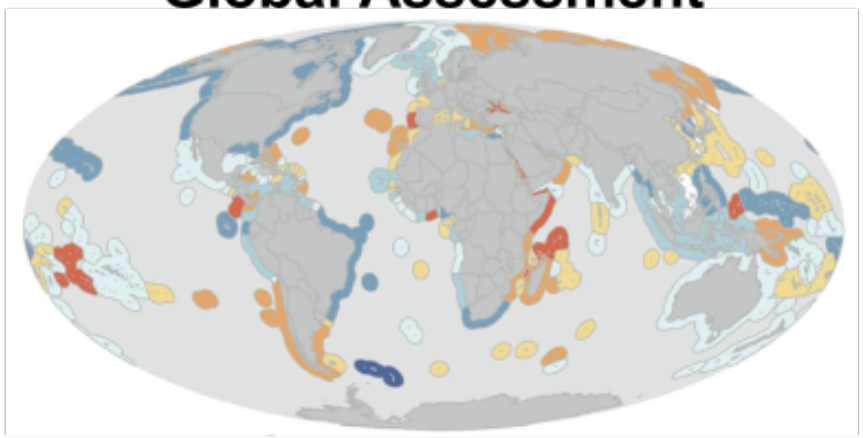
Benjamin S. Halpern[1,2], Catherine Longo[1], Darren Hardy[1], Karen L. McLeod[3], Jameal F. Samhouri[4], Steven K. Katona[5], Kristin Kleisner[6], Sarah E. Lester[7,8], Jennifer O'Leary[1], Marla Ranelletti[1], Andrew A. Rosenberg[5], Courtney Scarborough[1], Elizabeth R. Selig[5], Benjamin D. Best[9], Daniel R. Brumbaugh[10], F. Stuart Chapin[11], Larry B. Crowder[12], Kendra L. Daly[13], Scott C. Doney[14], Cristiane Elfes[15,16], Michael J. Fogarty[17], Steven D. Gaines[8], Kelsey I. Jacobsen[8], Leah Bunce Karrer[5], Heather M. Leslie[18], Elizabeth Neeley[19], Daniel Pauly[6], Stephen Polasky[20], Bud Ris[21], Kevin St Martin[22], Gregory S. Stone[5], U. Rashid Sumaila[6] & Dirk Zeller[6]

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

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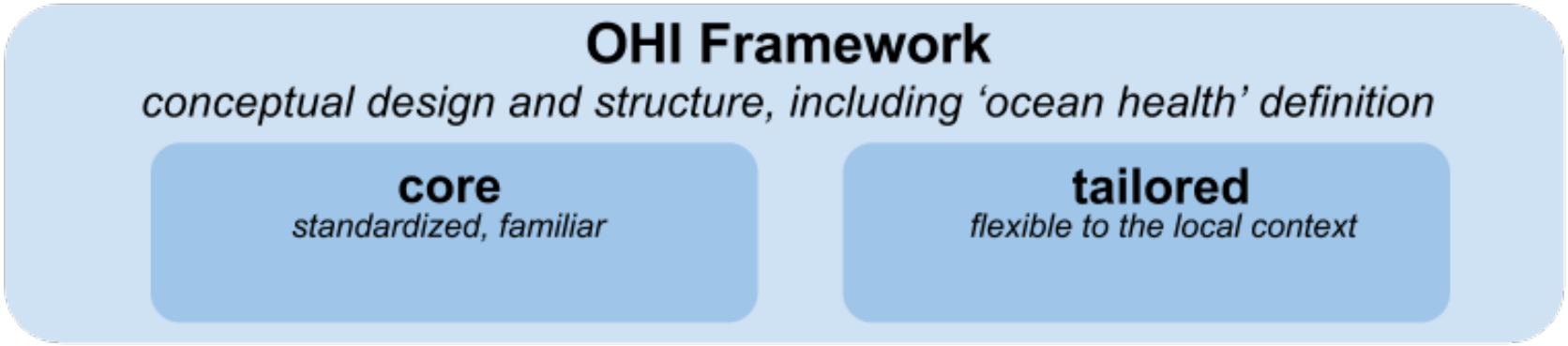
"A healthy ocean sustainably delivers a range of benefits to people now and in the future"

Ocean Health Index: 2012 recap



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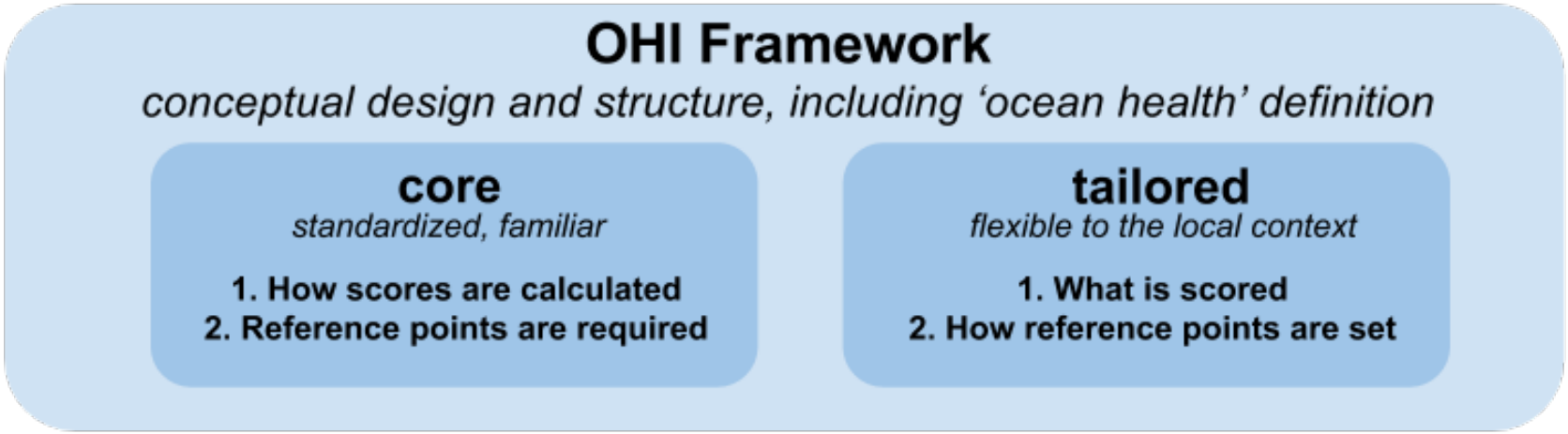


Ocean Health Index: 2012 recap

OHI Framework

conceptual design and structure, including 'ocean health' definition

core

standardized, familiar

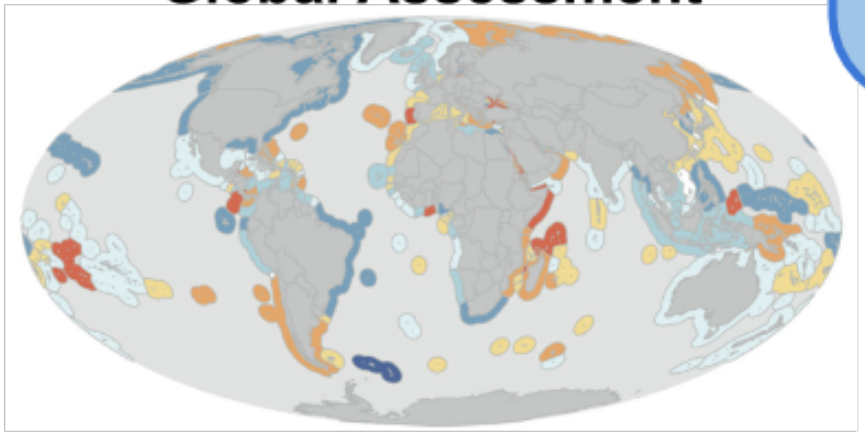
1. How scores are calculated
2. Reference points are required

tailored: Global

flexible to the local context

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

Global Assessment



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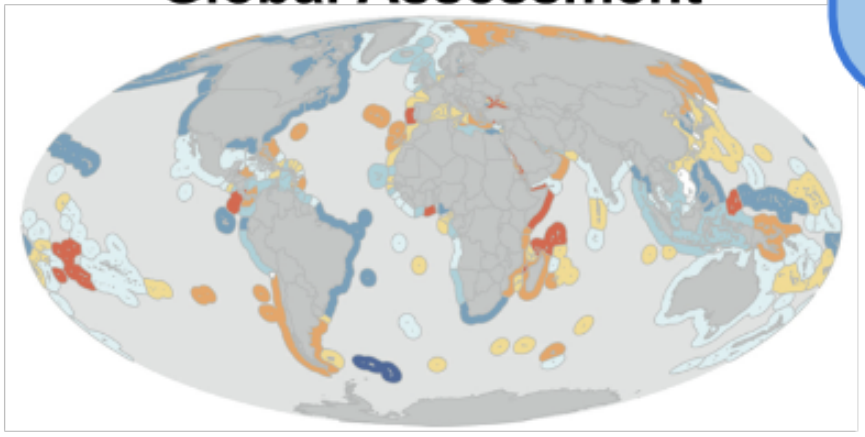
- 10 benefits ('goals')
- all coastal nations/territories

2. How reference points are set

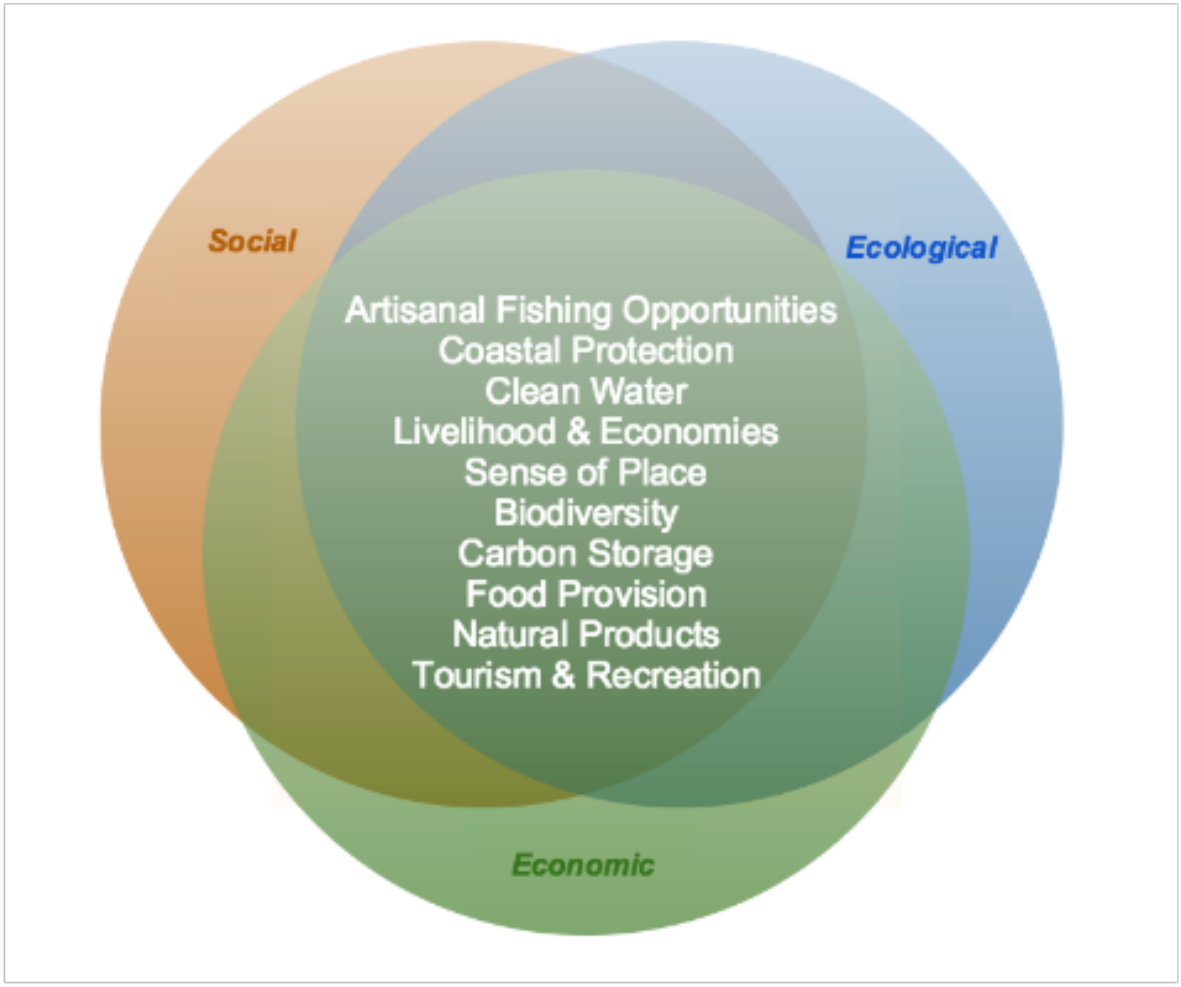
- used freely available data

Global Assessment



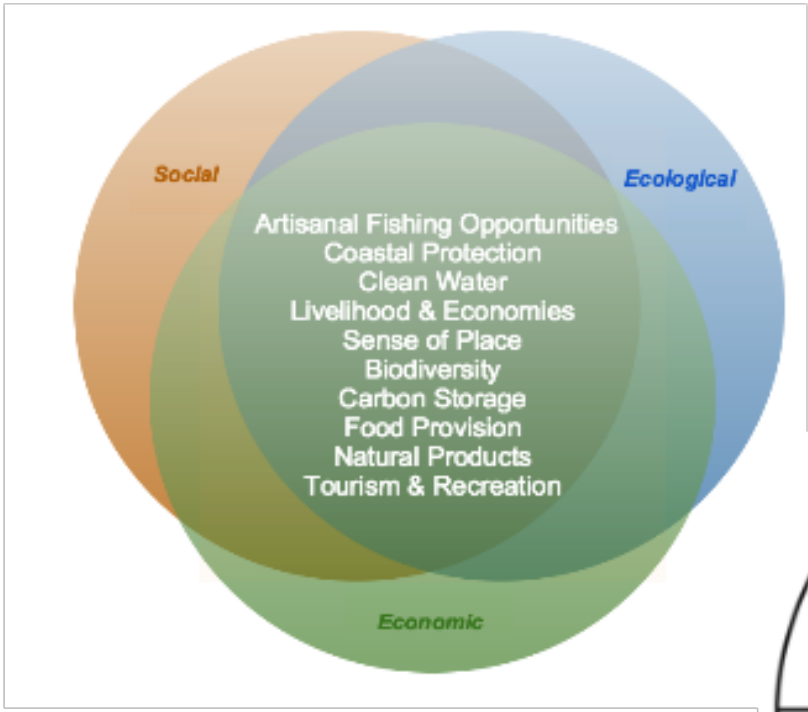
Ocean Health Index: 2012 recap

Goals in the global assessment



Ocean Health Index: 2012 recap

Goals in the global assessment



Ocean Health Index: 2012 recap

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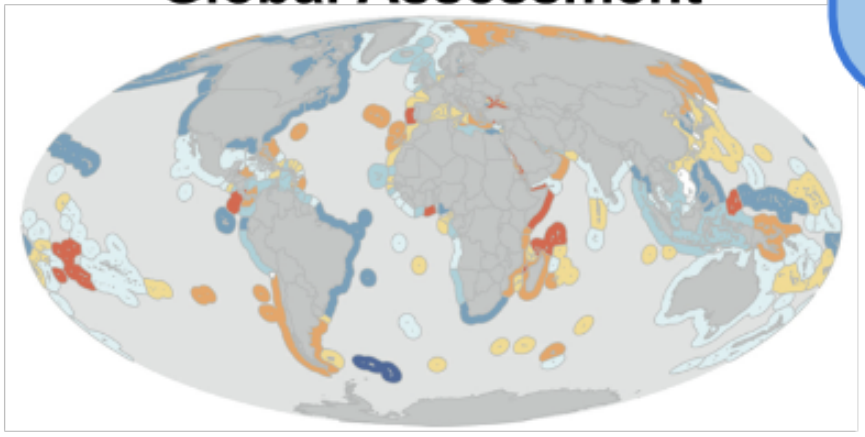

OHI: 2012-2015 overview

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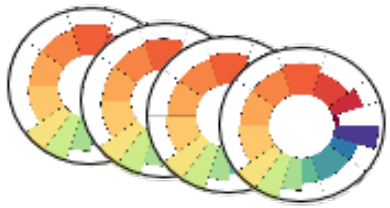

Global Assessments

2012*, 2013*, 2014, 2015

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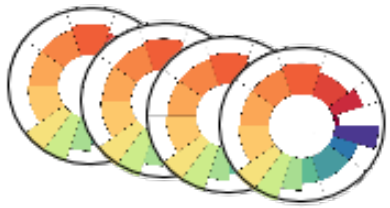

Global Assessments

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Toolbox

- open-source software
- visualization tools
- training program

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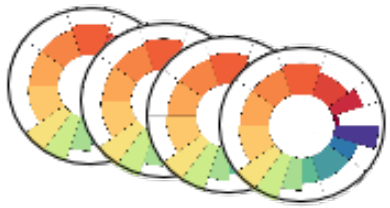

Global Assessments

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Small-scale Assessments

Brazil 2014*

British Columbia

US West Coast 2014*

Fiji 2015*

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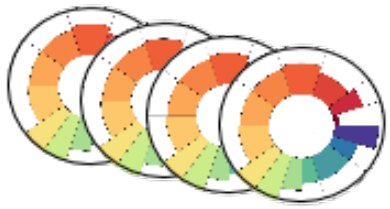

Global Assessments

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Independent Assessments (OHI+)


Canada 2013


Israel 2014*


Gulf of Guayaquil 2015

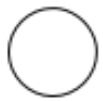

China 2014

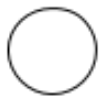

Peru

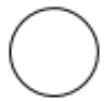

Colombia


Spain


Chile


Arctic


Baltic Sea


Hawaii

Small-scale Assessments


Brazil 2014*


British Columbia


US West Coast 2014*


Fiji 2015*

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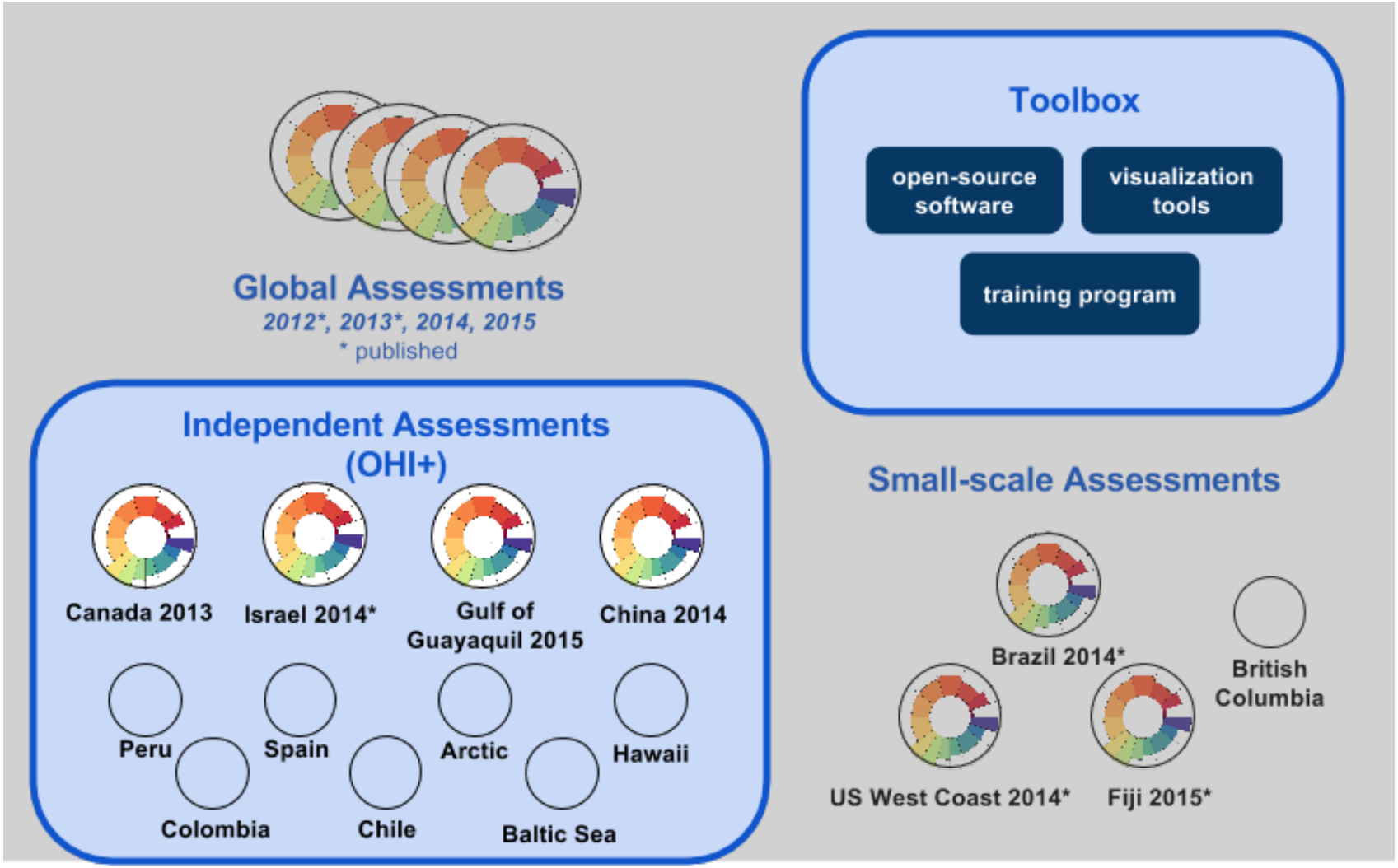
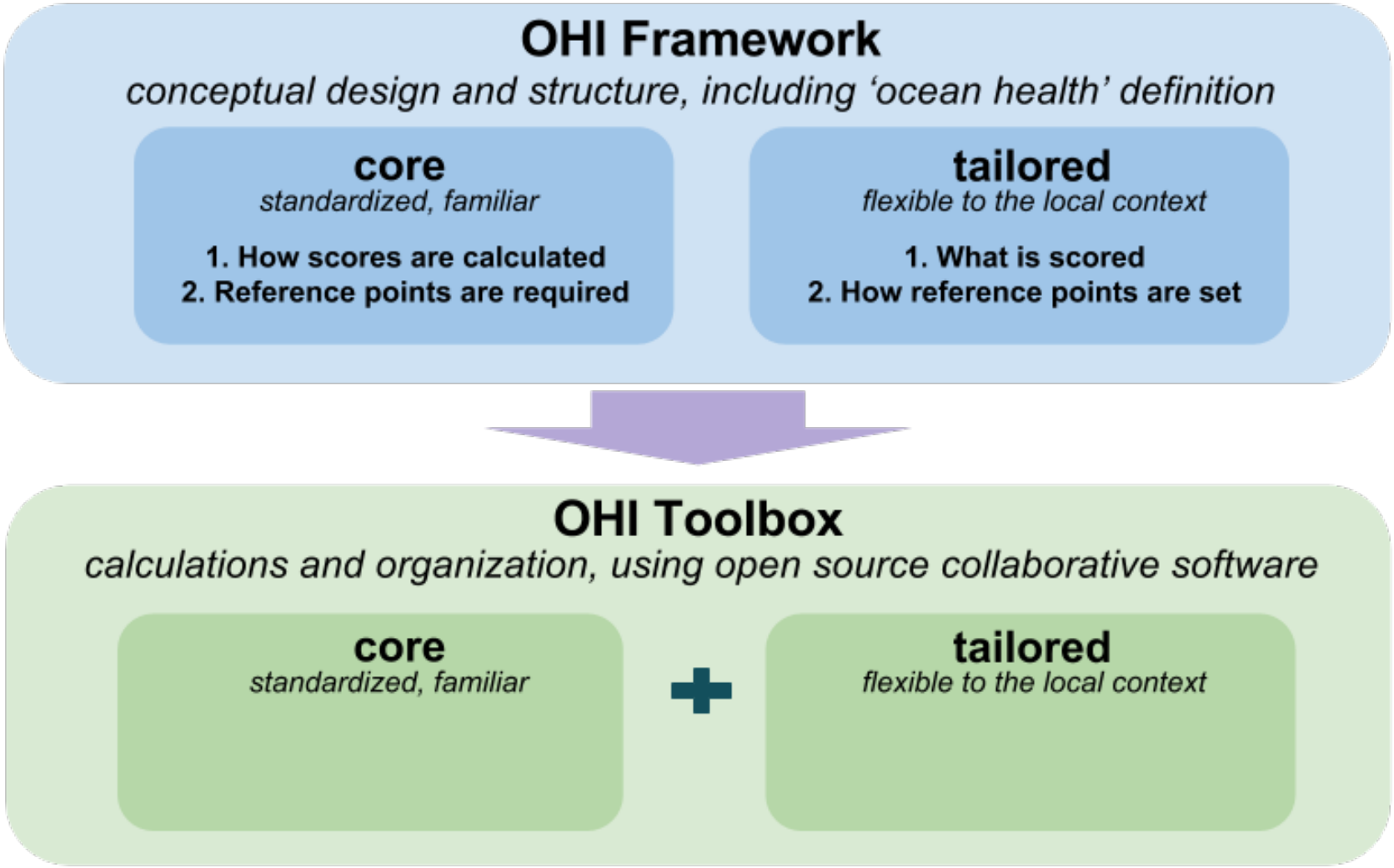


OHI Toolbox


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
OHI Toolbox
calculations and organization, using open source collaborative software
core
standardized, familiar
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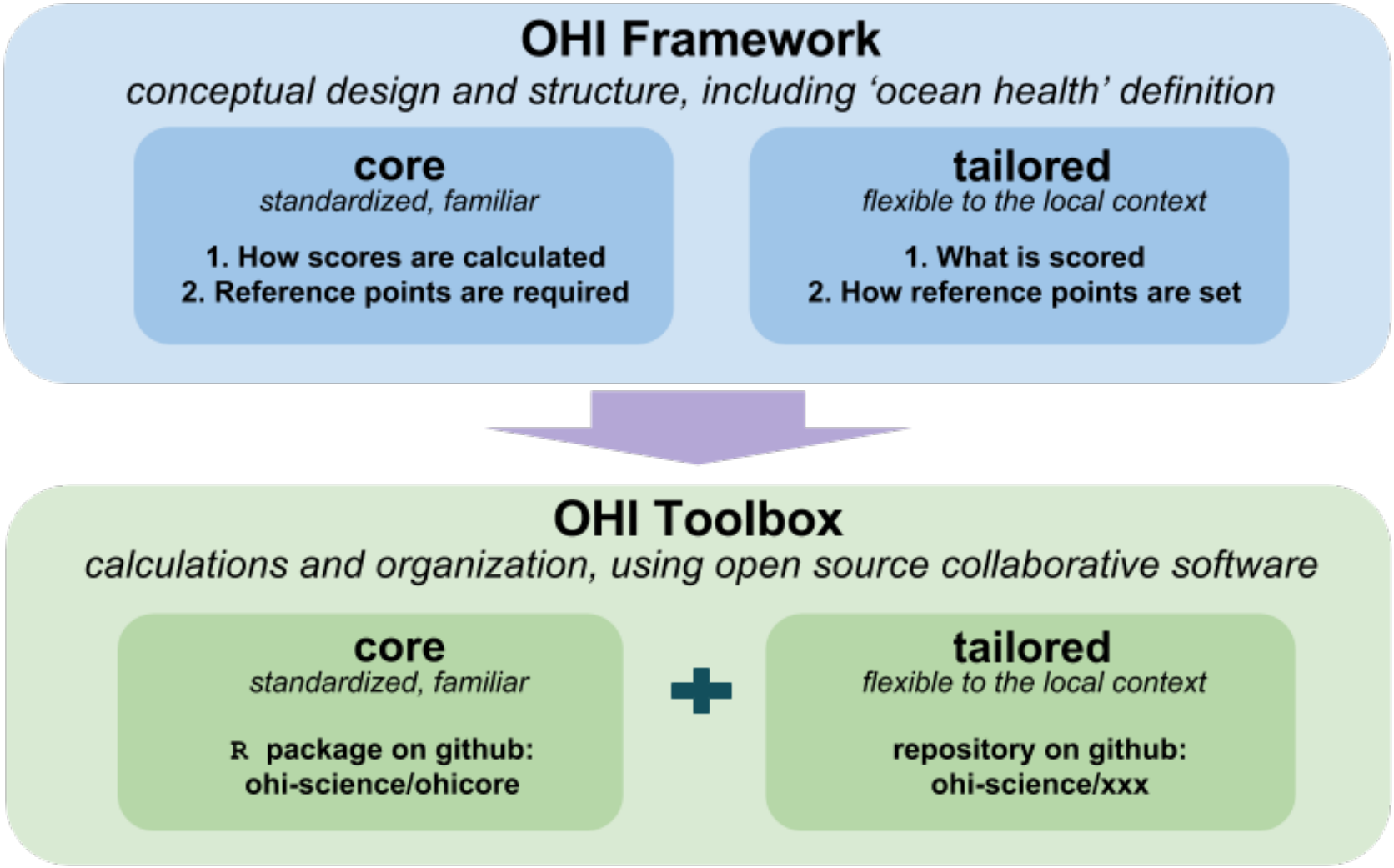
OHI Toolbox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flexible to the local context
repository on github:
ohi-science/xxx

OHI Toolbox

OHI Toolbox

calculations and organization, using open source collaborative software

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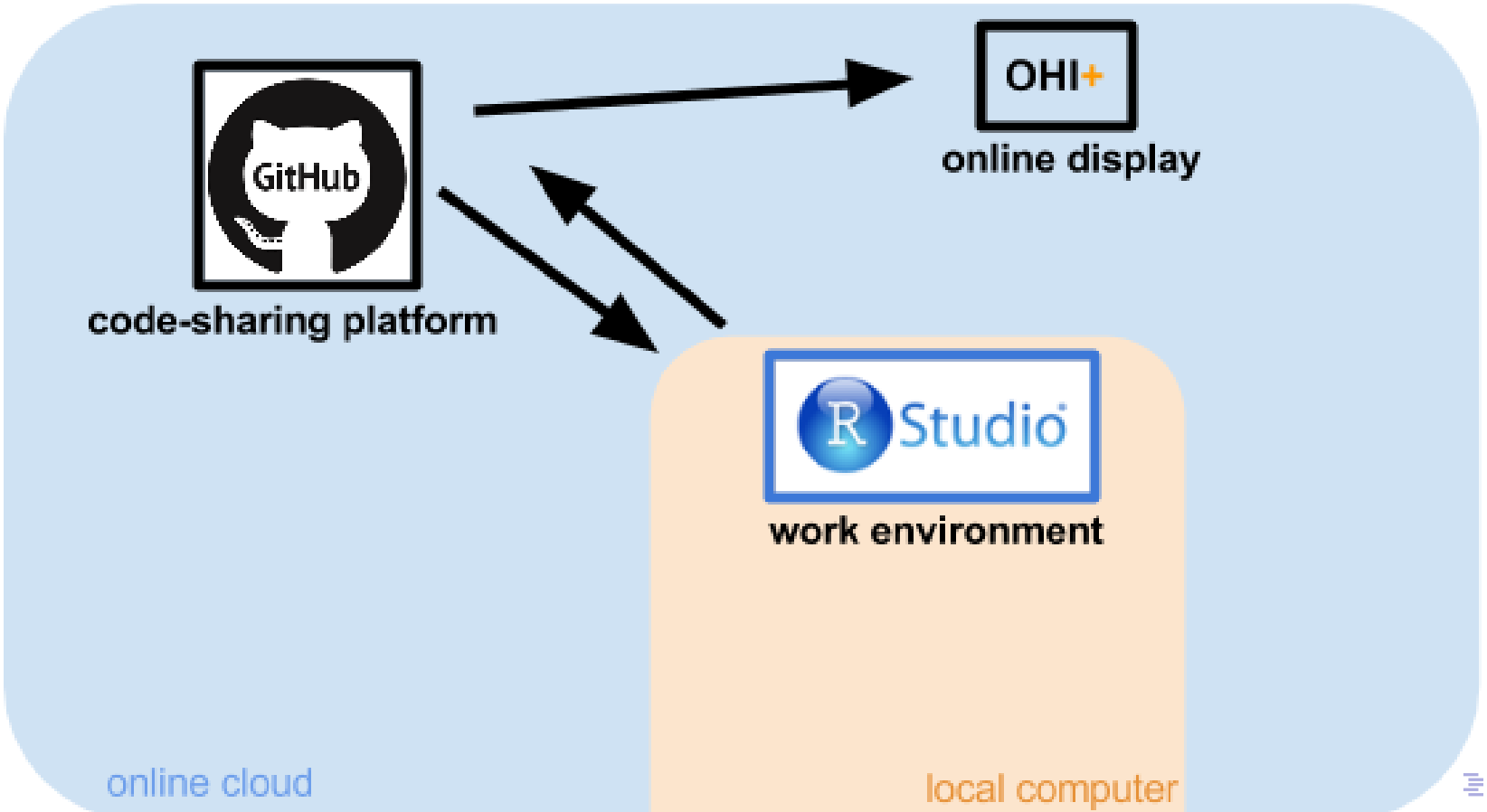
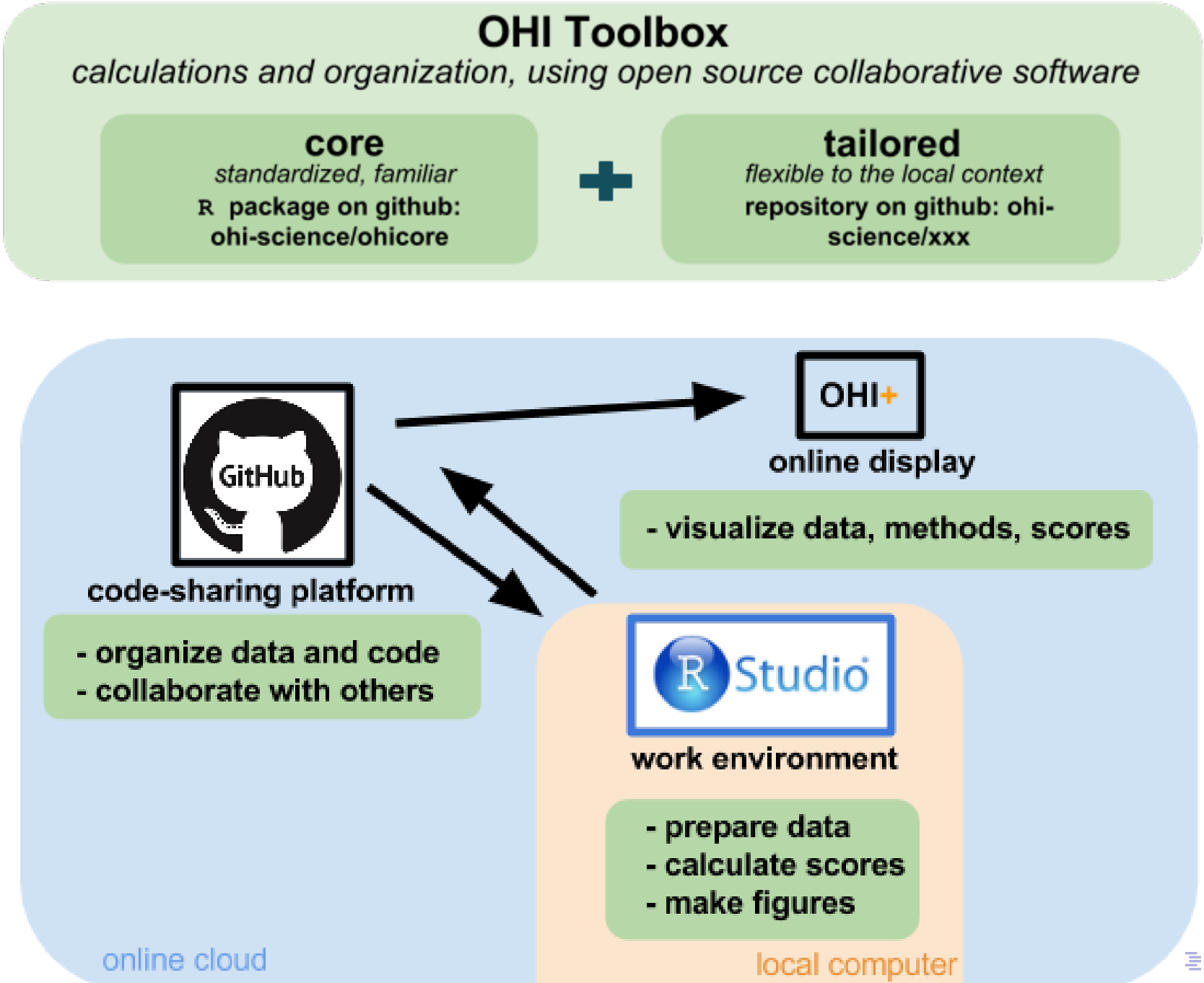


OHI Toolbox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GitHub
code-sharing platform
- organize data and code
- collaborate with others
OHI+
online display
- visualize data, methods, scores
RStudio
work environment
- prepare data
- calculate scores
- make figures
online cloud
local computer

OHI Toolbox

OHI Toolbox

calculations and organization, using open source collaborative software

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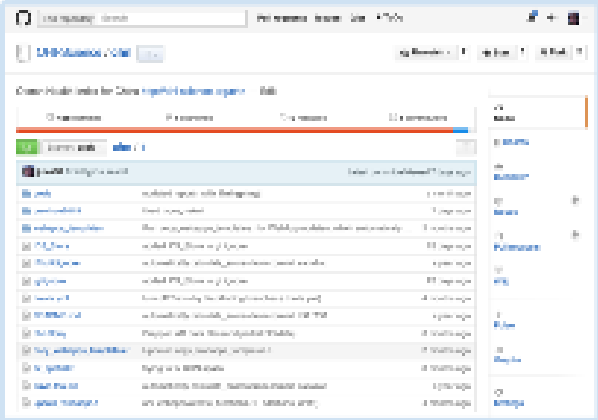
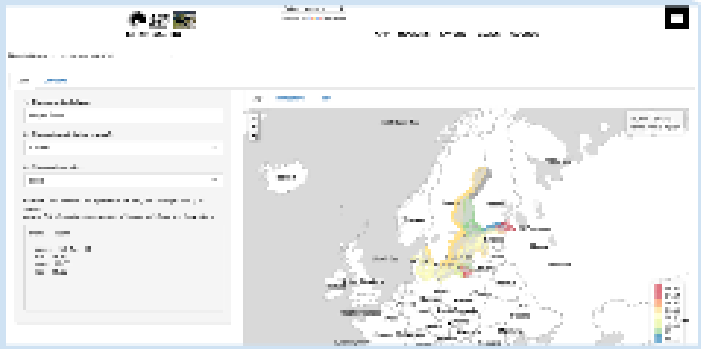
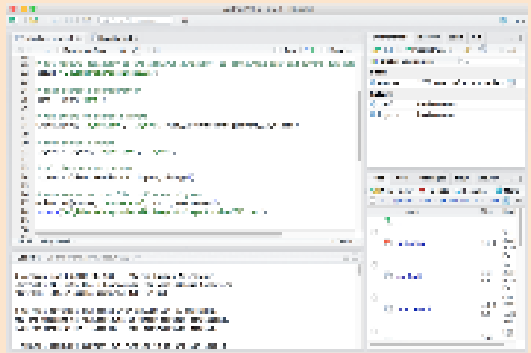




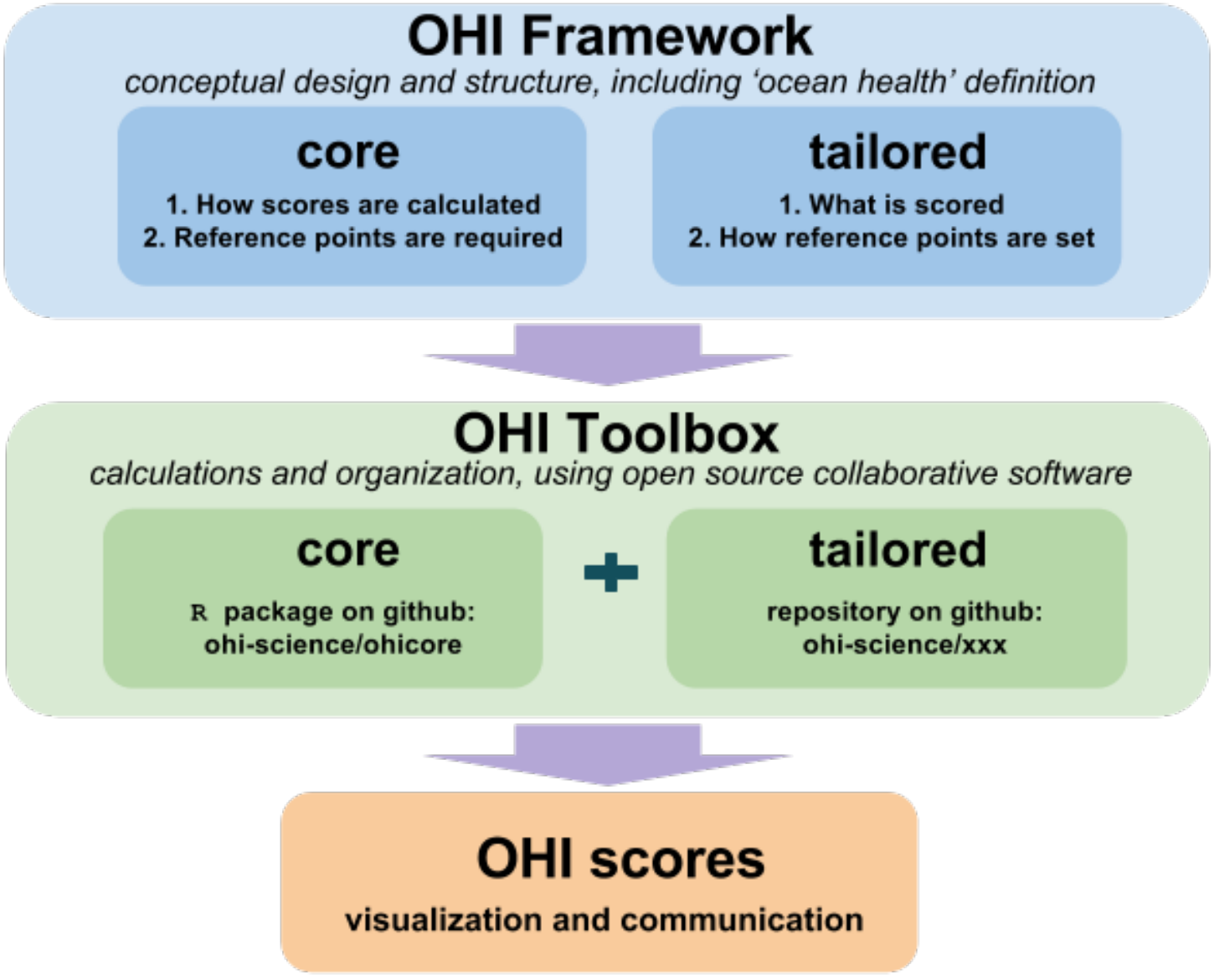
DEMO:
github.com/ohi-science/bhi
ohi-science.org/bhi

online cloud



local computer

OHI assessment process



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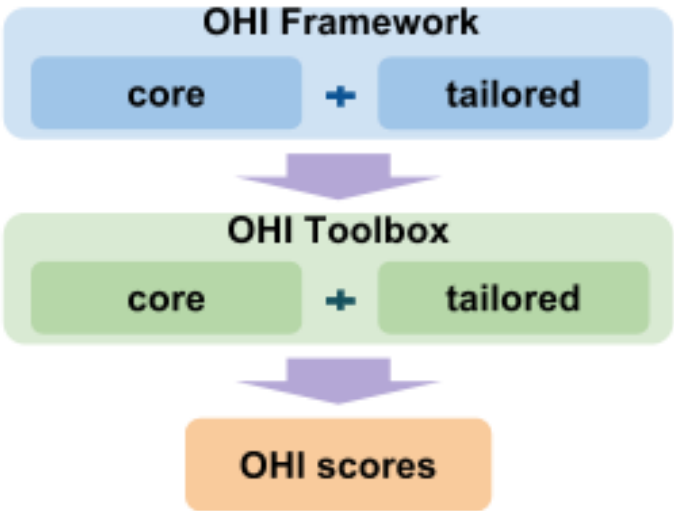
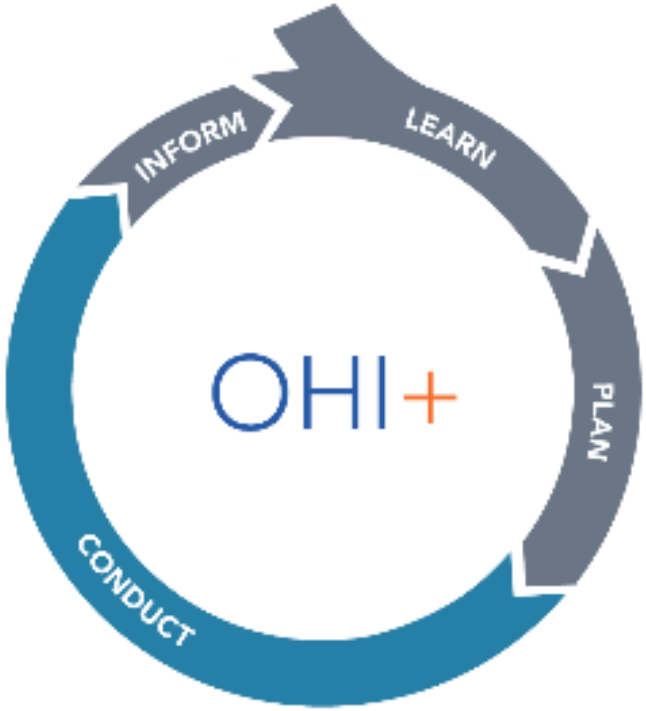




OHI+: independent assessments

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)

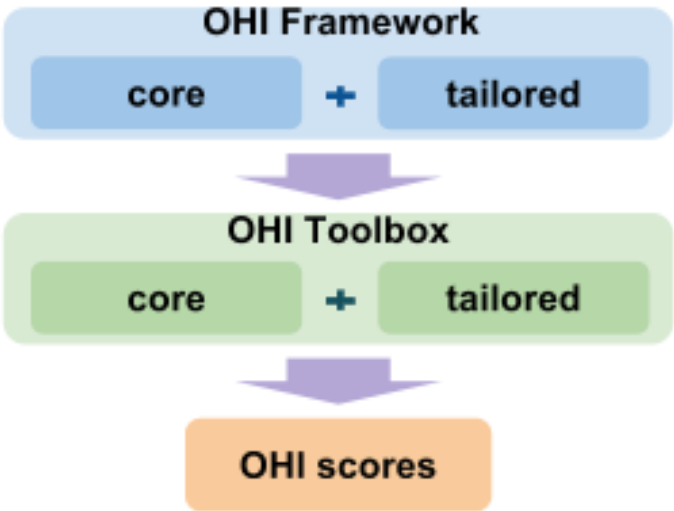
Toolbox: tailored

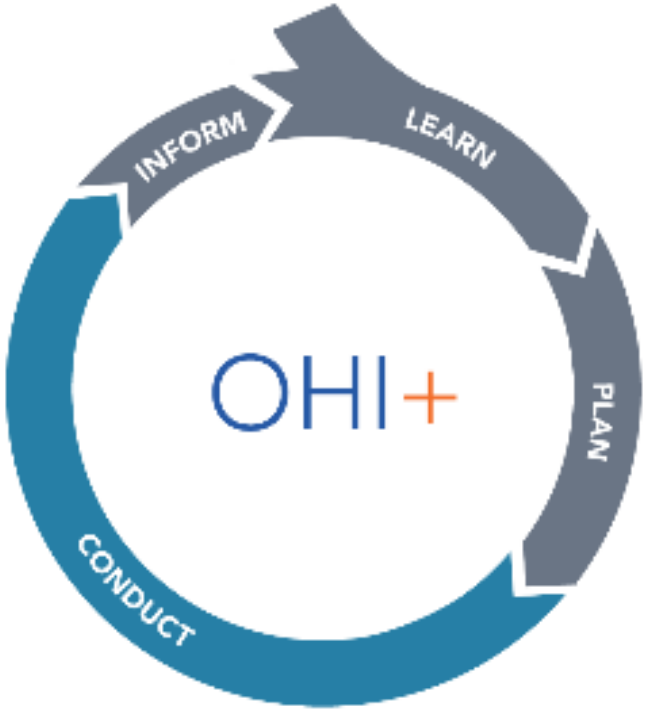
- technical team's workflow

Scores

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

OHI assessment process





Community resources

ohi-science.org

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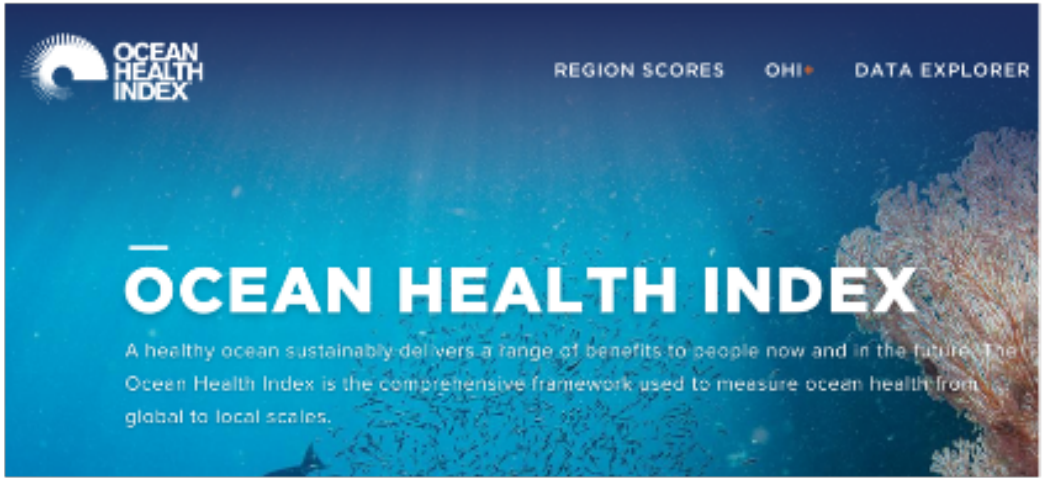
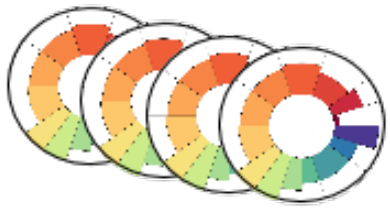


www.oceanhealthindex.org

Next steps



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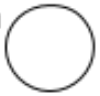

Colombia


Chile


Baltic Sea

Small-scale Assessments

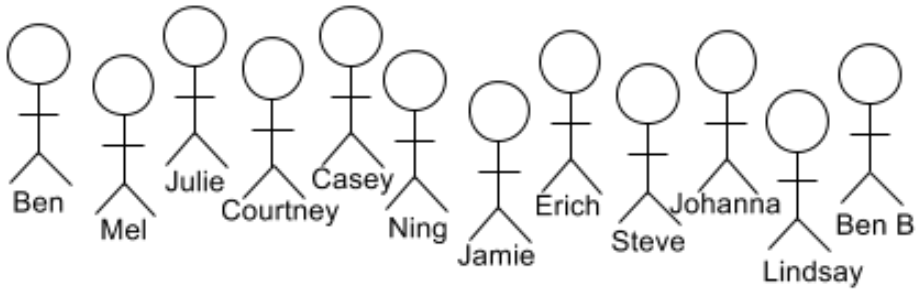

Brazil 2014*


British Columbia


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

Julie Lowndes: `lowndes@nceas.ucsb.edu`
Ning Mendes: `mendes@nceas.ucsb.edu`
Erich Pacheco: `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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- Halpern et al. 2008, *Science*. A global map of human impact on marine ecosystems.
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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 (currently under a major restructuring and improvement, stay tuned!).