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Title:

A Regional Information System for Improving Fisheries Governance and Assessment.

Abstract :

The EU funded Istam Project aims to provide some tracks in order to improve scientific advice on the state of west African fisheries. One of our lines of research is to develop a prototype of regional information system suited to give all the tools to improve the scientific advice and to disseminate it. Thanks to our proximity with the fisheries data and information users, we attempted to offer tools that could be useful within the different aspects of their work. They are tools to understand how the data are collected and managed, how to get them, which method have been used for a particular assessment. These type of information are more dedicated to scientists who want to redo an assessment or gauge its quality. Tools for an easy access to the final diagnosis and to the fisheries regulations already in place are meant for the fisheries manager or for the scientist who want to have a global view of the fisherie ecosystem.

The prototype can be found on the web available through a web interface and provides six types of information necessary for the fisheries assessment and management :

First we can access to the inventory and description of the monitoring systems, then We also provide raw or aggregated data to input some models to produce the scientific advice We provide all the methodology used to create the advice : data input, description of the models and results

We disseminate the advice itself
We provide information on fisheries regulations, which could be the result of advice likely to influence the next, updated advice on the same stock or fisheries.

The ISTAM prototype is an integrated framework which makes information on the fisheries easier and more documented to help develop new advice.

Shortnote

Introduction:

The EU funded ISTAM Project (Improve Scientific and Technical Advice for fisheries Management) aims to provide some ideas and directions to improve scientific advices on the state of west African fisheries. ISTAM concerns the coordination of scientific activities ensuring the methodological reinforcement of information systems and more generally of monitoring and assessment instruments namely:

·   - The improvement of the quality and quantity of data used in stock assessments.
·   - The harmonisation of stock assessments by promoting the use of the most suitable and best controlled assessment methods, in the wider perspective of fisheries management,

·   - The improvement of the availability (accessibility) of validated and referenced datasets
·   - The dialogue for identifying future research needs to improve information supporting fisheries management

ISTAM is a coordination action between the research institutes of 5 European countries and 3 West African countries. The project is coordinated by IRD. The regional information system developed within the ISTAM project concerns Morocco, Mauritania and Guinea Conakry.

The project has been organized in 3 major Work Packages (WP). The objective of WP1 is to study fishing monitoring systems. This work package allowed us to have a general view of observatories producing data for fish stock assessment.
WP3 aims to analyse, develop, and disseminate technical methods to improve the quality of fish stock assessments conducted in the sub-region.
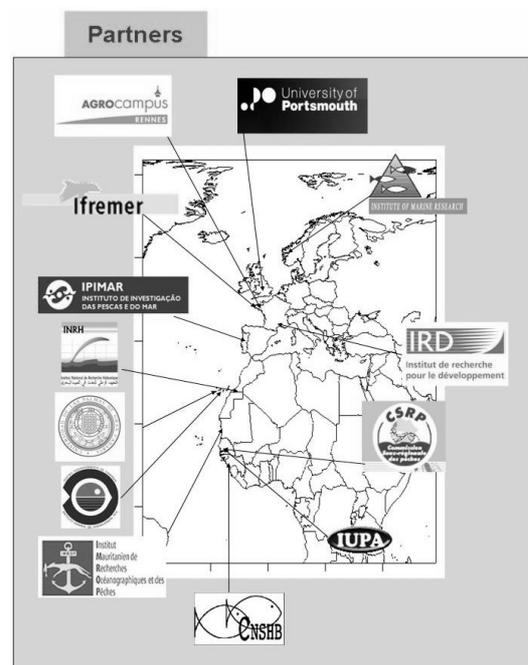
Between these 2 WPs, the problem of data integration in a centralized place was tackled through WP2. Although several datasets have been collected during several years, the current major problem concerns data accessibility and storage for scientifists. Historically, data located within an institute were collected by a given scientist for a specific study and not made available to the community. Today assessment models require time-series data and there is a need to merge short time series and harmonize them to get a long-term view of anthropic impacts. To this end, 3 main aims were defined within WP2 entitled "Subregional Information Systems":

– Specifying procedures to enable assessment working groups (e.g. CECAF working groups) get easily documented data used as inputs in assessment models,
– Specifying procedures to store and disseminate the assessment process and the final diagnosis,,
– Improve skills in the sub-region to manage the specified database and software.

I- Scope of the prototype.

First we had to select information that should be included in the subregional information system.
We first started from the inventory of monitoring systems. Then we had to get the data produced by some of these observatories. To deal with the data for the assessment we have to get some skills. After that, the assessment process can begin, and we have to store and disseminate a description of it: from the models use to the advice. At least we want to include information on fishing regulations because it's a purpose of the assessment and because it has to change the data (and perhaps the monitoring systems) for the next assessment.

Monitoring systems.

The main data required for assessment models are abundance indices derived from scientific surveys and commercial data such as catches and fishing effort. They are provided by fishing monitoring systems. Therefore, in order to select an appropriate assessment tool, we first need an inventory of the monitoring systems and a description of the data series it produces. This first sub-part of the information system directly provides meta-data on the available series. Our work was to describe all the sources of information that could be used as inputs in the assessment process. We have mentioned specific objectives, protocol, output, cost and a lot of other details of each monitoring systems (for small-scale fisheries, scientific surveys, etc.) used in west Africa by all partners.

Data

The prototype has to improve data accessibility. To develop a method for this part we first used the data from the scientific surveys. Such data were mainly collected during the FIAS project[1] for the Mauritanian and Guinean partners and are a good example of data we are working with. They are disaggregated data, issued from the scientific world and are usually considered as the best information for estimating abundance indices. We already have experience on these as the FIAS project aimed at developing a database framework to collect historical and new data. We identified three ways to make this data accessible through three interfaces dedicated to more or less expert users. The key part of this is the database called 'Trawlbase ISTAM' which is a new version of the 'Trawlbase FIAS' database (with some differences in the structure of the database and with new data).

For a first data overview, we connected an on-line atlas to the database and the connection provides an indicator factsheet for a selected survey or species. All the graphs and maps are created on the fly The suggested indicators which still have to be discussed with our scientific partners refer to a specific spatial or temporal scale and give some usual characteristics (number of species, list of major species, area covered by the survey, etc.). A classical objective in ecology is to select similar surveys in order to create homogeneous data series.

Once the suitable survey is selected we want to extract usual indicators. A second interface was developed for this purpose and a set of indicators was defined in collaboration with the international working group (Eur-ocean) working on standardized indicators and ecosystem comparison. This interface is called predefined queries. So we tried to make an easy to use interface for all the queries on scientific surveys coming from this working group. This interface also allows the user to easily estimate other usual indicators such as density index or mean trophic levels.

The third interface is devoted to users from the expert level. The user can query scientific survey data through an interface looking like a simplified Access interface or directly in SQL the standard language for the database.

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[1] GUITTON J., GASCUEL D., 2004. TrawlBase-SIAP : un outil de gestion des données de campagnes de chalutage scientifique. In : Pêcheries maritimes, écosystèmes & sociétés en Afrique de l'Ouest : Un demi-siècle de changement. Actes du symposium international, Dakar (Sénégal), 24-28 juin 2002, Bruxelles, Office des publications officielles des Communautés européennes, XXXVI-532-XIV p. (coll. Rapports de recherche halieutique A.C.), 37-42

We should use the same 3 interfaces for the fisheries data (catch and effort) but we have not completed this yet and the main problem is that each country has its own database structure.

Scientific advice.

When the scientist get the data, the assessment process is still offline. Each data user has his own tools; from excel to R, Splus or sometimes a Fortan self-made software. At this time and in the ISTAM context, it is therefore useless to offer an on-line tool to perform assessment (as the FAO want to do with the D4Science project).

But we are in charge to store the assessment process and the advice and to facilitate its dissemination. To do this we took advantage of the work of the FAO in the FIRMS project[2]. In collaboration with several Regional Fisheries Commissions in the world, the project defined the terms that could describe the assessment process of a resource or a fishery. We can thus get a concerted flexible XML structure to store our scientific advices. We had to understand the structure and to integrate it in our global information system. This part of the information system is a way to make some knowledge management and we aim to have a better local or global dissemination of the advice on the state of the stock or fishery.

Fishing regulation measure:

One original aspect of the work was to take in account the step after the scientific advice. Most often the scientific advice recommended to regulate the fishing pressure and the stakeholders are invited to take some regulation measure. In fact the fishing regulation is often based on the definition of various marine areas where the fishing activity is restricted. For instance, the EEZ is shared between industrial and artisanal fisheries, between the fisheries targeting demersal or pelagic fish ... (gear separation, etc.). Management should be the result of an objective arbitration between scientific advice, socio-economic aspects and the view of regulations still in place. In our prototype a sub-part of the system is

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[2] TACONET M., BENSCH A., CAILLOT S., CAROCCI F., GUITTON J., LLEONART J., 2007. Tailoring Fisheries Global Information System infrastructure. Ocean Biodiversity Informatics conference. Oct. 2-4 2007 at the Bedford Institute of Oceanography

dedicated to the storeage and dissemination of the fishing regulation measures as a result of a scientific advice or as an input of an assessment process.

Skills:

An inventory of the institutes and persons involved in the assessment is included in the information system. This is a way to find skills to develop or explain a scientific advice.

Meta-data:

In order to access each part of the information system the web interface can be used. Thus, user directly access to information and data in each sub-part: skills, monitoring, data, scientific advice, fishing regulation measure... Another way is to use the search engine of the metadata catalogue which contains description on each information available in the system. We inserted metadata on scientific surveys, fisheries data, available geographic layers. Thus using meta-data could be a transversal tool to access the different parts of the system.

II -Technical aspects

In order to support the development 5 main softwares were used. Postgres with the spatial extension, postgis allowed us to get spatial database capabilities. This software can also be extended with the R statistical software (via the plr, procedural language for R, a postgres library). With mapserver we were able to create some maps "on the fly". The geonetwork software, developed for the FAO, stores and disseminates our metadata. Finally the PHP language let us create a website, as a front-end to integrate all these primary softwares.

The choice of each software was based on several criteria such as the quality of the software but also its use by the community. PHP was chosen because of the easy transfer it permits. There are large possibilities of tutorials and free documentations. At least another argument was the software to be issued from the open source community.

III- Perspectives.

The prototype developed is a flexible tool for presenting some methods to improve data management. From our point of view (avoid personal comments), it is a great tool for the implementation of a sub-regional information system, and the integration of data from various countries.

We have yet several questions about its future:

- To really become a sub-regional information system with safeguard and dissemination functionalities a structure like the Sub regional Fisharies Commission (S.R.F.C.) will have to be the organizer of a network of national information systems. It could be one of the new functions of the SRFC. We have a software but people are required to make it really efficient.

- How to ensure a hard-link between users and database managers. How mention all the update on data made at a national or regional level? How could we get traceability of the data?

- Finally the issue of user right will be discussed in due course so as to have a concerted data policy.

The answer to these questions will depend on the financial and technical abilities of the SRFCto deal with the prototype in order to make it become a real information system, the next step following the prototype..

Website:
http://www.istam-project.org or http://www.projet-istam.org