

FAO FISHERIES AND AQUACULTURE INFORMATION AND DATA

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ABSTRACT: FAO is charged with the collection, analysis, interpretation and dissemination of information relating to nutrition, food and agriculture. The Fisheries Department of FAO has a global mandate in relation to these activities within the fisheries and aquaculture sectors. This paper presents some examples of the information and data programmes of the Fisheries Department and outlines the mechanisms and standards used in handling statistical, geographic, bibliographic and textual information. The need to analyse and interpret an ever increasing volume of information and data in order to facilitate effective decision-making in response to rapidly changing world fisheries and aquaculture presents new challenges. Examples of some of the information tools and products which are being developed to assist FAO staff and Member Countries to meet these challenges are described and their potential for improving dissemination of the various types of information and data are described. These include the FAO Fisheries Statistics Programme; the Species Identification and Data Programme; the Surface Water Body databases of the ALCOM project; and development of the fisheries and aquaculture components of the FAO Digital Atlas. Dissemination of FAO Fisheries and Aquaculture information and data via WAICENT is presented.

Fisheries Information Programmes

The programmes selected for presentation cover a broad spectrum of the activities of the FAO Fisheries Department, both at Headquarters, in Regional Offices and in field projects. The sample is small but it covers some of the most important information products which the Department is responsible for producing and disseminating to FAO Member countries. The types of information and data involved are very different, but the mechanisms for their collection, analysis, interpretation and dissemination reflect the role played by FAO in its normative activities.

FAO's Role

- ◆ Coordination
- ◆ Establishing Standards and Methodologies
- ◆ Developing Software
- ◆ Training
- ◆ Data Collation
- ◆ Data Screening and Quality Control
- ◆ Data Analysis and Interpretation
- ◆ Dissemination

1. Fisheries Statistics Programme

Richard Grainger, Senior Fisheries Statistician, Fishery Information, Data and Statistics Unit.

The production of the FAO Fisheries Yearbooks has always been one of the major activities of the Department. The analysis and interpretation of trends in global fisheries and aquaculture statistics also provides the basis for other information programmes and for technical advice given to Member Countries.

Total fishery production statistics alone involve the collection of data from 244 countries, on 1080 different species and from 26 fishing areas. With 46 years of data and 13,820 time series in the FishDAB database, it is obvious that a lot of effort goes into the standardisation of statistics collection systems and in the collation of data.

FAO provides the Secretariat for the Coordinating Working Party On Fishery Statistics (CWP) which has a membership of ten agencies : ICES, NAFO, CCAMLR, ICCAT, OECD, EUROSTAT, NASCO, SPC, IWC and FAO. The CWP has as its purpose to (i) keep under continuous review the requirements for fishery statistics for research, policy-making and management, (ii) agree on standard concepts, definitions, classifications and methodologies for the collection and collation of fishery statistics, and (iii) make proposals for the coordination and streamlining of statistical activities amongst relevant intergovernmental organizations.

FAO is responsible for maintaining the standard classifications for statistical reporting on behalf of the CWP i.e.

ISCAAP (International Standard Statistical Classification of Aquatic Animals and Plants)

ISSCFV (International Standard Statistical Classification for Fishing Vessels)

ISSCFC (International Standard Statistical Classification of Fishery Commodities)

Dissemination of Fisheries and Aquaculture Statistics by FAO

It is the policy of the Fisheries Information, Data and Statistics unit (FIDI) of FAO to disseminate statistics as much as possible in the form of dissemination database packages which comprise a complete data set at the full level of detail (except for fishery commodities) together with data extraction, aggregation, sorting, presentation and export facilities. The intention is to provide users with a user-friendly way of accessing the full data set so as to minimise the need to respond to individual inquiries. Currently the following packages are disseminated by FAO as English language, DOS versions in this way:

FISHSTAT PC - Total fishery production statistics, 1950-1995

CECAF PC - Regional catch statistics for the CECAF area, 1972-1995

GFCM PC - Regional catch statistics for the GFCM area, 1972-1995

AQUACULT PC - Aquaculture production statistics, 1984-1995

FISHCOMM PC - Fishery commodity production and trade statistics, 1976-1995

A Windows version is under development which will be more user-friendly and will be tri-lingual. It will incorporate the first four packages above as a single integrated package. Current practice is to disseminate these packages free of charge on diskettes or via the Internet using ftp or a WWW downloading facility. All data are considered as being in the public domain but users are expected to cite the source as FAO.

Data sets not yet available as such packages include fish consumption statistics (based on food balance sheets), fishing fleet and fisher statistics.

Some of the above-mentioned statistics are also available in a more aggregated form through the statistics component of the FAO World Agricultural Information Centre (WAICENT), which also contains statistics on agriculture and forestry, by two means:

FAOSTAT Statistics Database on the WWW

FAOSTAT PC and its many modules

Usage of FAOSTAT on the WWW has been growing exponentially, roughly doubling every three months. With the growth in electronic dissemination, it is the Organization's policy to reduce and eventually phase out statistical publications on paper. A timescale for this has not been established but the Organization is aware of the absence of full Internet connectivity in many developing countries, particularly in Africa and parts of Asia.

Future Activities of the Coordinating Working Party on Fishery Statistics

The UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks¹ obliges regional fishery management organisations and arrangements to adopt standards for reporting and exchange of fisheries data (Article 10) and States to cooperate to agree on the specification of data and the data format in which they are to be provided to such organisations or arrangements (Article 14). Annex 1 of the Agreement obliges flag States to share data with other relevant States through regional fisheries management organisations or arrangements using an agreed format, while maintaining confidentiality of non-aggregated data. The Code of Conduct for Responsible Fisheries contains very similar provisions in section 7.4. Such recommended formats would be only part of any overall standards for **Vessel Monitoring Systems** reporting which might eventually be agreed.

Article 36 of the UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks provides for review of the implementation of the Agreement four years after its entry into force. Also, FAO is obliged² to monitor and report on the implementation of the Code of Conduct for Responsible Fisheries and its effects on fisheries, including action taken under other instruments and resolutions by UN Organizations, in particular, the UN Agreement. In order to undertake any comprehensive review of the implementation of these international initiatives, it would seem essential to have an **Inventory of World Fisheries** in order to appraise which fisheries fall within the responsibility of States or regional fisheries management organisations or arrangements, and which ones are not. From the aspect of fisheries data, this could be useful in identifying where major weaknesses exist due to the absence of formal responsibilities, and their real importance, with the aim of directing international efforts for the improvement of data.

2. Species Identification and Data Programme

Pere Oliver, Senior Fisheries Resources Officer, Marine Resources Service.

Initiated in the early 1970's within the Fishery Resources Division, the Programme has produced species guides in three series:

- FAO Species Identification Sheets for Fishery Purposes
- FAO Species Identification Field Guides for Fishery Purposes
- FAO Species Catalogues and Synopsis Series

¹ Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks

² Resolution of the Twenty-eighth Session of the FAO Conference on 31 October 1995 adopting the Code of Conduct for Responsible Fisheries.

The primary objectives of the Programme are:

- to promote the upgrading of fisheries data by species through reliable species identification in the field;
- to rationalize and expedite fishery work in all fields by furthering the use of correct scientific and standardized vernacular species names;
- to develop a global system of aquatic species names and data designed to serve as the standard basis for the increase and exchange of information on potentially or actually exploited marine species and their fisheries.

Priority has been assigned to resources of major commercial importance and to developing regions troubled by species identification problems. Two principles are considered essential for the validity and success of the Programme:

- Species identification and nomenclature are based on sound taxonomy and should be comprehensive at each of its geographical levels (global, regional or national)
- The strategies for the implementation of the Programme are based on a worldwide involvement of a large number of individual experts, organizations working on taxonomy and biology of aquatic species, and an editorial group working at FAO Headquarters.

Dissemination

The Field Guides in particular are aimed at national data collectors in need of quick identification of species in markets and at landing places for the specific purpose of improving statistical and other fisheries data by species. FAO continues to produce and disseminate these publications in printed form. However, the data are also made available to collaborating organizations who wish to make specific parts of the Species Database available in other formats. For example the Expert Center for Taxonomic Identification in the Netherlands has produced both Marine Mammals of the World and Marine Lobsters of the World on CD ROM; SpeciesDAB is a significant part of FISHBASE, produced and distributed on CD ROM by ICLARM.

3. ALCOM's Surface Water Body Database for SADC

**Lieven Verheust, Small Reservoir Fisheries Specialist, ALCOM, Harare, Zimbabwe.
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Introduction

Since 1992, ALCOM (Aquatic Resource Management Programme for Local Communities) has been gathering information on surface water bodies (SWBs) from all countries in the SADC Region (Southern African Development Community). In the past four years, this work has evolved from a compilation of a list of dams to what is now probably the most complete and accurate database on all surface water bodies at the SADC Regional level and, for a number of countries, even at the national level.

More than 14,000 water bodies have been inventoried in eleven countries and more data are being added daily. Database fields include geographical, administrative, meteorological, socio-economic, physical and chemical data as well as data on the use of the water body, presence of plant and animal species and fishing activity. Additional, supplementary information is generated by linking to other existing databases with other fields, using uniform identifiers. Since 1996, the SWB database has been integrated in a geographical interface which has enabled a multitude of applications in various disciplines: hydrology, agriculture, fisheries, health, environment or general development. Besides the SWB digital map, which holds the point data for all geo-referenced water bodies, the database is now also adding polygon data for a number of water bodies as well as polygons of all watersheds in SADC.

Sources of Data

The database incorporates data from different disciplines and different countries, collected from a number of governmental and non-governmental organizations as well as from literature and existing databases:

Information and grey literature from : national water departments or hydrological services; national fisheries departments; national departments and organizations involved in irrigation; development organizations.

Official literature on : fisheries water physico-chemistry; hydro-electric installations.

Hardcopy and digital maps on: hydrological boundaries (lakes, dams, rivers and catchments); administrative boundaries; land use.

Databases (international and/or national) on: reservoirs; fisheries; hydrology.

Field work from: ALCOM; NGOs; GOs.

For Zimbabwe alone, the information in the core fields (name, geographical references and size) was compiled from more than 10 different sources. Information on other specialised fields is gathered from specific literature, much of which is classified as "grey" literature. Continuous contacts with the different sources of information is also ensuring a regular update on new information from these sources. New dams are still being constructed, new research is being conducted, fisheries statistics are being collected continuously and the new information is entered in the database when it becomes available. A number of fields are generated by overlaying the geographical coordinates of water bodies with digital maps such as climatological, topographic, hydrological, geological, pedological and administrative maps. A meta-database contains the data sources for each individual entry so that sources can be retraced easily and contacted for verification or supplementary information.

Table 1. Number of entries per country for 3 important fields

Country	Number of entries with lat. long. coordinates	Number of entries with known surface area	Number of entries with known capacity	Total number of entries
Angola	47	25	15	55
Botswana	36	291	332	338
Lesotho	591	68	526	593
Malawi	601	108	71	763
Mozambique	30	30	13	40
Namibia	21	21	19	21
Swaziland	7	11	7	11
Tanzania	47	62	5	83
Zambia	549	230	215	651
South Africa	495	0	474	517
Zimbabwe	9953	7995	7735	11168
TOTAL	12377	9341	9412	14240

Integration into a Geographical Interface and GIS (Geographic Information System)

Entries with latitude and longitude data have been integrated in a geographical interface. The integration of the database into a GIS is used to generate more data and to enable studies that require geographical analysis. It is possible to zoom into a certain area of SADC and click on displayed points or polygons (water bodies) to get more information about these bodies. One can also display one water body or a set of water bodies based on their characteristics from the database. This has been made possible using a combination of two simple and affordable software packages in the Windows environment by a transfer of unique identification numbers of the database program to the mapping program and vice versa.

Application of the Database as a Decision Support Tool

Modules are being developed in the database to function as a decision support tool for policy-makers, government services and non governmental organizations. Applications are numerous:

- **Hydrology** : Planning of new dams; Monitoring of filling and drying of dams.
- **Environment and ecology** : Monitoring of aquatic pests and aquatic exotics; Wildlife.
- **Irrigation** : Analysis of potential for irrigation.
- **Fisheries and aquaculture** : Choice of the right species to stock; Determination of fisheries potential.

- **Health** : Monitoring of water borne diseases such as bilharzia and malaria.
- **General development and food security.**

Future of the Database

Just like most databases, the SWB SADC database is very dynamic. Dams are continuously being constructed and related information added to the database. More information is being collected to complete fields for registered water bodies and fields are being added when there is a demonstrated need. New databases are also being linked to the main database as necessary. A number of data in time series require monthly or yearly inputs from the different SADC member countries. This underlines the need for an integration of the database management in a strong SADC structure that is able to fulfil these tasks. Finally the database has to be accessible to all interested parties to perform queries and analyses. Part of these queries could be satisfied by making a part of the database available on a WWW server where a simple search instrument could provide users with information on a selection of water bodies. HTML (Hyper Text Markup Language) also provides a graphic clicking interface which allows users to zoom into the geographical area of interest. The same interface can be used on WWW and on a local network. ALCOM has already made some information available on WWW and plans to make a large part of the database available later this year. More specialised queries and requests for analysis should be directed to the database management team which should be able to respond to all demands through the decision support module of the database.

4. The FAO Atlas of Agriculture, Forestry and Fisheries and UN Atlas of the Oceans **S. Garcia, Director, Fishery Resources Division, FAO**

A brief introduction should also be given to the development of digital interactive information products which have not previously been available or even feasible in printed form. The fisheries component of the FAO ATLAS, which is being developed, will also be incorporated in the UN Atlas of the Oceans.

The United Nations (UN) ACC/SC (Administrative Committee on Co-ordination, Sub-Committee) on Oceans and Coastal Areas has for sometime identified the need for a means of distributing the information on the world's seas and oceans held by the various UN agencies. To this end, a group of British universities and companies, in conjunction with the Food and Agriculture Organization (FAO) of the UN, has drafted a co-operative proposal to develop an interactive, electronic "Ocean Atlas", incorporating the UN information and data. The focus for the project is EXPO '98 in Lisbon, Portugal, celebrating the International Year of the Oceans, with the potential for further development afterwards.

Project Objectives

The central objective of the Ocean Atlas is to offer the various UN agencies an organized collection of selected, strategic information and data on the oceans and their sustainable use, accessible through the Internet and on CD-ROM. This will complement the existing information systems accessible to UN personnel and structures.

Outside the UN system, the Atlas could be used by national and regional policy makers, technical advisors to intergovernmental agencies for development, co-operation and aid, development banks, NGOs, scientists, libraries, universities, media, the public at large, and the private sector.

The Atlas will:

- enhance the diffusion of strategic information related to the UN Conference on Environment and Development (UNCED) available in UN agencies;
- add value to the UN (and non-UN) strategic analyses of the oceans, their resources, their sustainable development, and the global problems affecting them; and
- facilitate end-user satisfaction by providing rapid and easy access to selected, strategic UN data and information.

5. WAICENT : World Agricultural Information Centre

J. Judy, Library and Documentation Systems Division.

WAICENT comprises three principal components which are interactive and complementary: FAOSTAT, for the storage and dissemination of statistical information, FAOINFO, which covers hypermedia information, and FAOSIS which covers very specialised information systems. WAICENT has brought a new strategic information approach to the Organization related to paper versus electronic distribution and dissemination versus central storage. Particular emphasis is given in this paper to the public information initiatives under WAICENT; the specialised information services provided by the various departments of FAO and delivered through WAICENT; and the full-text document storage and retrieval system.

FAO is faced with increasing demands to prepare, manage and disseminate the information that it produces to the widest possible audiences, in the most efficient manner, utilising the latest in technologies, and at less cost.

The WAICENT system was created at FAO to bring together and refocus the multiple information related activities, databases and publishing activities of this large multidisciplinary, international institution. There was also the need to reorient these activities to take advantage of the rapid developments in information technology.

In summary the principal aims behind the creation of WAICENT were to:

- increase the extent of information coverage handled by FAO;
- improve and streamline in-house data management;
- strengthen and simplify the flow of information to and from the Member Countries;
- reduce processing costs in all phases of receiving, treating and disseminating information;
- reach FAO's target audiences more effectively at less cost.

The practical advantages are principally seen as three:

- ❶ capitalise on the intellectual output of the Organization through the maintenance of an institutional memory in electronic format;
- ❷ increase the availability of information to multiple users, bringing greater efficiency and cost-effectiveness;
- ❸ reduce the burden to Member Countries in accessing FAO's information resources.

WAICENT - An Umbrella for FAO's Information Services

WAICENT is to foster a corporate atmosphere - to co-ordinate information, and, through a co-operative and well-structured approach, enhance the content, improve the quality and widen still further its outreach. This is the reason why WAICENT is termed an "umbrella": the connotation is one of cumulating or protecting, not of controlling.

WAICENT is made up of three interactive and complementary components:

- **FAOSTAT**, for the storage and dissemination of statistical information,
- **FAOINFO**, which covers hypermedia information (viz. text, images, audio and video),
- **FAOSIS**, covering specialised information systems.

FAOSTAT

This system contains a collection of time-series data on demography, agriculture, fisheries and forestry covering 210 countries and territories to date that are merged into one statistical database service. There are data on trade flows, food aid, development assistance, and the results of the World Agricultural Census, on household budget and food consumption surveys. Software was developed to allow users to select and organize

the statistical information into tables and charts that meet their individual needs and this is made available both on the Internet, CD-ROM, diskette and in printed yearbooks as well as other special publications. The original statistical data is supplied by each country or intergovernmental organization and is then mapped in a common format, merged and put into one database by FAO.

FAOINFO

The intent of FAOINFO is to develop the infrastructure and procedures to prepare, organize, store and disseminate textual and hypermedia information. Like FAOSTAT, a key activity of this group is to manage the change in the way the information is prepared and handled by the Organization. Word processing templates have been designed and are being implemented so that documents are properly formatted as they are being prepared in the departments. The records are then automatically converted into a structured document format in SGML (Standard Generalized Markup Language), processed through a document management system and put into a corporate electronic document repository. There they are indexed by the FAO Documents Unit and the citations added to the FAO Documentation (FAODOC) and the Agricultural Research Information System (AGRIS) databases with links back to the full text records. The data can also be easily output in HTML format for the FAO World Wide Web pages and in other appropriate formats for printing or other forms of electronic distribution.

A new MediaBase system for hypermedia files, such as photos, audio, video, and graphics, has also been put into place with the capability to link these files to the appropriate documents in the corporate repository. The new system can also be accessed and searched separately to find photos and other graphical materials to be used in new publications or on the Web.

The overall intent is to refocus the whole publishing system to a database centric one where the information is prepared in a decentralised mode but managed and made available through a centralised service for multiple use.

FAOSIS

FAOSIS, like FAOSTAT and FAOINFO, brings together information under its own discipline-heading. At present, there are three major information systems accessible under FAOSIS:

- The Global Information and Early Warning System on Food and Agriculture (*GIEWS*) provides regular bulletins on food crop production and markets at the global level, and situation reports on a regional and country-by-country basis.
- The Domestic Animal Diversity Information System (*DAD-IS*) is the key communications tool for the Global Programme for the Management of Farm

Animal Genetic Resources; it provides extensive searchable databases, tools, guidelines, references and contacts.

- The FAO Emergency Prevention System (*EMPRES*) for transboundary animal and plant pests and diseases. The term “transboundary” refers to major epizootic diseases that are of significant importance in economic, trade and/or food security importance; basically, where the control and management of the importation of animals requires inter-country co-operation for the prevention of major emergencies. The system has two components: Livestock Diseases, and Desert Locust Management.

References

FAO. 1995. The Coordinating Working Party on Fishery Statistics: its Origin, Role and Structure. *FAO Fisheries Circular* No. 903. 14p.

Judy, J. R.; Mangstl, A. and Le Hunte, Ward, F. 1997. WAICENT (World Agricultural Information Centre) : FAO's Information Gateway. In: *USAIN/IAALD '97: The Information Frontier: Linking People and Resources, April 3-5, Tucson, Arizona* (to be published)

Verheust, L. 1997. ALCOM's Surface Water Body Database for SADC. *FAO Aquaculture Newsletter : FAN*, No. 15: 12-17