Food and Agriculture Organization of the United Nations

Innovative data management services for sustainable fisheries and aquaculture

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Importance of scientific evidence at FAO

IT innovation at FAO for:

- Developing global knowledge products
- Building capacities of FAO members

IT innovation applied to support:

- fisheries assessment, monitoring and management
- Aquaculture marine spatial planning and monitoring

IT innovation enabled through:

- Global partnerships with IT and data suppliers
- Virtual Research Environments (VREs)

i-marine

BlueBRIDGE

Google Earth Engine

Global Fishing Watch

SOFIA – a FAO flagship publication

Key facts & figures

Global total capture fishery production in 2016 was 90.9 million tonnes.

33.1% of fish stocks are estimated as overfished (fished at biologically unsustainable levels).

Global total aquaculture production of aquatic animals in 2016 was 80.0 million tonnes.

Develop global knowledge products

Assist with fisheries monitoring and research around the globe

The FAO Tuna Atlas

ABNJ / Common Oceans
A GEF Project

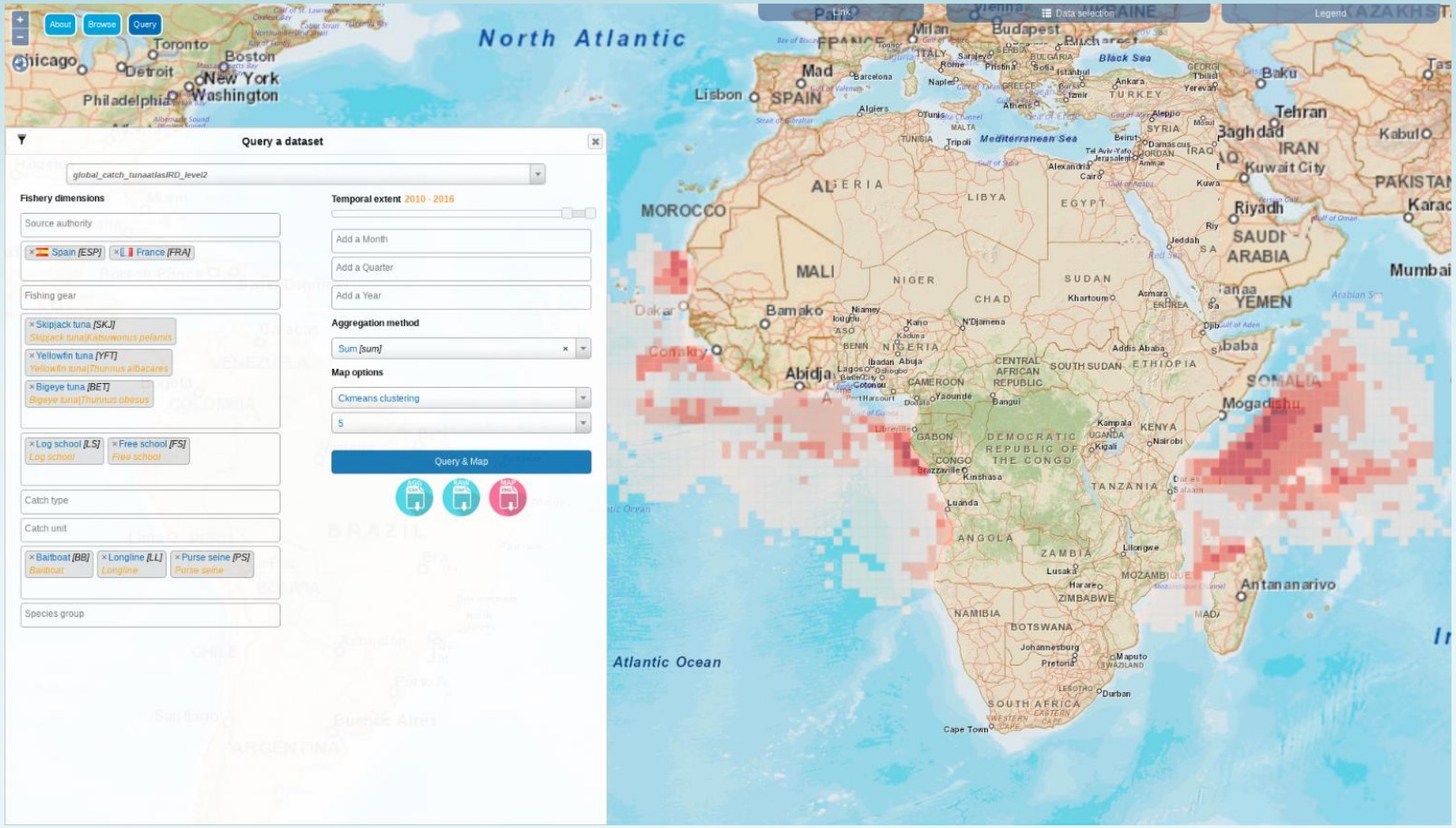
Coordinating Working Party on Fishery Statistics

CWP

Fisheries and Resources Monitoring System

FIRMS

FISHERIES AND RESOURCES MONITORING SYSTEM



Develop global knowledge products

Assist with fisheries monitoring and research around the globe

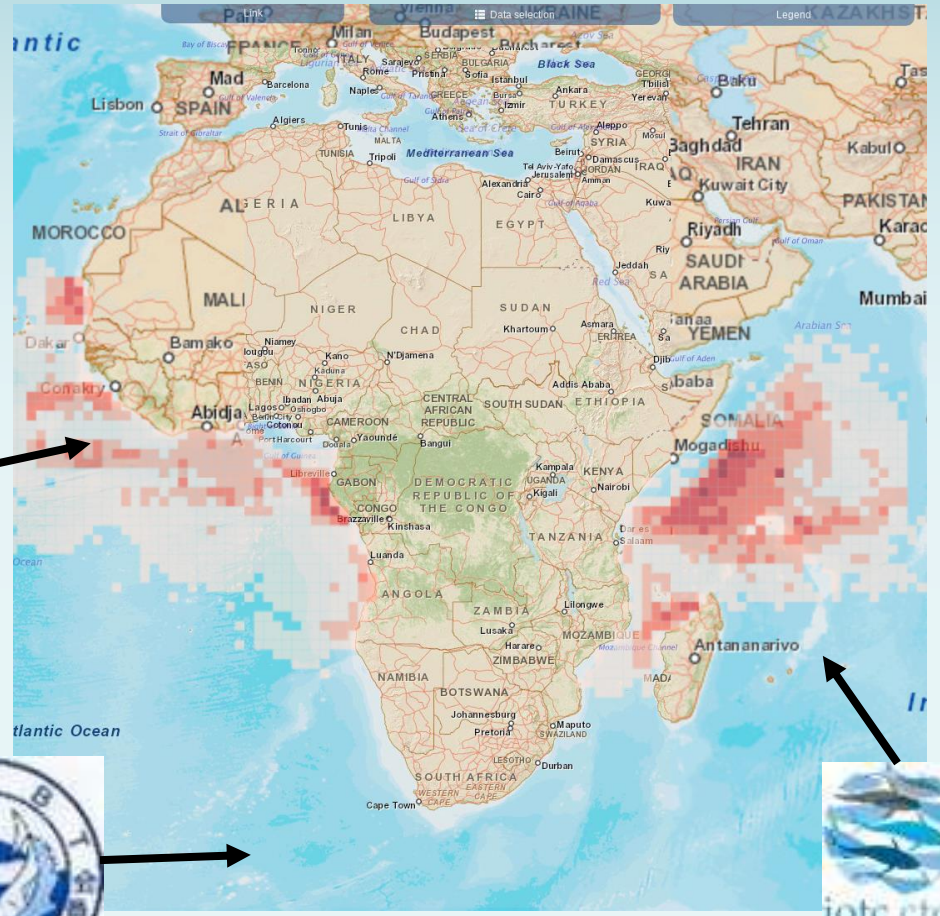
The FAO Tuna Atlas

Collation of global tuna fishery statistics

Harmonize and standardize fisheries capture data in a global database

- From 5 tuna RFMOs
- Harmonize spatial / temporal / species / gear / “flag” dimensions

Publish the data (OGC catalog) and see it (MapViewer)



WCPFC

In partnership with: IRD, CNR, ICCAT, IOTC, CCSBT, IATTC, WCPCF

Develop global knowledge products

Assist with fisheries monitoring and research around the globe

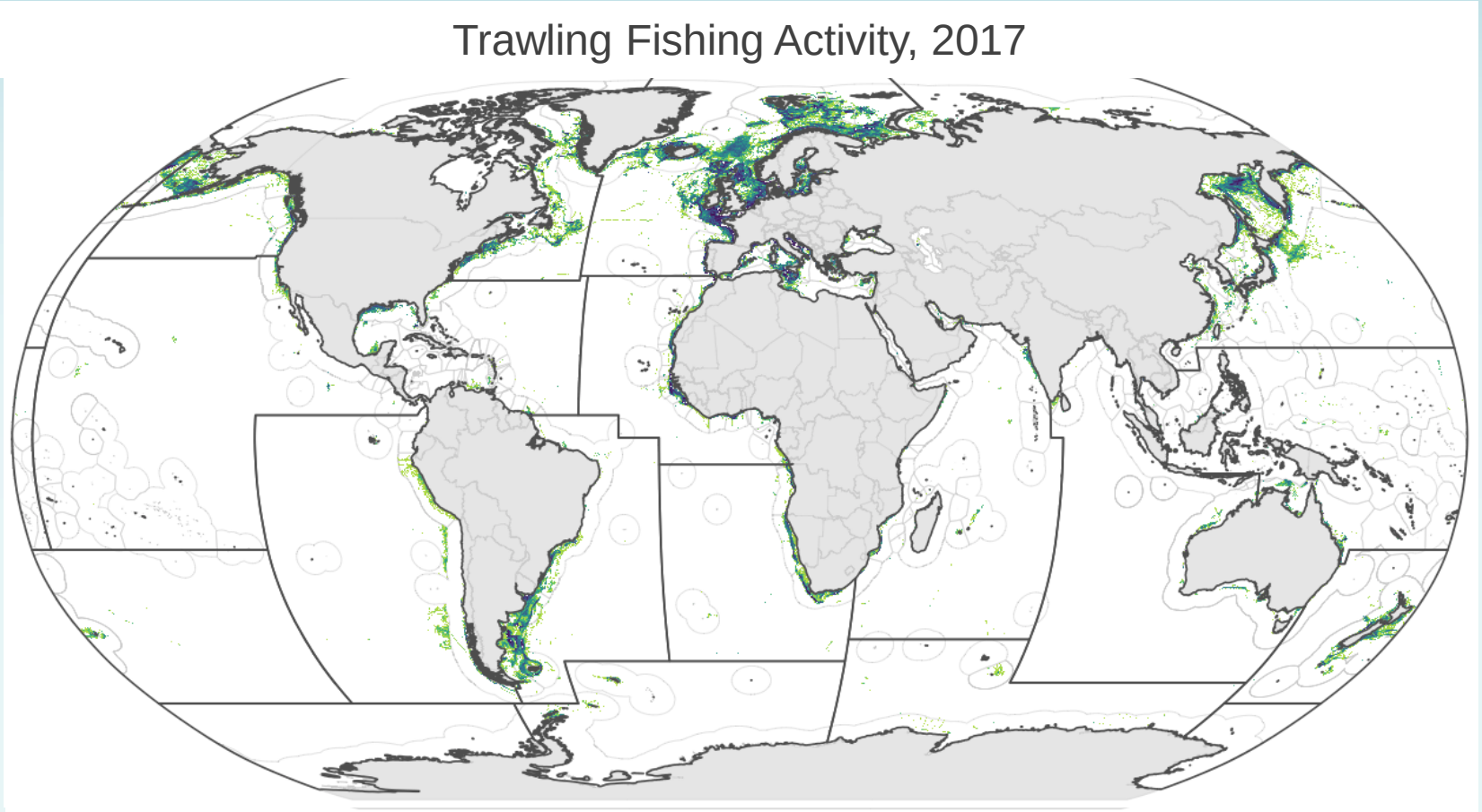
FAO Atlas of AIS-based fishing footprint and effort

A global database of fishing footprint by gear type with an unprecedented spatial and temporal resolution

AIS (Automatic Identification System) is used to create high-resolution maps

Comparison studies with VMS and logbooks

Raise awareness of the potential of the technology as well as caveats



In partnership with: Google Earth Engine
Global Fishing Watch

Develop global knowledge products

Support resources and fisheries status monitoring

The Global record of stocks and Fisheries

A global repository of uniquely identified stocks and fisheries

For monitoring global stocks status (SOFIA, SDG14.4.1)

To support traceability schemes with links to web-based fisheries status reports

Plan is for Governance under FIRMS

Partnership with: CNR, Forth, FIRMS, Univ. Washington
Sustainable Fisheries Partnerships

Unique identifiers for Stocks and Fisheries

Species: ***Gadus morhua***
Species code: **COD**
Fishing Area: **FAO 21.3.M**
Management Authority: **Northwest Atlantic Fisheries Organization (NAFO)**
Jurisdiction: **NAFO area of competence**
Fishing Gear: **Bottom otter trawls**
Fishing Gear code: **OTB**
Flag State: **Lithuania**
Flag State Code: **LTU**
ID: asfis:**COD** + fao:**21.3.M** + grsf-org:**INT:NAFO** + rfb_comp:**NAFO** + isscfg:**OTB** + iso3:**LTU**
UUID:http://data.d4science.org/ctlg/GRSF_Admin/b99fd03e-709e-3139-9f5d-133df0b103fd

Develop global knowledge products

Support resources and fisheries status monitoring

The Global record of stocks and Fisheries

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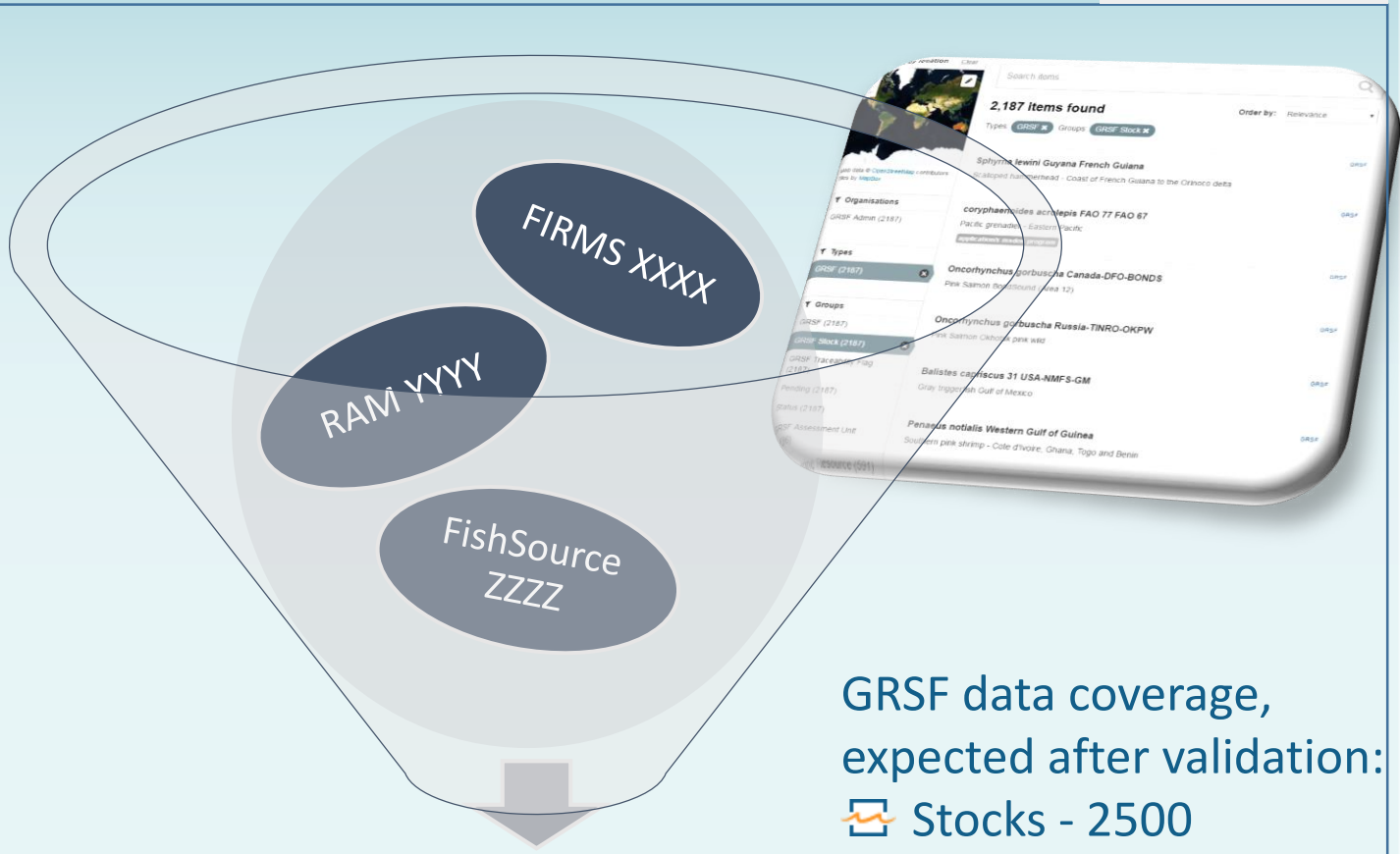
A catalog of stocks and fisheries in a VRE

- Assign Unique Identifiers (to data from FAO, RAM, SFP)

and

- Publish as Open Data



GRSF data coverage, expected after validation:

- Stocks - 2500
- Fisheries - 6000

Partnership with: CNR, Forth, FIRMS, Univ. Washington Sustainable Fisheries Partnerships

Build capacities of FAO members:

Support to fisheries monitoring and management

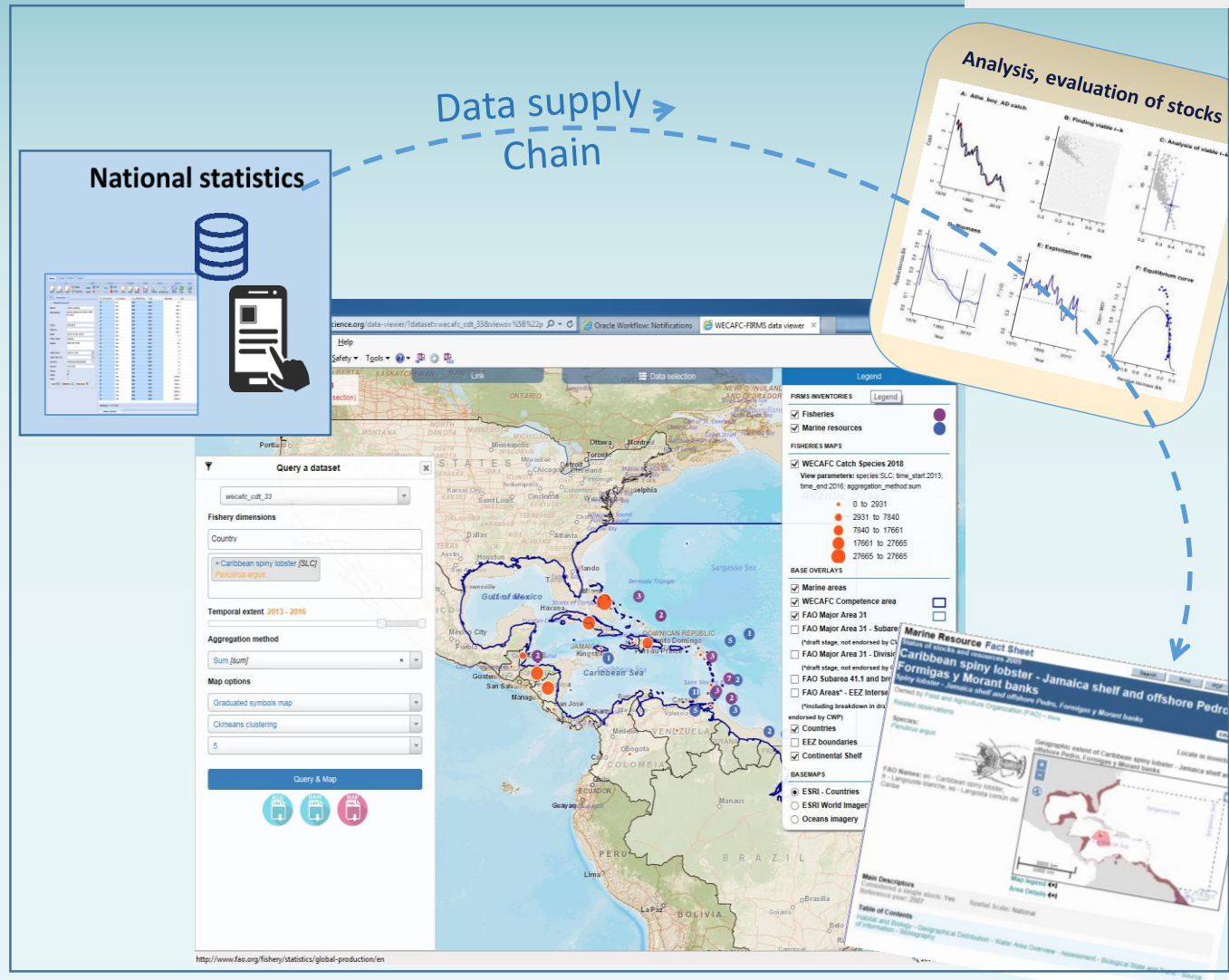
a Regional Database for fisheries assessments

VREs to support scientific collaboration along data supply chain

- Harmonize statistical data collation
- Data analysis by assessment teams; reproducible stock reports
- FIRMS - Disseminate stock status in dynamically built reports

The Metadata driven approach results in data and infra interoperability:

- Map viewers; GeoNetwork based
- Cross domain analysis; generate fisheries data in NetCDF format

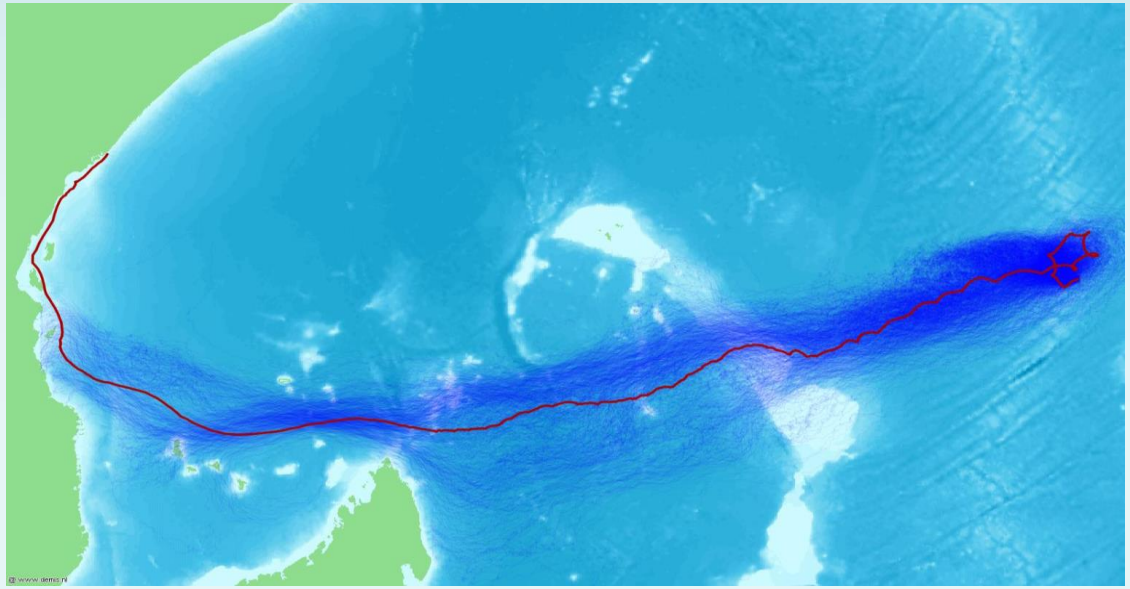


Build capacities of FAO members:
Support to fisheries monitoring and management

Simulations of Fish Aggregating Devices trajectories

Support research to improve assessment of tuna stocks

- Ichthyop model & OSCAR data
- uses Copernicus data



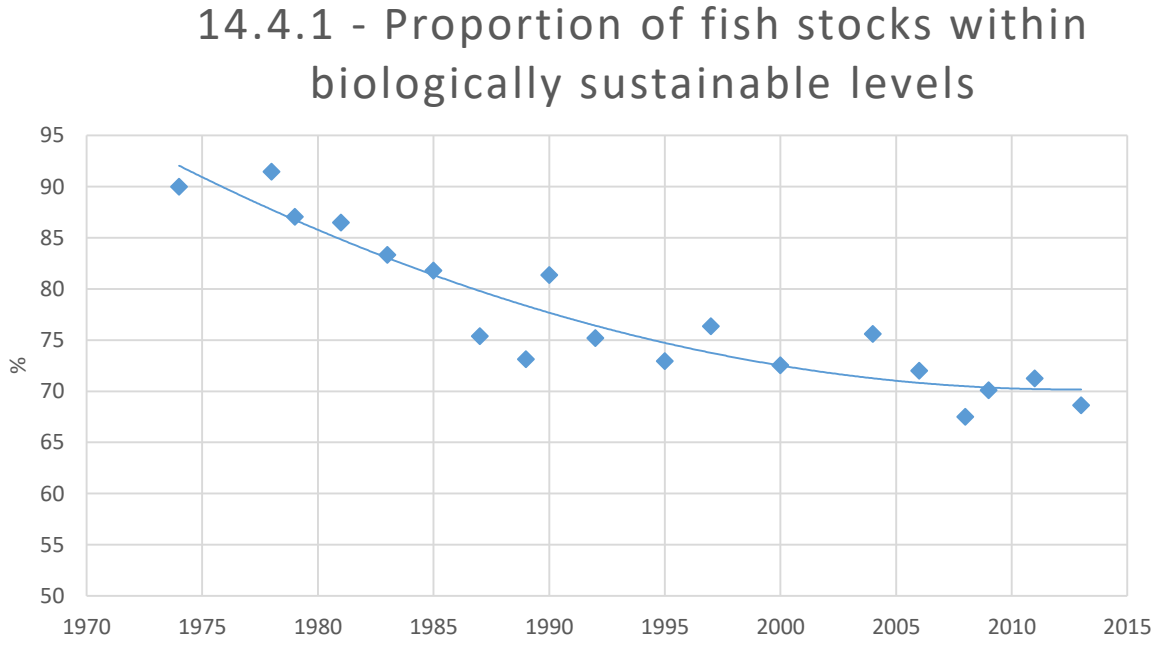
Build capacities of FAO members:

Support fisheries monitoring and management

On-Line hands-on training for Stock assessment

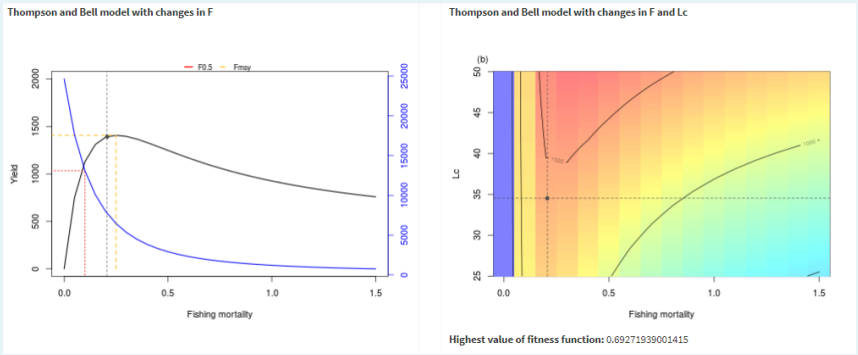
FAO custodian agency of SDG14.4.1

- Responsible for monitoring and reporting framework
- Capacity development supported through e-learning



VRE for SDG 14.4.1 indicator with R algorithms and Rshiny user interface

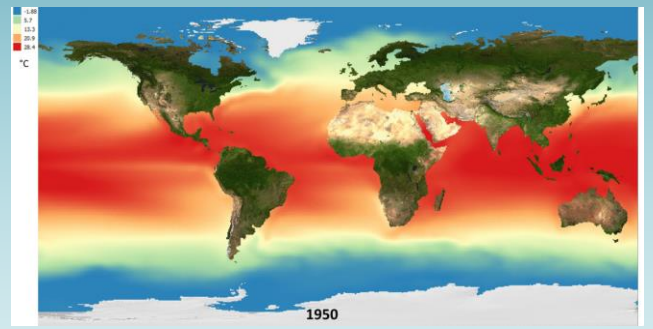
- elefan
- CMSY
- …



Partnership with: CNR, ICES

Build capacities of FAO members:
Support fisheries monitoring and management

Model species distribution under CC scenarios



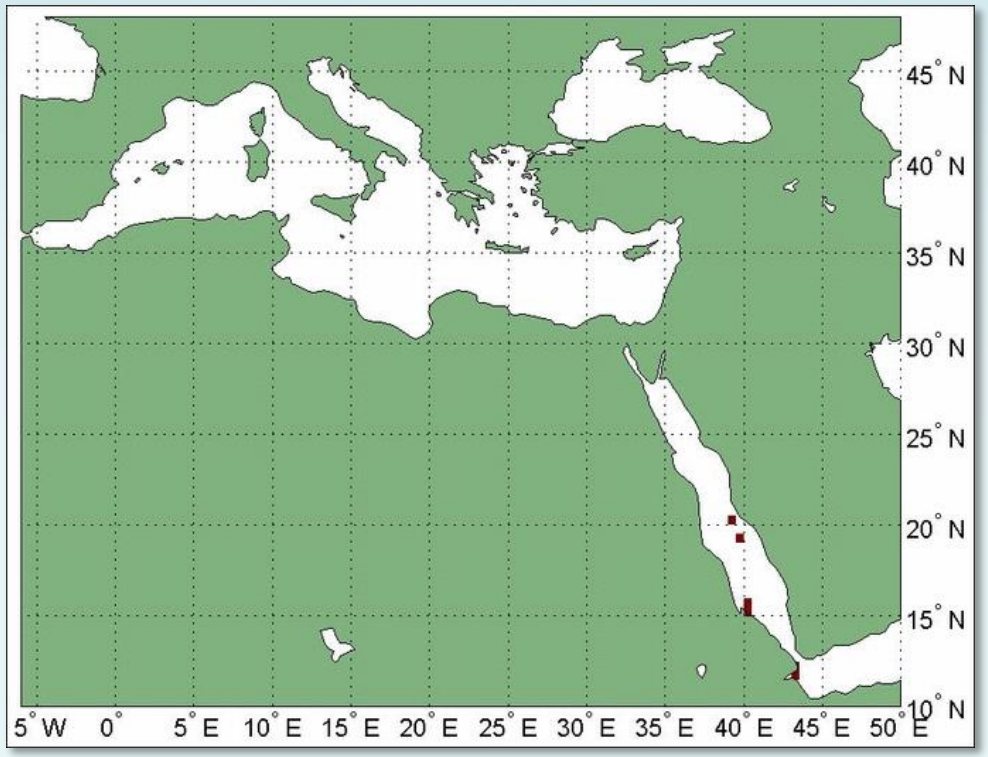
Species distribution based on generated timeseries of forecasted environmental values

- Combine species occurrence data (Aquamaps)

and

- Environmental parameters (NOAA, NASA)

to predict invasive patterns



Services set-up to exploit Copernicus CMEMS data

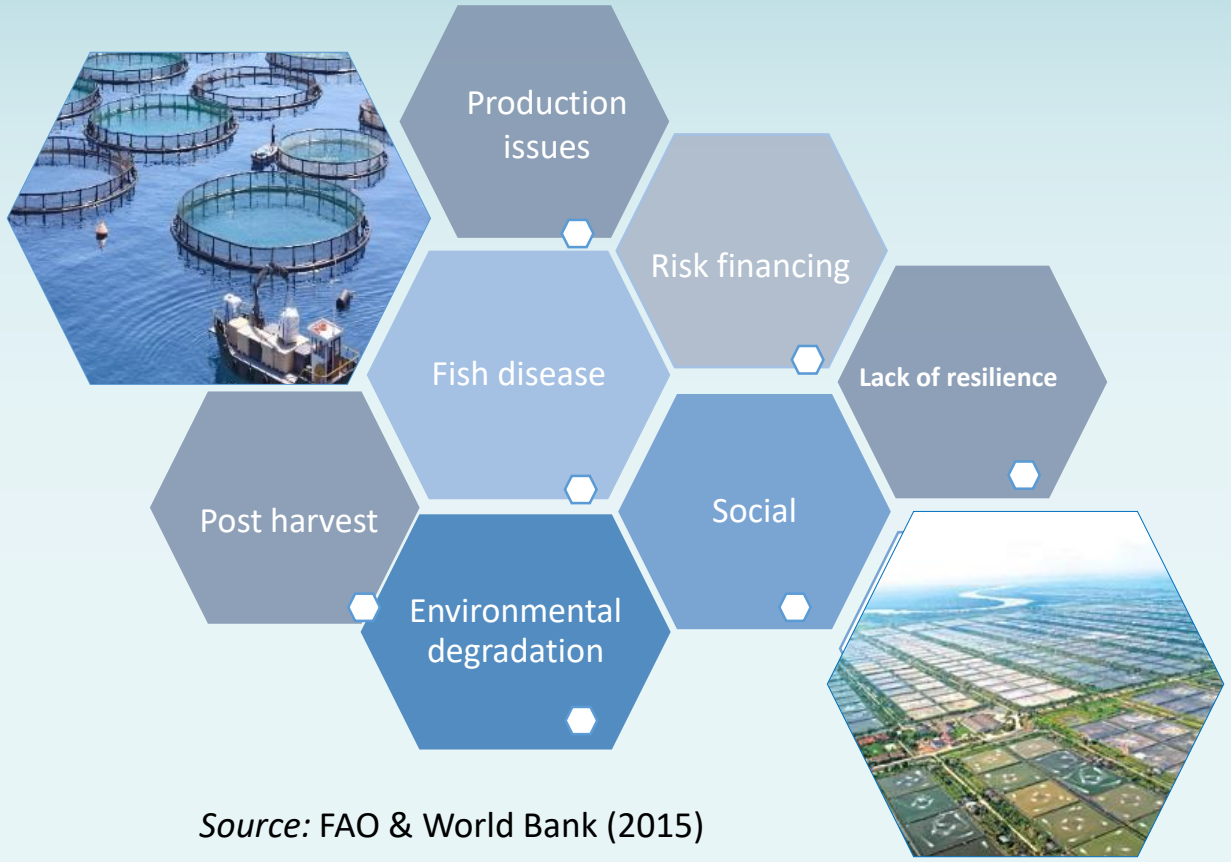
Partnership with: CNR,

Build capacities of FAO members:
Support responsible Aquaculture through spatial planning

Mapping aquaculture farming structure and their environment, for:

- filling production reporting gaps through earth observation
- site selection / optimization and aquaculture zoning
- Multisectoral development
- Environmental risks assessment and monitoring
- Disaster assessment and emergency preparedness

Common problems due to the lack of spatial planning and management



Source: FAO & World Bank (2015)

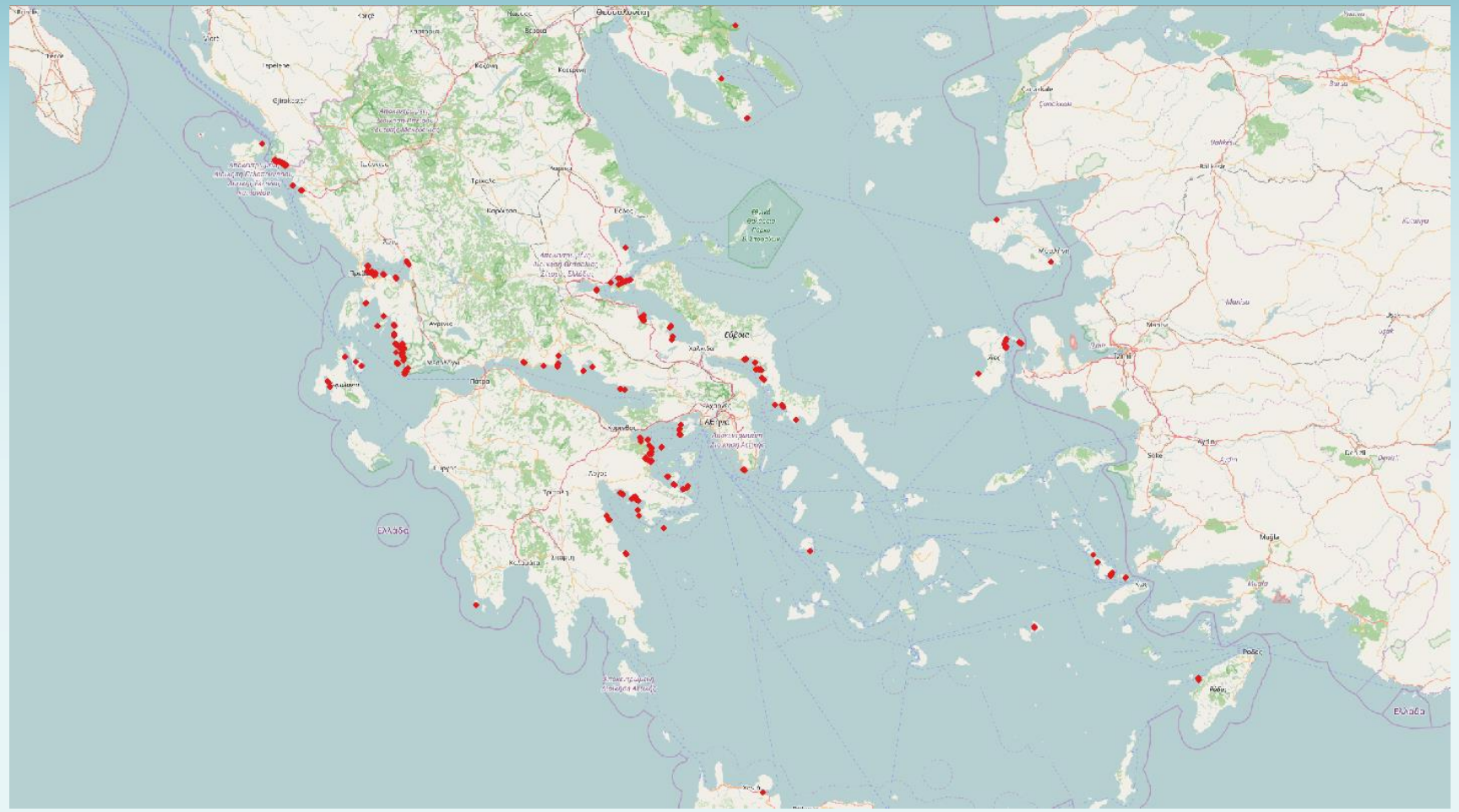
Build capacities of FAO members:
Support responsible Aquaculture through spatial planning

Semi-automated detection of Aquafarms for inventories

Inventory of cage culture in Greece

Based on free optical imagery

- Detect cages algorithm
- Edit cage attributes
- Publish data to a geoserver



Example of user interface

Partnership with: CNR, CLS,

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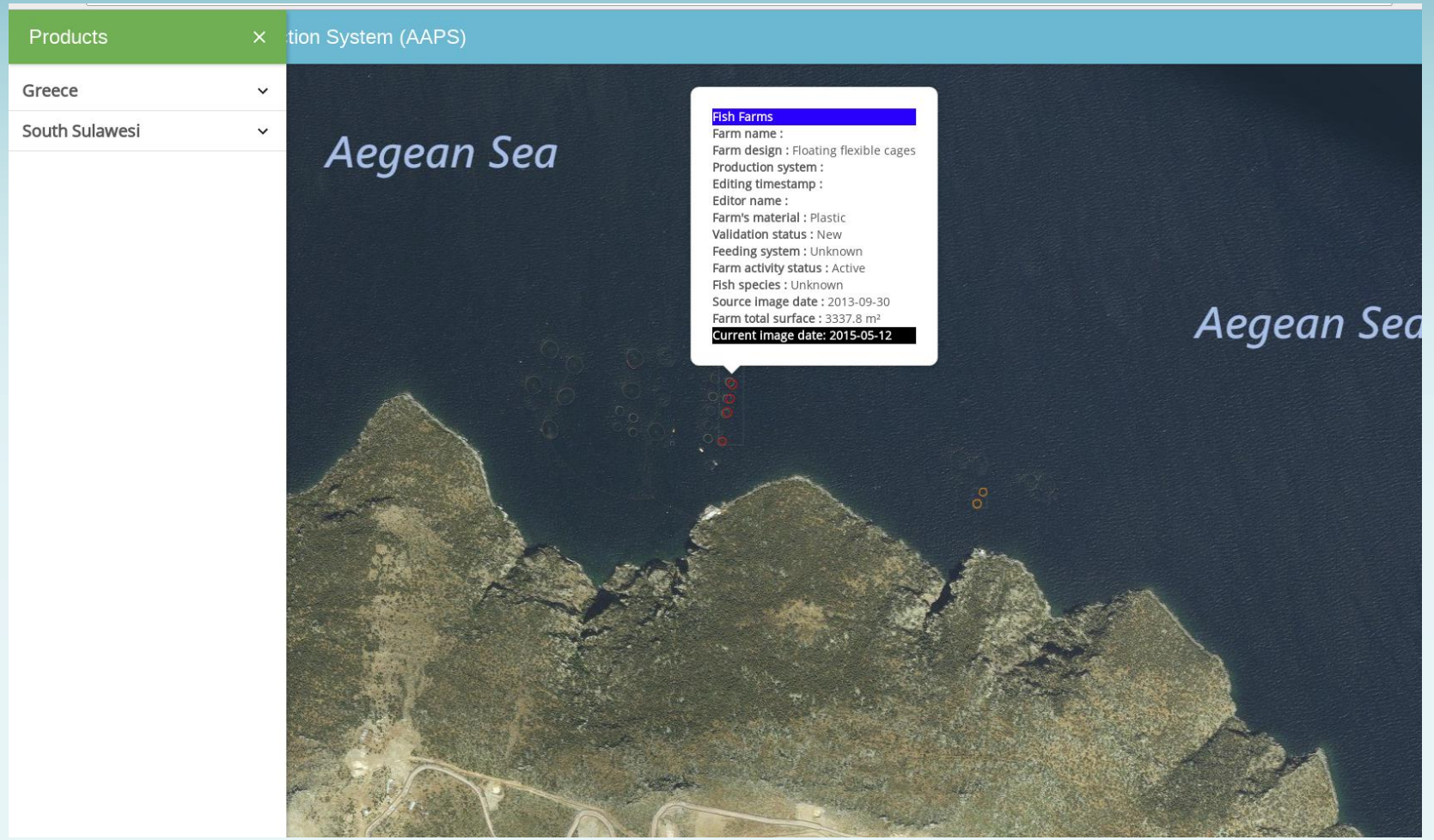

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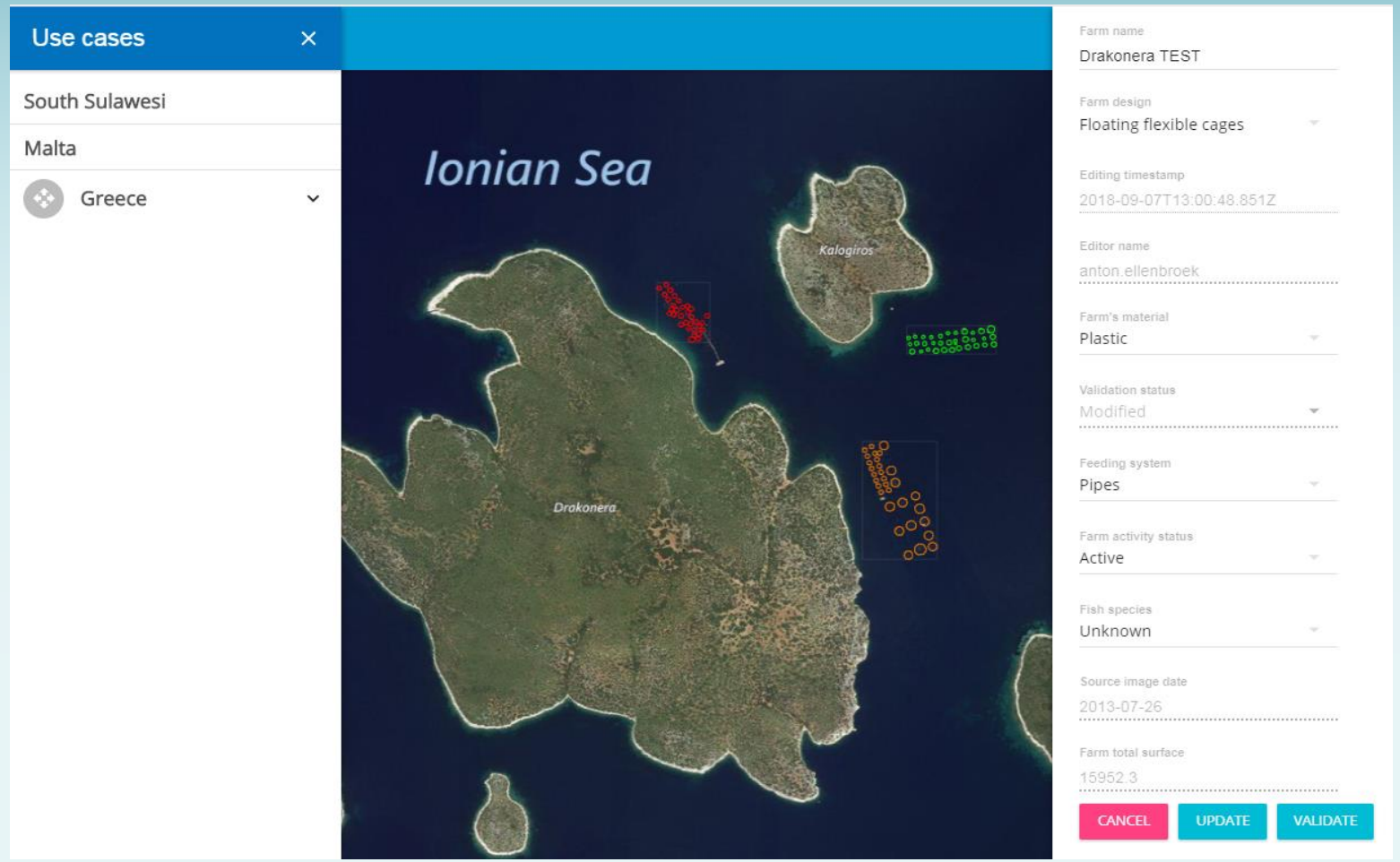


Example of user interface

Partnership with: CNR, CLS,

Build capacities of FAO members:
Support responsible Aquaculture through spatial planning

Semi-automated detection of Aquafarms for inventories

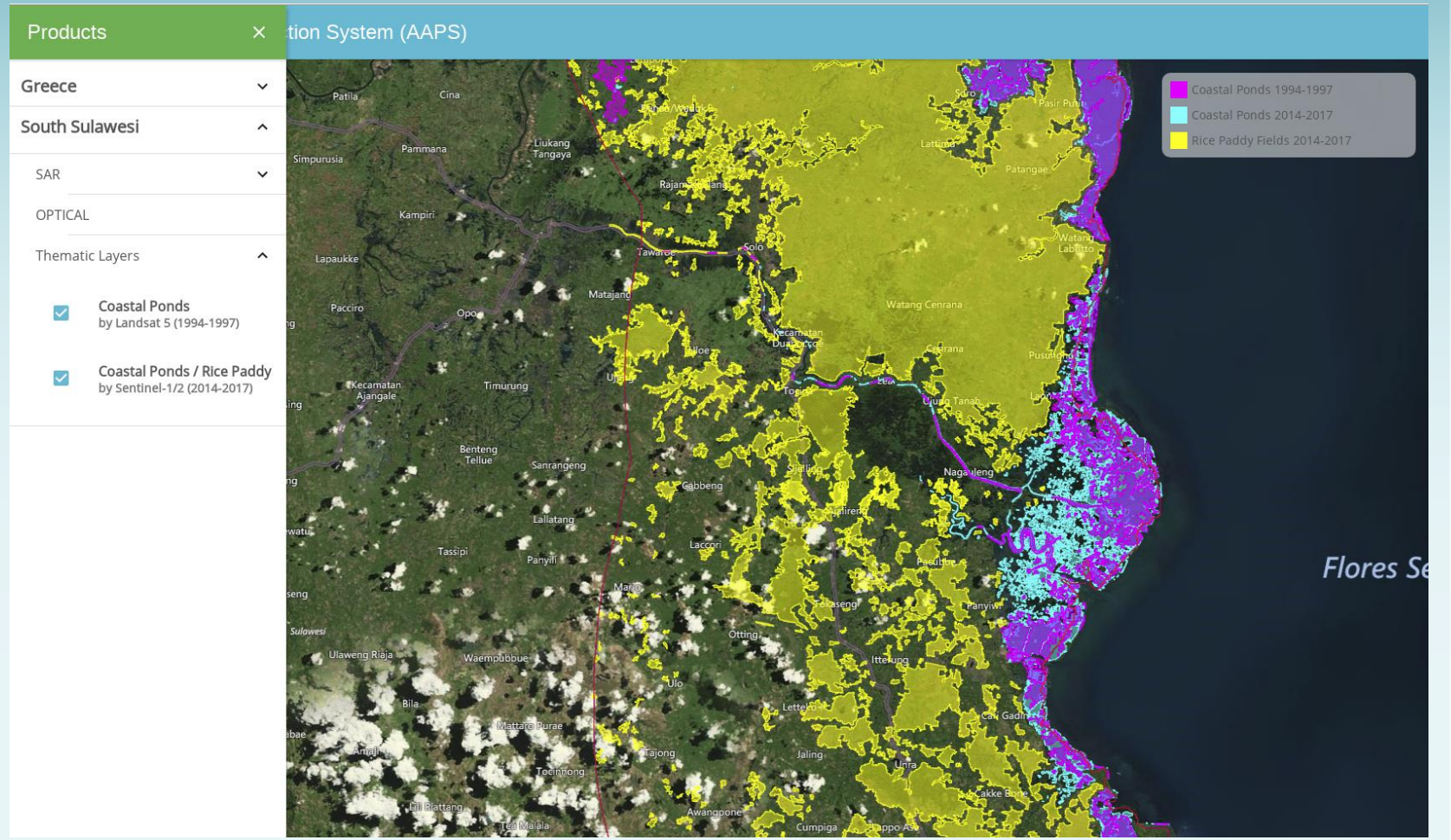
Coastal shrimp ponds delineation in Indonesia

- Use Sentinel radar

and

- Landsat multispectral optical

→ to distinguish aquaculture ponds from rice fields



Example of user interface

Partnership with: CNR, CLS,

Build capacities of FAO members:
Support responsible Aquaculture through spatial planning

Monitor performance of Marine Protected Areas

Get your MPA reporting in "shapes" with a VRE

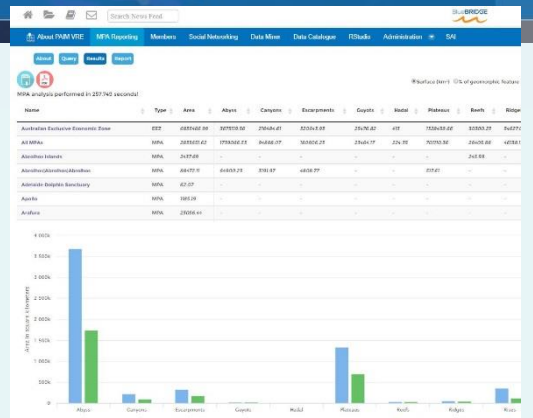
- Use world class environmental datasets (Geomorphology, ecology)

and

- Overlay with Admin areas (EEZs, or upload your own)

→ to generate MPA 'performance' maps and reports

→ to assist with monitoring of AICHI Target 11



Partnership with: CNR, GridArendal

Wrap-up message

FAO

Leverage IT innovation to develop global knowledge products and build capacities of its Member countries

Engages in forging sustainable models

Welcome collaborations with its multiple field projects

Thank you for your attention