

**REVIEW OF THE REQUIREMENTS FOR
PROGRESS IN FISHERY STATISTICS:**

**approaches to statistical development and a global advocacy
role for the Coordinating Working Party on Fishery Statistics**



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role for the Coordinating Working Party on Fishery Statistics

by

D. W. Evans

Consultant

FIDI

FAO Fisheries Department

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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PREPARATION OF THIS DOCUMENT

The 19th Session of the Coordinating Working Party on Fishery Statistics recommended that the Secretariat (FAO) should investigate the nature and extent of calls for improving the quality of fishery statistics as a basis for a possible future advocacy role for the CWP.

A draft report was discussed by an Inter-Sessional Meeting of the Coordinating Working Party on Fishery Statistics, 21-22 March 2002, held at FAO in Rome, Italy. That meeting called for a revision of this paper taking into account its views and recommended that further discussion of the issue forms part of the agenda of the 20th Session of the Coordinating Working Party on Fishery Statistics, Seychelles, 21-24 January 2003.

Evans, D.W.

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ABSTRACT

This paper reviews recent technical and management reports from a variety of sources where specific statistical data needs were identified and calls were made in support of data collection activities. It then analyses the basis for developing an understanding of the cost-effectiveness of improved statistical projects and programmes in supporting improved science and better management, including the consequences of failure.

The paper reviews perceived needs in current fisheries statistical issues that require urgent attention. It then offers options for further development of the issue through the Coordinating Working Party on Fishery Statistics, from further developments based on opportunities as they arise, to the development of a programme framework. The latter is described in outline detail; a project framework and proposal for demonstrating and developing fisheries statistical systems and a global advocacy role for the Coordinating Working Party on Fishery Statistics.

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Executive summary

This report has been prepared by the CWP Secretariat in response to a recommendation by the Nineteenth Session of the Coordinating Working Party on Fishery Statistics, that the Secretariat should further elaborate on the role of the CWP in relation to statistical development¹. The Terms of Reference that guided this study were reviewed and interpreted in the light of information availability and general objectives of the study.

Views and documents were obtained from CWP members, international organisations and institutes, some aid agencies, FAO headquarters staff and systems, and individuals. From these, the range and scale of general and specific statistical data needs was analysed. There are clear differences between the calls for statistical development made by organisations that represent developing countries and those that represent developed countries, although many organisations have mixed membership from these groups. Statistical development and data collection requirements are spread across a continuum from the very general, usually at high level, to fine-scale requirements, usually at the working group level or against specific analytical arguments.

Almost every technical, scientific and management document contains some reference to statistical problems, ongoing or new data needs, or systems that need to be prepared to improve fishery statistics quality and availability, either continually or for short term applications. Cataloguing or prioritising these is not a useful analytical approach, given the extreme diversity of the expressed needs, what issues they are meant to contribute to, and the institutions making the call. Instead, a general analysis is provided together with a detailed summary of the new European Union system for data collection that is now a mandatory regulation of EU Member States. The reason for describing the EU system is that it is a fine-scale requirement where specific data targets are applied by species, stock, area and precision level, thus perhaps a model that might be useful elsewhere. The key reason for establishing that system (and the detailed data requirements that it lays down) is to provide some stability for a multiannual period, so that countries can properly establish procedures to enable it, with some expectations that new requirements will not be imposed without agreement or advanced warning. Nevertheless, changes and new requirements need also to be addressed and some examples of the type and scale of these are given.

Cost-effectiveness evaluations of fishery statistics in relation to improved science and better fishery management have almost never been analysed. Indeed, the most comprehensive recent analysis of the whole issue of fisheries data *"could find no existing analyses of the costs and benefits of data collection and management for specific fisheries, particularly of the ratio of marginal costs and marginal benefits for each additional dollar spent on data collection"*². Nevertheless, demonstrating cost-effectiveness would be extremely useful in persuading policy makers and planners of the relative value of data collection in meeting their science and management performance targets, and hence a useful advocacy tool. Characterisation of a general approach to this issue and examples of where cost and benefit/effectiveness measures are sometimes employed are given.

This report concludes with a section on the options available to the CWP to address the issues discussed here. Two general options are described:

- 1) a general watch is maintained for opportunities to advocate the position and competencies of the CWP;

¹ Report of the Nineteenth Session of the Coordinating Working Party on Fishery Statistics, Noumea, New Caledonia, 10-13 July 2001. FAO Fisheries Report No.656, FIDI/R656. paragraphs 188-190.

² Improving the collection, management and use of marine fisheries data. National Research Council. National Academy Press, Washington, D.C. 2000. page 132, Matching data collection costs to benefits from fisheries.

- 2) a general framework for a programme of activities in support of statistical development and in establishing an advocacy role for the CWP is adopted for consideration without commitment by all members, and which may be addressed in a variety of ways.

This last section includes a general appraisal of requirements followed by a brief description of the objective, purpose, outputs and inputs for the programme. Many of the issues need further expansion. Two of the project proposals are described in more detail in the Appendix 1.

Introduction

Origin

This report presents the results of a study called for by the Coordinating Working Party on Fishery Statistics³ and has been revised following discussion at the Inter-Sessional Meeting of the CWP, 21-22 March 2002, held at FAO in Rome, Italy.

The background to this call was discussed during consideration of a new CWP agenda item 16, *the Role of the CWP in relation to Statistical Development*⁴. Firstly, the CWP noted that technical issues relating to norms, standards, classification and definitions in fishery statistics, and in coordinating the role of participating agencies had been very effective. Secondly, the CWP also noted its influential role in formulating Annex 1 to the UN Fish Stocks Agreement⁵, the *Standard Requirements for the Collection and Sharing of Data*, which was the first time its technical advocacy had led to incorporation of such advice into international law. Lastly, in offering similar technical advocacy to improve fishery statistical data collection, it would be essential to base any further advice on sound technical considerations, but that the means to do this were less clear than for previous activities.

The Coordinating Working Party on Fishery Statistics recommended that a first approach to the latter issue would be the terms of reference for this study, as follows:

TERMS OF REFERENCE:

As a basis for possible future advocacy by CWP for improving the quality of fishery statistics, the following areas should be investigated and presented as a draft proposal of about 6,000 words:

- *Collate, summarize and prioritize reports from recent technical and management meetings where specific statistical data needs were identified and calls made in support of data collection activities;*
 - *Identify examples and reasons for success of successful projects and programmes where an improvement in the quality of statistical data has led to improved science and better fishery management. Demonstrate the cost effectiveness of collecting higher quality data. Identify examples of unsuccessful projects and reasons for failure and demonstrate the cost of not collecting data; and*
 - *Identify specific problems which require immediate attention and action needed to improve these situations.*
-

³ The Coordinating Working Party on Fishery Statistics is established under Article VI-2 of the FAO Constitution, adopted by FAO Conference at its Tenth Session in 1959, as an outcome of the 'Continuing Working Party on Fishery Statistics in the North Atlantic Area'. Statutes amended by FAO Council at its Hundred and Eight Session in June 1995.

⁴ Report of the Nineteenth Session of the Coordinating Working Party on Fishery Statistics, Noumea, New Caledonia, 10-13 July 2001. FAO Fisheries Report No.656. FIDI/R656. Rome 2001.

⁵ The UN Fish Stocks Agreement entered into force with the required 30 signatures in November 2001.

Interpretation of terms of reference

The terms of reference are essentially four interrelated tasks and are interpreted here as follows:

1. Extract identified statistical data needs from technical and management meetings.

Seek a range of meeting reports from regional fishery bodies, national governments, scientific committees and working groups. In doing this, other documents would need to be referred to, including any adopted recommendations and regulations, or guidance documents.

2. Analyse the cost-effectiveness of fishery statistical projects and programmes in improving science and fishery management, including the costs of not collecting data.

Demonstrate cost-effectiveness of statistical projects and programmes by

- suggesting and applying measures of effectiveness against scientific and management objectives for identified projects;
- evaluating reasons contributing to successful and unsuccessful projects;
- demonstrating the costs (impoverished science and lowered fishery benefits) from not collecting data.

3. Identify specific problems requiring immediate attention and the actions needed to improve these situations.

Review statistical problems of a specific nature that affect fisheries generally, including those that have arisen globally as a result of the Code of Conduct for Responsible Fisheries; International Plans of Action; the establishment of the Commissions on Biodiversity (CBD) and Sustainable Development (CSD); and the identification of species of special interest, etc⁶. Therefore, the study would also look at issues related to standards and classifications, methods and schemes, and the potentials and problems of statistical coordination.

4. Prepare a project proposal (or programme proposal of several projects) to address these issues in the context of a possible future advocacy role for CWP.

Following identification of the issues that are raised by the first three tasks, prepare a general proposal, including the objectives, purposes, outputs and inputs to address them, which would include, inter alia;

- Investigation of the constitutional position and membership of the CWP, and to make recommendations on these that would support acceptance of fishery statistical advocacy;
- Publication of a mission statement, statement of principles and an enhanced mechanism for dissemination of products and services;
- A work programme to establish the CWP advocacy role in relation to other international fora, e.g. FAO Committee on Fisheries, UN organisations, and in general with Regional Fishery Bodies, Regional Economic Integration Organisations and research networks; and
- Identification of the nature, extent and prioritisation of a CWP statistical development programme; and investigation into methods to address them, including their finance.

⁶ CWP has addressed specific fishery statistical issues such as the recent integration of databases for Atlantic fisheries, but generally it only makes recommendations that are globally applicable. It does not make fishery-specific recommendations to RFBs or States.

Approach to the study

These interpretations of the terms of reference defined the approach that was taken. Members of the CWP were requested to provide source material from their organisations that would contribute to the compilation of relevant calls for improved statistical information. Responses ranged from directions towards websites where relevant material might be found, to scientific assessment group/committee reports and general communications on the issues in question. In particular, members were asked to provide documentation (project documents and implementation reports) related to evaluations of statistical projects and programmes that might indicate their cost-effectiveness.

The FAO Fisheries Branch Library contributed to this latter aspect by providing bibliographic references to relevant papers extracted from its own sources and ASFA, access to FIPIS (Fisheries Project Information System) and FPMIS (FAO Project Management Information System), paper library archives and other suggestions. FIDI staff contributed documents, publications and discussion.

Approaches were made to other organisations⁷ that might be expected to have similar documentation, or experience with statistical programmes or projects, either directly to relevant persons or through extensive research in their web archives.

Numerous relevant public domain documents (reports, publications and guides) were gathered, some of which are referenced in the text.

The fishery statistical issues being addressed in other international forums were investigated, including the UN Economic and Social Council, the UN Statistics Commission and PARIS 21⁸.

Scope of the report

Notwithstanding the varied and useful contributions received during this study, direct or indirect, this report presents the analysis of the situation by the author within the framework and constraints of a short consultancy. Although it benefits from personal contributions on many aspects, the scope of the report against the terms of reference is limited for a number of reasons, some of which are mentioned in the Executive Summary. These reasons are addressed in more detail in relation to the issues as reported in the following sections. For the purposes of this introduction, some of the limitations should be briefly stated, so that what follows is seen in context.

Firstly, while stating the obvious, that fishery statistics are simply products that contribute to understanding (science) and action (management), it should also be recognised that improvements to fishery statistics simply provide better resources to arrive at these goals, and are never (or should never be) the goals/objectives of projects or programmes (or simply calls) for their collection. The problem with this aspect of the study is that it is always difficult to disentangle the relative utility of fishery statistics in meeting objectives when, at the same time, other influences are at work, including advancing theoretical knowledge, improved political decision-making, changes in biological and environmental circumstances, and/or sectoral adjustments.

In making calls for improved statistics, scientists, managers, economists, planners, administrators and industry have particular individual objectives that relate to their understanding and action in support of fisheries sustainability and the generation of benefits. None of them are interested in the numbers per se, only in how the numbers inform their tasks. Therefore prioritisation depends on who you talk to, and it is not attempted here.

⁷ Interim Scientific Committee on North Atlantic Tunas, UK Department for International Development, US National Marine Fishery Service, US Agency for International Development, FAO Regional Programme for Asia and the Pacific (Bangkok and Samoa), Danish Institute for Fisheries Economics Research, Australian Fisheries Management Authority and the Directorate-General of Fisheries of the European Commission.

⁸ PARIS 21. The Partnership in Statistics for Development in the Twenty-first Century (based at OECD/DAC)

Secondly, calls for improved statistics vary very widely in their range, from very generalised exhortations to highly specific requirements for species. For the latter, calls for improved statistics are made for stocks and sub-stocks, by geographic area, time, method of collection, precision of estimate or other stratification. Documenting these calls in detail therefore has no utility for the scope and objectives of this report, in that the great species detail sometimes required is often peculiar to a particular fishery, and furthermore may change over time. Instead, this report focuses on the general scale of perceived fishery statistical requirements, from the basic data (what, how, where and when were fish caught) to the requirements that originate in specific problems that the global fisheries community is addressing, e.g. IUU fishing and trade information, overcapacity and fleet rationalisation, among others.

The problem of relative utility of fishery statistics is also encountered when considering the contribution of improved statistics quality to improved science and better management. Knowing exactly how many vessels are in fleets, and the high detail of their fishing capacities, *may* lead to better science and management, but only when rational decisions are made, and these are not based on the numbers themselves but on arguments that are influenced from elsewhere. The relative success of scientific analysis is only indirectly linked to the effectiveness of statistical achievements.

Cost-effectiveness, then, is difficult to assess against the criteria of better science and management, and indeed there are almost no examples of where this has been systematically attempted. Nevertheless, scientists and managers do attempt to optimise statistical collection against the requirements of their tasks, most often within the budgets available. Some examples of this are given, and a general process is described on how retrospective analyses might be undertaken to quantify benefits, hence cost-effectiveness, of improved information.

Lastly, the deficiencies in this brief analysis are addressed in the required project proposal. As the CWP 19 report noted, the case for it to support a particular position must be based on sound technical considerations. It is clear that the scope for such technical considerations (and the advice that would come out of them) has expanded considerably in recent years, and indeed the CWP has considered many of them, e.g. catch documentation schemes, coordination of standards and the development of methodologies. As the CWP report inferred, successful advocacy requires general and widespread recognition of competence of the committee. Some recommendations on this aspect, for work to promote this recognition, are briefly described, including consideration of the membership and mandate of Coordinating Working Party on Fishery Statistics and a work programme to bring the benefits of its work to a wider audience.

Intersessional discussion

The report of Inter-Sessional Meeting of the Coordinating Working Party on Fishery Statistics, 21-22 March 2002, noted the following:

“4. Advocacy role of the CWP

4.1. The meeting reviewed the proposal called for at CWP-19, and undertaken by the Secretariat, on a framework for a possible future advocacy role for CWP, noting that such advocacy in relation to the UN Fish Stocks Agreement had been influential in formally establishing detailed information requirements in that instrument. The proposal offered a framework containing several elements that implied significant changes to the conduct of CWP’s work, including probable requirements for increased resources to undertake the identified work.

4.2. The meeting agreed that with respect to the proposal:

- *the paper outlining the proposal should be revised to also include another option which would enable the CWP to make advocacy calls when the opportunities arise, and that this proposal should be presented to CWP-20;*
- *some of the elements were beyond the current capacity of the CWP to undertake them; and*

- *some of the elements (e.g. enhancement of the CWP website) could be accommodated within current Secretariat activities.*

4.3. *The meeting agreed that:*

- *CWP should keep a general watch for opportunities and to use such opportunities to advocate its position and competencies, but that a concerted and proactive advocacy role as described in the proposal is probably not feasible at this stage; and*
- *CWP members should communicate their own activities in the identified elements (e.g. further statistical classifications and standards, including the issue of metadata) in ways that served the purpose of the proposal but without commitment to separate investigations of the issues.*

Analysis of requirements for improved fishery statistics

Introduction

The demand for fishery data and statistics in all areas of fishery science and management is evident in reports of almost all technical and management meetings, from working groups to international Ministerial meetings. In addition to these, information demands occur in research reports and papers, synthesis documents and reviews, project preparatory and proposal documents, regulations, public requests to politicians and bureaucrats; all can contain some level of further information requirements. The demand is thus ubiquitous and the types of data seemingly inexhaustible. Recognition of the importance of including environmental, economic and socio-cultural information in scientific and management decision-making is driving the search for new sources of data, and for better or new methods of collecting it.

One major result of the general acceptance of the precautionary approach is also quite clear⁹. Without data, greater precaution must be taken, hence a wider margin of safety between the allowable catch and the possible sustainable yield. Without the data needed to assess and minimise risk and to establish indicators, the difference between a precautionary catch and a sustainable allowable catch may translate into substantially lower fishery benefits than otherwise would be the case, i.e. under-utilization. More data means less precaution, assuming the correct analyses can be made.

Demand is also conditioned by requirements for improved quality. Greater coverage and precision, higher accuracy, improved comparability and compatibility, enhanced access and portability, are all in increasing demand.

Obtaining the right data of the right quality, for whatever purposes it is to be used, is an arduous and onerous task that consumes enormous quantities of human and financial resources, and takes place in a social environment in which authority/fisher distrust is legendary. The tendency of fishers to believe that data cooperation will only induce more restrictive control on fishing activities is matched by authority beliefs that fisher self-interests inevitably result in incomplete or inaccurate data on the exploitation of resources, which are not directly observable and on which the consequences of fishing activities are not directly verifiable. This conundrum occupies a huge amount of time and effort. Indeed, as pointed out by Eurostat¹⁰ (among many other similar sources):

'When one attends meetings at which fish stock assessments are being discussed, one is struck by the complexity of the techniques being used to analyse the data. Many of the techniques are concerned with methods of overcoming the short-comings in the quality of the data and lengthy discussions often result as to which sophisticated technique is the most appropriate to apply in particular circumstances. Even using these techniques it has to be acknowledged that the confidence limits attached to the estimates are wide and contribute significantly to a lack of confidence in the resulting advice.'

⁹ Code of Conduct for Responsible Fisheries. Article 6.5. 'States and subregional and regional fisheries management organizations should apply a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available. The **absence of adequate scientific information** should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment.'

¹⁰ Eurostat. 1995. A review of the quality and reliability of fisheries statistics. In Report of the workshop on the significance of reliable statistics to conduct effective management. OECD, Paris. 1995. p185-187.

Globally, data shortcomings are identified and efforts are continuously being made to meet them, including by the CWP and its member organisations. The most recent and comprehensive assessment of this issue was undertaken by a panel assembled by the US National Research Council at the request of the US Congress¹¹. (Although applying only to marine fisheries, many of the findings and recommendations would apply equally well to freshwater fisheries and aquaculture.) The report reiterated the same point raised by Eurostat at the OECD meeting in 1995, that inadequate or non-reporting in one form or another is the continual bane of those trying to undertake fishery analysis.

Analysis of sources

During the conduct of this study a wide range of sources were obtained in order to assess the content of technical and management meeting reports, and other documents, and to identify calls for data collection activities.

CCAMLR	Working Group reports
CCSBT	Stock Assessment Working Group Reports
EU	Eurostat reports and Commission Regulations
IATTC	Resolutions and scientific reports
ICES	Advisory Committee on Fisheries Management reports
NAFO	Annual Reports
NASCO	Minimum standards. Council and Annual Meeting reports
OECD	Reviews and Workshop reports
SEAFDEC	Workshop reports
SPC	Scientific Committee on Tuna and Billfish

In addition to these reports, information on the issue of data quality and general statistical development was obtained from several organisations, including UN (FAO, Commission on Biodiversity, Commission on Sustainable Development, Economic and Social Council, Commission on Statistics), US (NMFS, NRC, USAID), EU (Eurostat, DG Fish, DG Development), Canada (Statistics Canada), and from many other publications.

During review of these documents it became apparent that the identification of specific statistical data needs is largely embedded within particular frameworks (reports, regulations, resolutions, etc) that are often only relevant to the nature of the issue under discussion¹². Furthermore, the calls for data collection activities ranged from policy level recommendations to collect all forms of data necessary for fisheries governance, to fine scale scientific recommendations about changes to sampling precision for particular species/area/time strata. Some calls are thus exhortations to do better, while other calls become functional specifications that may become mandatory by adoption or through regulations.

In these circumstances it is not particularly useful to try to summarise them in a comparable way or to establish any priority values. As pointed out in the introduction, priority

¹¹ National Research Council. Improving the Collection, Management and Use of Marine Fisheries Data. National Academy Press, Washington. 2000. ISBN 0-309-07085-6. 222p.

¹² For example, between 1999 and 2001 IATTC adopted 7 resolutions on specific issues, from estimation of miscellaneous species and discards, fleet capacity, at-sea reporting of real-time catch and effort, to tuna tracking for trade documentation.

depends on the expected use, and the users, of the data - it depends on who you talk to. Furthermore, data requirements may be ad hoc or transitional to address a particular subject, or to investigate the nature of a model variable, which may then be later discarded.

For example in relation to fine-scale statistical requirements, in 2000 CCAMLR recommends¹³ that in addition to the 100 fish measured for length and sex in longline exploratory fisheries, samples from 30 fish for biological data (otoliths, scales, stomach contents) should be collected. Or, in para 3.65 of the same report, that Conversion factors should be recorded by scientific observers on a fish-by-fish basis.

These calls cannot be set against general recommendations made at high-level consultations, such as in recent reports by SEAFDEC¹⁴ or FAO¹⁵. In between fine-scale recommendations and general recommendations there is a continuum of requirements for new projects and programmes, altered or new approaches, and enhanced or new datasets. Nevertheless, it is important to recognise that part of the objectives of this study is to look at this continuum, with a view to suggestions to CWP that can form part of an enhanced work programme and raised profile. A good example of the way general recommendations can lead to fine-scale recommendations is to be found in the current coordination process being undertaken by the European Union in relation to fisheries statistics in all member countries, and hence in any countries in the EU enlargement process.

The new European Union system for fisheries data collection

The Council Regulation

Probably the most complex and detailed call for improved statistics stems from a key fisheries regulation of the European Union of 29 June 2000, *Council Regulation No. 1543/2000, establishing a Community framework for the collection and management of the data to conduct the common fisheries policy*. This regulation requires Member States to prepare schemes to cover 2002-2006 (and thereafter for 6 year periods) for all waters where Community registered vessels operate. These can be in the Baltic, ICES areas, Mediterranean, NAFO, CECAF, WECAF, CCAMLR, South West Atlantic, Angola and worldwide for Highly Migratory Species.

In summary, the Council Regulation requires Member States;

- to collect data encompassing biological, fleet operations and economic and social issues and provide these at levels of aggregation useful to complete and reliable scientific analysis;
- to specify the procedures used in the production of aggregated data, to retain original data for the purposes of recalculation, and to use appropriate international or European classifications;
- to establish priorities (sampling rates, periods and precision) to ensure consistency in data collection and processing and to optimise cost-effectiveness by creating a stable multiannual framework;
- to establish a minimum programme of data collection, and an extended programme to collect wider and more detailed data that may be desirable; the latter being eligible for Community-funded support; and

¹³ CCAMLR. Report of the Working Group on Fish Stock Assessment, Hobart, Australia, 9-19 Oct 2000, paragraph 3.49

¹⁴ SEAFDEC. Report of the Consultation of Senior Administrators and Managers on the Strengthening of Fisheries Statistical Systems in Southeast Asia. Bangkok, Thailand, 13-16 October 1998.

¹⁵ FAO. Report of the High Level Panel of External Experts in Fisheries, Rome, Italy, 26-27 January 1998.

- to make the data available to appropriate international organisations and to the Commission's Scientific, Technical and Economic Committee for Fisheries (STECF).

Annexes to this Council Regulation define:

- Details of the data sets required under the minimum and extended programmes.
- Reference species and areas to be covered by the minimum and extended programmes.
- Data for economic monitoring of fishing enterprises and the processing industry (minimum programme).

The Commission Regulation

In establishing this framework the Commission (in operating as the administration of Council decisions) required the submission of national fisheries statistical programmes to the Management Committee for Fisheries and Aquaculture. These were then compiled into a *Commission Regulation, Laying down detailed rules for the application of the Council Regulation No. 1543/2000*.

This Commission Regulation established the following under the minimum programme:

- Three modules: 1) evaluation of inputs, fishing capacities and fishing effort; 2) evaluation and sampling of catches and landings; 3) evaluation of the economic situation.
- Definitions of precision and confidence levels for sampling, or in the absence of quantitative targets for sampling, pilot surveys and estimates of their cost-effectiveness.
- Instructions for the gathering of data, including the definition of parameters, disaggregation and precision levels, scientific surveys of stocks, biological sampling of catch (discards and some recreational fisheries),
- Rules for the transmission of the multi-annual National programmes, including timings of submission, strategies to be followed (together with cost and precision relationships).
- Measures for the management of primary and aggregated data, including confidentiality, archive period, computerised database storage and security.
- Measures for data access by the Commission and between Member States.

The detailed data Annexes to this regulation define:

- Geographic stratification required at the 4 precision levels.
- Basic segmentation and detailed disaggregation of vessels for capacities (with mobile, passive and polyvalent gears).
- Species thresholds (% catch) for the definition of fishing effort.
- Vessel Typology for effort information, definition of fishing effort by vessel type and fishing technique typology for vessels (by area).
- List of stocks for landings and discards monitoring (by major and minor area and sampling period stratifications) under the minimum and extended programmes.
- Specification of the surveys to be conducted (by area and period, and defined survey effort [days, hauls]).
- Age and length sampling schemes (by species, area, sample level and fish per sample stratifications) under the minimum and extended programmes.

- Biological data for growth, maturity, fecundity and sex ratio (by species, major and minor area).
- Economic information per fleet segment (including income, production and other costs, ownership, prices, employment).
- Economic information per primary and secondary industry sectors (including raw material, income, production and other costs, prices, employment and capacity utilisation).

General analysis

The range and scale of data that these regulations define appears overwhelming at first sight (consisting of 55 pages of highly detailed tables), but for much of it the information has been or is being collected under previous Commission Regulations, or under most national programmes where detailed interest in the data variables has existed for some time. Given the nature of the Common Fisheries Policy of the European Union, it is clearly essential that this standardisation be promoted, in terms of data types, stratification and methodology, so that comparable analyses can be made.

What this regulation also does is to standardise the approach that all Member States should take in contributing to a Community-wide fisheries statistical collection for scientific, economic and social research. In addition, it sets standards that are at least as detailed as are, or might be, required under fishery agreements in waters beyond Europe, both EEZs and high seas.

The compilation of this data requirement in the Regulation, in particular the catch and biological data that constitute the requirements for stock assessment research, has been developed mostly by national research institutions in collaboration with the appropriate working groups. It also ensures that the mandatory data provisions of bilateral (EU/country) fishery access agreements can be met.

The regulation thus provides a general recognition, and a shared understanding, of what is required across all species and areas where Community vessels operate. It stabilises these requirements within a multiannual framework to enable systems for collection to be put in place within national administrations.

Furthermore, the regulations provide clear guidance on what the minimum level must be in terms of time, area and precision stratifications. For example, catch and landings information for albacore tuna must be, for the minimum programme, monthly at 5° x 5° geographical aggregation, with discards reported yearly. The extended programme for albacore requires information monthly at 1° x 1°, which offers greater precision and is therefore more desirable for analysis. In another example, the requirement for length sampling of sole varies between statistical areas, both in terms of samples per tonne of annual landings and the numbers of fish to be measured per sample, presumably because of the different concerns about the sole stocks in those areas.

Changes in statistical requirements

The EU system aims at standardisation and stabilisation of requirements. However, in addressing problems and potentials for analysis, organisations can often be faced with implementation difficulties and new requirements. The range of recommendations for statistical requirements may change from year to year, including species-specific, computerisation or administrative issues. For example, the Report of the ICCAT Sub-

committee on Statistics for 2000-2001¹⁶ contains numerous recommendations related to this range of issues, including recommendations on:

- Data types, aggregation requirements and formats
- Codes for catch type to be included in the databases
- Revision of manuals for data collection
- Reporting formats for tag data
- Improvements to the Bluefin Tuna Statistical Document
- Electronic transmission of bluefin data
- Observer coverage
- New species data collection
- Establishment of a trade data statistical documentation group

ICCAT also coordinates its activities with other regional organisations. In a recent report in association with GFCM¹⁷, actions on nine substantive data collection issues were recommended.

In recent CCSBT reports^{18 19}, there are continual references to specific data uncertainties, and recommendations for action by the parties to the Commission. Some of these are ongoing and very similar to problems raised by ICCAT; others are new and resulting from new research focuses.

Strategy for Improving Information on Status and Trends of Capture Fisheries (formerly *International Plan of Action for Assembling and Disseminating Information on Status and Trends of Fisheries*)

A draft IPOA Status&Trends was referred by COFI 2001²⁰ to an FAO Technical Consultation that took place in March 2002. The Technical Consultation redefined the IPOA into an FAO Strategy, to be referred to as the FAO Status and Trends Strategy, and amended some of the contents. It requested the Secretariat to present the Report of the Technical Consultation and the draft FAO Status and Trends Strategy to the Twenty-fifth Session of the Committee on Fisheries in 2003. It also recognised that it would be necessary for FAO and FAO members to elaborate a programme to implement the Strategy.

Whatever the outcome and possible adoption by COFI, the programme(s) of action²¹ remain a general concern, as elaborated by the ACFR, and will probably include many issues of direct relevance to the mandate of the Coordinating Working Party on Fishery Statistics, including²²;

¹⁶ ICCAT. Report 2000-2001 (II) Appendix 7, Report of the ICCAT Sub-committee on Statistics.

¹⁷ 5th Meeting of the Ad-hoc GFCM/ICCAT Working Group on Stocks of Large Pelagic Fisheries in the Mediterranean Sea. Sliema, Malta, September 11-15 2000. SCRS/00/25

¹⁸ CCSBT. Report of the Second Stock Assessment Group Meeting, 19-28 August 2001, Tokyo, Japan.

¹⁹ CCSBT. Report of the Sixth Meeting of the Scientific Committee. 28 - 31 August 2001, Tokyo, Japan.

²⁰ FAO Council. Report of the 24th Session of the Committee on Fisheries (Rome, 26 February-2 March 2001). Hundred and twentieth Session of the FAO Council, Rome, 18-23 June 2001. CL 120/7, paras 73-81.

²¹ COFI. Proposal for Improved Status and Trends Reporting on Fisheries. Twenty-fourth Session of the Committee on Fisheries, Rome, Italy, 26 February - 2 March 2001. COFI/2001/8.

²² These draft programmes and projects are headers taken directly from a revised IPOA that were presented to the Technical Consultation in March 2002.

- The need for capacity building in developing countries.
- Data collection systems in small-scale fisheries and multispecies fisheries.
- Expanding the scope of information on status and trends of fisheries, including consideration of the needs for ecosystem based fisheries management.
- A global inventory of fish stocks and fisheries.
- Development of criteria and methods for ensuring information quality and security.
- Development of partnership arrangements.
- The role of working parties to assess the status and trends of fisheries.
- Sustaining data collection information on the status and trend of fisheries.

In the COFI 2001 report some members noted that some of the objectives of the IPOA could be addressed by *'better networking between FAO and regional fishery bodies'*

The CWP is part of that networking, as are the recent meetings between regional fishery bodies. Better networking is only part of the solution. The tasks under the programme of action outlined above will take sustained effort, which takes money and human resources. If CWP can develop a credible advocacy role based on the reputation and influence of its members, which are also seen to encompass fishery organisations worldwide, then it can contribute significantly to this programme of action.

The other IPOAs (Seabirds, Sharks, Fishing Capacity and IUU fishing) also have agreed plans of action that have major elements involving data collection and the development of statistics.

CCAMLR noted in a recent report that progress to establish the IPOA Status&Trends, especially in relation to data and information exchange may have a very positive effect on the issue of IUU fishing.

Co-operation Projects

Many donor cooperation projects have at least some statistical components, even if these are only limited to collecting data that would contribute to their design and implementation, or would verify the outputs of the project. One of the largest donors to fisheries projects is the European Commission, which reported nearly €400,000,000 for fisheries sector projects worldwide between 1998 and 1999²³. Of this total approximately €48,000,000 was for projects containing direct statistical elements.

Brief examination of each project suggested that, of this sub-total, approximately €22,000,000 (45%) could be directly attributable to fishery statistics. This amounts to only about 5.5% of all fishery projects. Of the €22,000,000 about €6,500,000 (30%) was spent on globally applicable projects (FishBase, etc) used by all countries. See Appendix 2 for European Commission Projects with significant fisheries statistical or information components (1988-1999).

Summary

This analysis of requirements for improved fishery statistics cannot summarise their full range and scope for all organisations. Nevertheless, from the review of documentation

²³ EC Co-operation on Oceans and Seas. A review of policies, programmes, financial instruments and projects. Brussels. European Commission, Directorate General for Development, 80p.

available to this study some general conclusions can be drawn that may offer the CWP a framework of concerns that it can address at the global scale.

Timeliness of data submission

This is a continuously reported problem over which the receiving organisations have little control or influence. It affects the speed with which comprehensive statistics can be published, the required contributions to stock assessments are received, or the regulation of quotas and fishing effort can be determined. Many countries supplying data to CWP members have difficulty in meeting deadlines by reason of impoverished resources to undertake the work.

Mechanisms need to be sought to improve data submission schedules. The growing availability of Internet technologies and business-to-business systems should be evaluated for their contribution to this problem.

Dataset documentation, data formats and comparability

Problems with data management are reported very often. Part of the problem is the nature and formats of the data files transmitted from one organisation to another. Many countries have legacies of computer systems that are not capable of producing data in the required (or new) form. Where formats of transmitted datasets are incompatible, significant efforts (time and money) are required to reconfigure, clean or otherwise transform datasets into a 'standard' form for the centralised databases of organisations.

Dataset documentation methods and software should be evaluated for their contribution to data management. Such detailed metadata/header information attached to datasets would assist in making them comparable, even to the extent of automating database updates. In addition, the Internet systems and technologies mentioned above should be assessed for the development of direct data extraction methods through which data format control (including aggregation) can be exerted directly and without the intervention of the supplying agency. Clearly, security and access control to ensure confidentiality will be a major concern. Solutions to this through the application of metadata methods would enable agencies (countries, institutions) to maintain data ownership and confidentiality, record and control access and distribution, and offer the data supply at the transparency level agreed, and in forms that are readily recognised and platform independent.

Standardisation of data types

The historical efforts of the Coordinating Working Party on Fishery Statistics in developing and documenting international standards for data types have been highly effective. However, reports of meetings in recent years contain many references to new data types that are often being requested. In particular, fishery trade data, which is likely to be increasingly used in the management of allowable catch and effort, is being addressed by several organisations (including CCAMLR and ICCAT). Fishery trade data is also required where economic and social considerations need to be available for general bio-economic analysis, or for the application of special requirement of developing countries.

Although the basics have been largely agreed, such as species, fishing vessels and gear, the ongoing work of CWP in this area may be expected to continue. Several areas should perhaps receive greater attention; including data standards for catch documentation schemes (trade data) and transmission data standards for vessel monitoring systems (some of which is addressed in recent documents of FAO²⁴).

²⁴ FAO Technical Guidelines for Responsible Fisheries. No.1 Supplement 1. Fishing Operations. Vessel Monitoring Systems.

Cost-effectiveness of data collection

Introduction

In a recent report by the World Humanity Action Trust²⁵ the problem of uncertainty is raised - in similar fashion to many other documented views, although it has long been recognised - that ‘... *information about the status of fishery resources is uncertain because of statistical variability associated with the problem of sampling organisms over vast areas of ocean*’. Given the perceived state of world fisheries, there has not been a previous time when *Informed Decision-Making* (under which key header this statement is made in WHAT’s report) was more urgently needed. Yet, in almost all countries the availability of resources to enable this through better data collection has been static or declining. It also appears to have low priority in development projects, e.g. in EU aid projects, only 5.5% of total fisheries budgets are attributable to information.

Part of the problem is confidence and credibility; confidence (and its diametric opposite, uncertainty) being both statistically demonstrable and a qualitative judgement, credibility being the acceptability of advice stemming from confident analyses. When science-based advice is given with a high level of uncertainty, it is hardly surprising that credibility falls, the value of the data already obtained is discredited and the money spent on it seemingly a waste. Under these circumstances, and particularly at times when fisheries are perceived to be in crisis, or when catches fall or fisheries are closed, calls for more data at increased cost can be easily resisted. The management response to such resistance for more money will always need to be justified, including demonstrations of cost-effectiveness.

Unfortunately, cost-effectiveness and cost-benefit are very difficult to measure for reasons outlined earlier in this report, and discussed in more detail below. During the conduct of this study, no evidence could be found of direct cost-effectiveness studies that could quantify the relationship and then, perhaps, provide some model guidance on how statistical programmes and projects might be evaluated in terms of improved science and better fishery management.

To reiterate the findings quoted in this report’s Executive Summary. The NRC Committee on improving the collection and use of fisheries data “*could find no existing analyses of the costs and benefits of data collection and management for specific fisheries, particularly of the ratio of marginal costs and marginal benefits for each additional dollar spent on data collection*”²⁶.

Notwithstanding this recognised deficiency, it seems clear that better methods to address cost-effectiveness and cost-benefit should be developed and this is addressed in the programme and project proposal.

Measures of effectiveness

To be effective fisheries data must be good enough to enter analyses that provide the basis for informed decision-making. Some data may need to be transformed and become part of a model, such as fishing effort parameters in stock assessment. The same data may enter decision-making directly, such as fishing effort information and management decisions about capacity reduction or quota allocation. Thus, data may often be used for different purposes and may have different levels of effectiveness according to its use.

²⁵ WHAT. Governance for a Sustainable Future. A report by the World Humanity Action Trust. UK. 2000 ISBN 0-9539041-0-5

²⁶ Ibid. footnote 2.

Effectiveness need not always be a quantifiable variable. Qualitative assessments of effectiveness based on subjective judgements may also be acceptable, particularly where these judgements can be operationalised using panels or rating systems to produce rank-ordered categories, itself a form of quantifying judgements. Bayesian approaches to fisheries analysis use informed but perhaps subjective expectations (priors) as real variables in quantitative models. Other approaches such as rapid appraisal methods, which typically have lower data requirements, may also be able to make effective assessments, useful to managers and policy-makers.

If data types are divided into broad bands (biological, environmental, catch, fleet, compliance and economic), and set against broad bands of fishery governance (science, management decision-making, economic planning and compliance control), contributions by each data type to the effectiveness of each 'role' within governance is likely to be different. Better biological data is highly effective in improving scientific advice, but may be only marginally important to compliance control. Better quality catch data is likely to be equally important to all roles, although its effectiveness in meeting their tasks may be perceived differently. Economic data will be absolutely essential for economic planning, but only of marginal utility to stock assessment science. As with all multidisciplinary enterprises, effectiveness depends on what you want to use the data for.

Thus, the adequacy of data can be evaluated only in the context of the purposes for which they are used. Each use implies a set of users and a suite of requirements that the data must satisfy, including timeliness, level of detail and precision, accuracy, accessibility to users, coverage or completeness, and credibility of the data collection process and the management process that uses the data.

In addition to these differences according to data use, where should we expect the lowest/highest cost-effectiveness of statistical investment to be, in any case? 'Target' cost-effectiveness will almost certainly vary by issue, whether for science, licence administration, or economic planning. For example, the utility of obtaining detailed biological data for a stock assessment model might be guaranteed to offer a particular percentage improvement in confidence levels, but because of its complexity and cost of collection, it may not also offer similar improvements to other benefits.

Measures of costs and their comparability

The cost of fisheries data can often be very large, for both direct and indirect costs. The direct costs of maintaining logbook, observer and inspection systems, and investing in surveillance and survey systems, usually form the largest budget items in fishery administrations. All the subsequent analytical processes combined usually cost much less than obtaining the data in the first place.

Required data and its costs may also impact indirectly on the economics, profitability and/or operating efficiency of the industry. For example, in some fisheries it is only allowable to land at designated ports to ensure monitoring (i.e. fish cannot be transhipped at sea, and not landed just anywhere). This landing site requirement may not be the best way of first transportation of catch to market and may increase the costs of production for a vessel, and decrease the economic position of the fleet. Vessels may be tied up longer than for a simple unloading time while inspections or biological sampling are undertaken.

It might be considered a general rule that the closer the fishery can be managed to approach the 'real' sustainable yield, the higher the data requirements to estimate necessary precaution will be, and hence the higher the costs. The inverse is probably also true; the lower the data quality (hence costs), then the higher the likelihood that over-exploitation will result, causing lost benefits, both present and future. In addition, as mentioned above, in the future with the precautionary approach the lack of data will result in lost opportunity for harvest and perhaps under-utilization of the available resource.

Most costs of data collection, of course, relate to human resources. Where labour costs are low, choices can be made on the form of data collection, i.e. labour intensive as against technology intensive systems. In countries where the marginal cost of labour greatly exceeds technical solutions (to achieve the same data), the latter will be more cost-effective. Namibia has an Observer system consisting of more than 300 people, continuously employed across most vessels in the fishing fleets. Their effectiveness in a range of tasks, including catch monitoring, biological sampling and general deterrence, is largely due their low cost in providing that level of coverage. In one way or another, fishing industries carry the cost of data collection anyway, either directly or through taxation. The fact, that in Namibia the industry directly contributes to the operation of the Observer system, has little to do with overall cost-effectiveness for the industry or the government since Observer costs are included in company expenditures and hence tax deductible.

Data quality and indicators

Much has been written on data quality and indicators of data performance, and it is an issue that has great relevance to any discussion on cost-effectiveness. However, the issue is treated much better elsewhere than can be fully presented here and references to publications and sources may prove useful in this regard^{27 28}. Most statistics producers currently discuss data quality in terms of a total quality concept in that the quality of statistics refers to all aspects of how well statistics meet users' needs and expectations of statistical information, once disseminated. Table 1 outlines the quality concept components and sub-components that are generally accepted as necessary to meet all needs.

<p>Contents of Report</p> <ul style="list-style-type: none"> Statistical target characteristics Units and population Variables Statistical measures Study domains Reference time Comprehensiveness 	<p>Timeliness</p> <ul style="list-style-type: none"> Frequency Production time Punctuality Coherence, especially comparability <ul style="list-style-type: none"> Comparability over time Comparability over space Coherence in general Availability and clarity Forms of dissemination Presentation Documentation Access to micro data Information services
<p>Accuracy</p> <ul style="list-style-type: none"> Overall accuracy Sources of inaccuracy <ul style="list-style-type: none"> Sampling Coverage Measurement Non-response data Data processing Model assumptions Presentation of accuracy measures 	

Table 1. Quality Concept for Statistics²⁹

²⁷ Encyclopaedia of Statistical Sciences, Update Volume 3. Wiley-Interscience, NY. pp621-629.

²⁸ USAID Guidelines for Indicators and Data Quality. USAID TIPS, No.12, 1998.

²⁹ NRC Improving the collection, management and use of marine fisheries data. National Research Council. National Academy Press, Washington, D.C. 2000. p83..

Methods to address cost-effectiveness

Cost-effectiveness of sampling

During the design of statistical sampling surveys it is usually recognised that variation in sample estimates fall as sample size increases (Figure 1). At some point the costs of increased sampling outweigh the advantage of reducing variance.

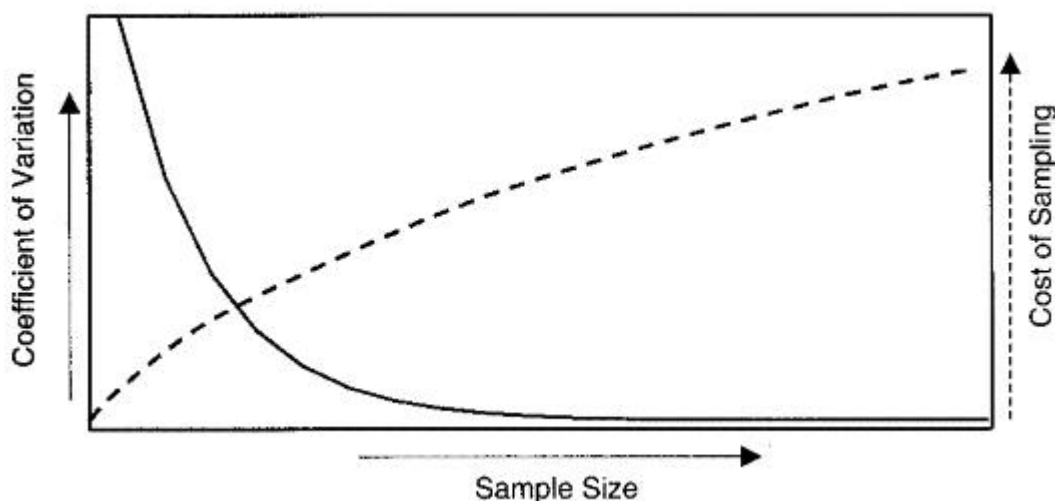


Figure 1. Coefficient of variation and cost as a function of sample size. Note that certain levels of precision are unattainable for limited cost levels. Above certain sample sizes not much additional precision is obtained while costs continue to rise.³⁰

Surveys, particularly at-sea fishery independent surveys, often conduct adaptive sampling in ways that enable surveys to be curtailed to save costs, or to better target information needs as new information becomes available. Prior to surveys, the minimum level of bias that satisfies the conditions of an assessment model or hydro-acoustic survey can be estimated. Continuous calculation of standard error and coefficient of variation during surveys, based on current information rather than past information, enables cost-effective application of survey resources.

Calls for the evaluation of cost-effectiveness of surveys are often made in scientific papers when the results of analysis indicate uncertainties on survey utility, e.g. whether surveys should be intensified or scaled down, or whether additional types of surveys should be conducted³¹.

Management method simulation of cost-effectiveness

Choosing a fishery management method can make a real difference to information requirements, both in terms of data costs and their characteristics (timeliness, etc). Some fisheries can be managed through a method involving real-time analyses of stocks, by obtaining expensive real-time data and applying stock assessments continuously until reference points are reached and control rules are activated. Alternatively, the same fishery might be managed by post-fishery assessment (the usual management method) for which data requirements, quality and costs are generally lower. Simulation studies have

³⁰ NRC Improving the collection, management and use of marine fisheries data. National Research Council. National Academy Press, Washington, D.C. 2000. p83.

³¹ Butterworth, D.S., J. De Oliveira and K. Cochrane. Current initiatives in refining the management procedures for the South African anchovy resource. In Proceedings of the International Symposium on Management Strategies for Exploited Fish Populations, Alaska Sea Grant College Program, 1993.

demonstrated that arguments for the choice of management method (say, between real-time and post-fishery) can be quantified through the estimation of benefits, such as total allowable catch and hence income³². Cost-effectiveness can thus be demonstrated.

Retrospective analysis of cost-effectiveness

It may be possible to undertake retrospective stock assessment analyses of fisheries where details of the methods of analysis, data availability and other factors lead to a known outcome. In this analysis some form of simulation might be undertaken that uses the then-known models or analytical methods and applies better information. Such better data might have been subsequently discovered or collected, or the data itself could be simulated. Further explanation of this approach is in Appendix 1.

³² In one case known to the author but which remains unpublished, simulation of real-time and post-fishery solutions to management clearly demonstrated that the more expensive and complex method would allow a higher total allowable catch, with a similar level of precaution, and greater income. The difference to incomes under the two management solutions far exceeded the additional data collection and analysis costs. Managers and politicians were thus persuaded, and real-time monitoring was implemented.

Approaches to statistical development and a global advocacy role for the CWP

Introduction

The terms of reference in the Statutes of the CWP are:

1. *keep under continuous review the requirements for fishery statistics (including aquaculture) for the purposes of research, policy-making and management, taking into account inter alia their purpose, usefulness, cost, burden in collection and collation, timeliness, quality, confidentiality needs and regional differences;*
2. *agree standard concepts, definitions, classifications and methodologies for the collection and collation of fishery statistics;*
3. *make proposals and recommendations for action in relation to the collection, collation and dissemination of fishery statistics, recognising the need to coordinate activities so as to avoid duplication.*

This section of the report is a first attempt to review the scope for CWP activities that would enhance its output, develop its competencies, and support its claim for an advocacy role when considering the above terms of reference. Some of the issues are institutional and programmatic; others are technical.

One of the key issues in supporting advocacy is the comprehensiveness of membership. While the CWP constitution (under Article VI-2 of the FAO constitution) was amended in 1995 to extend beyond the Atlantic, current membership by intergovernmental organisations does not include all possible organisations. No freshwater or aquaculture organisations are members, except in so far as Eurostat handles these subjects in Europe and OECD similarly for its member States.

The profile of the CWP in general statistical matters needs to be enhanced, particularly in forums where developments are taking place rapidly and towards countries that have difficulties participating in statistical developments. Further participation in initiatives such as PARIS 21 could provide a means to secure resources to address general problems of statistical coordination, particularly as these affect developing countries. Active dissemination of CWP's 'products and services' needs to be widened, taking advantage of Internet and other technologies.

Statistical data quality standards, data transmission methods and standards, data documentation methods, indicators of statistical development and other matters need to be addressed. Support in these technical issues, particularly in relation to statistical transactions, could be sought from other UN agencies, such as the UN Statistics Commission and the World Bank.

Options

The Intersessional meeting of the CWP noted that some of the suggestions for further developments contained in this paper were beyond the current capacity of the CWP to undertake them and that some of the elements (e.g. enhancement of the CWP website) could be accommodated within current Secretariat activities. The meeting instructed the Secretariat to revise this paper by the inclusion of options for presentation to CWP-20. Accordingly, the options are as follows:

Option 1

The CWP should make advocacy calls when the opportunities arise as follows:

- CWP should keep a general watch for opportunities and to use such opportunities to advocate its position and competencies, but that a concerted and proactive advocacy role as described in Option 2 is probably not feasible at this stage; and
- CWP members should communicate their own activities in the identified elements of Option 2 (e.g. further statistical classifications and standards, including the issue of metadata) in ways that serve the purpose of the proposals under Option 2 but without commitment to separate investigations of the issues.

Option 2 - Programme for the Enhancement of the Role of the CWP

The CWP may consider addressing the following general framework for a programme for the enhancement of the role of the Coordinating Working Party on Fishery Statistics, either as a complete programme or as individual projects for the 6 key areas. This programme is described through brief elaboration of its objective, purpose, outputs and inputs.

Objective

The objective of this programme, which contains specific projects, is to develop a framework of activities leading to the successful establishment of an advocacy role for the CWP on global fishery statistics, based upon:

- wider participation and an enhanced profile;
- further development of generally applicable standards, methods and technologies; and
- support to developing countries in their actions to improve fisheries statistical systems and coordination.

Purpose

Bearing in mind the existing information mandates of other global organisations, the purpose of the programme is to:

- widen membership and review the institutional structures that would be necessary for the tasks;
- evaluate the potential for developing a successful advocacy role and an enhanced programme of activities;
- decide on the scope of advice that CWP would advocate;
- conduct or promote further analyses of cost-effectiveness of statistical systems and indicators of statistical capacity-building; and
- assess methods and technologies to address statistical administration issues, in particular data transmission.

Outputs

Outputs of the programme would consist of advisory, background and project proposal documents for future consideration by the Coordinating Working Party on Fishery Statistics. These documents would address the following 6 key areas.

1. Development of membership and institutional structures

Reviews will be prepared on:

- the ways of achieving active participation by more intergovernmental bodies, including for freshwater fisheries and aquaculture, and for regions where the special interests of developing countries need closer attention, including possible sources of support. The review will also address whether amendments to the statutes of the Coordinating Working Party on Fishery Statistics need to be made to accommodate wider participation; it may be that the statutes have sufficient flexibility already to accommodate an expanded advocacy role; and
- institutional structures to address particular issues, including sub-committee and working group structures and whether regional CWP sub-committees or working groups should be established.

2. Development of advocacy methods

Mechanisms to support advocacy will be evaluated, including:

- preparation and publication of a mission statement;
- publications, such as guides and handbooks, brochures, posters and web sites;
- seeking advice from other agencies and programmes on the ways to promote advocacy at international (e.g. UN Statistics Commission) and regional forums (e.g. Southern African Development Community); and
- enhancement of the capacity of FAO to take the lead as Secretariat to Coordinating Working Party on Fishery Statistics, to attend statistical meetings and report to CWP on its behalf.

3. Further development of statistical classifications and standards

A review will be prepared on the range of issues that may require the amendment, adoption or establishment of data classifications and standards, in particular relating to trade and catch documentation systems, habitats and ecosystems, and other identified matters. For example, the use of geographic information systems as a tool for fishery analysis may also require the investigation and establishment of digital Geospatial standards³³

4. Demonstrating the cost-effectiveness of data collection

A review will be prepared, including:

- evaluating the range of indicators of effectiveness in fishery science and management;
- undertaking retrospective research into the effect of poor data on fishery assessments (see Proposal 1 in Appendix 1); and
- reviewing current research on fishery assessments in data poor situations, such as Bayesian and rapid assessment approaches, and their likely contribution to effectiveness.

5. Development of data transaction and documentation standards and methodologies

A review will be conducted of available Internet and other technologies that might improve the quality of fisheries data transmissions between institutions (see Proposal 2 in Appendix 1), including

- ways to improve timeliness, data handling errors and dataset identification and management³⁴; and
- ways to encourage data suppliers that security and confidentiality can be maintained while preserving data ownership and control of access for which they are the responsible party.

³³ e.g. the US National Digital Geospatial Data Framework. Site reference: <http://www.fws.gov/stand>

³⁴ e.g. the FIGIS metadata initiative. An example of a data documentation framework is proposed for all datasets in FIGIS. See Agenda item 15. Background paper by FAO at CWP 19.

6. Development of indicators of fisheries statistical capacity-building

On the basis of general approaches being undertaken by PARIS 21³⁵, the IMF³⁶ and others, a review will be prepared of indicators of statistical capacity-building, with emphasis on indicators³⁷ of particular relevance to fisheries.

Inputs

The outputs described above will need to be supervised and/or prepared by CWP working groups established for the purpose, either temporarily or permanently. These working groups might consist of experts in their fields nominated by CWP members and, as in the case of CWP itself, drawn from participating governments and institutions, and supported from the Secretariat and other experts.

It is envisaged that there might be a need for three working groups, as follows:

1. **Working Group on Advocacy:** to review membership, statutes and mission of CWP, and ways to promote its role in the uptake of CWP recommendations.
2. **Working Group on Statistical Development:** to review requirements for standards and classifications; technologies for improving data quality; and methods for demonstrating cost-effectiveness.
3. **Working Group on Statistical Capacity-Building:** to review approaches to improving fisheries statistical capacity, focussing on the needs of developing country members of CWP's intergovernmental organisations.

³⁵ PARIS 21, based at the OECD/DAC, has five task teams that bring together professionals interested in particular aspects of statistical capacity-building, one of which addresses Indicators of statistical capacity-building; the other teams are Advocacy, Strategic statistical development plans, Census, and Agriculture and Rural Statistics, all of which may be able to offer advice and support to CWP.

³⁶ International Monetary Fund. Data Quality Assessment Framework.
Reference site: <http://www.dsbm.imf.org/dqindex.htm>

³⁷ Evans, D Indicators to assess the performance of regional fishery bodies. Paper No. RFB/II/2001/3, Second Meeting of FAO and non-FAO Regional Fishery Bodies or Arrangements, Rome, 20-21 February 2001.

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Appendix 1 - Proposals

Proposal 1. On the relationship between information inadequacies, fishery science, fishery management advice and fish stock failure: theoretical approaches and case studies into the risks and costs of poor data.

Background

The empirical evidence for the relationship between failure to obtain information and subsequent poor fishery science and management is largely unavailable for many reasons (see main text of report). Establishing such a relationship, and thereby providing policy makers, fishery managers and administrative planners with hard evidence that more and better data has direct and beneficial effects on fishery science and improved management, cannot be achieved through simple evaluations of before and after situations, which are often part of project evaluation procedures. This lack of hard evidence is mainly because these evaluations do not generally exist in any comparable way across projects from which conclusions could be drawn. The indicators that verify outputs of statistical projects are usually cast in subjective mode, while claiming that they are objective (i.e. the Objectively Verifiable Indicators [OVIs] of Logframe project design and evaluation). This is particularly the case in capacity-building projects in developing countries.

Where information availability is enhanced, it mostly just feeds into the scientific process, the management control rules or compliance regimes, where it contributes only partially - along with political, biological, environmental, technological and social influences - to improved fishery management. It is therefore difficult to separate the effects of all these influences.

However, hard evidence might be achieved by returning to situations (in time, in understanding and in information availability) and testing whether advice at the time for more and better data - and at the level of theoretical understanding then available - would have made any difference to a known outcome. Simulation should be able to do this, and the appropriate test beds for such simulations would probably be seriously failed fisheries. Failed fisheries are what fishery managers try to avoid. Essentially their principal task is risk management, while having to cope with many sources of uncertainty.

Investigating if information inadequacy (identified at the time) contributed significantly - all other things being equal - to fishery failure would provide some measures of the risks in not having information of the right type at the right time. Some general quantifiable understanding of the relationship between cost and effectiveness might then be established. It is difficult to guess at this stage whether substantive conclusions of this type would emerge that might apply to all capture fisheries. Nonetheless, generic conclusions are the subject on which the Coordinating Working Party on Fishery Statistics ought to be able to make authoritative statements, including scientifically substantiated views on the nature and importance of fisheries information.

General Proposal

This proposal outlines a general framework only, consisting of three parts.

It requires 1) a general theoretical approach to establish the methodology, followed by 2) identification of appropriate failed fisheries for further analysis, where some or all of the information, scientific and advice history are fairly well documented. Lastly, the framework requires 3) simulation of the stock assessment models in use at the time, together with appropriate extensions. These extensions would be mainly additional model variables or enhanced datasets that might have been included if the information had been available at the time, i.e. information that had been determined as essential or desirable for the model but which, for one reason or another, was not collected.

If such an approach works, the outcome of the simulation might develop an improved understanding of the quantitative and qualitative relationship between the availability of fishery statistics and the likelihood of fishery management failure or, in inverse, success.

Using such an approach is likely to be very difficult, as it will involve retrospective analyses of target fisheries on the ways in which information availability was prioritised and collected (i.e. ignored and not collected), fishery science was managed (i.e. better theoretical approaches were eschewed in favour of pragmatism or incapacity), and scientific advice was taken up (i.e. avoided due to some alternate influence). Obtaining access to all this for candidate fisheries may prove difficult for many reasons.

Nevertheless, the approach might enable further serious evaluations of other fisheries and of future fishery science and management information requirements, at least for stock assessment. In this sense, the work may also be useful in establishing indicators for fishery statistical requirements and priorities.

Approach

This project requires a relatively long-term approach to the issues and the three parts of the framework - methodology, identification of target data and simulation. It also requires a compliant government that is willing to investigate the issue and provide the information. It seems likely then that several governments or regional fishery bodies would necessarily be involved, and that the work is done outside the institutions (but with their input) where the original work was done, probably in an academic environment.

Proposal 2. Technical standards and solutions for statistical transactions.

Internet processing and data transmission

Many problems reported in RFB documentation relate to the failure of Member States to submit the statistical data that they have collectively agreed upon, either from calls at a previous meeting or as an ongoing problem. Either that, or data is submitted very late, or sometimes in incompatible forms.

The administration of this communication between a country and its regional institution - a fairly simple statistical transaction - is difficult for technical as well as political reasons. In many cases data is being collected by the Member State, whose responsibility it is, but stored and processed in a different or unique way. RFB requirements, as agreed by members, need to be served by the Member State. This means considerable work by the Member State data managers; an additional task that means additional resources. It also means that the RFB may receive a wide variety of datasets that it must then re-configure internally. Hence it would be desirable to extract data, either directly, or from a mirror site established by the country, in the form needed. There are thus two stages: data aggregation by the country into the agreed form roughly according to the capabilities and architecture of the country systems, plus a whole range of data checking once it arrives at the RFB. Cutting one stage out would be very advantageous in efficiency, reducing the costs of data supply. Timing might also be improved, among many other benefits.

Platform independent and highly secure business-to-business systems are becoming increasingly available for the Internet. Using these architectures, RFBs (or any others to whom permission had been given) could access the country databases directly. This could only be done in pre-agreed ways and according to access keys and other security procedures, both of which are controlled by the country (or institution). The country thus maintains ownership, and controls and records access. Thus, it maintains confidentiality, at the same time as offering agreed levels of transparency.

A project to investigate the range of technical approaches to this data transaction method should be undertaken.

Metadata

Some of the above approach requires the attachment of descriptive information to datasets, its metadata. This can be achieved through a dataset documentation system, which includes features for **dataset identity** (including ownership), **data set profile** (including quality information; aggregation, coverage, time range, etc) and **dataset features** (including confidentiality, access rights and processing history). An example of such a system is proposed for all datasets in FIGIS³⁸.

This metadata framework and hierarchy is a promising avenue for looking at standardisation without necessarily restructuring raw data. It can also be operated at any level, from the highest (useful) aggregation down to raw data entry, and thus forms the basis of full-system quality assurance. Much of the metadata information can be generated automatically by system resident software, including on standalone computers. Other aspects that may be peculiar to metadata for fisheries statistical transactions can be developed.

The UN Statistics Commission, the World Bank/IMF, the US³⁹ and many others are involved in developing standards for metadata and statistical transactions. PARIS 21⁴⁰, whose client focus is on developing countries and which coordinates funding for statistical capacity building, has been established to investigate and develop partnerships in statistical user-producer dialogue processes.

A project to investigate the range of technical solutions to the definition of fisheries metadata and to the development of metadata software for fisheries statistical transactions should be undertaken.

³⁸ Agenda item 15. Background paper by FAO at CWP 19.

³⁹ e.g. US Content Standards for Digital Geospatial Metadata

⁴⁰ UN Economic and Social Council. Annual Report of the Steering Committee of the Partnership in Statistics for Development in the Twenty-first Century (PARIS 21). E/CN.3/2002/19.

Appendix 2 - EC Fisheries Projects

European Commission Projects with significant fisheries statistical or information components (1988-1999)

Country/region	Date	Project Code	EC Funds €	Project Description	Project Objectives (or composition of research collaboration)
Asia	01/06/96	ERBIC 18CT960105	400000	(SimCoast) Interdisciplinary methodologies for the sustainable use and management of coastal resource systems	Concerted action: Universities
Asia	11/11/98	ERBIC 18CT980296	649300	Measuring, monitoring and managing sustainability: the coastal dimension	Cooperation between research institutes
Costa Rica	15/01/93	STD III- CT920094	142724	Development and application of cost-effectiveness methods for biological monitoring of rivers in Costa Rica	Aquatic environment research cooperation
Ecuador	02/01/93	STD3/CT920131	208000	Organisation of an information system on production inputs, catches and characteristics of small-scale fishery Ecuador	Research cooperation
Global	01/06/90	B7/5040/90	300000	Database for aquatic organisms	Establishment of a database for aquatic organisms of potential importance in developing country fisheries development. Summarize global information about aquatic resources.
Global	25/06/92	B7/5040/92	500000	Two year extension of FishBase	Extend and consolidate the database add analytical routines to FishBase.
Global	01/08/93	B7/5040/93/13	450000	ReefBase database	Develop a worldwide relational database of structured information on coral reefs and their resources. Create a network of coral reef researchers. Distribute analytical routines for proper use of base.
Global	01/09/94	B7/5040/94/12	290000	Consolidation of FishBase	Consolidation and preparation of CDROM
Global	08/07/96	7.ACP.RPR.545	5000000	Strengthening of fishery and biodiversity management in ACP countries (FishBase)	Disseminate FishBase to all ACP countries through regional nodes. Provide training and equipment
Global	28/08/96	BD/CPD-20- R/2450	10000	Inventory of ACP fisheries research institutes - update	Consolidate data quality and consistency of information
Indian Ocean	24/10/91	6.ACP.RPR.458	5000000	Development of a commercial tuna fishery in the South West Indian Ocean - Phase II	Promote regional common management measures and promote applied research and development for tuna fishing in the area
Indonesia	18/12/87	ALA/87/17	2200000	Java Sea Pelagic Fisheries Assessment	Fish stock assessment and study for improvement of the exploitation and management of offshore pelagic fisheries in the Java Sea
Mauritania	04/05/94	STABEX/90	5552	Support to the Central Bank's capacity to monitor boat owners - implementation phase	Implementation, technical assistance and training in the operation of a computer database for the monitoring of foreign trade transactions in the fishing sector and the operations of fishing boat owners
Pacific	21/12/88	6.ACP.RPR.170	10850000	Pacific Regional Marine Resources Development Programme	Increase the capability of the ACP States in the Pacific to understand and manage their living and non-living resources, including FFA information system

Country	Date	Project Code	EC Funds €	Project Description	Project Objectives (or composition of research collaboration)
Pacific	20/12/93	7.ACP.RPR.271	5000000	South Pacific Tuna Resource Assessment and Monitoring Project (SPRTRAMP)	To ensure the long term sustainable management of the tuna resources in the South Pacific by producing and elaborating complete data on stocks, fishery assessments and other supportive measures for providing management advice to SPC member states for sustainable resource use
SADC	01/12/98	8.RPR./REG/6404	13340000	SADC Regional Monitoring control and surveillance ((MCS) of Fishing Activities Programme	Improved management of marine resources and the compliance of fishery operators with the legislation in force in the region. Create a basis for conservation and management of shared fish stocks. Protect marine environment. Harmonise the control of international fishing activities. Enhance regional cooperation, communication and training.
Sierra Leone	01/08/94	7.ACP.SL.040	58400	Integrated database for fisheries management	Assist the Department of Marine Resources in establishing an integrated database for industrial fisheries. Provide training of staff to use and modify the database as appropriate.
Thailand	06/06/97	THA/B7-301/96/0	460100	Feasibility Study for the Definition of a Decision Support Network for Coastal Areas Management	Prepare the ground for shifting the focus of marine and coastal resources management from short term production maximisation to long-term sustainable use of resources. GIS is a key tool to support this change. The Department of Fisheries was the principle counterpart agency for the institutional assistance study
West Africa	10/09/92	7.ACP.RPR.032	170000	Preparatory work for the development of a regional database for fisheries management	Solicited by the Ministerial Conference on maritime cooperation of coastal West African States, develop a concept for a database on marine resources and their exploitation in collaboration with a group of countries in the region in support of resource evaluation and management
West Africa	01/02/97	7.ACP.RPR.625	24000	Project planning workshop for a fisheries information & analysis system for West Africa	Convene a workshop with representative from six member countries of the Sub-Regional Fisheries Commission and from European institutions with competency in the field to produce a draft project document for the implementation of a decision support Infosys for sustainable fisheries
West Africa	15/10/97	COM BUDGET	23000	Project definition workshop for FIAS	Conduct a workshop with ACP (Mauritania, Senegal, Gambia, Cape Verde, Guinea Bissau, Guinea) and EU fisheries specialists to progress the definition of technical content of the Fisheries Information and Management System (FIAS) for the Sub-regional Commission Fisheries in West Africa
West Africa	05/03/99	7.ACP.RPR.730	3000000	Fisheries Information and Analysis Systems (FIAS)	Strengthen fisheries management at national and sub-regional levels through establishing historical baselines of past ecosystem productivity.
TOTAL:			€48081076	of which approximately €22000000 (45%) estimated as directly relating to statistical information	
TOTAL: all EC Fisheries Projects ⁴¹			€398270000	Therefore, statistical elements of above projects accounted for about 5.5% of all EC fisheries donor projects	

⁴¹ These projects are drawn from the document, EC Co-operation on Oceans and Seas. A review of policies, programmes, financial instruments and projects. Brussels. European Commission, Directorate General for Development, 80p, which does not claim to be completely exhaustive. Percentage estimates contributing to statistics are by the author.