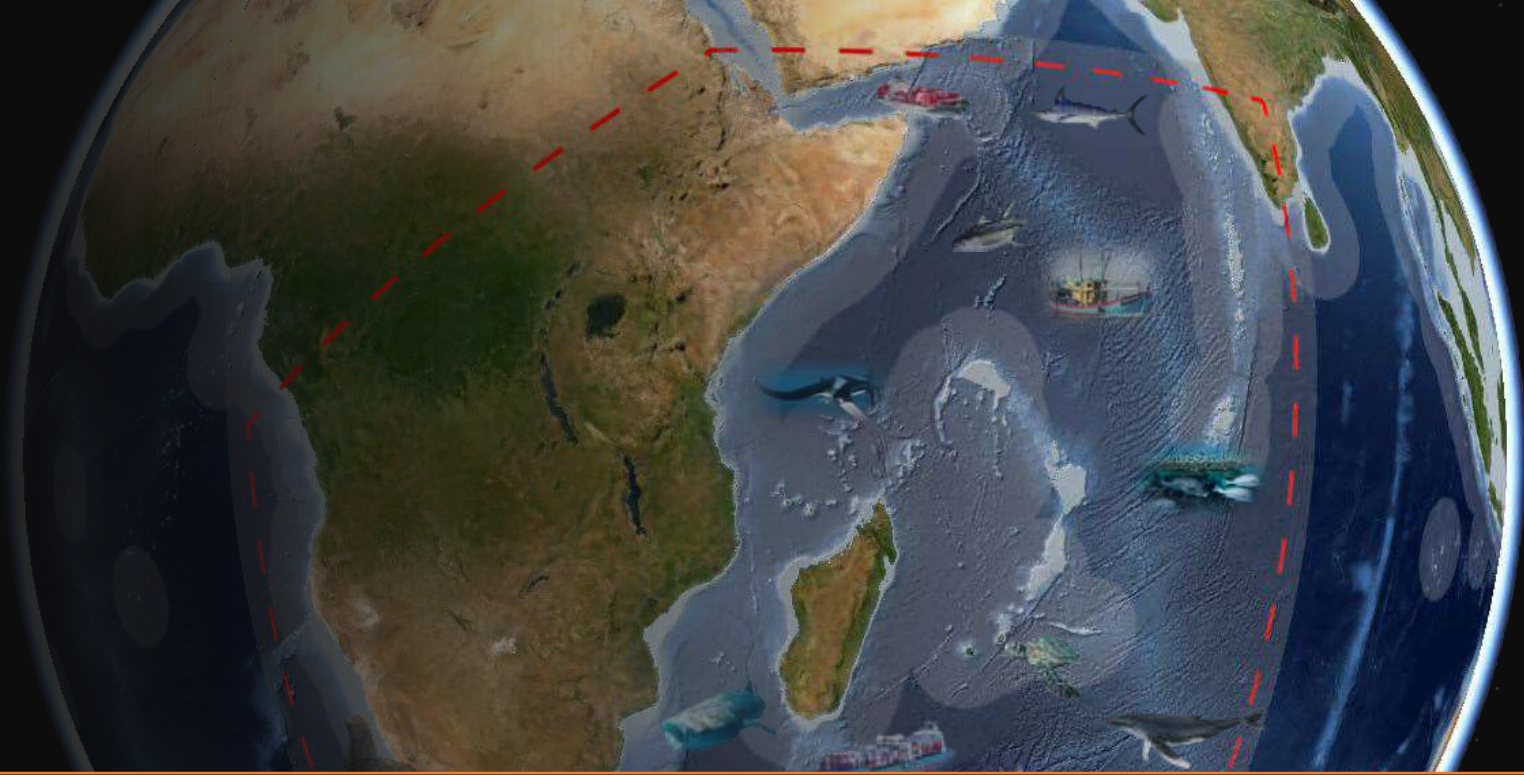


Swedish Agency
for Marine and
Water Management



DUNCAN HUME &
duncan.hume@sgu.se
GUSTAV KÅGESTEN
gustav.kagesten@sgu.se

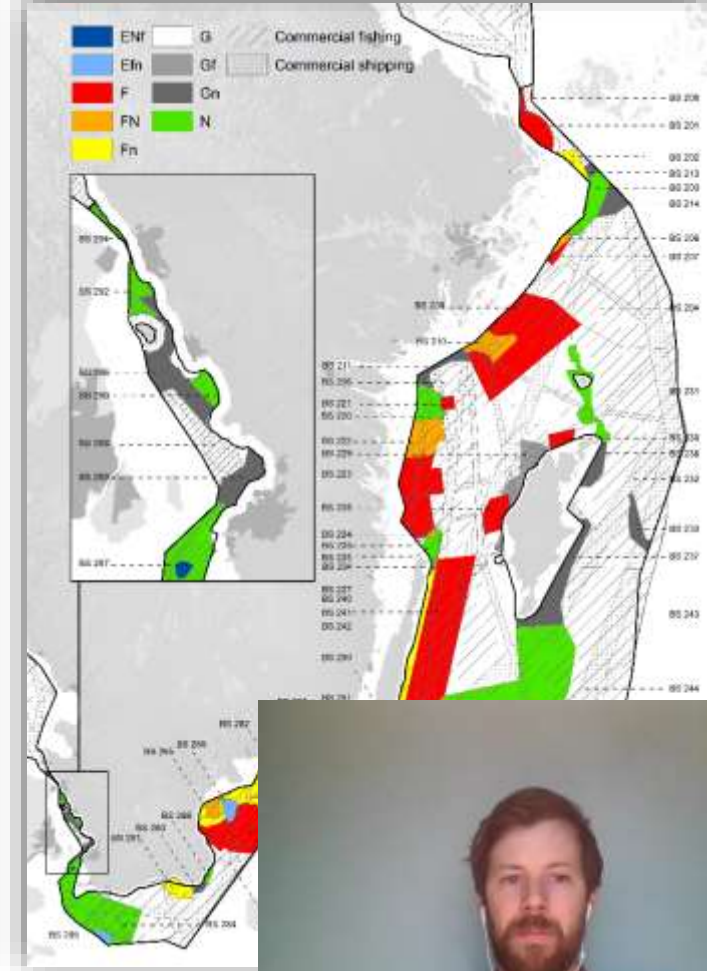
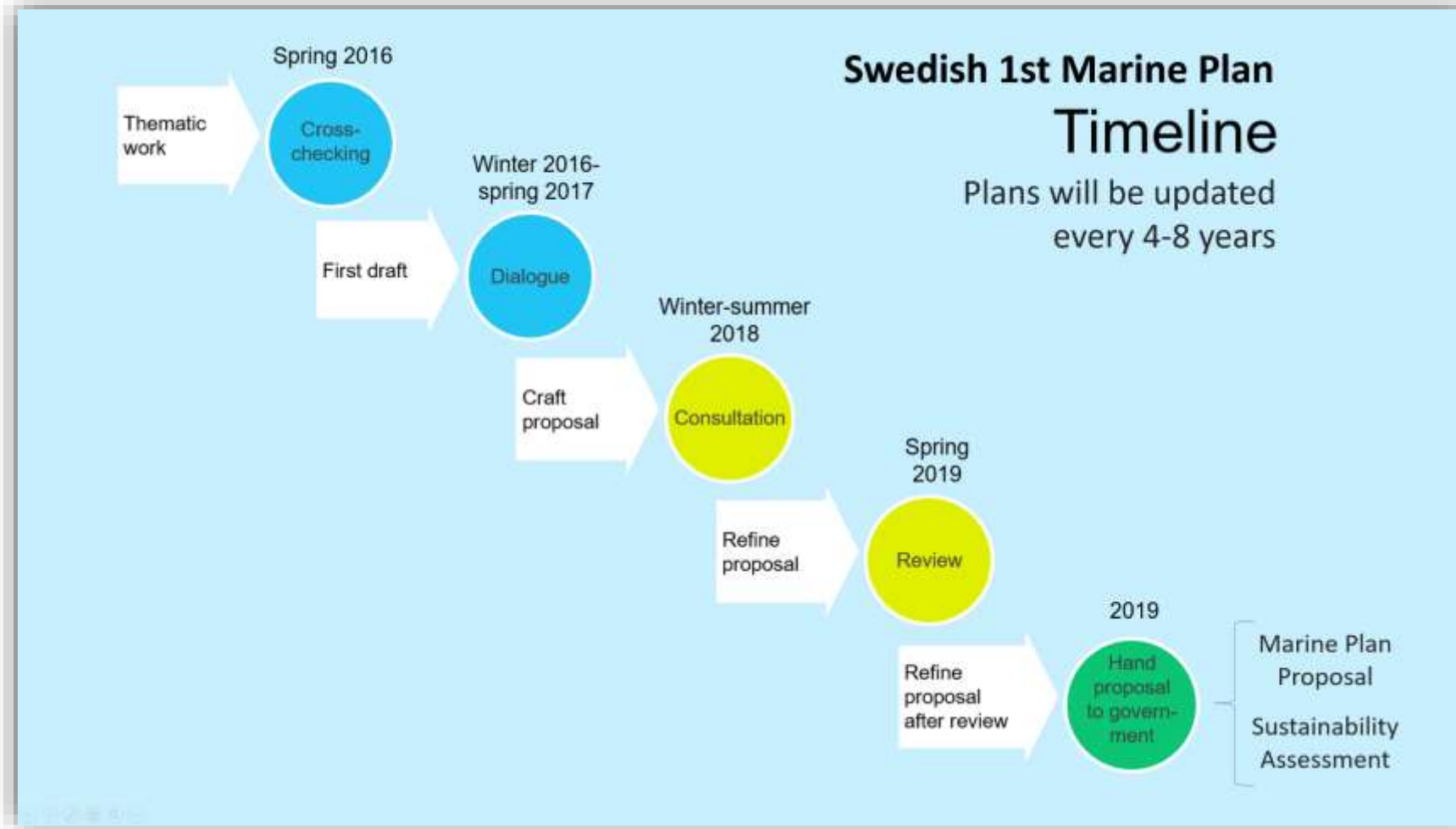
Open Data for Marine Spatial Planning Decision Support

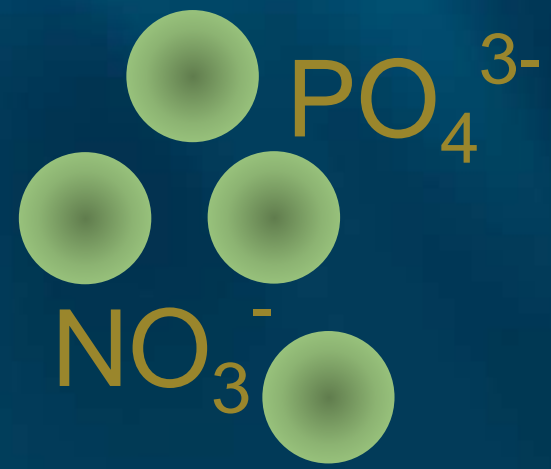
Examples from the WIO Symphony project



It all started with a question during the Swedish MSP process...

- How do we implement ecosystem based MSP in practise?







Climate change temperature

Oilspill shipping

Climate change acidification

Explosions peak pressure

Heavy metals background

Pollution boating

Catch gillnet

Noise boating

Anoxia background

Noise 125Hz wind power

Explosions SEL

Noise 125Hz shipping

Catch pelagic trawl

Habitat loss fish farm

Phosphorous overload

Habitat loss coastal exploitation

Synthetic toxins treatment plant

Noise 2000Hz shipping

Electromagnetic field

Bird hunt

Heavy metals mine dump

Catch bottom trawl

Toxic munition dump³⁻

Habitat loss sand extraction

Habitat loss dumping

Nitrogen overload

Turbidity bottom trawl

Heavy metals military area

Heavy metals fiber bank

Turbidity sand extraction

Synthetic toxins background

Turbidity

Synthetic toxins harbor

Abrasion bottom trawl

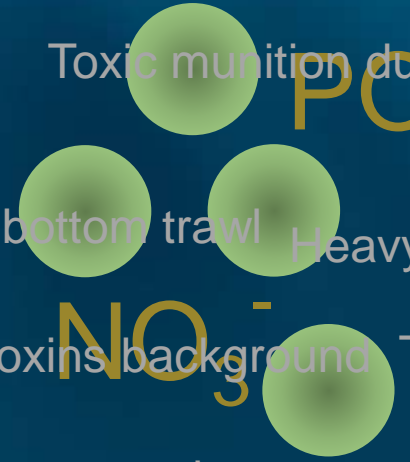
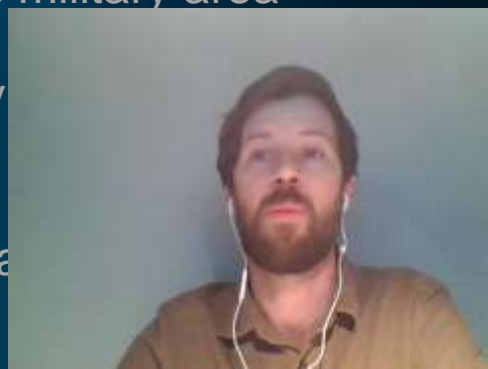
Habitat

Habitat loss mussel farm

Oilspill wreck

Heavy metals mercury dump

Synthetic toxins industry

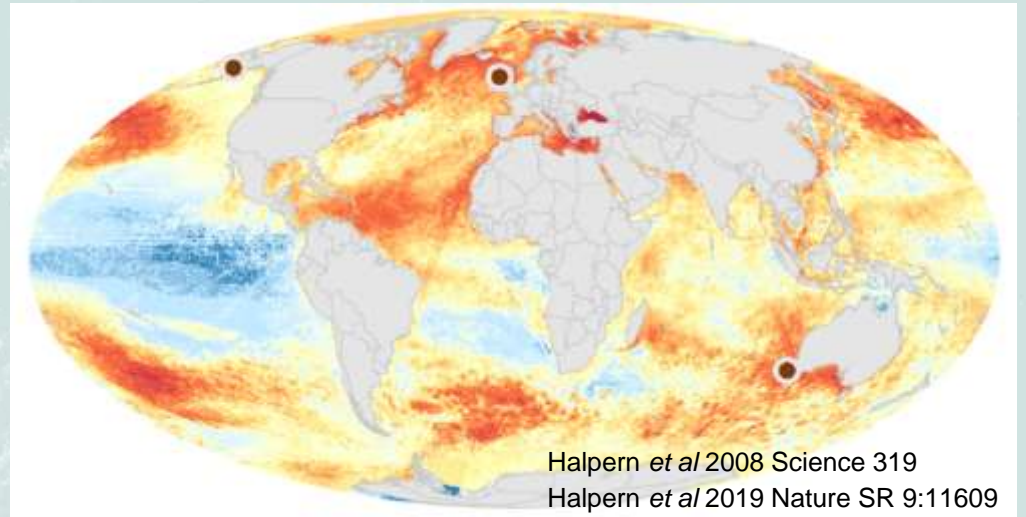


Climate change acidification
Climate change temperature
Angiosperms Haploops reef Oilspill shipping Heavy metals background
Explosions peak pressure Noise boating Rough bottom photic Anoxia background
Seabird coastal Fur seal Rough bottom aphotic Noise 125Hz wind power Shoreline
Hard bottom aphotic Pollution boating Catch gillnet Whaleshark
Explosions SEL Noise 125Hz shipping Catch pelagic trawl Coastal birds Habitat loss fish farm
Phosphorous overload Plankton pelagic Seabird offshore Synthetic toxins treatment plant
Soft bottom photic Habitat loss coastal exploitation Reef fish Noise 2000Hz shipping Hard bottom photic
Electromagnetic field Tuna Sprat Sea lion Bird hunt
Heavy metals mine dump Fish spawning Whale migration Toxic munition dump Transport bottom photic
Penguins nesting Catch bottom trawl Herring Dolphins Habitat loss sand extraction
Habitat loss dumping Nitrogen overload Turbidity bottom trawl Deep reef
Soft bottom aphotic Sharks Coral reef Rivermouth fish Heavy metals military area
Heavy metals fiber bank Turbidity sand extraction Synthetic toxins background Turbidity
Rough bottom deep Synthetic toxins harbor Transport bottom aphotic Artificial reef
Habitat loss mussel farm Hard bottom deep Abrasion bottom trawl
Synthetic toxins industry Oilspill wreck Heavy metals mercury dump
Nodule bottom deep



Models behind the map

Cumulative impact assessment - Halpern et al 2008



Pressures

From human activities

Ecocomponents

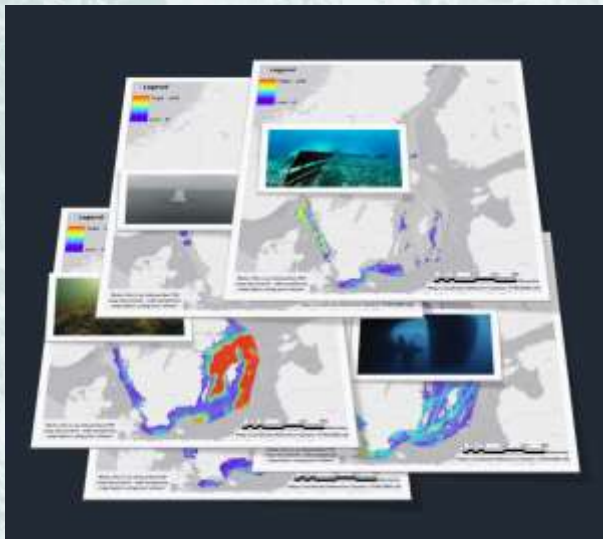
Nature values

Sensitivity matrix

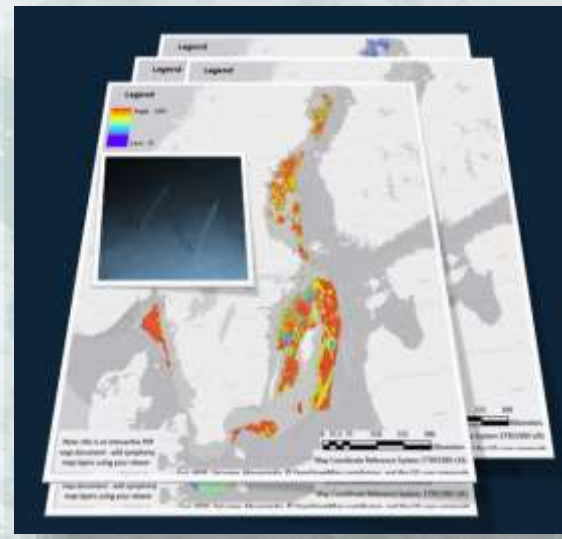
Describes the specific effect of each pressure on each ecocomponent

Results


Figures and tables



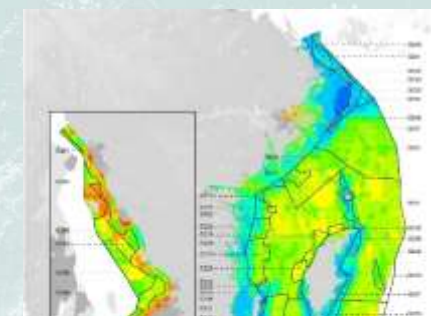
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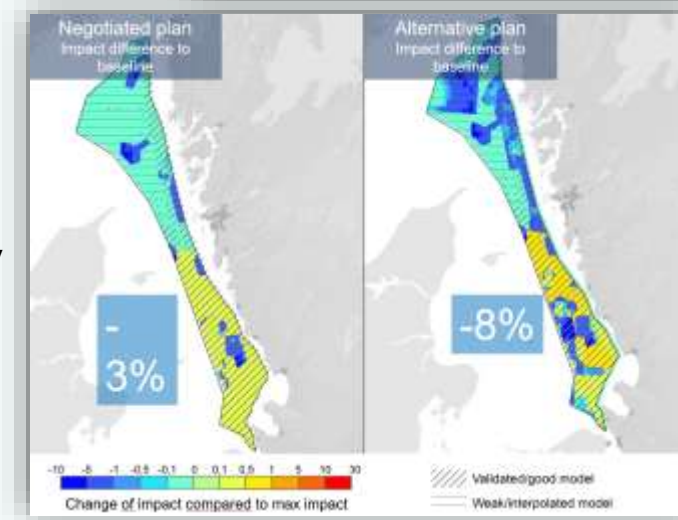
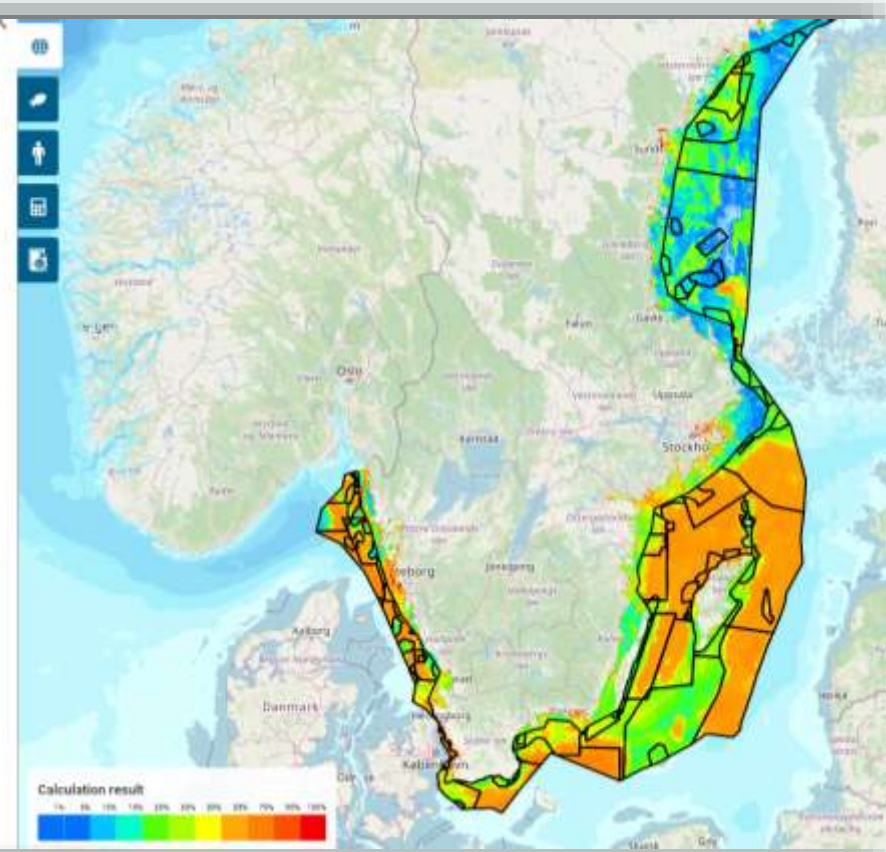
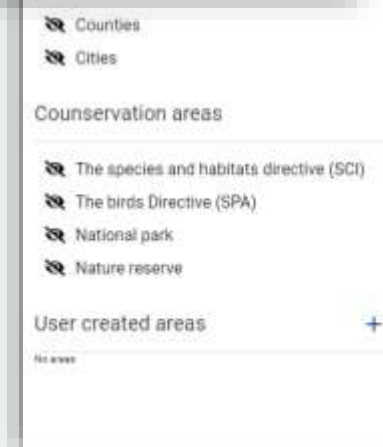
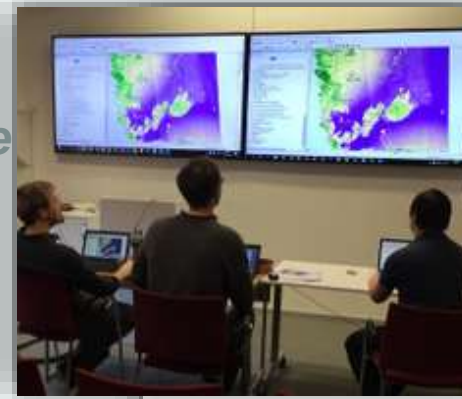
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MSP is a process of analysis and allocation of human uses of marine space
IOC-UNESCO

Swedish Symphony Tool

- » First Swedish ecosystem-based **MSP** 2014 - 2020
- » Environment is **one** (fundamental) component of MSP
- » Decision-makers and planners need **practical** access to data
- » Need to **compare** environmental performance of MSP
- » **Symphony** was developed – using only "existing data"
- » **Strategic** support to MSP



Why the **WIO Symphony** collaboration?

- » 2017: Symphony presented at UN 4th PrepCom meeting on BBNJ
- » 2019: WIO Symphony workplan approved by Nairobi Convention - Aligns with COP decisions 4/8 & 9/10
- » 2020: Co-development initiated between Sweden, Nairobi Convention Secretariat and Contracting Parties (MSP Technical Working Group representing 10 countries)
- » 2021: WIO Symphony v 1.0 under development
- » 2022: WIO Symphony 2.0 fully operational



NAIROBI CONVENTION Who we are What we do News Events

News Articles APR 17

On 28 to 29 March 2019, the Nairobi Convention Secretariat gathered representatives from the Western Indian Ocean (WIO) and other states, NGOs, and academics in Tanzania to take stock of the progress made in the region in the adoption of MSP at both policy and on-ground implementation for enhanced sustainable management of coastal and marine resources.

Participants at the Regional MSP Policy Workshop @Nairobi Convention 2019

Representatives from the region and beyond shared their experiences in MSP. Find some updates and recommendations below.

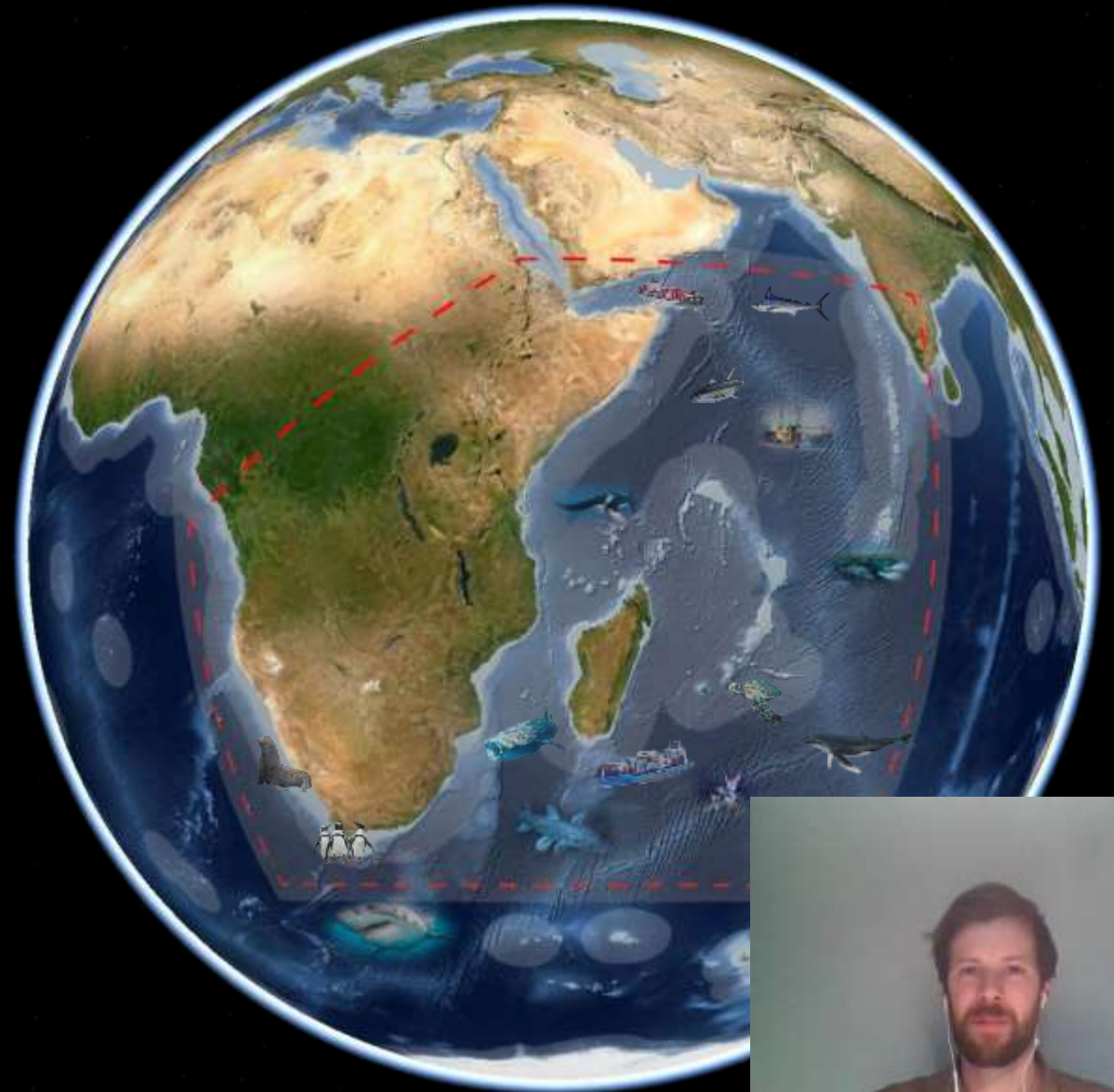
Shared Experiences and Status of MSP in the Region

Representatives of Sweden and Djibouti shared their partnership approach to MSP allowed all stakeholders understanding of the main problem and challenge. Consultation helps create commitment and prepare. Meanwhile, recommended creating spatial database. Kenya, Mozambique, Mauritius, South Africa, Seychelles, Madagascar, Vietnam, Comoros, Tanzania, Maldives, Madagascar, South Africa.

- Kenya is preparing its draft MSP road map, which road map will also formulate recommendations.
- Mozambique is negotiating the Terms of Reference.

A small video feed of a man with a beard and headphones, likely a participant in a meeting. He is looking directly at the camera and appears to be listening or speaking.

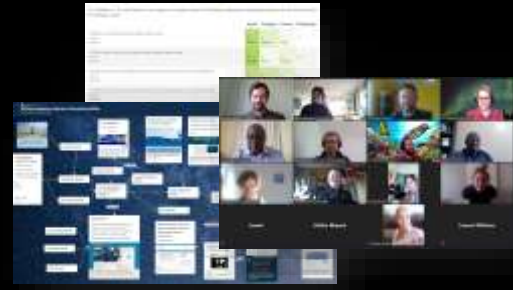
from Symphony to WIO Symphony



ROADMAP WIOSym - TWG



Symphony presented at sci-to-pol meeting in Mauritius



2nd Workshop - Data collection

Launch WIOSym – version 1

Launch completed WIOSym – version 2

2020

2022

2019

2021

Q1-3

Q4-2

Q3-4

Q1

Q2-4

Q4

Q1-3

Q3-4

WIO Symphony workplan adopted by NC



Collaboration on MSP issues

Technical preparations

1st Workshop – Thematic & Geographic scope



Data collection and processing

Workshops Preliminary results, Sensitivity matrix

Continued work on data collection and processing

Hand-over to Nairobi Convention



Geospatial decision support tools – Hungry for data!



Indata

Different resolutions
formats and coordinate systems

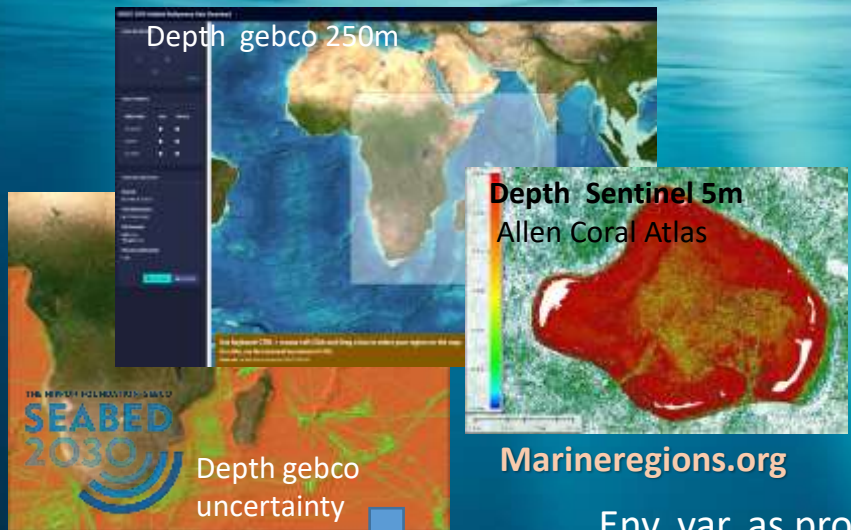
Process

Repeatable
Open source
Transparent

Processed data

Combined
Standardised
Original units & normalised data

Environmental data



Marineregions.org

Env. var. as proxy for
eco/pres

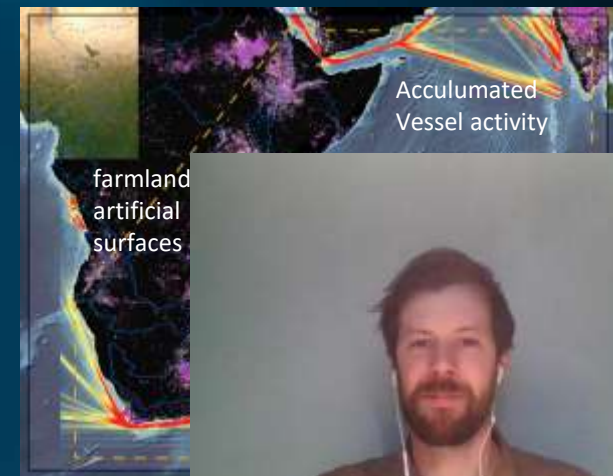
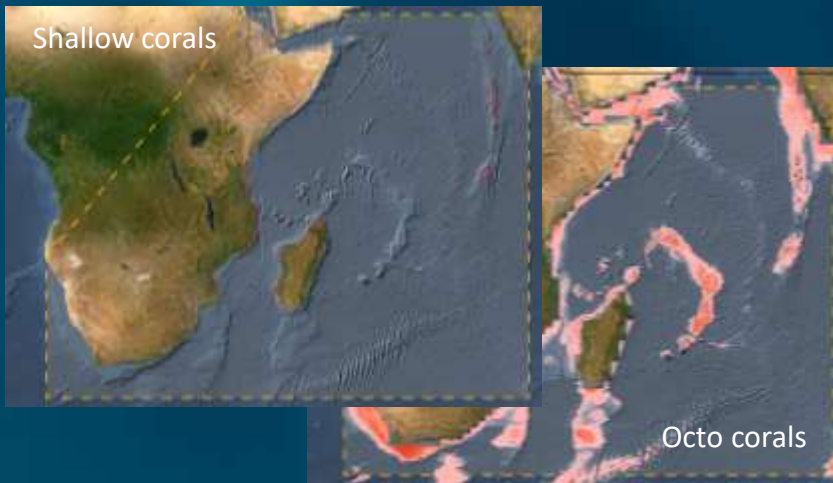
Ecosystem data



Human pressure/activity data



Global Fishing Watch



Geospatial decision support tools – Hungry for data!



Indata

Different resolutions
formats and coordinate systems

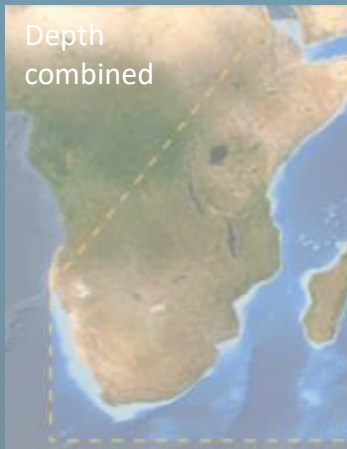
Process

Repeatable
Open source
Transparent

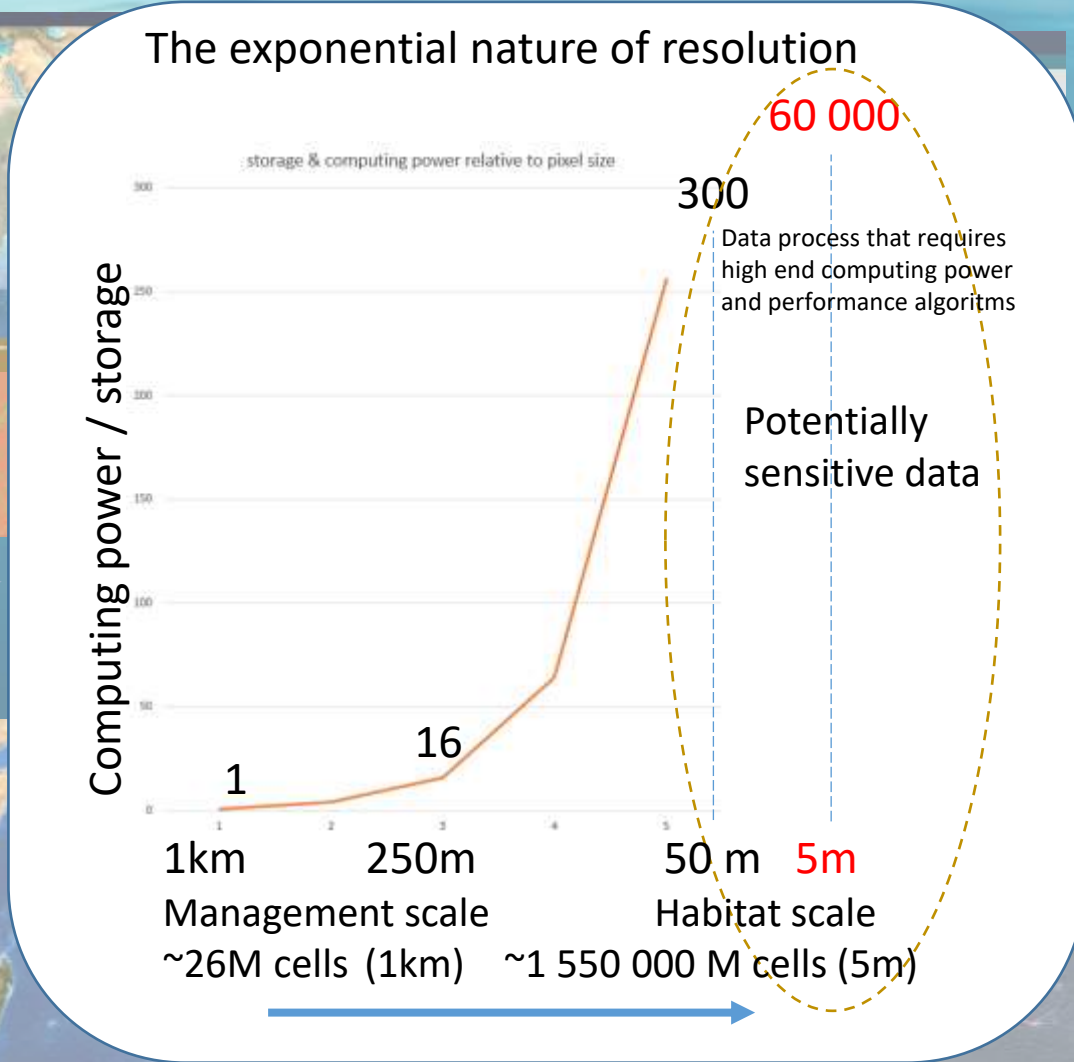
Processed data

Combined
Standardised
Original units & normalised data

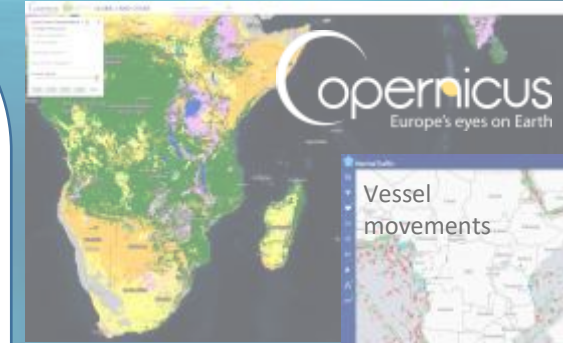
Environmental data



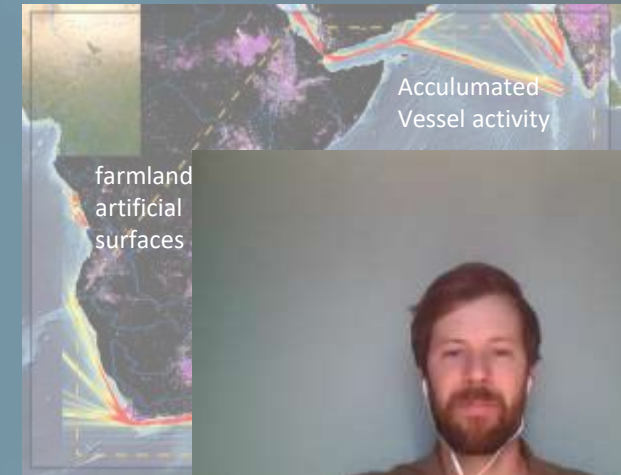
Ecosystem data



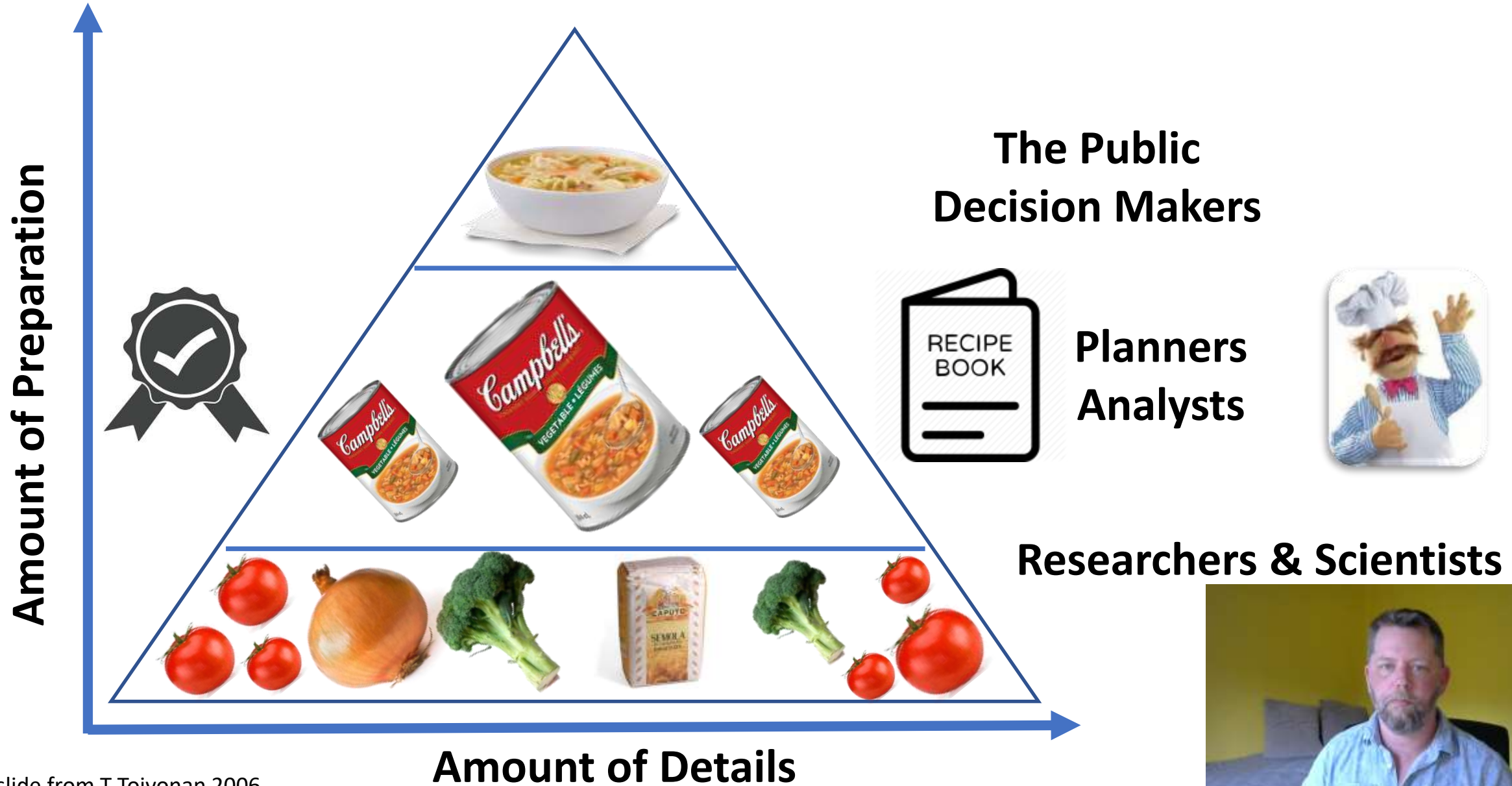
Human pressure/activity data



Global Fishing Watch



Information According to Users Needs



WIO Symphony data example: Corals

Process overview



Fresh ingredients and a *well organised kitchen*

Cook book & a hot oven

Main course

Side dish

Precautions

Allen Coral Atlas interface showing a map of the Indian Ocean region with various overlays. A file explorer window is overlaid on the map, showing the directory structure:

```

wiosym
├── .git
├── .Rproj.user
├── arcgis
├── data
├── data_raw
├── activity
├── adm
├── eco
│   ├── coral
│   │   ├── nat
│   │   └── reg
│   │       ├── allen
│   │       │   ├── 20200824
│   │       │   ├── benthic
│   │       │   │   ├── benthic.kml
│   │       │   │   └── benthic.shp
│   │       │   ├── boundary
│   │       │   ├── geomorphic
│   │       │   ├── license and documentation
│   │       │   ├── Satellite Reef Imagery
│   │       │   ├── stats
│   │       │   └── download_info.txt
│   │       └── wcmc
│   ├── fish
│   ├── mangrove
│   └── marine_mammals

```

Blue arrows point from the map interface to the file explorer, indicating the data source.

Data processing
- transparent
- repeatable

```

# coral_2020_0824.sh
#!/bin/bash

set -e

# Variables
CORAL_DATA_DIR="/data/coral_data"
CORAL_RAW_DIR="/data_raw/coral"
CORAL_OUT_DIR="/data/coral_out"

# Check if raw data exists
if [ ! -d "$CORAL_RAW_DIR" ]; then
    echo "Raw coral data directory does not exist."
    exit 1
fi

# Create output directory if it doesn't exist
mkdir -p "$CORAL_OUT_DIR"

# Run R script for data processing
Rscript /scripts/coral_processing.R "$CORAL_RAW_DIR" "$CORAL_OUT_DIR"

# Clean up
rm -rf "$CORAL_RAW_DIR"

echo "Coral data processing complete."

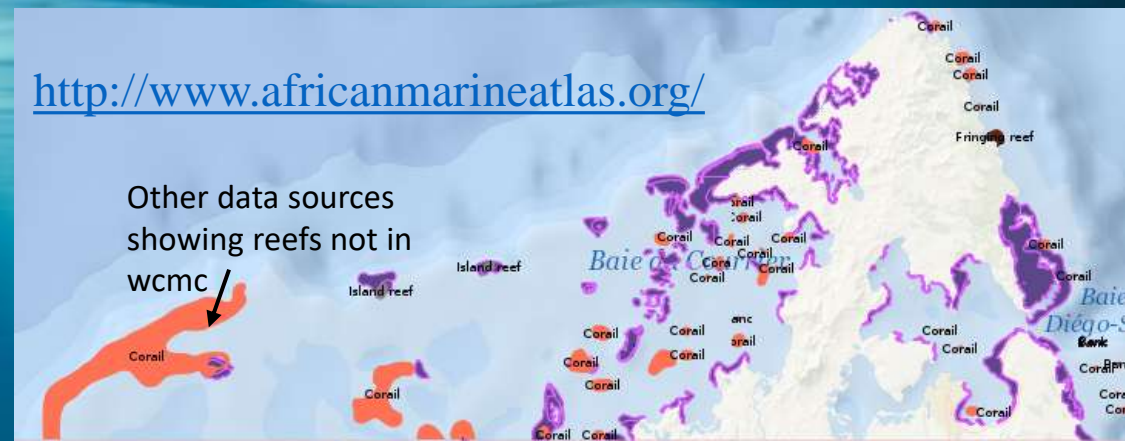
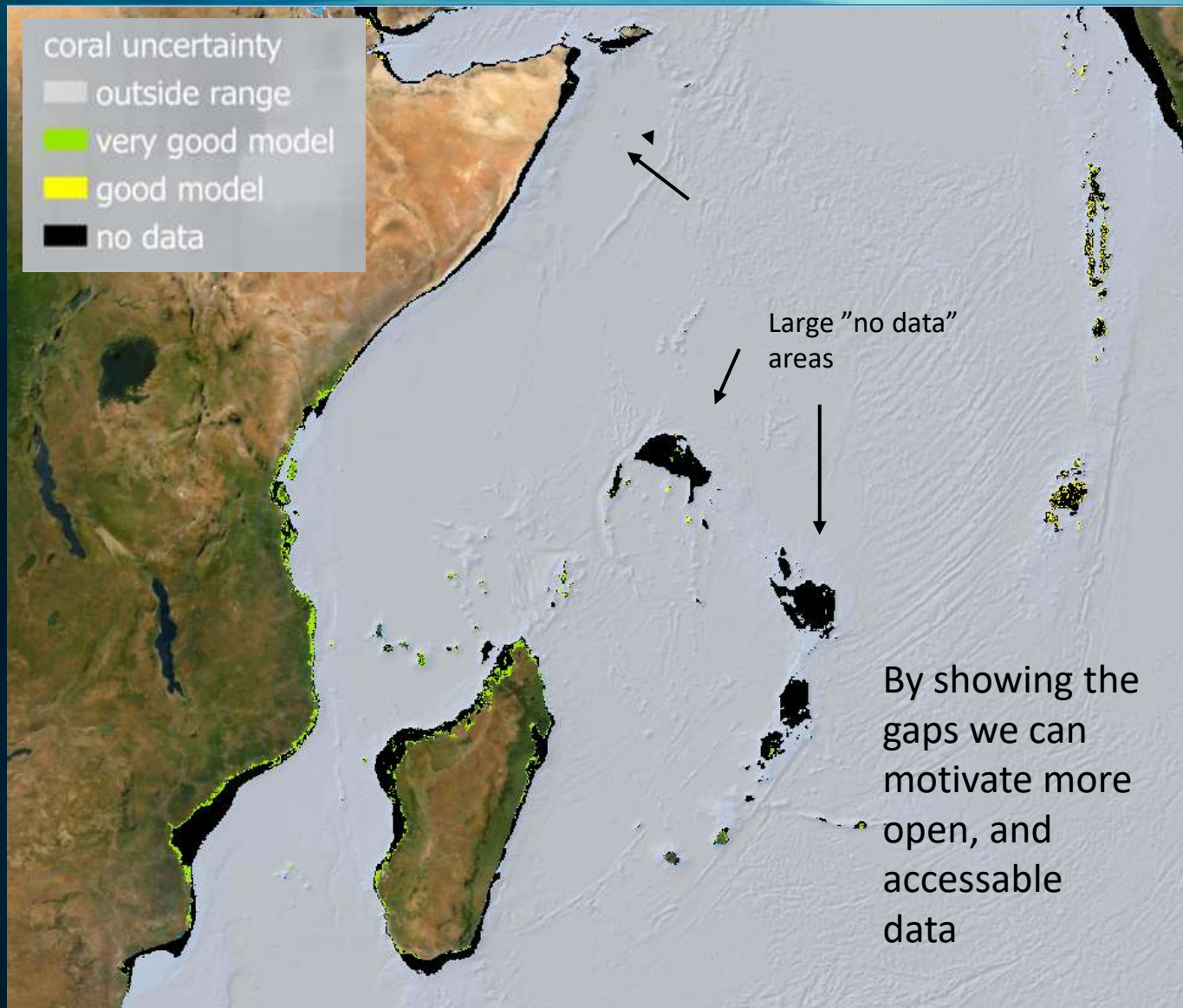
```

Maps of corals
- combined sources
- standardised

Maps of potential corals
- env. proxy
- caution areas

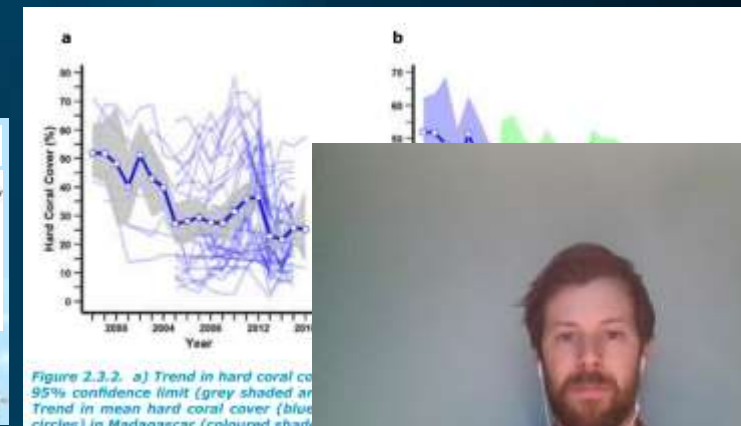
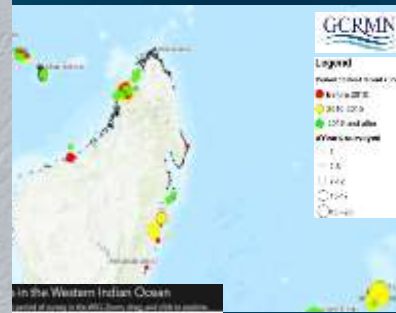
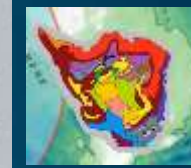
Uncertainty
- maps
- metadata

WIO Symphony data example: Coral reefs



Corals - to do

Additional data, expert knowledge/evaluation, refined themes (such as % live coral) ...



Framing the problems and possibilities

Valuable input from WIO MSP TWG during "data collection workshop" 2021



"Areas with **strong commercial interests** might be more **difficult to obtain data** from, for example the oil or mining industries."

"Funding needed to give other data managers **incentives to contribute data**. Gap in human activities at a regional scale - how do we fill that management gap?"

"It is important to **clarify the intention of data usage early** on in order to gain confidence and through that participation from data owners"

"A lot of **trust issues**, people are not used to data sharing. Scientist **concerns about "perfect data"**

"Most of the **data** will have to be **desensitized** to remove commercially sensitive information

"The **main task** would be to have formalize a task team responsible for **collating data** that is collected at a **local level** into a coherent **national dataset** which could then be provided nationally. Data copyrights is not an issue here"

"Mapping of existing data and establishing collaboration and collection of that data is resource demanding, **the more restricted the more resource demanding** the process"

"The **challenge** with regional data sharing platforms is the **difference in data policies for member states** that limit national agencies capacity to share data."

"Some data may be commercially sensitive or government owned. **The lack of central archives can be a challenge.**"

"**The openness of data may depend on who asks for it** and in which format the request is made. **national countries** path communication sometimes a challenge such as the **Netherlands** more successful internal national

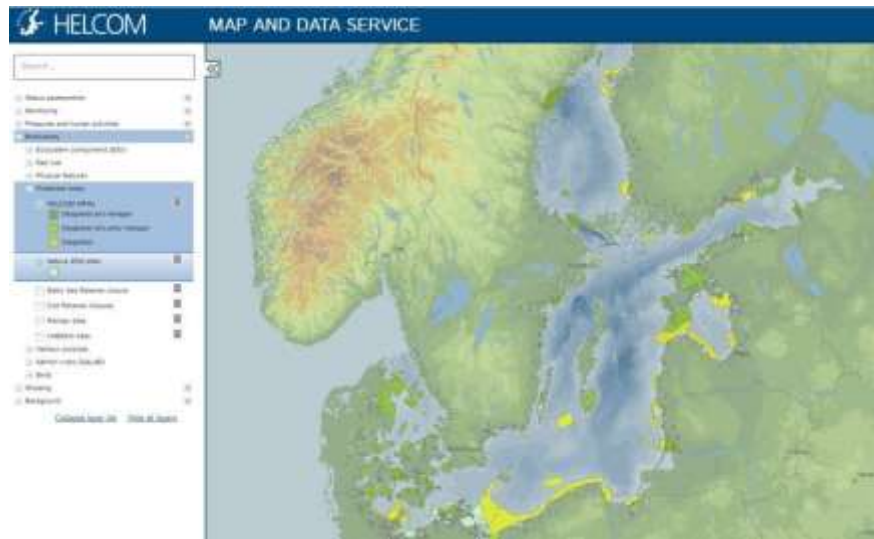


Open Marine Data in Europe



www.medin.org.uk

inspire-geoportal.ec.europa.eu



<https://helcom.fi/baltic-sea-trends/data-maps>



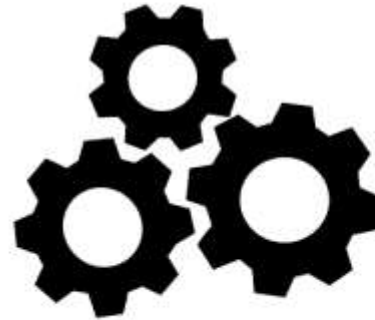


Horizon 2020
European Union funding
for Research & Innovation



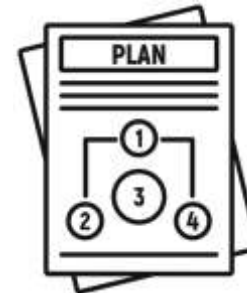
SangyaPundir / CC BY-SA (<https://creativecommons.org/licenses/by-sa/4.0>)

Findable **A**ccessible **I**nteroperable **R**eusable



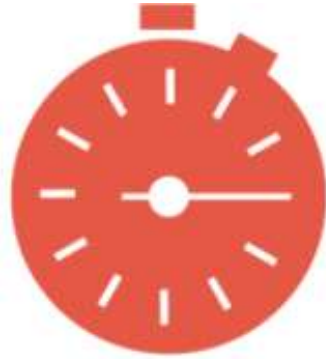
The FAIR Guiding Principles for scientific data management and stewardship

<https://www.nature.com/articles/sdata201618>





Open by Default



Timely & Comprehensive



Accessible & Useable

opendatacharter.net/adopt-the-charter



Comparable and Interoperable



For Improved Governance & Citizen Engagement



For Inclusive Development & Innovation



Marine Information in the WIO



www.wiomsa.org/publications/



www.nairobiconvention.org/clearinghouse



www.commissionoceanindien.org/publications-thematique/



maspawio.net



portal.odp.odinafrica.co.ke



africanmarineatlas.net

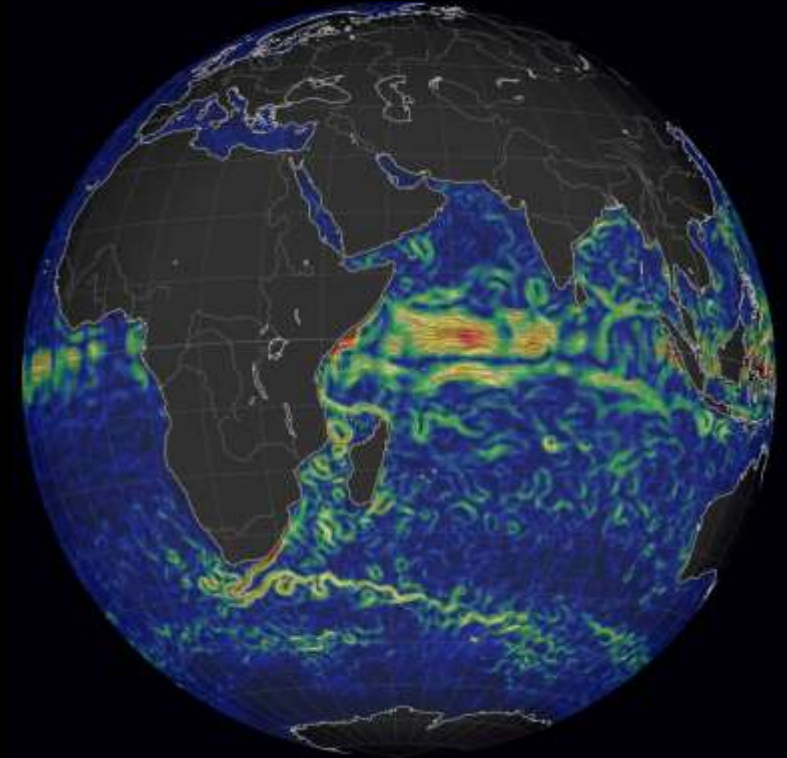


OH Ocean InfoHub Project



Key benefits of open data to MSP

- Facilitates participation and builds trust in policy
- More efficient use of limited resources
- Encourages collaboration & scientific rigor
- Promotes innovation and generates new insights
- Enables leverage of new technologies (e.g.: Big Data)



Key Recommendation

Accept & implement open-data principles

Support initiatives that:

- Improve access & management of marine data & knowledge
- Empower data holders to make data open and accessible
- Harmonise data at national, regional and global scales



Thank you!

For more details on WIO Symphony project
please contact

jonas.palsson@havochvatten.se

gustav.kagesten@sgu.se

**Swedish Agency
for Marine and
Water Management**

Webpage

<https://www.havochvatten.se/en/eu-and-international/international-cooperation/swam-ocean/wio-symphony---assess-the-impacts-of-your-planning-decision.html>

