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Enhancing fisheries management through data integration: A case study of the Seychelles fisheries

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Context

The Seychelles are committed to the conservation of marine resources and the **sustainability of fisheries**, which is one of the pillars of their economy .

The **Seychelles Fisheries Authorities (SFA)** monitors on average per year (Fig 1.):

- 45 Semi-industrial Longliners,
- 157 Industrial Longliners,
- 46 Purse Seiners,
- 300 Artisanal Fisheries.

This represents on average 421,327 Mt of catches landed per year.

Objectives

Fisheries monitoring is crucial for **stocks management** and **ecosystem sustainability**, and must be based on reliable data and scientific expertise.

To meet these requirements, IRD and SFA collaborated to implement **ObServe**: an information system for **continuous integration** of data relating to **various fisheries** for vessels licensed to fish in **Seychelles** waters.

ObServe's purpose is to enhance the data workflow and to improve the data **quality and integrity**.



Data collection

Data is collected from multiple sources and formats, including:

- **Logbooks** of daily fishing activities submitted by vessel operators,
- **Landing and transshipment documentation** of total catches unloaded,
- **Port sampling** to collect biological and species size composition data,
- **Data contributions from multiple partners** hosted on different servers such as SFA, AZTI and IEO and IRD.



ObServe data system

- **Manual** inputs by data clerks and observers through a dedicated software application,
- **Online** and **offline** entry **workflows**, depending on connectivity and operational context,
- PostgreSQL based data storage with **uniformisation** and **conformation** of the data,
- **Interoperable system architecture** through an **API**,
- **Automated** data feed *via* third-party API clients,
- **Data sharing** with other ObServe instances and third-party systems, *via* the API,
- **Multiple fisheries design** supporting purse seine (including FADs), longline, and baitboat operations.



Data ecosystem

Tools for **streamlining** and **standardizing** workflows.

Embedded tools:

- **Completion algorithms** infer weights, sizes, numbers from known data, as well as FADs types,

Third-party tools:

- **SQL queries** perform reproducible **data extraction** from large databases,
- **R scripts** **validate data**, including consistency checks and identification of missing or incoherent entries, and do **reporting**,
- Python app performs **automated integration** of logbook data from Excel sheets.

Industrial Longline
25 008 Mt
5.9 %

Artisanal Fisheries
4 489 Mt
1.1 %

Purse Seine
389 859 Mt
92.5 %

Semi-Industrial Longline
1 972 Mt
0.5 %



Fig 1. 5 years average catch (Mt) per fisheries per year in WIO by vessel licensed in Seychelles (source from sfa.sc)

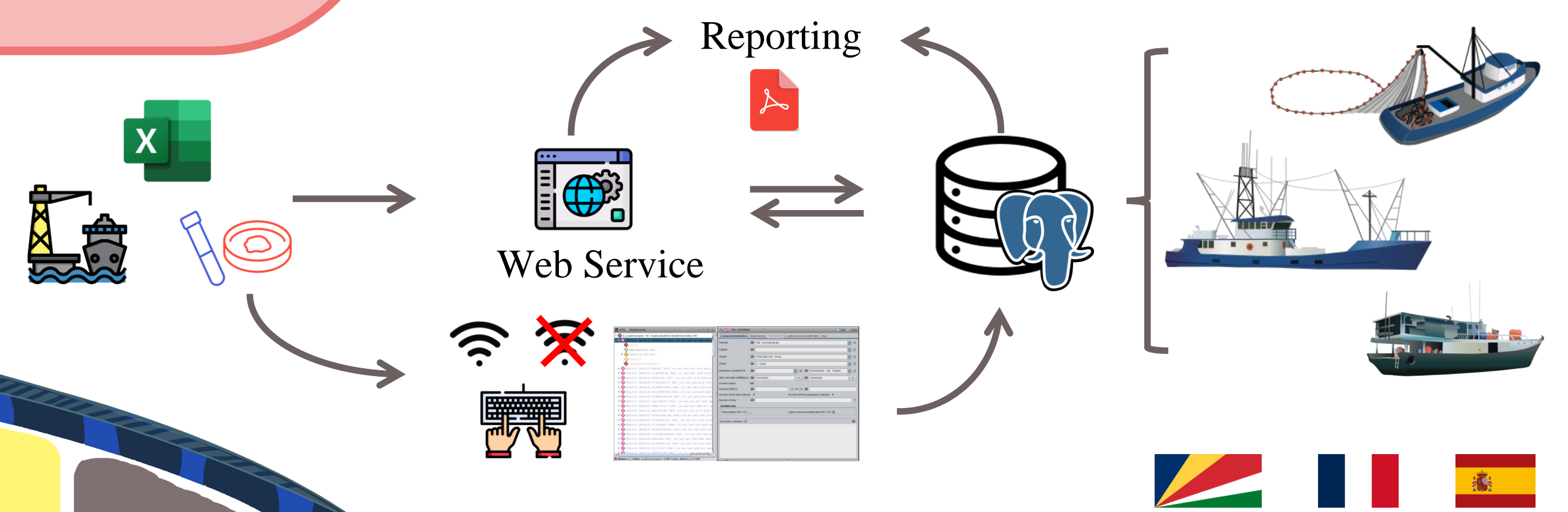
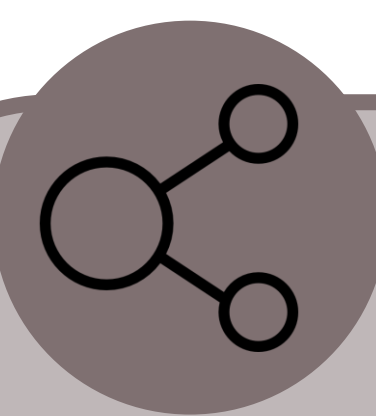
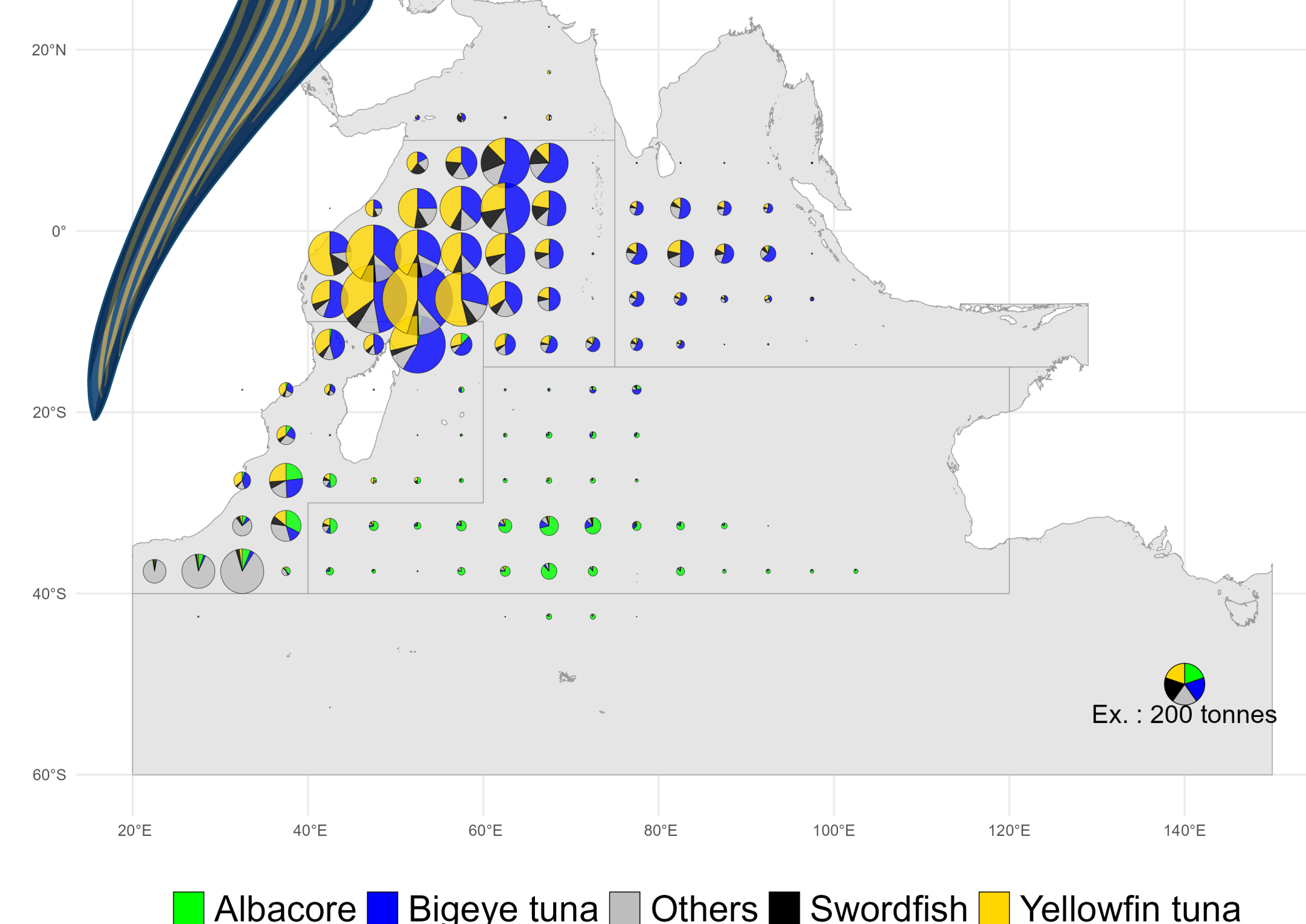


Fig 2. Simplify schema of Observe functionalities and processes for the multi-fishery and multi partners data workflow.

Fig 3. Map of catch distribution by Seychelles flagged longliners in WIO



Reporting and sharing

Integrated systems facilitate efficient reporting and data sharing:

- **Seamless workflows** improve **data quality, timeliness and compliance** with reporting obligations (e.g RFMOs, FAO, and National agencies),
- **Automated reporting** supports the production of annual fishery reports and dissemination to general public through the SFA FIMS (<https://sfa-fims-dev.traseable.com>),
- Shared data formats ease data merges and **enhance collaborations** between countries and stakeholders,
- Interoperability technologies like REST API make information more **accessible**, usable and useful.

Conclusion: Advancing Fisheries Data Systems

- Refined and **seamless workflows**,
- **Ease** data acquisition and monitoring,
- Enhance data **quality and integrity**,
- Timely and accurate fisheries data dissemination,
- Improved stocks management,
- Compliance with national, regional and international **reporting obligations**,
- Support **data-driven decision-making** by policy-makers,
- Strengthen cross-institutional **collaborations**.

Perspectives

- Extension to **other fisheries** (incl. artisanal fisheries)
- **Collaboration** with newly interested countries, organisms
- Development of **interoperability bridges** with other systems



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