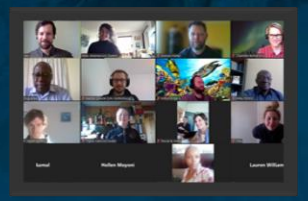
WIO Symphony

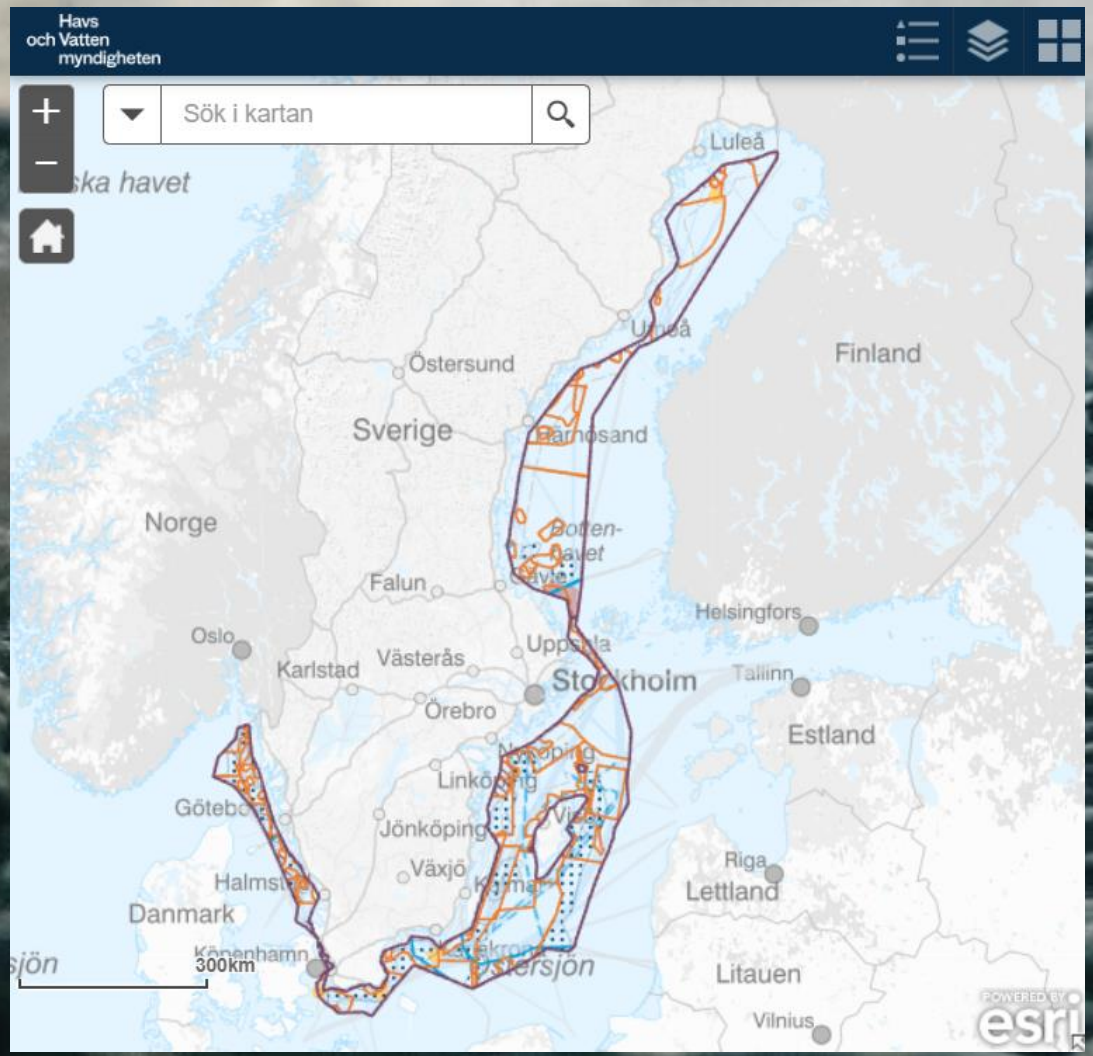







www.nairobiconvention.org/wio-symphony

Background



First Swedish MSP

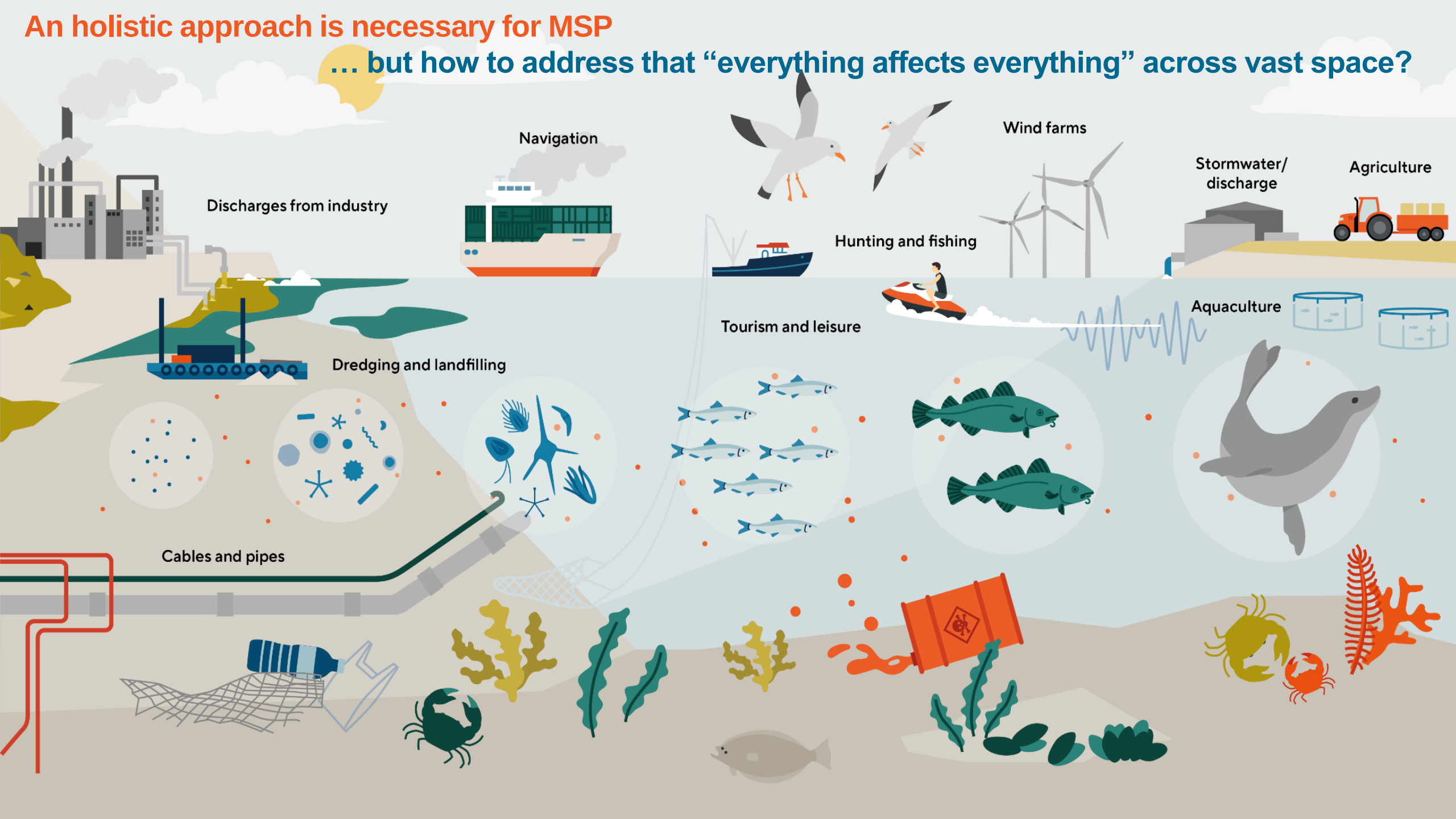
Started 2015 - Approved by government in Feb 2022

Environmental focus

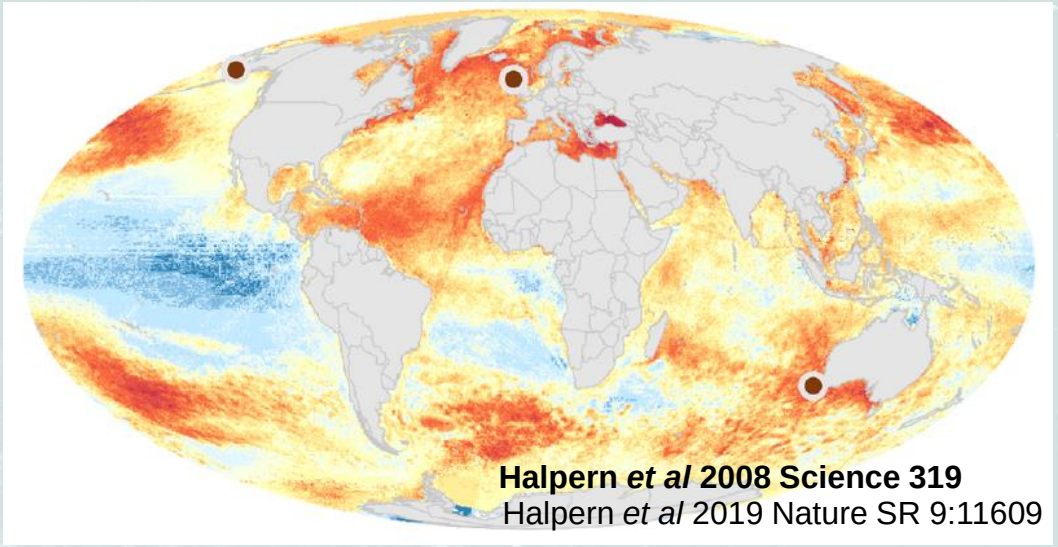
Image: The Ocean Agency

An holistic approach is necessary for MSP

… but how to address that “everything affects everything” across vast space?

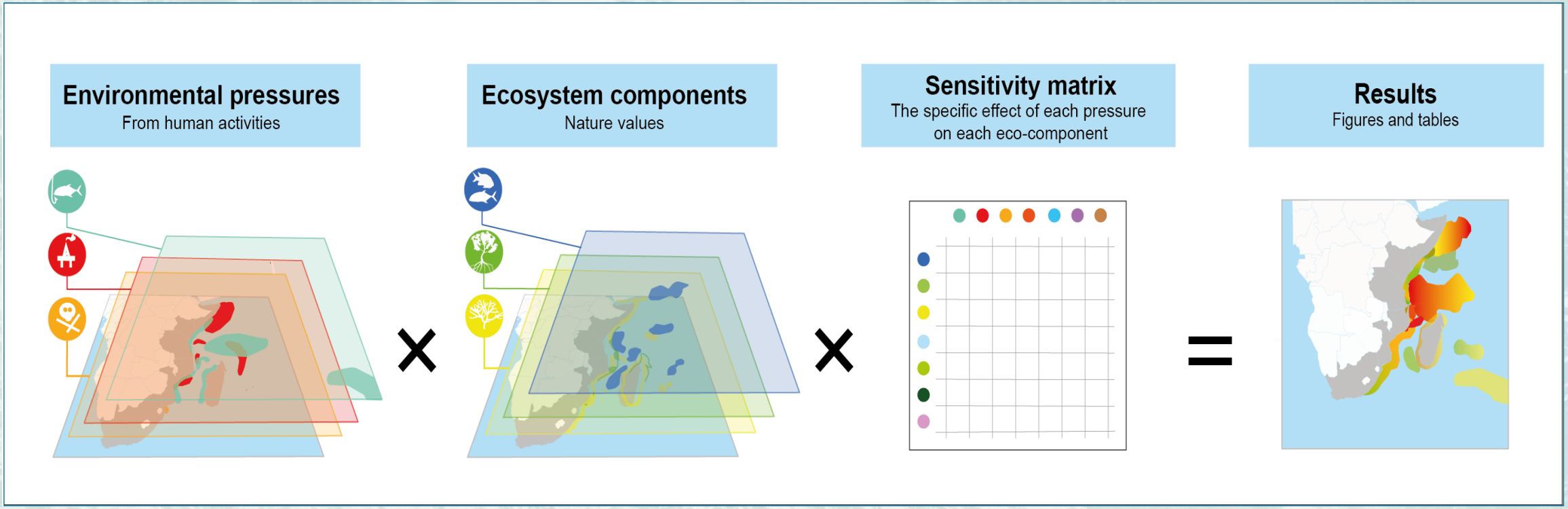


Cumulative impact assessment



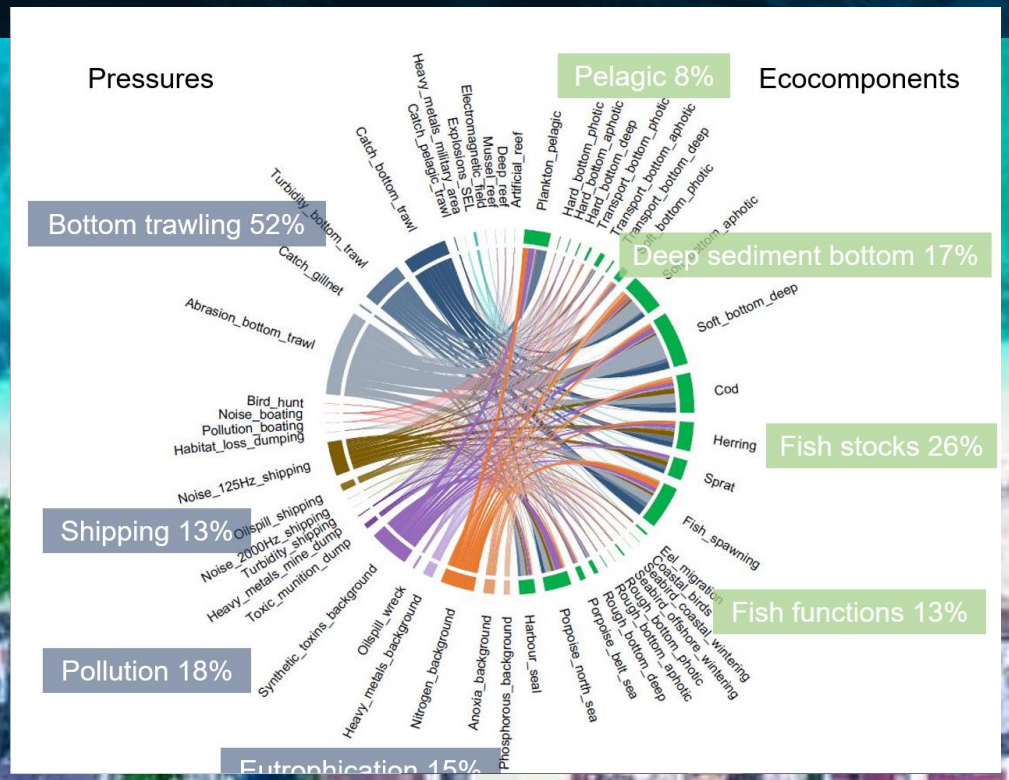
Halpern *et al* 2008 Science 319
Halpern *et al* 2019 Nature SR 9:11609

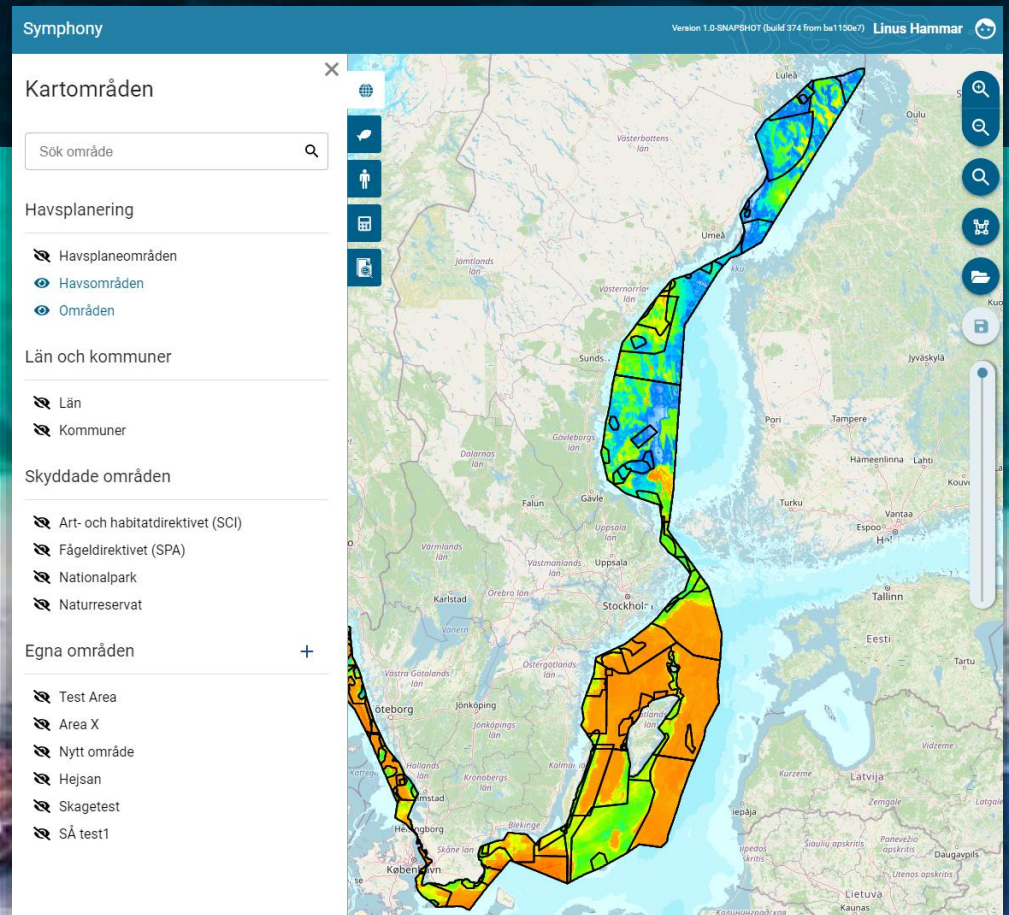
Models behind the map



Development of Symphony in Sweden

We collected a lot of spatial data, produced maps, and developed an analytic tool (software)





SwAM Ocean – reducing poverty through sustainable use of the ocean

- SwAM's development cooperation program 2019-2023
- Funded by SIDA and Swedish EPA
- Continued program post 2023 under preparation

www.havochvatten.se/swam-ocean

Focus areas

- Support MSP
- Managing MPAs
- Transparency in fisheries
- Blue Growth

Sweden
Sverige

Swedish Agency for Marine and Water Management

SwAM Ocean 2019-2023

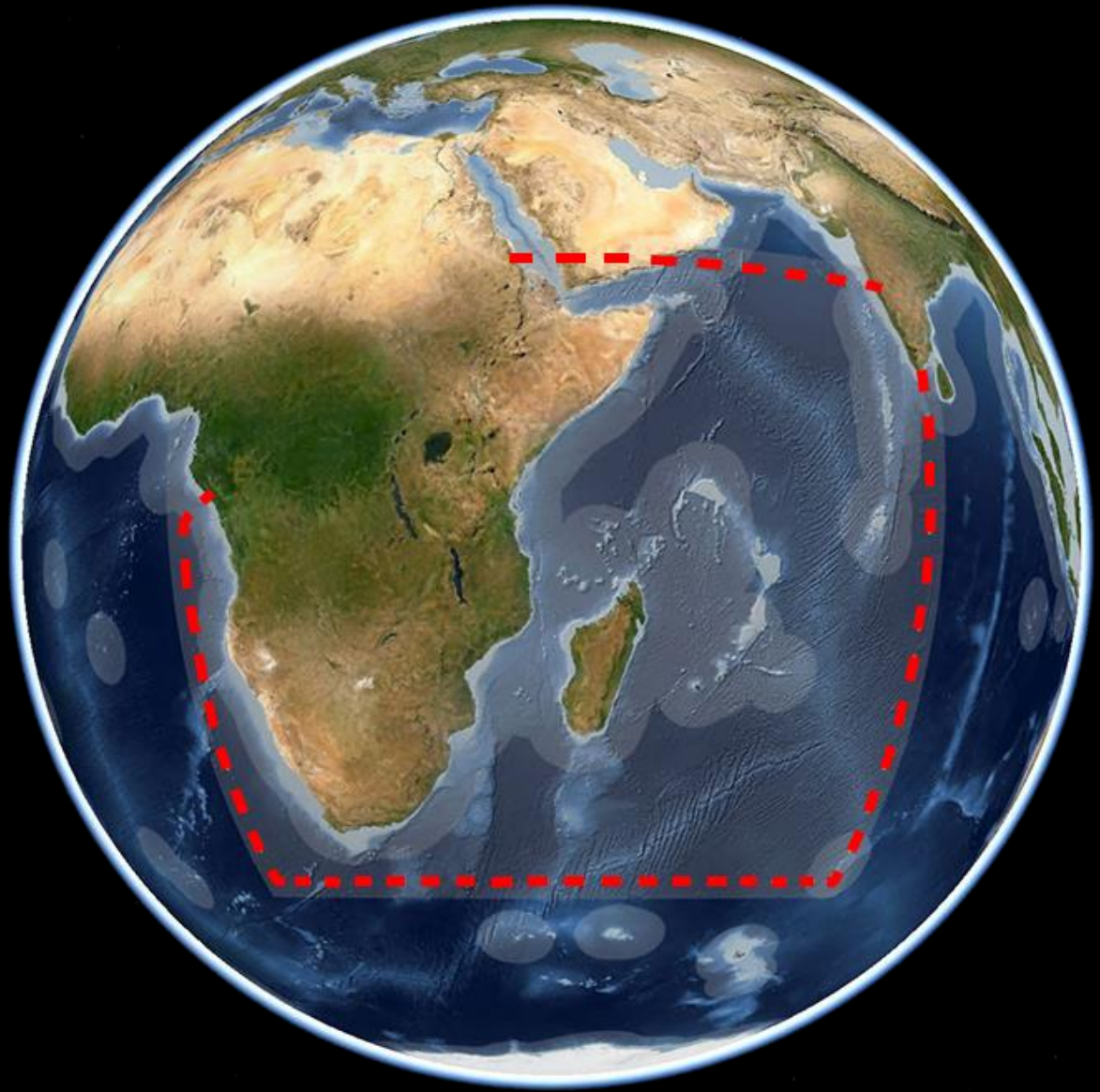
Sida The Swedish International Development Cooperation Agency

43,000,000 SEK

- Protection for strong ecosystems
- Use, Blue growth and fisheries
- Marine Spatial Planning (MSP)
- **WIO Symphony 2020-2022 +2023**

from Symphony to WIO Symphony

on request by Nairobi Convention 2019



WIO Symphony co-development

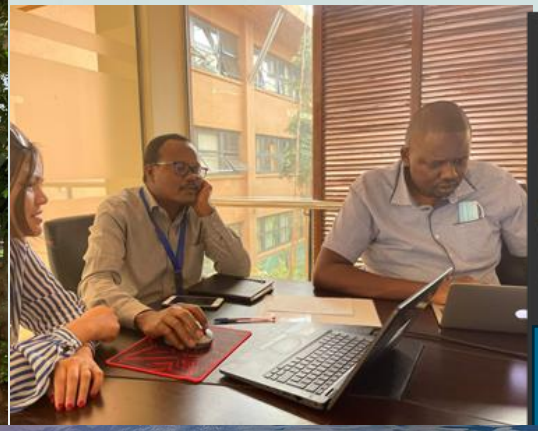
- **Technical Working Group** (TWG) through Nairobi Convention provides the core, representing 10 countries in WIO
- **Swedish team** has experience of developing the Swedish Symphony tool
- **Regional experts** and **national teams** add scientific information and advice
- **International marine community** essential for data and collaboration
- **Activities** include Workshops – Thematic Groups – Trainings – Data collection – Modeling – Review – Implementation

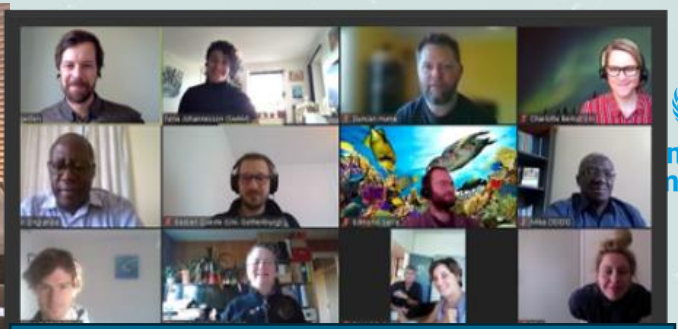
Online workshop series 2020-2022

Mombasa workshop 2022

Comoros training 2022

Nairobi secretariete





Online webinars 2020-2023

Sweden
Sverige

Swedish Agency
for Marine and
Water Management

First WIO Symphony Launched, South Africa

Technical workshop Mombasa

WIO Symphony meeting, South Africa

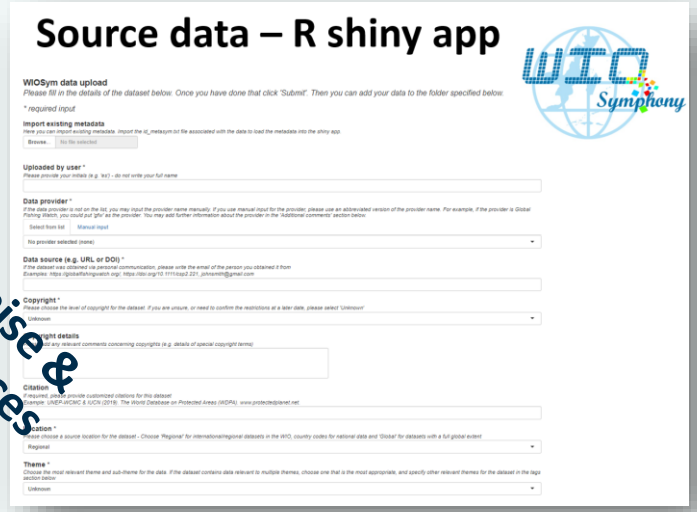
Comoros GIS workshop

A capacity development workshop on marine spatial planning (MSP)

Data behind the WIO Symphony

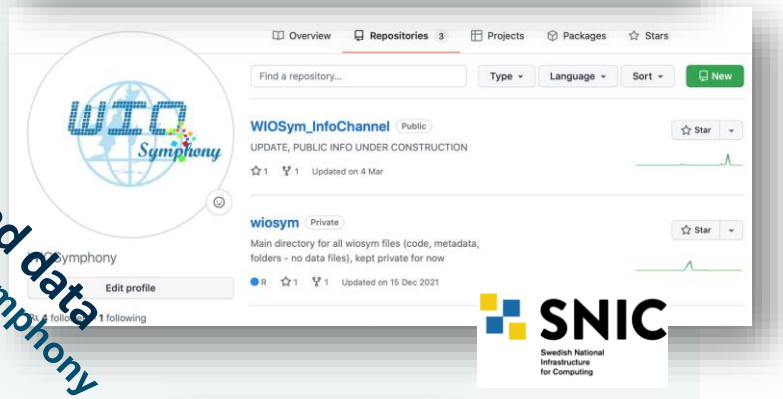
1: Data layers

App to organise & track data sources



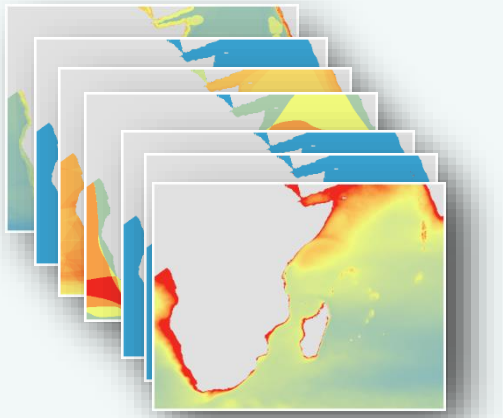
Open code and data

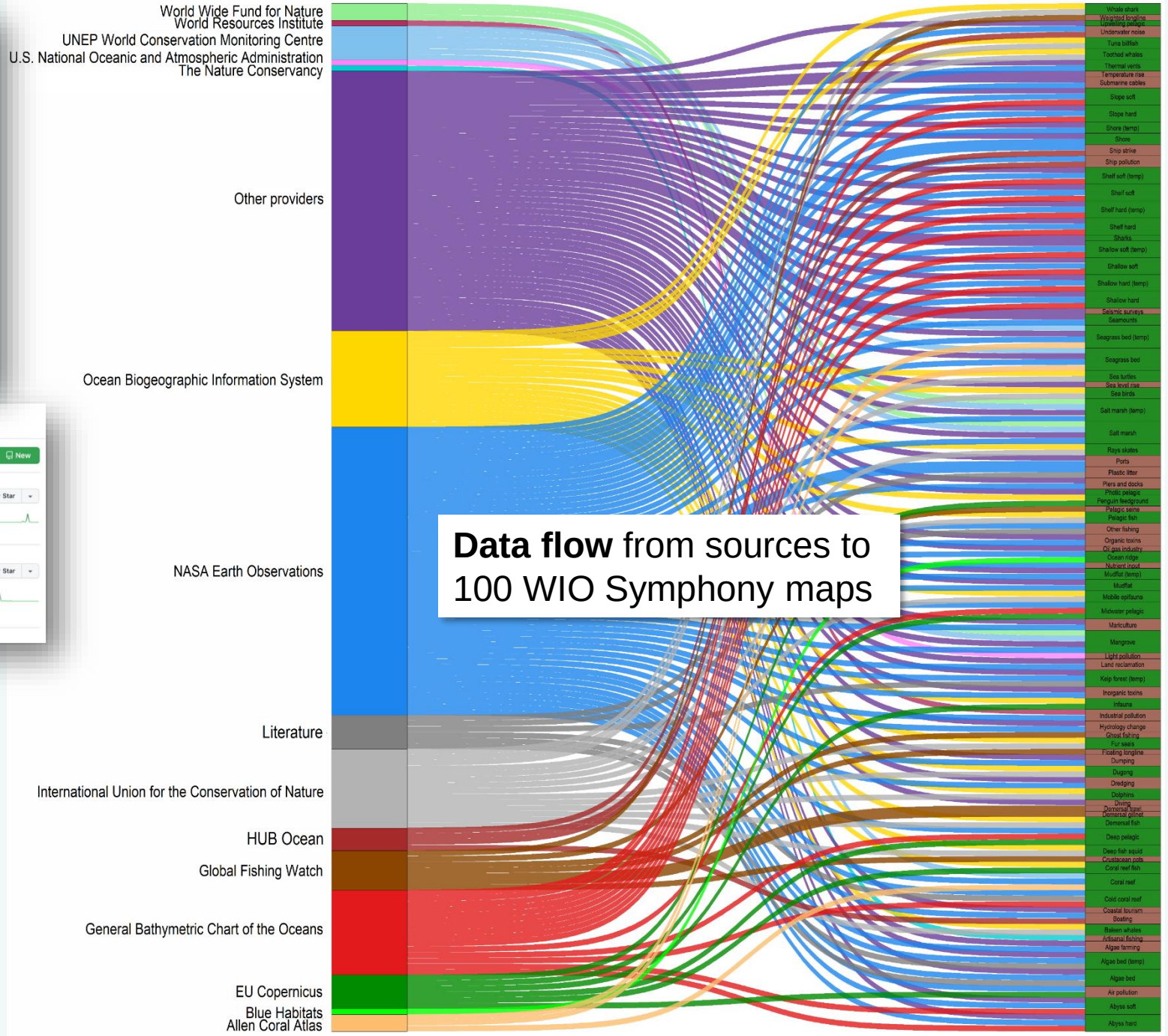
github.com/WIOSymphony



Products

Made to be remade...

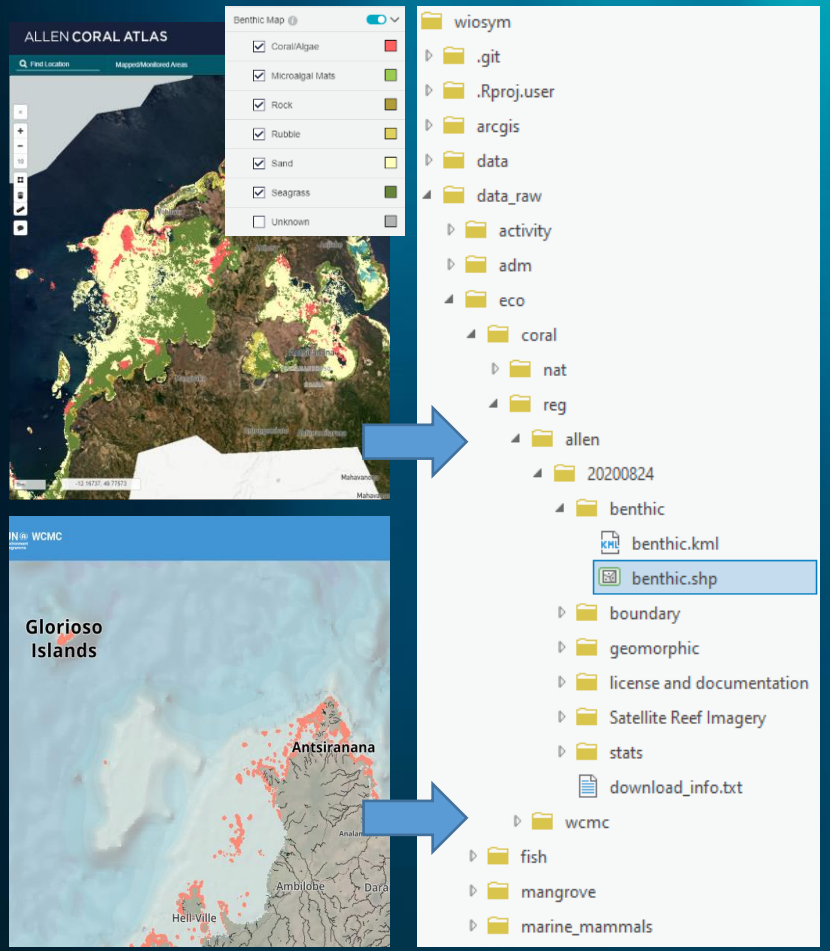




WIO Symphony Data Process

from habitat scale to management scale

Fresh ingrediens and a *well organised* kitchen

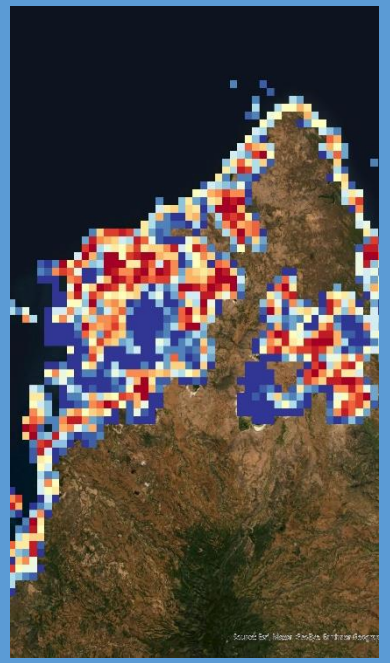


Cookbook & oven

<u>Data processing</u>
-open source
-reproducible

Main course

<u>Maps of corals</u>
- combined sources
- standardised



Side dish

Maps of potential corals
- env. proxy
- caution areas

Precautions

Uncertainty
- maps
- metadata

2. Sensitivity Matrix

Swedish Agency

Number of respondents

Coastal development
Shipping
Fishing
Recreation
Survey
Aquaculture
Offshore development
Pollution
Climate Change

	Ports	Piers and docks	Land reclamation	Water flow changes	Light pollution	Industrial pollution	Dredging	Dumping	Ship pollution	Underwater noise	Ship strikes	Pelagic trawl fishing	Pelagic seine net fishing	Floating Long-line	Pelagic gill net	Demersal trawl fishing	Weighted Long-line	Demersal gill net	Crustacean fishing (selective)	Artisanal fishing (mixed methods)	Ghost fishing	Recreational fishing	Recreational boating	Tourism	Diving and snorkelling	Shark control	Marine waste	Seismic surveys	Bycatch	Mariculture	Algae farming	Infrastructure	Submarine cables	Oil and gas	Renewable energy	Impulsive noise	Invasive species	Sea bed mining	Oil spill	Organic toxins	Inorganic toxins	Air emissions	Nutrient input	Temperature rise	Sea level rise	Ocean acidification	Storm surges	Average
	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	COASTAL DEVELOPMENT	SHIPPING	SHIPPING	SHIPPING	FISHING	FISHING	FISHING	FISHING	FISHING	FISHING	FISHING	FISHING	FISHING	FISHING	FISHING	RECREATION	RECREATION	RECREATION	LITTER	SURVEY	SURVEY	AQUACULTURE	AQUACULTURE	OFFSHORE DEVELOPMENT	OFFSHORE DEVELOPMENT	OFFSHORE DEVELOPMENT	OFFSHORE DEVELOPMENT	OFFSHORE DEVELOPMENT	BIOLOGICAL DISTURBANCE	MINING	POLLUTION	POLLUTION	POLLUTION	POLLUTION	NUTRIENTS	CLIMATE CHANGE	CLIMATE CHANGE	CLIMATE CHANGE	CLIMATE CHANGE	
Mammals - Baleen whales																																														
Mammals - Toothed whales																																														
Mammals - Sea cows																																														
Mammals - Seals																																														
Reptiles - Turtles																																														
Fish - Tuna & billfish																																														
Fish - Pelagic fish (other)																																														
Fish - Deep-sea fish & squid																																														
Fish - Small fish																																														
Fish - Coral reef fish																																														
Fish - Sharks (predatory)																																														
Fish - Whale shark																																														
Fish - Ray/Skate/Manta																																														
Invertebrates - Mobile epifauna																																														
Invertebrates - Infauna																																														
Tropical - Shore																																														
Tropical - Mudflats																																														
Tropical - Shallow soft bottom																																														
Tropical - Shallow rocky bottom																																														
Tropical - Deeper (>40m) soft bottom																																														
Tropical - Deeper (>40m) rocky bottom																																														
Tropical - Mangrove																																														
Tropical - Seagrass bed																																														
Tropical - Coral reef shallow (<40m)																																														
Tropical - Coral reef deep (>40m)																																														
Tropical - Macro algae bed																																														
Tropical - Salt marsh																																														
Open ocean - Continental slope soft bottom																																														
Open ocean - Continental slope rocky bottom																																														
Open ocean - Abyssal plain (deep soft bottom)																																														
Open ocean - Abyssal rock (deep hard bottom)																																														
Open ocean - Seamounts																																														
Open ocean - Mid-ocean ridge																																														
Open ocean - Cold-water coral reef																																														
Open ocean - Hydrothermal vents																																														
Open ocean - Pelagic midwater																																														
Open ocean - Pelagic deep water																																														
Open ocean - Pelagic upwelling																																														
Temperate - Shore																																														
Temperate - Mudflats																																														
Temperate - Shallow soft bottom																																														
Temperate - Deeper (>40) soft bottom																																														
Temperate - Deeper (>40) rocky bottom																																														
Temperate - Kelp forest																																														
Temperate - Seagrass bed																																														
Temperate - Salt marsh																																														
Temperate - Penguins feeding area																																														
Temperate - Sea birds																																														
Average																																														

Mammals & reptiles

Fish & invertebrate

Tropical habitats

Open ocean habitats

Temperate habitats

Definition of sensitivity scores for habitats and species:

0 = **No sensitivity** (essentially no change, no response)

1 = **Marginal** (subtle stress)

2 = **Moderate** (some damage, clear stress)

3 = **Detrimental** (damage, some mortality)

4 = **Severe** (vast damage, high mortality, slow recovery)

5 = **Catastrophic** (devastation, complete mortality, very slow recovery)

Sensitivity score (mean)

	Ports	Piers and docks	Land reclamation	Water flow changes	Light pollution	Industrial pollution	Dredging	Dumping	Ship pollution	Underwater noise	Ship strikes	Pelagic trawl fishing	Pelagic seine net fishing	Floating Long-line fishing	Pelagic gill net fishing	Demersal trawl fishing	Weighted Long-line fishing	Demersal gill net fishing	Crustacean fishing (selective)	Artisanal fishing (mixed methods)	Ghost fishing	Recreational fishing	Recreational boating	Tourism	Diving and snorkelling	Shark control	Marine litter	Seismic survey	Bycatch	Mariculture	Algae farming	Infrastructure	Submarine cables	Oil and gas	Renewable energy	Impulsive noise	Invasive species	Seabed mining	Oil spill	Organic toxins	Inorganic toxins	Air emissions	Nutrient input	Temperature rise	Sea level rise	Ocean acidification	Storm changes	Average
Mammals - Dolphins	2,5	1,8	1,5	1,3	1,5	2,8	1,7	1,7	2,3	2,7	2,7	1,3	2,7	2,3	2,5	1,3	2,0	2,7	1,7	1,7	2,3	1,3	2,0	2,0	1,7	2,7	2,7	3,8	0,8	1,3	1,3	1,7	1,3	2,3	1,3	2,3	1,3	2,0	2,7	2,7	2,7	1,7	2,0	2,0	1,0	2,3	3,0	2,0
Mammals - Baleen Whales	1,5	1,5	1,3	1,3	1,3	2,5	2,7	2,0	4,0	3,3	3,7	1,3	1,3	2,0	2,5	1,7	2,0	2,7	1,3	1,3	1,7	1,3	1,7	1,0	1,0	1,7	3,0	3,5	0,8	2,0	1,0	1,7	1,3	3,0	1,3	2,0	2,0	2,0	2,0	3,3	3,3	1,7	3,3	1,7	1,0	2,3	3,0	2,0
Mammals - Toothed whales	1,5	1,3	1,3	1,0	1,3	2,3	1,7	2,0	3,3	2,7	3,3	1,0	1,3	2,0	2,5	1,3	2,0	1,7	0,7	0,7	1,7	1,0	1,7	1,0	1,0	1,7	2,7	3,5	0,8	1,5	1,0	1,7	1,7	3,0	1,3	2,0	1,3	2,0	2,3	3,0	3,0	1,7	3,0	2,0	1,0	2,3	3,0	1,8
Mammals - Dolphins	1,5	1,5	1,8	1,3	1,5	2,8	2,0	2,0	3,0	2,7	2,7	2,0	2,0	2,0	2,5	1,7	2,0	1,7	1,0	1,0	2,0	1,0	1,7	1,0	1,0	1,7	2,3	3,0	0,8	1,3	1,3	1,7	1,3	2,0	1,3	2,0	1,3	2,0	2,3	2,3	2,3	1,7	2,0	1,7	1,7	2,3	3,0	1,8
Mammals - Seals	1,0	1,0	1,0	0,7	1,5	3,0	2,0	2,0	4,0	2,0	4,0	3,0	3,0	3,0	3,0	2,0	2,0	2,0	0,0	0,0	2,0	1,0	2,0	1,0	1,0	3,0	4,0	2,5	1,0	2,0	1,0	3,0	1,0	3,0	1,0	3,0	2,0	2,0	3,0	4,0	4,0	1,0	2,0	0,0	0,0	3,0	2,0	2,0
Reptiles - Turtles	2,0	1,8	1,8	1,3	3,0	3,0	3,0	2,0	4,0	2,3	3,0	3,3	3,3	2,0	2,5	2,0	2,0	2,0	2,7	1,3	1,7	2,0	1,3	1,7	1,0	1,0	1,7	2,7	2,5	0,8	2,0	1,0	1,7	1,3	2,0	1,3	2,0	2,0	2,0	2,3	3,3	3,3	1,7	2,7	3,0	2,0	2,7	3,5	2,2
Fish - Tuna & billfish	1,4	1,0	0,6	0,5	1,3	1,9	1,6	1,0	1,3	2,0	1,1	2,9	2,8	3,9	3,2	1,3	1,4	1,7	0,3	2,5	1,3	2,8	1,0	0,5	0,3	1,0	1,8	1,6	0,5	0,7	0,3	0,6	1,0	1,2	1,0	1,2	1,0	1,8	2,2	2,0	2,5	0,8	1,0	1,8	0,8	2,5	1,8	1,5
Fish - Pelagic fish (other)	1,7	1,1	0,9	0,5	1,2	2,2	1,8	1,3	1,6	1,3	0,9	3,2	2,8	2,0	2,8	1,7	0,4	2,1	0,8	3,3	1,4	1,4	0,9	0,5	0,4	1,0	2,1	2,2	0,6	1,0	0,3	0,7	0,8	1,5	1,0	1,5	1,8	2,7	3,0	1,9	2,3	1,0	1,4	2,1	1,2	2,7	1,8	1,5
Fish - Oily Sea fish & squid	1,2	0,5	0,3	0,7	1,7	2,0	2,5	1,7	1,3	1,5	0,4	1,5	1,7	1,8	1,0	3,7	2,3	2,8	1,7	2,7	1,3	1,8	0,3	0,0	0,5	1,0	1,6	1,8	0,5	0,5	0,0	0,3	0,7	1,0	0,7	1,0	1,3	2,5	2,7	2,0	2,8	0,0	1,0	2,0	0,7	3,0	1,0	1,4
Fish - Demersal fish	1,4	1,3	3,1	2,0	1,9	2,6	3,3	1,8	2,0	1,5	0,8	1,0	1,0	2,0	1,8	3,8	3,0	3,6	2,3	2,8	1,5	1,6	0,8	0,5	1,0	1,3	1,5	2,4	1,0	1,0	0,5	1,3	0,8	1,8	1,0	1,5	1,3	3,2	2,7	2,1	2,7	1,0	2,0	2,7	1,5	3,2	1,8	1,8
Fish - Coral reef fish	2,1	1,8	2,9	2,0	1,9	2,0	2,9	2,0	2,3	1,8	1,0	1,6	1,4	2,1	2,0	3,0	2,8	2,7	1,2	2,8	2,1	2,0	1,2	1,2	1,2	1,3	2,0	2,5	1,0	0,9	0,5	1,2	1,2	1,8	1,2	1,5	1,5	2,4	2,8	2,1	2,7	0,8	1,8	2,5	1,2	2,9	1,6	1,9
Fish - Sharks (predatory)	1,4	1,0	1,5	1,6	1,3	1,8	1,4	1,2	1,8	2,0	1,4	3,0	2,6	3,1	3,0	1,8	2,3	2,3	0,8	2,5	2,7	1,8	0,8	1,0	0,8	2,0	1,4	2,0	0,7	0,8	0,4	0,8	1,2	1,2	1,0	1,2	1,0	1,7	2,4	1,8	2,2	0,8	1,5	2,0	1,2	2,3	1,8	1,6
Fish - Shad/Herring	0,7	0,7	0,8	1,0	1,0	1,7	1,9	1,4	1,6	2,2	2,1	2,7	2,2	1,7	2,8	2,0	0,8	2,0	1,0	2,3	1,2	1,3	1,2	1,0	1,0	1,4	1,9	2,0	0,8	0,7	0,4	0,6	1,0	1,4	1,0	1,4	1,0	1,5	2,2	1,7	2,4	1,0	1,4	2,0	1,0	2,3	1,8	1,5
Fish - Ray/Skate/Manta	1,2	1,0	1,3	1,0	1,5	1,5	1,3	1,2	1,6	2,2	1,4	2,4	2,2	2,1	2,8	2,7	2,5	2,7	0,8	2,8	2,7	1,6	0,8	0,6	1,0	1,8	1,5	2,0	0,7	0,8	0,4	0,8	1,2	1,2	1,0	1,2	1,0	1,8	2,2	1,8	2,1	0,8	1,6	2,0	1,0	2,5	1,8	1,6
Invertebrates - Mobile epifauna	2,0	1,7	3,4	2,0	1,4	2,9	2,8	2,8	2,2	1,4	0,6	0,4	0,4	0,6	0,5	2,8	1,5	1,4	3,8	3,8	1,5	1,2	0,6	0,8	1,0	0,6	1,7	2,2	0,8	1,3	0,8	1,0	1,2	1,6	1,0	1,0	1,6	2,7	2,4	2,3	2,8	0,8	2,5	2,4	1,4	2,8	2,0	1,7
Invertebrates - Infauna	2,0	1,8	3,2	2,4	0,8	2,5	3,2	2,8	2,4	1,4	0,6	0,4	0,4	0,3	0,5	2,4	0,5	0,6	1,0	2,5	0,8	1,2	0,6	1,0	0,8	0,4	1,7	2,2	0,5	1,3	1,0	1,2	1,4	1,8	1,2	1,0	1,6	2,8	2,6	2,5	3,2	0,8	3,0	2,6	1,6	2,5	2,0	1,6
Tropical - Shore	2,1	2,6	3,3	2,3	1,3	2,0	2,3	2,0	2,0	1,4	1,4	0,4	0,4	1,0	1,0	1,0	1,0	1,0	0,8	1,0	1,6	1,4	1,3	2,0	0,4	0,7	2,4	1,0	1,0	1,2	1,4	2,0	1,2	1,3	1,3	2,5	1,8	1,2	3,2	2,4	2,4	1,6	2,2	2,3	3,7	2,5	3,3	1,7
Tropical - Mudflats	2,3	2,0	3,5	2,3	0,5	2,0	2,0	1,3	1,3	0,3	1,0	0,7	0,7	0,7	0,7	0,7	0,7	0,7	1,7	0,7	1,0	1,0	1,0	1,3	0,0	0,5	1,8	0,0	1,3	1,0	0,8	1,5	0,5	0,5	1,0	2,0	1,0	0,5	2,8	2,0	1,8	1,0	1,5	2,0	3,0	1,7	2,5	1,3
Tropical - Shallow soft bottom	1,7	1,3	1,7	2,3	0,5	1,5	2,8	1,3	1,8	0,5	1,0	1,3	1,3	2,0	2,0	3,3	2,3	2,5	1,8	1,5	1,3	1,5	1,0	1,8	1,5	1,0	1,8	1,0	1,5	1,6	1,3	2,3	2,3	1,0	1,0	1,0	1,8	3,0	2,0	2,0	2,3	0,8	1,5	1,0	1,0	2,0	0,5	1,6
Tropical - Shallow rocky bottom	1,5	2,8	3,2	0,7	0,5	0,7	2,0	1,3	1,5	0,5	2,0	1,0	1,0	1,5	1,5	3,3	2,3	2,0	1,8	1,3	1,5	1,0	1,0	1,0	1,3	1,0	0,5	1,0	1,3	1,2	1,3	2,8	2,3	2,8	1,0	1,0	1,0	3,0	1,8	1,5	1,5	1,3	1,5	1,0	1,0	2,0	0,5	1,5
Tropical - Seagrass (Low Canopy) bed	1,8	2,0	2,3	0,7	0,5	1,0	2,8	0,8	2,0	0,5	1,0	1,3	1,3	2,0	2,0	3,3	2,3	2,3	1,5	1,5	2,3	1,5	0,7	1,5	1,3	1,0	1,5	2,0	1,3	0,8																	1,3	0,5	1,5
Tropical - Deeper (>40m) rocky bottom	2,0	2,2	2,5	0,7	0,5	1,2	2,8	0,8	2,0	0,5	2,0	0,8	0,8	1,8	1,8	3,3	1,8	1,5	1,5	1,5	2,3	1,0	0,7	1,0	0,8	1,0	0,3	2,0	1,3	0,8																	1,7	0,5	1,4
Tropical - Mangrove	3,2	3,0	4,3	3,5	0,5	2,8	1,8	3,3	1,3	0,5	2,0	0,7	0,7	0,7	1,0	2,0	0,7	1,3	1,5	2,8	2,8	1,3	1,0	2,5	1,8	2,0	2,8	1,0	1,5	2,0																	2,7	3,0	2,0
Tropical - Deeper (>40m) soft bottom	2,4	3,0	3,8	2,3	1,3	2,5	3,4	3,0	2,6	1,4	3,0	1,3	1,3	1,4	1,2	2,7	1,2	2,3	1,8	1,4	2,6	1,4	1,4	2,0	1,8	1,3	1,7	1,8	1,2	1,1																	2,4	2,5	2,1
Tropical - Coral reef shallow	2,4	3,0	3,6	1,8	0,5	3,0	4,0	2,5	2,8	2,2	2,0	2,8	1,3	1,7	2,0	4,0	3,0	2,7	2,3	2,0	2,8	1,5	1,7	2,0	2,5	3,0	2,5	2,0	2,0	1,5																	3,4	3,0	2,4
Tropical - Coral reef deep (>40m)	1,5	2,0	3,0	1,0	0,5	3,0	4,2	2,2	2,8	2,2	2,3	3,0	0,0	1,0	1,0	4,5	3,7	2,0	3,0	3,0	3,0	1,5	1,0	0,5	1,3	3,0	1,7	2,3	1,3	0,7																	3,3	1,0	2,1
Tropical - Macro algae bed	2,3	1,6	3,0	1,7	0,5	3,0	2,3	1,3	1,3	1,5	1,3	0,5	0,5	1,0	1,0	3,0	1,0	2,0	1,5	1,5	1,5	0,5	1,5	0,5	1,5	1,0	1,5	1,7	0,7	1,3																	2,7	2,5	1,5
Tropical - Salt marsh	2,2	1,8	3,0	2,3	0,5	2,3	2,3	1,5	1,5	1,5	1,3	0,5	0,0	1,0	0,5	2,5	0,5	2,0	1,5	1,5	1,5	1,0	1,0	1,5	1,5	1,0	1,5	1,7	0,7	1,3																	2,3	2,0	1,6
Open ocean - Continental slope soft bottom	1,0	1,0	0,0	1,0	0,0	0,5	1,7	2,0	1,0	1,3	0,0	3,0	3,0	3,0	3,0	3,7	2,3	3,0	1,3	0,7	2,3	1,0	2,0	0,0	0,0	0,0	2,3	1,0	0,8	0,0																	2,0	0,0	1,3
Open ocean - Continental slope rocky bottom	0,0	0,0	0,0	1,0	0,0	0,3	1,0	2,7	1,0	0,7	1,0	2,0	2,0	2,0	1,0	4,0	2,0	1,7	1,7	1,0	1,7	1,0	1,3	0,0	0,0	0,0	1,7	1,0	0,3	0,0																	2,0	0,0	1,1
Open ocean - Abyssal plain (deep soft bottom)	1,0	0,0	0,0	0,0	0,0	0,8	3,0	1,7	1,0	1,3	0,0	3,0	3,0	3,0	2,0	3,0	3,0	3,0	0,5	0,5	2,3	1,0	0,0	0,0	0,0	0,0	2,3	1,0	0,8	0,0																	1,0	0,0	1,3
Open ocean - Deep rocky bank (deep rocky bottom)	1,0	0,0	0,0	0,0	0,0	0,8	3,0	1,7	1,0	1,3	0,0	2,0	2,0	3,0	2,0	3,0	3,0	3,0	1,0	1,0	2,0	0,0	0,0	0,0	0,0	0,0	1,7	1,0	0,3	0,0																	1,0	0,0	1,1
Open ocean - Seamounts	0,0	0,0	0,0	0,0	0,0	0,5	3,0	1,0	1,0	1,3	0,0	2,7	3,0	3,0	2,0	3,3	2,7	3,0	1,3	1,0	1,7	0,0	0,0	0,0	0,0	0,0	1,7	1,5	0,3	0,0																	1,0	0,0	1,1
Open ocean - Cold water coral reef	1,0	1,0	3,3	0,0	0,0	3,0	5,0	3,0	1,0	1,7	0,0	3,0	4,0	1,0	1,0	4,0	1,7	4,0	3,0	1,0	2,7	2,0	0,0	0,0	0,0	0,0	3,0	1,0	1,0	0,0																	2,0	0,0	2,0
Open ocean - Pelagic [illegible]	0,0	0,0	0,0	0,0	0,0	1,5	3,0	1,7	1,0	1,5	0,0	2,0	2,0	1,0	1,0	3,7	1,7	2,7	1,7	0,0	1,5	1,0	0,0	0,0	0,0	0,0	1,7	1,0	0,3	0,0																	2,0	0,0	1,2
Open ocean - Pelagic photic zone	2,0	2,0	0,0	0,0	0,5	2,0	0,0	2,0	1,0	0,0	0,0	2,3	2,7	1,0	1,0	1,0	0,0	0,0	2,0	1,0	0,0	1,0	0,0	0,0	0,0	0,0	2,0	0,0	0,5	0,5																	2,0	0,0	1,0
Open ocean - Pelagic midwater	1,0	1,0	0,0	0,0	0,0	1,0	0,0	1,0	1,0	0,0	0,0	2,0	1,7	1,0	1,0	1,0	0,0	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,5	0,0																	2,0	0,0	0,7
Open ocean - Pelagic deep water	0,0	0,0	0,0	0,0	0,0	0,5	0,0	1,0	1,0	0,0	0,0	2,3	3,0	0,0	1,0	1,0	0,0	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,5	0,5	0,0																	2,0	0,0	0,7
Open ocean - Pelagic upwelling	1,0	1,0	0,0	0,0	0,0	1,0	0,0	3,0	1,0	0,0	0,0	2,0	2,0	1,0	1,0	0,0	0,0	0,0	2,0	1,0	0,0	1,0	0,0	0,0	0,0	0,0	2,0	0,0	0,5	0,5																	2,0	0,0	0,9
Temperate - Shore	5,0	3,5	3,5	2,5	2,0	1,5	3,5	2,0	1,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	2,0	0,0	0,0	2,0	0,0	1,0	1,0																	1,0	4,0	1,3
Temperate - Mudflats	5,0	3,0	3,0	3,5	1,5	1,5	3,0	2,0	1,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	2,0	0,0	0,0	2,0	0,0	1,0	1,0																	1,0	4,0	1,3
Temperate - Shallow soft bottom	2,0	2,0	3,0	3,0	1,5	1,5	3,5	3,0	1,0	1,0	1,0	0,0	0,0	0,0	0,0	4,0	1,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0	0,0	1,0	2,0	1,0	1,0	1,5																	1,0	1,0	1,5
Temperate - Deeper (>40m) soft bottom	3,0	2,0	2,5	2,0	1,5	0,5	2,0	3,0	1,0	1,0	2,0	0,0	0,0	0,0	0,0	4,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	2,0	1,0	1,0	1,0																	1,0	1,0	1,5
Temperate - Deeper (>40) rocky bottom	3,0	1,5	2,5	1,0	1,0	1,0	2,0	2,0	1,0	1,0	1,5	0,0	0,0	0,0	0,0	4,0	0,0	1,0	1,0	1,5	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	0,5																	1,5	1,0	1,2
Temperate - Shallow reef	4,0	2,0	2,5	1,0	1,0	1,0	2,5	2,0	1,0	1,0	1,0	0,0	0,0	0,0	0,0	4,0	1,0	2,0	3,0	3,0	1,0	1,0	1,0	1,0	1,0	1,0	2,0	1,0	0,5	1,5	1,5	1,5	2,0	2,0	1,0	2,0	3,0	2,0	3,0	3,0	1,0	2,0	2,0	1,0	1,0	2,0	1,6
Temperate - Seagrass bed	3,0	2,0	3,0	2,5	1,0	2,0	2,7	2,5	1,0	1,5	2,0	0,0	0,0	1,0	1,0	3,0	1,0	2,0	2,0	2,5	1,5	2,0	1,0	2,0	1,5	2,0	1,5	2,0	0,5	1,3	1,7	2,0	2,5	2,0	2,0	1,0	2,0	3,0	4,0	2,0	2,0	1,5	2,5	2,0	2,0	2,0	2,0	1,9
Temperate - Salt marsh	4,0	2,5	3,0	3,5	1,0	1,5	3,0	2,0	1,0	1,0	2,0	0,0	0,0	0,0	0,0	3,0	0,0	2,0	2,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	0,5	1,5	1,0	1,0	2,0	2,0	1,0	1,0	3,0	4,0	2,0	2,0	2,0	2,0	2,0	3,0	2,0	2,0	1,6
Temperate - Penguins feeding area	0,0	2,0	1,5	0,0	0,5	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,5	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2
Temperate - Sea birds	0,0	2,0	1,5	1,5	0,5	0,5	2,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	1,0	0,0	0,0	0,0	0,0	0,5	0,0	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,3
Average	1,7	1,5	1,9	1,3	0,9	1,7	2,4	1,8	1,6	1,3	1,3	1,5	1,4	1,4	1,4	2,4	1,5	1,8	1,4	1,5	1,5	1,1	0,9	0,9	0,7	1,0	1,8	1,5	0,8	0,9	0,7	1,6	1,3	1,7	1,1	1,2	1,4	2,4	2,4	2,2	2,3	0,9	1,6	1,7	1,2	2,0	1,5	1,5

Coastal development

Shipping

Fishing

Recreation

Survey

Aquaculture

Offshore development

Pollution

Climate Change

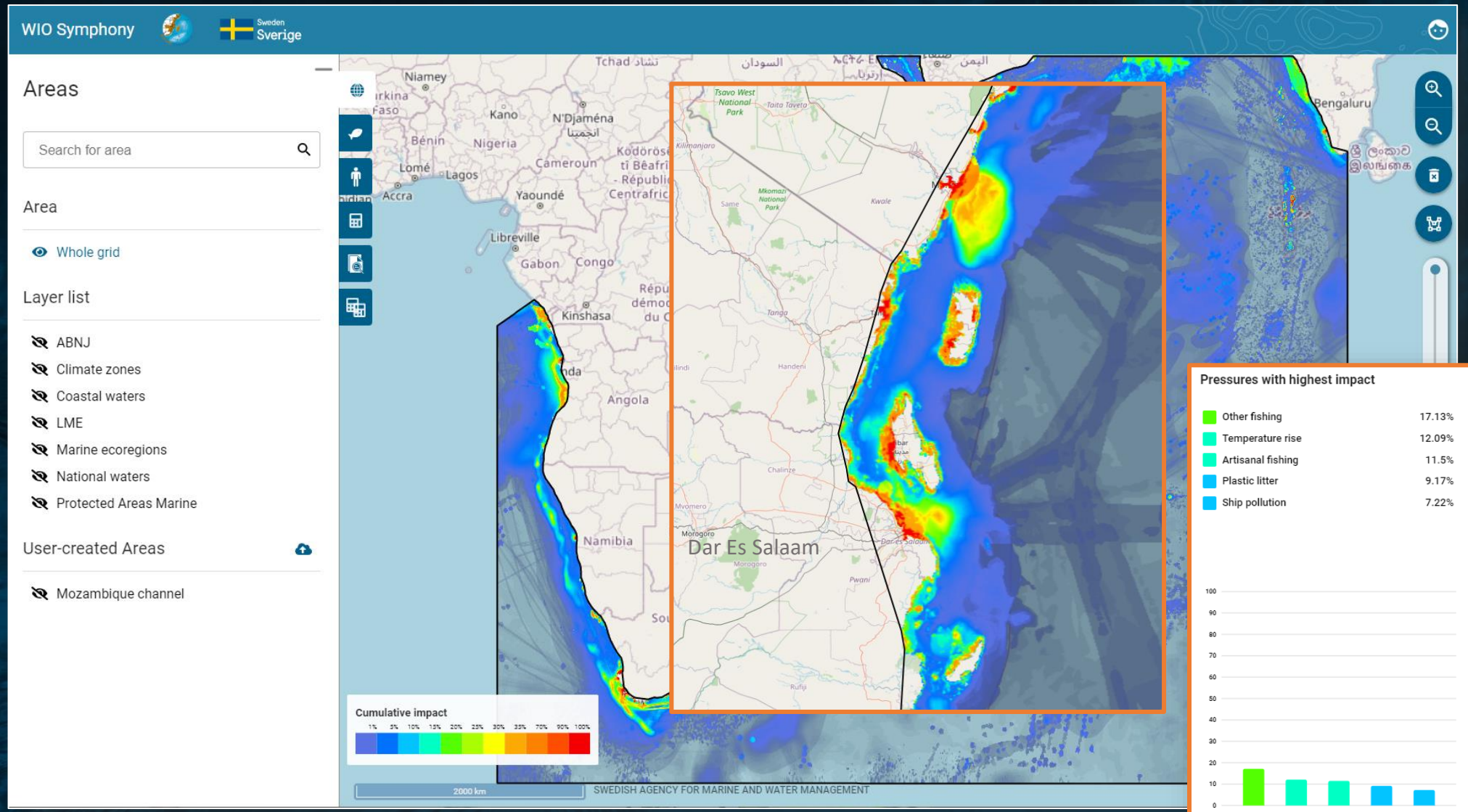
Mammals & Reptiles

Fish & Invertebrate

Pelagic habitats

Open ocean habitats

Temperate habitats


WIO Symphony
Sweden
Sverige
Areas
Search for area
Area
Whole grid
Layer list
ABNJ
Climate zones
Coastal waters
LME
Marine ecoregions
National waters
Protected Areas Marine
User-created Areas
Mozambique channel
Dar Es Salaam
Cumulative impact
2000 km
SWEDISH AGENCY FOR MARINE AND WATER MANAGEMENT
Pressures with highest impact
Other fishing 17.13%
Temperature rise 12.09%
Artisanal fishing 11.5%
Plastic litter 9.17%
Ship pollution 7.22%
Nature values with highest impact
Shallow soft 13.61%
Slope soft 13.28%
Coral reef 11.48%
Cold coral reef 11.22%
Seagrass bed 7.63%

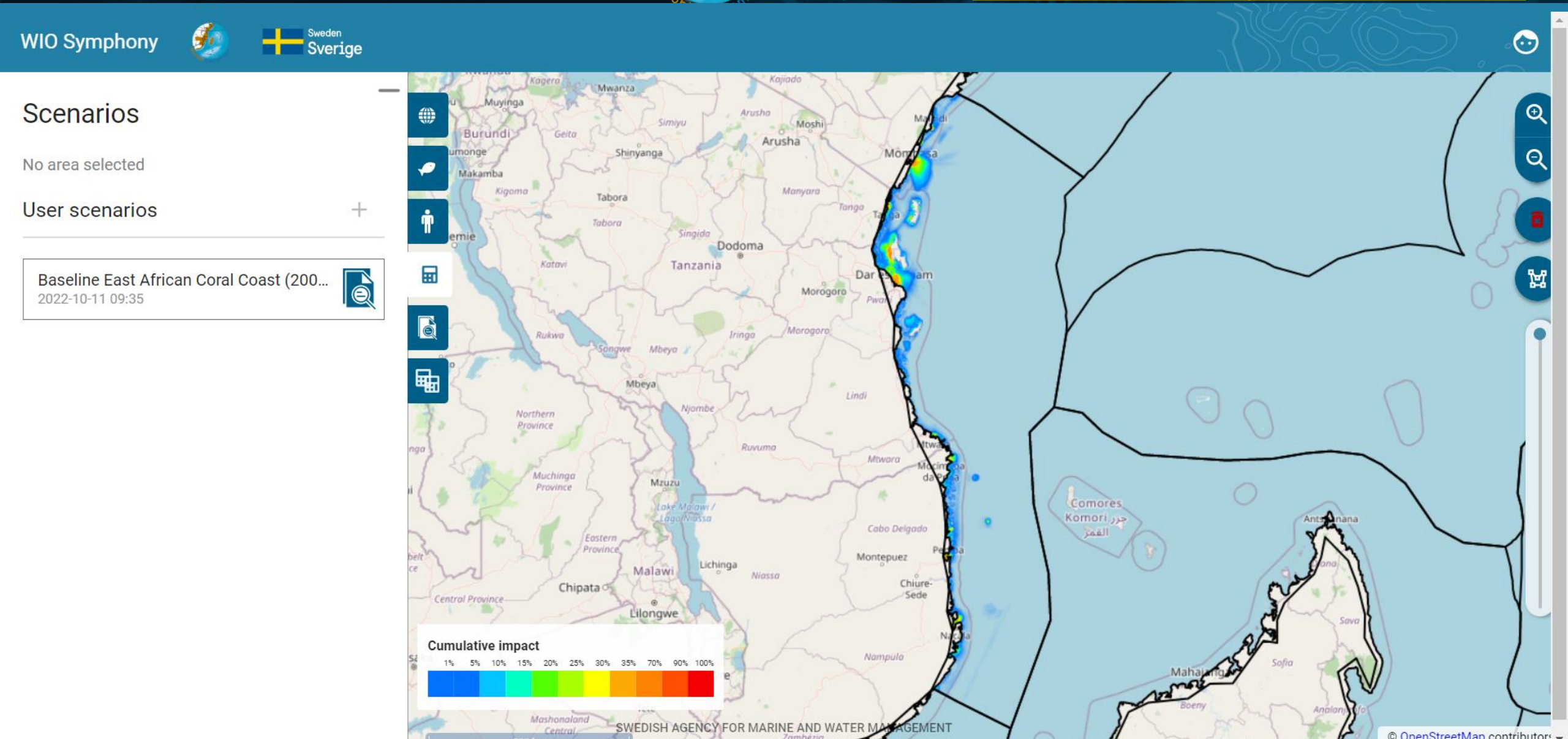
How this tool could support MSP ?

1. Cumulative impact assessment

UN environment programme

Sweden Sverige

Swedish Agency for Marine and Water Management

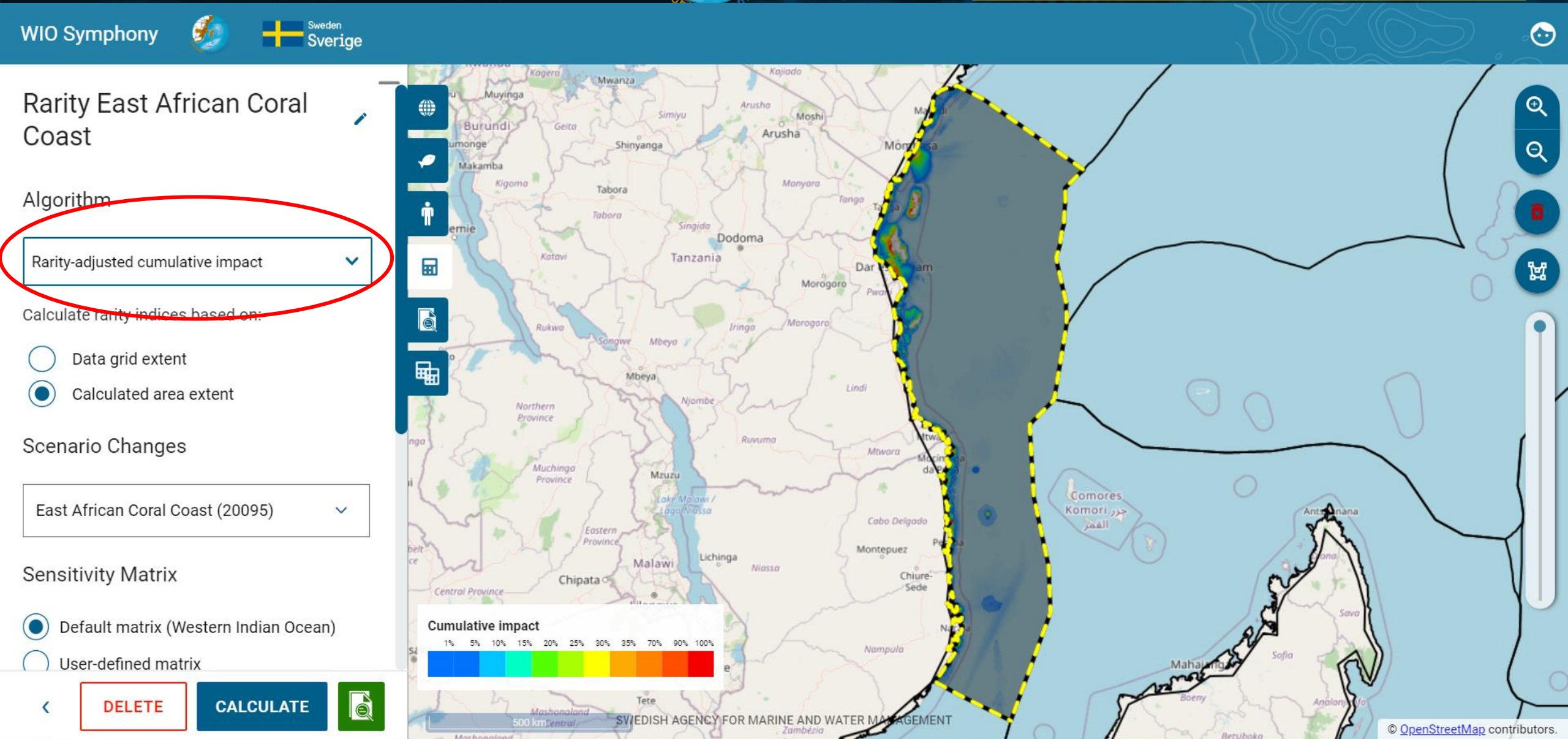


2. Rarity adjusted cumulative impact

UN environment programme

Sweden Sverige

Swedish Agency for Marine and Water Management



3. Create a planning scenario and compare baseline

UN environment programme

Sweden Sverige

Swedish Agency for Marine and Water Management

WIO Symphony

Compare calculations

Calculation A

Baseline Pemba Channel Conservation Area

Calculation B

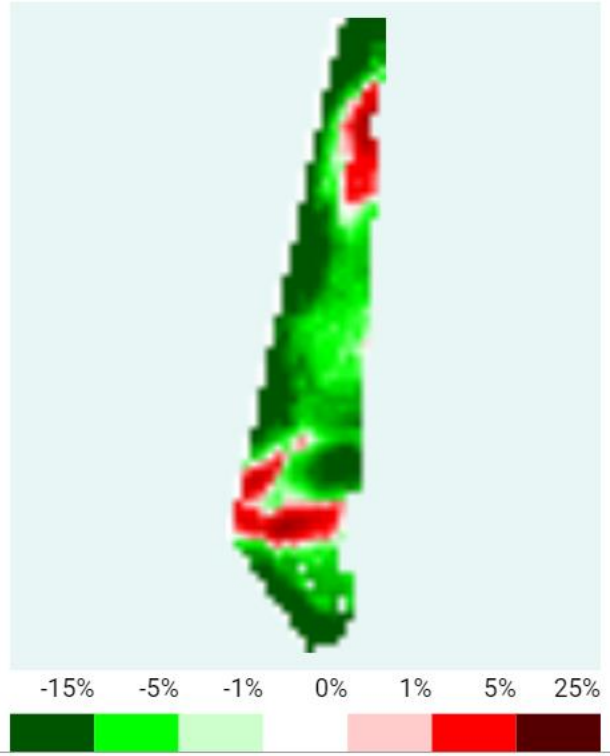
MSP Scenario Pemba Channel Conservation A

COMPARE CALCULATIONS

Calculation Comparison Report

Baseline Pemba Channel Conservation Area and MSP Scenario Pemba Channel Conservation Area

Havs och Vatten myndigheten



Baseline version: BASELINE2022-v5

Algorithm: Cumulative impact

Cumulative effect

	Baseline Pemba Channel Conservation Area	MSP Scenario Pemba Channel Conservation Area	Relative change
Total:	15,646,293	29,421,176	+88.04%
Average:	9,902.7171	9,310.4987	-5.98%
Min:	0	0	0%
Max:	111,926	94,743	-15.35%
Std. Dev:	14,608.5369	13,499.1685	-7.59%
Calculated area:	98.75 km²		

* The image shows the relative difference in total cumulative impact between the base and what-if scenario.

OPEN IN NEW TAB

PRINT

4. Find a suitable location for blue economy development

UN environment programme

Sweden Sverige

Swedish Agency for Marine and Water Management

WIO Symphony

Sweden Sverige

Offshore Comoro DEV

Algorithm

Cumulative impact

Scenario Changes

Comoro DEV

Sensitivity Matrix

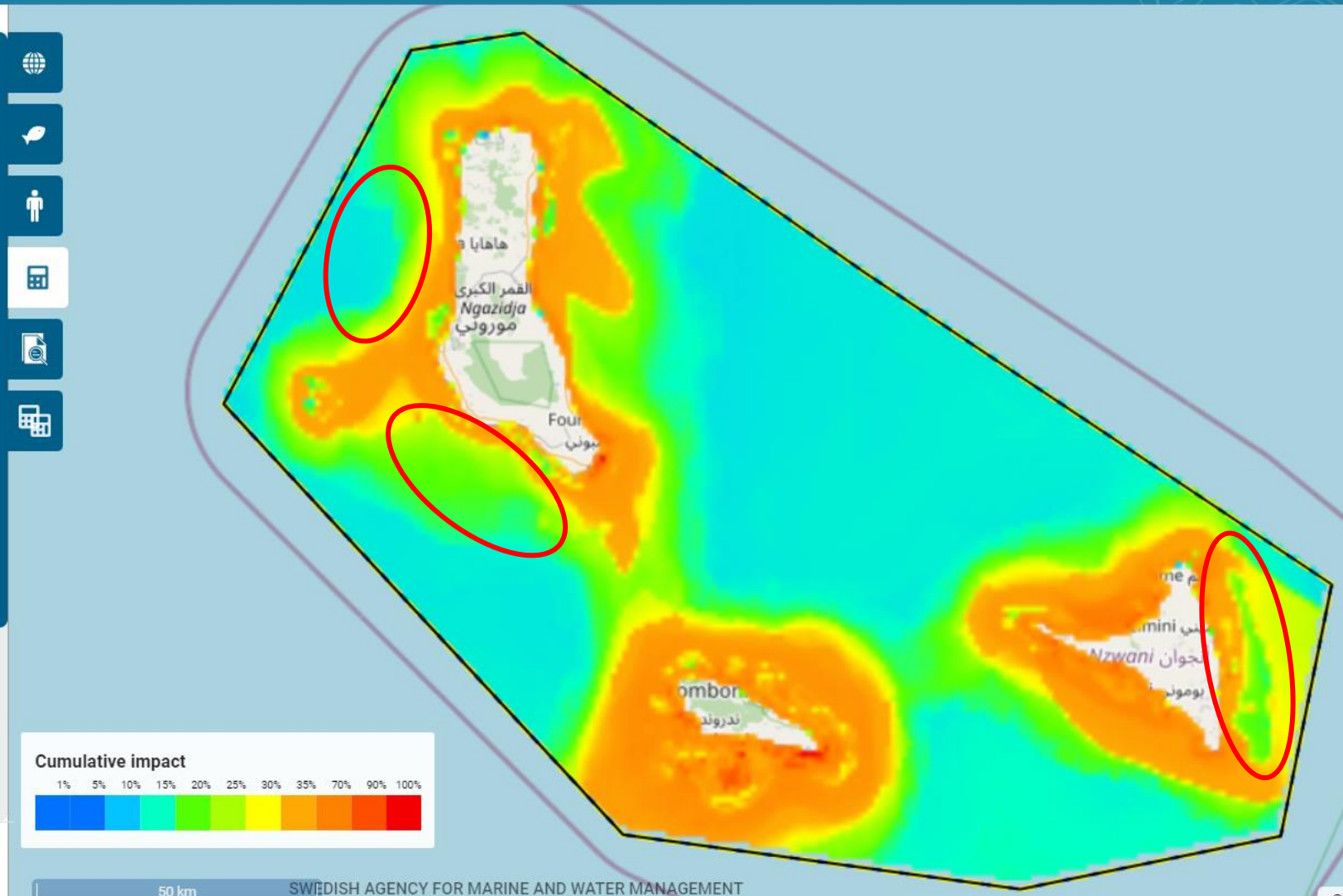
- (•) Default matrix (Western Indian Ocean)
- ( ) User-defined matrix

Välj matris

EDIT MATRIX

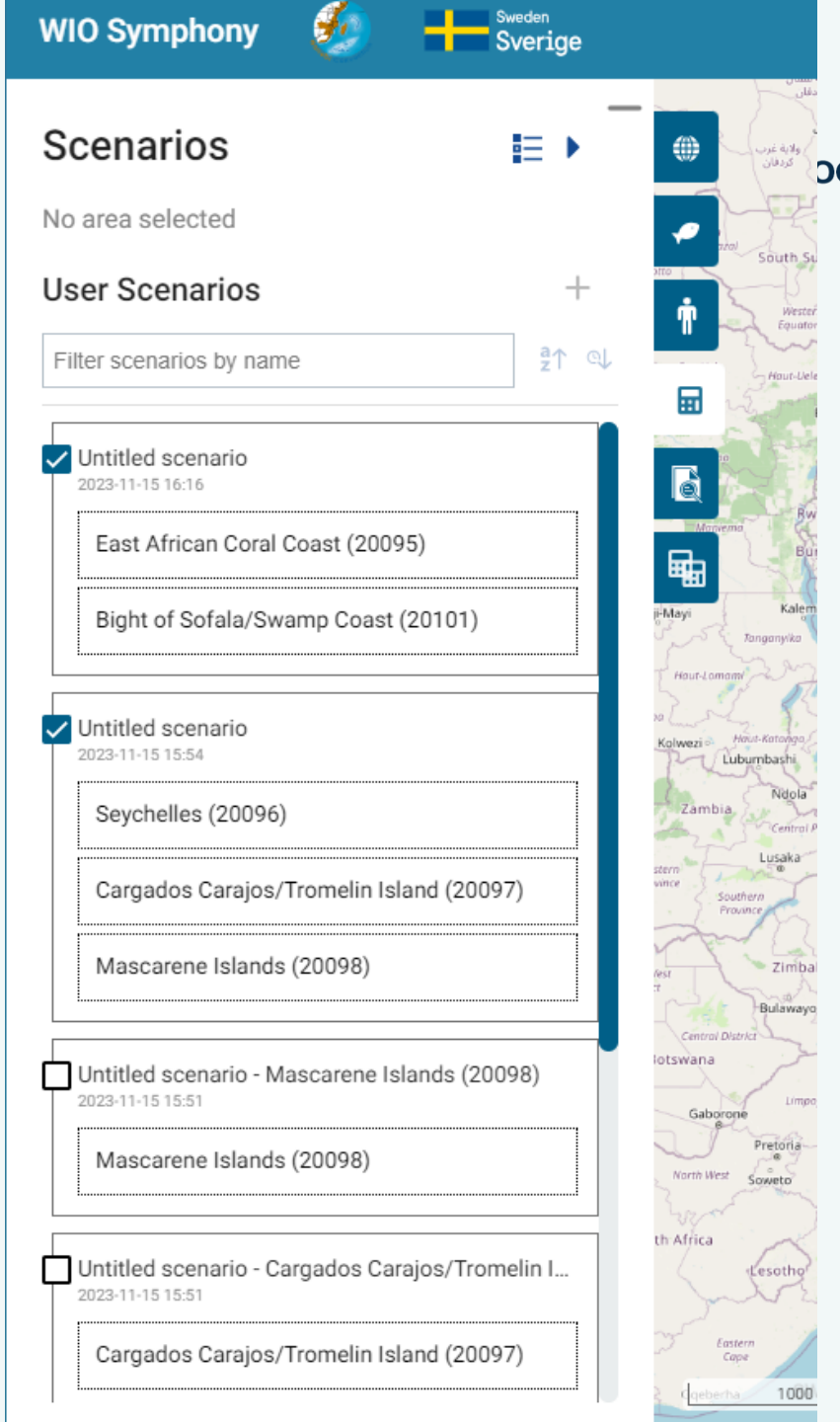
DELETE

CALCULATE



Split Scenarios & Batch Process

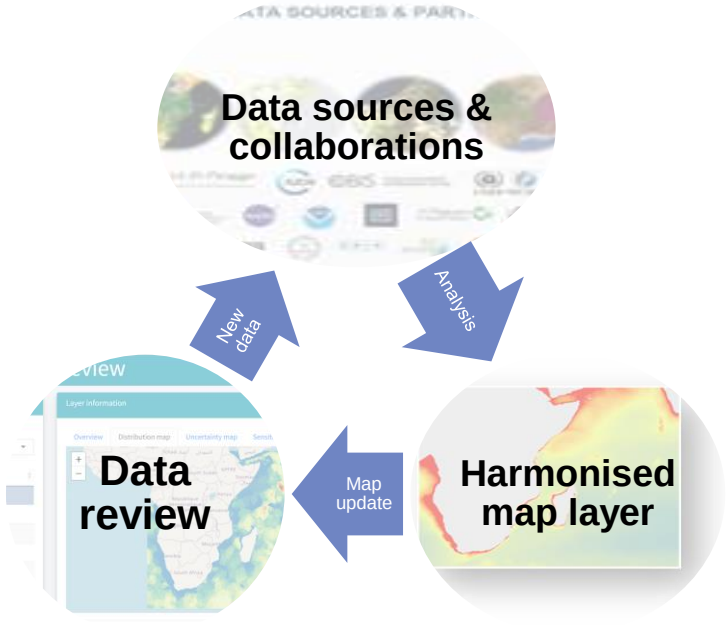
- New functions: Split Scenarios & Batch Process
  - Generate multiple scenarios
  - Split a scenario of several polygons into one scenario per area
  - Create common or specific changes



Havs och Vatten myndigheten

WIO Symphony development

Production of individual map layers



Roles & responsibilities

Data contributors (e.g. TWG): Make new source data available

Expert Analyst (e.g. Bastien, Pichaya): Turns data sources into harmonised map & document process

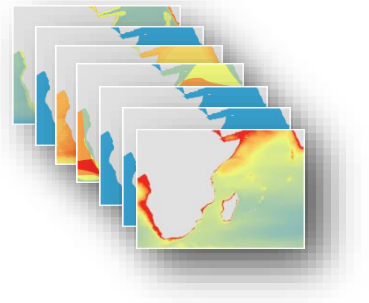
Other experts (e.g. WIOMSA): Review maps and contribute to process / data

Map layer PI* (e.g. Gustav, Ed):
Check and approve all above
Organise work

Outputs include:
- map layers including additional environmental data and uncertainty maps
- documented code (GitHub)
- well organized data
- metadata (GitHub)

Tool development

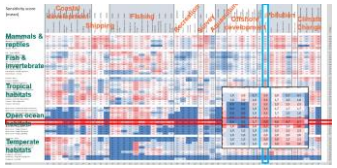
Ecosystem / Pressure maps



Roles & responsibilities

Map layer PI (e.g. Ed, Pichaya, Gustav, Mårten):
Develop guides and data infrastructure
Organize workshops
QC maps and metadata
Converts maps into stack
Distributes to tool and map portal

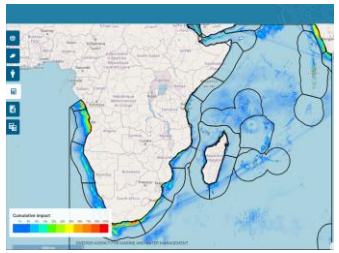
Sensitivity Matrix



Matrix PI (e.g. Linus, Charlotte):
First review of matrix+maps
Organize workshops

Experts (e.g. TWG, WIOMSA):
Input into sensitivity scores
Review sensitivity scores

WIO Symphony Tool



Tool PI (e.g. Linus):
Prioritizes developments

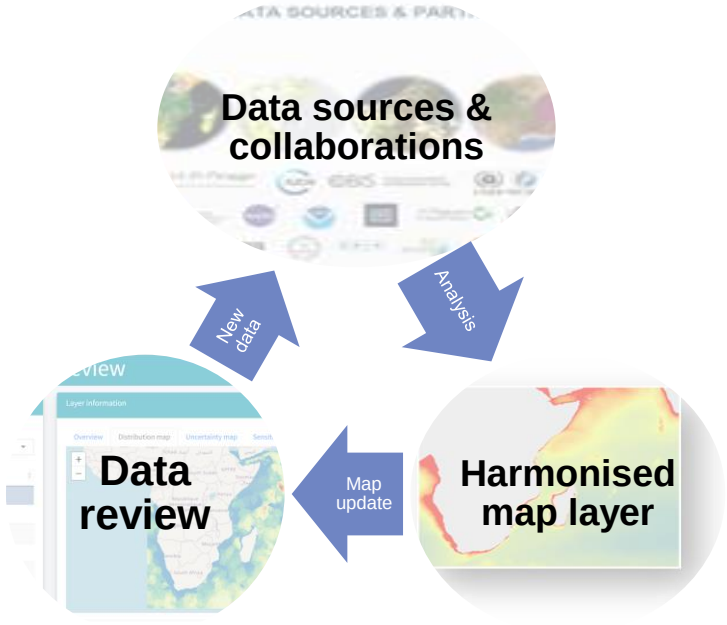
Lead developer (e.g. Ann):
Develops tool and code base

IT / server manager (e.g. Elijah):
Tool and server maintenance

** PI – Principle Investigator*

WIO Symphony management

Update of individual map layers



Roles & responsibilities

Data contributors:
Make new source data available

Expert Analyst:
Turns data sources into harmonised map & document process

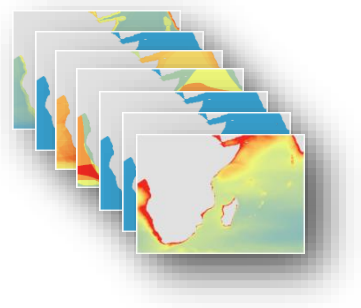
Other experts:
Review maps and contribute to process / data

Technical staff :
Check and approve all above.
Organise work

Outputs include:
- map layers including additional environmental data and uncertainty maps
- documented code (GitHub)
- well organized data
- metadata (GitHub)

Tool management

Ecosystem / Pressure maps

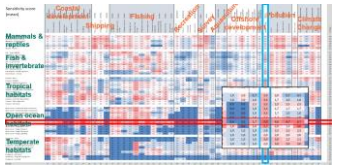


Roles & responsibilities

Coordinator function (NCS):
Approve/request map layer updates
Metadata point of contact

Technical staff:
Maintain guides and data infrastructure
QC maps and metadata of new map layers
Converts maps into stack
Distributes to tool and map portal

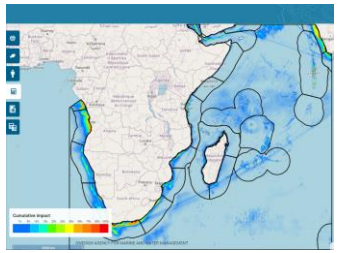
Sensitivity Matrix



Scientific board:
Decision/approval of matrix update
Ensure maps are compatible with matrix

Experts:
Input to updated sensitivity scores
New review sensitivity scores

WIO Symphony Tool



Technical staff:
Prioritizes developments and tool updates
Uploads new branches when relevant

IT / server manager:
Tool and server maintenance

External developer:
Develops tool and code base for GitHub

Nairobi Convention

UN environment programme

Sweden
Sverige

Swedish Agency for Marine and Water Management

Thank you

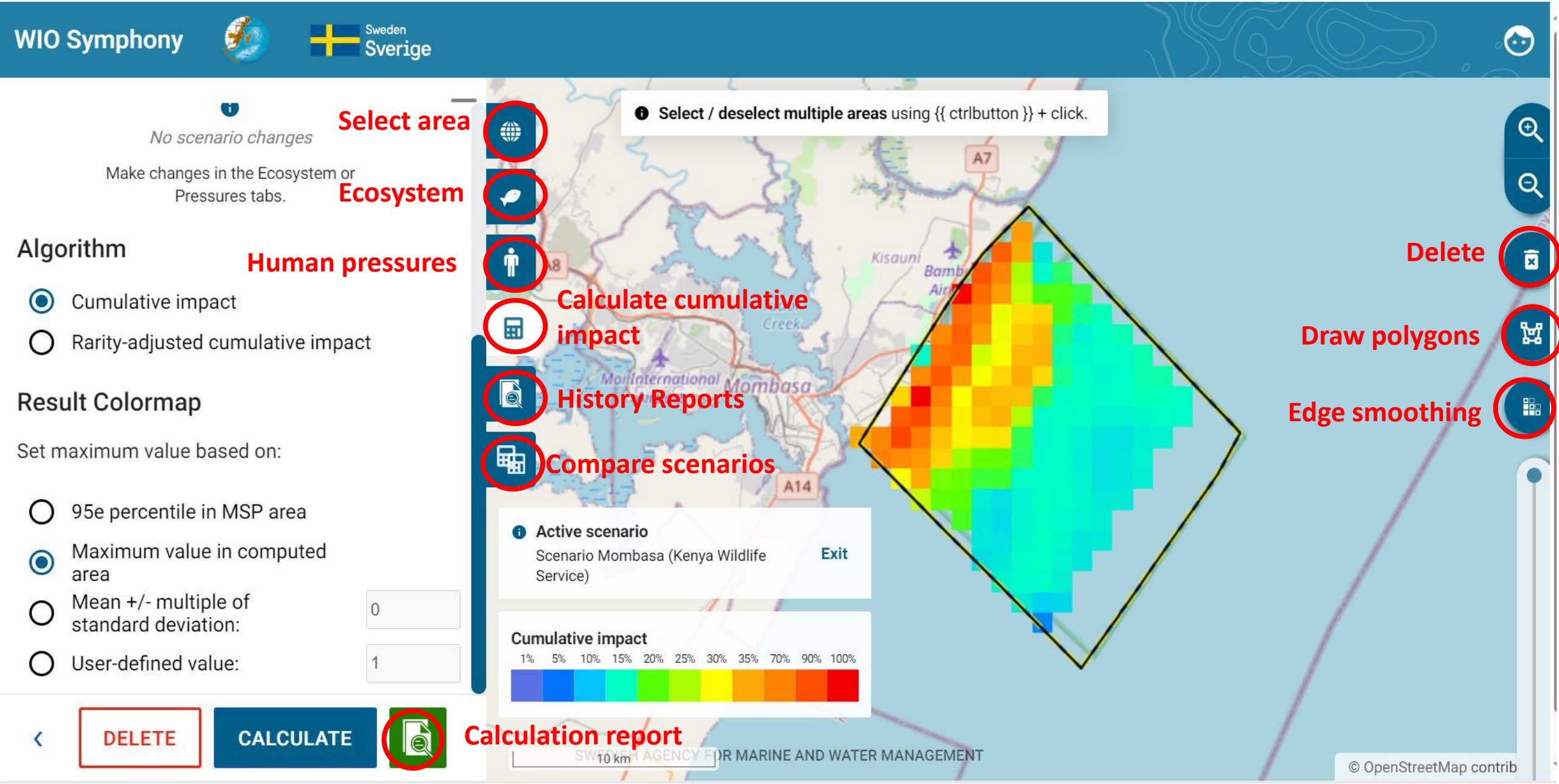
Exercises

1. Identify the key features of your MSP and utilize these features to formulate your MSP objectives.

2. Utilize the WIO Symphony tool to support your MSP plan.

3. Deliver a 15-minute presentation of the results of your Environmental-based MSP from WIO Symphony within your country groups

1. *Tanzania mainland*
2. *Zanzibar*
3. *Kenya*
4. *Somalia*
5. *Mozambique*
6. *The Comoros*
7. *Madagascar*
8. *Mauritius*


WIO Symphony
Sweden
Sverige
No scenario changes
Make changes in the Ecosystem or Pressures tabs.
Algorithm
Cumulative impact
Rarity-adjusted cumulative impact
Result Colormap
Set maximum value based on:
95e percentile in MSP area
Maximum value in computed area
Mean +/- multiple of standard deviation:
0
User-defined value:
1
DELETE
CALCULATE
Select area
Ecosystem
Human pressures
Calculate cumulative impact
History Reports
Compare scenarios
Calculation report
Select / deselect multiple areas using {{ ctrlbutton }} + click.
Active scenario
Scenario Mombasa (Kenya Wildlife Service)
Exit
Cumulative impact
1% 5% 10% 15% 20% 25% 30% 35% 70% 90% 100%
Delete
Draw polygons
Edge smoothing
A7
A8
A14
Kisauni
Creek
Mombasa
10 km
SWEDISH AGENCY FOR MARINE AND WATER MANAGEMENT
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