FIRMS Steering Committee Meeting
Sixth Session
Hobart, Australia 24 - 26 February 2010
FIRMS TARGET AUDIENCE AND PERSPECTIVE ON THE DEVELOPMENT OF NATIONAL MEMBERSHIP
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OUTLINE

ACTION SUGGESTED TO THE STEERING COMMITTEE

The Steering Committee is invited to consider the review, its conclusions and operational suggestions regarding:

1. The timeliness of the development of a NatFIRMS initiative within FIRMS, taking into account the potential benefits and constraints implied by the initiative;
2. The necessary characteristics that such initiative should have to ensure a harmonious development of both NatFIRMS and FIRMS.
3. The steps foreseen for such a development

[1] A paper prepared by S.M. Garcia and M. Taconet for consideration at the 6th session of the FIRMS Steering Committee (FSC6), February 2010, Hobart, Tasmania

EXECUTIVE SUMMARY

BACKGROUND

There is a growing global concern on the state of fishery resources and fisheries and a growing need for an authoritative source of information on these matters. The concern and the needs have been formally expressed at FAO and well as the UN level and in many international and regional institutions in charge of fisheries monitoring and management or environmental management. FAO has adopted a Strategy to improve information on the status and trends in fisheries (Strategy-STF) to foster its own efforts and those of its members.

The FIRMS partnership and information system are central elements of the implementation of that strategy. The FIRMS system has been developing slowly during the last 6 years with the view to develop and test the concept and the system with competent regional fishery organizations. Thirteen organisations are presently members of FIRMS and a few others are contemplating the possibility to become members. Most FAO regional commissions are not yet part of FIRMS even though a collaboration has been going on, e.g. in the General Fishery Commission for the Mediterranean (GFCM) and or the Indian Ocean Tuna Commission (IOTC).

The opportunity to expand the operational membership to national institutions (under the NatFIRMS initiative), as foreseen in the FIRMS Partnership Arrangement, has been considered by the FIRMS Steering Committee and some concerns have been expressed regarding: (i) the audience of NatFIRMS; (ii) the possible interferences between FIRMS and NatFIRMS developments.

Based on considerations about: (i) the historical demand for stocks and fisheries information and the FAO role, (ii) the origin and development of FIRMS, (iii) the potential audience and benefits of NatFIRMS, (iv) the risk of duplication of NatFIRMS with national efforts; and (v) the possible interferences and synergies with FIRMS, the following conclusions are reached:

GENERAL CONSIDERATIONS

Demand

There has been, for the last 5 decades, a growing demand –and hence a large and growing audience- for authoritative information on the state of individual fisheries and stocks. FAO has been at the forefront of the response. However, because of the stagnation or decrease of many developing countries' capacity, fulfilling this demand has become a major challenge;

Capacity gap

The capacity gap between developed and developing countries in fisheries information has widened substantially since the 1980s as developed countries adopted the new internet-based technology at a growing pace while the developing countries struggled with both the *digital divide*[2] and the stagnation if not collapse of their effective capacity to assess stocks and fisheries and to face the new emerging ecosystemic responsibilities;

The only logical and possible way to close the gap is to use ICT to mobilize and empower the regional organizations and, through them, their member countries, using coordinated technical assistance and South-South cooperation to develop national and regional capacity. FIRMS has been developed for this purpose.

[2] The *Digital divide* is the technical term used generally when referring to the inequality in the access to and use of the technology of the Information and Communication Society. Gaps, inequity, disparity reflect the difficulty of some social categories or countries to benefit from the ongoing information revolution.

Beneficiaries and audience

The list of potential beneficiaries (and hence the *potential audience*) of FIRMS and NatFIRMS is long and important. It is the audience historically reached by FAO publications on the state of fisheries and resources. The *actual audience* as reflected by trends in web traffic is more limited and focussed on: (i) the contributing scientists and advisers involved in developing and populating the system with information; (ii) fishery and other scientists interested in the state of resources. Many of these scientists happen to be both providers and users of information. This narrow audience is typical of the development phase of such a system. The phenomena is reinforced probably by the fact that the paper publications of FAO are still supplying a more comprehensive picture of the world resources.

Risk of duplication

A rapid analysis of a number of national websites in developed and developing countries lead to the conclusion that: (i) with a few notable exceptions in developed countries, there are no national websites dedicated to the state of national resources. Conventional reports can be sometimes found online but most of the assessments, if conducted, remain hardly accessible in the grey literature. Not a single database has been found containing historical and actual information on state of stocks and fisheries. The risk of duplication is therefore inexistent.

Risk of regional overload

The risk of some regional institutions overload is a genuine concern. The NatFIRMS implications for regional institutions must be considered on a case by case basis (as regional operational areas are identified) and will differ between areas and institution. In any case, the process will have to be tailored to existing capacity and extra resources identified. It is stressed, however, that the NatFIRMS initiative, because of the potential synergies it offers (see below), brings with it an opportunity to upgrade regional collaboration and enhance regional systems. In any case, the regional institutions support to their members in the process of accessing NatFIRMS can only be voluntary and that the FAO Secretariat will do all it can to assist in containing the burden within acceptable limits.

Synergies

Important synergies have been identified between national and regional information systems and both NatFIRMS and FIRMS. NatFIRMS would help strengthening national capacity in assessment and monitoring through the development assistance programme. It would also help improving the quality of the information submitted by countries to their regional organizations. It could also help significantly in cases of resources under the jurisdiction of two mechanisms (such as CECAF and ICCAT). Workshops organized in Africa and Asia indicate a large interest of the scientists and managers of countries for NatFIRMS and its inventories and fact sheets. Additional synergy exist with the FAO Fishery Country Profiles programme.

There are obvious potential benefits for countries in joining a NatFIRMS collaborative initiative. Countries with insufficient capacity will be guided and coordinated in their formal inventory of fisheries and resources and the start-up on their simple monitoring system, first but indispensable step to sound adaptive management. For countries with higher available capacity, joining the initiative will contribute to formalize their ongoing assessment and reporting processes, to identify and fill the eventual gaps in the system, to organize and cross-link all documents generated throughout the knowledge based management workflow, and to demonstrate good governance to their general public. The development of a national version of NatFIRMS would clearly provide a framework to support these developments.

Contribution to EAF

As defined by FAO in its guidelines, EAF is an extension of the conventional management system, with broader, more systemic objectives and management measures to conserve a broader range of ecosystem components, within an area-based and more participative approach. Transparency is a must. Within FIRMS and NatFIRMS, resources can be defined very flexibly and nothing impedes the system to adopt more ecosystem-relevant definitions of the fisheries and the resources as an when national and regional systems will have the capacity to do so. The structure and internal functions are not and will never be an impediment for moving towards a more EAF-compliant system as needed.

CO-DEVELOPMENT OF NatFIRMs AND FIRMS

Based on the above, the smooth and harmonious development of NatFIRMS in FIRMS will require a strategy, a plan and an approach that take into account the various needs and constraints identified above.

Premises

The expansion of FIRMS to the national level is conditioned by a number of realities:

1. Priority to the ongoing process: the operations of the existing FIRMS platform need to sufficiently strengthened and consolidated before any substantial growth in the membership, ensuring that the development of NatFIRMS does not perturb the present development process;
2. Extra-budgetary support: additional financial resources must be identified for the expansion process, to assist developing countries in the process of accession to NatFIRMS. The fund raising operations should start rapidly while identifying the amount of work needed and the existing capacity.
3. The information quality assurance scheme needs to be strengthened to ensure an adequate level of quality in the enlarged system, involving, as appropriate, the relevant regional institutions in the information review; and
4. An appropriate governance process must be developed for an enlarged institution with full inter-operability between the two areas of the information system dealing respectively with regional and national information.

Operational areas

The regional units within which NatFIRMS will be developed must be formally identified, taking into consideration resources distribution as well as existing competent mechanisms and institutions and their membership. The FAO regional commissions area of jurisdiction are priority areas for NatFIRMS development, using the Secretariats of the commissions as well as the FAO Regional Offices capacity as boosters and catalysers of the process.

Updating frequency

Continuous (real time) updating might be both unnecessary and unsustainable. The system should accept updates at any time but aim for updates every 5 years or so, at dates most convenient for the countries or the regional organization involved.

Coordination

The work could be coordinated regionally by the secretariats of the competent regional institutions. Where necessary, the coordination of national inventories and assessments could involve the FAO Regional Offices or the FAO central secretariat in Rome.

First steps

Because of the reduced capacity available, a stepwise approach is needed. First, draft inventories could be developed with the assistance of the FAO Regional Offices staff and eventual consultants supported by extra-budgetary resources and with the collaboration of existing field projects (e.g. F. Nansen, FishCode, etc.). The drafts will be published and progressively improved. Second, assistance could be provided to elaborate a review of the state of these stocks and fisheries (potential, relative fishing pressure, etc.) using quantitative and qualitative indicators (when quantitative information is missing).

The two steps may be undertaken successively or simultaneously if the local capacity permits it and they will be accompanied by a renewed effort for training in the assessment of stocks and exploited ecosystems, focussing on data limited situations. These efforts will be deployed in very close collaboration with the national fishery policy-makers and managers, and, as far as possible, under the coordination of the competent regional institution for fisheries. They will be combined with a renewed effort to develop the assessment capacity as well as the objective connections between assessments, management and development policy.

Developed countries process

For developed countries, and for the resources not dealt with by any regional organisation, the use of FIRMS standards for the development of their fact sheets would facilitate their contribution to the global system.

In order to be successful, the NatFIRMS initiative needs to: (i) build on and complement the national initiatives, e.g. using the agreed national standards regarding the geographical units, ecoregions, fishery clusters, gear types; (ii) facilitating the work of national laboratories through user-friendly interfaces (e.g. map-based interfaces; allowing easy input and download from and to national systems); (iii) facilitating the interaction of the regional communities (e.g. providing for some e-meeting facilities); (iv) be selective, focussing on the main species of interest.

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1. INTRODUCTION

World marine capture fishery landings began to level off after 1970 and are now slowly approaching the forecast ceiling of conventional resources at about 100 million tonnes. Overall, about 50% of the world resources for which data is available are fully exploited and about 25% are overexploited while 25% could still apparently produce higher level of landings. A few fisheries have collapsed but many of them are in a state in which the risk of collapse is not negligible.

Widespread concern is being expressed about the state of many fishery resources and their non-sustainable use, especially since the UN Conference on the Environment and Development (UNCED, 1992). This has led to questioning of present performance of production and management systems and to the adoption of new important international instruments as well as to a growing process of change in governance at national and lower level.

This concern has often been exaggerated by dedicated advocates and the real situation misinterpreted because of the lack of scientifically adequate and easily available information. While fairly detailed information is available for a number of important stocks, a large but unknown number of stocks and species are in an unknown state. There is a particular lack of information on the status of resources in coastal areas (especially for many small islands), resources exploited by small scale fisheries, and resources subject to rapid environmentally-induced fluctuations.

With the entry into force of UNCLOS and the adoption of the UN Fish Stocks Agreement, the Code of Conduct, the Compliance Agreement, as well as the Convention on Biological Diversity, the legal framework for enhanced resources conservation has improved, but there is a growing feeling that public opinion is destabilized and often misinformed because of the lack of clear, easily understandable and verifiable information on the state of the resources and their habitat, based on the best scientific evidence available, from objective sources. Similarly, policy-makers, confronted to tremendous implementation challenges lack clear information on alternative solutions and pathways to management or rebuilding of stocks as well as to ecosystem-based fisheries management.

The monitoring of the implementation of the recently-agreed instruments and the assessment of management performance calls also for the development of harmonised and integrated information systems of indicators on the resources and their habitat. The formidable challenge created by rising demands for timely, verifiable, high quality, integrated information, at the appropriate level of aggregation and resolution (from national to global levels) is being tackled by FAO through development of FIGIS (the Fisheries Global Information System)**.** The main objectives of FIGIS are to raise awareness of policy issues relating to fisheries and their environment, to promote standards and improved practices in the conduct of fisheries and fisheries-related activities, and to provide comprehensive and coherent fisheries information.

The need to cooperate globally to improve the information was recognized in principle at the first Meeting of FAO and non-FAO Regional Fishery Bodies or Arrangements (Rome, 11-12 February 1999). The FAO Advisory Committee on Fisheries (ACFR) recognized the unequal distribution of scientific knowledge across regions and species groups and the various processes needed to monitor status and trends of resources where the following situations can be encountered:

1. stocks assessed regularly in cooperation: in the framework of management commissions (IATTC, ICCAT, NAFO; CCSBT; FAO Commissions under Article XIV, etc.) or in the framework of scientific commissions (ICES, PICES, SPC, FAO Commissions under Article VI)
2. stocks assessed regularly at national level, in a national fishery management institution or fishery research agency

3. stocks irregularly assessed: (i) by university scholars (in the framework of thesis, etc). formal assessments published in refereed journals; (ii) in informal reports (consultants, NGOs, industry) in newspapers, magazines; (iii) through other types of information of value for assessment (market supply, prices, sector information, etc.);
4. Stocks not assessed, either because they are considered as having no commercial value or/and they are exploited only as by catch

For many of these situations, the information quantity, quality, availability and integration could be significantly improved through a global undertaking to develop a global fishery resources monitoring system interactively maintained by a network of partners facilitated by FAO. ACFR concluded that progress towards a global system of status and trends reporting on marine fishery resources should be achieved through:

1. increasing completeness by including information on some fisheries and fishery resources currently under-represented in FAO data;
2. expanding the scope of current reports, broadening them to the economic social and ecosystem aspects; and,
3. enhancing quality assurance.

For those fisheries/resources falling under mandates of Regional fishery body or national centres of excellence, such an information development strategy is specified in a **Partnership Agreement** between FAO and Regional Fishery Bodies as well as national centres of excellence, to promote information exchange on stocks status and trends.

2. BACKGROUND ON FIRMS AND THE NATIONAL MEMBERSHIP ISSUE

Six years after its establishment, in February 2004, the global Fisheries Resources Monitoring System (FIRMS) partnership has reached a significant level of development -particularly on fishery resources inventories and monitoring and publications standards: It is also progressing towards the implementation of its inventory of fisheries and fishery management systems. The FIRMS legal partnership involves presently 13 regional fishery organisations dealing with regional collaboration, management and statistics and the information collected concerns those stocks and fisheries that are under their jurisdiction. About 620 stocks are presently registered and monitored in FIRMS, and additional 810 enumerated by Partners and Observers but not yet loaded in the system. The 620 stocks loaded in the system represent only roughly 15 %[3] of the total number of stocks[4] exploited worldwide. Most of the stocks presently uncovered are under national jurisdiction or transboundary and exploited by coastal fisheries, many of which small-scale.

In order for the global system to improve significantly its coverage, initiatives similar to FIRMS in spirit and approach need to be developed, involving new partner contributors at national level, progressively closing the gap between monitored and unmonitored resources and fisheries. This will assist policy-makers at global, regional or national level in identifying new areas for action and priority in line with the requirement of the 1982 LOSC, the 1995 UN Fish Stock Agreement and the 1995 Code of conduct, directly supporting the implementation of related international and national plans of action. This will also bolster States action actions needed to implement other international instruments such as the 1992 CBD or to achieve the UN Millennium Development Goals. The idea of expanding the FIRMS effort and model to cover all known world stocks, developing a

[3] The global number of stocks is not known with certainty and may change slightly as management systems evolve. Extrapolating from the ongoing comprehensive inventory undertaken by FAO under the Fisheries Global Information System (FIGIS) initiative, it could be roughly estimated at about 4000.

[4] Following Gulland's original suggestion, the concept of stock is pragmatically taken here as a set of resources, comprising one or many species, exploited and managed together.

NatFIRMS information system has therefore been logically presented to the FIRMS Steering Committee (FSC4) in Madrid in March 2007.

The paper "*Feasibility of FIRMS opening to national membership, 1st draft*" (FIRMS Secretariat 2007a) presented to FSC4 outlined the legal, technical, financial and strategic aspects of opening FIRMS membership to national institutions. It was noted, that the FIRMS Agreement did foresee the inclusion of national members and that the paper presented by the Secretariat had given a useful analysis of the various aspects to consider when such expansion will take place in the future, including good balance between the participation of developed and developing countries. Different possibilities of finding donors for strengthening the Secretariat and/or Partner organisations – if such an extension was to take place – were presented. In addition, the paper suggested to cooperate with the 2003 FAO FishCode-STF project which is also fostering the implementation of the FAO Strategy for Improving Information on Status and Trends of Capture Fisheries, collaborating in data collection and capacity building, and using the project website as the interaction platform to reduce the burden on the FIRMS site. In the discussion one gap was noted, relating to the *modus operandi* of future FSC meetings involving numerous national members in addition to the present members. The importance of strengthening national capacities in the area of status and trends information, in particular in developing countries, was also stressed.

FSC4 felt that the current work of FIRMS had to be better consolidated and better embedded before an expansion could take place and it concluded that such expansion was not to be considered at this point in time. It decided also that the document FIRMS FSC4/2007/5 should be kept on the FIRMS website for future discussions.

In parallel, however, a number of discussions took place: (i) in FIRMS partners' meetings regarding the validation of the resources or fisheries inventories being completed; and (ii) with potential donors[5], looking for financial support for the FIRMS partnership. These discussions indicated the need for a FIRMS-like process at national level, building on, and further supporting, the existing initiative (FIRMS Secretariat 2008a). Such an initiative of direct interest to donor countries could foster financial support and be launched as a 4 to 5 years project to test its feasibility. Presented as *institutionally disconnected* from the FIRMS Partnership arrangement (i.e. using distinct operational and governance structures), this project would strive to develop synergetic information flows between countries and RFBs on a case by case basis, where these flows do not yet exist. It should benefit many FIRMS Partners through an enhanced ability to exchange a more comprehensive information on fisheries status and trends, and from the additional toolkit eventually developed.

The initiative was therefore tabled again at FSC5 in July 2008 through a document entitled "*NatFIRMS[6], an initiative for fostering FIRMS like processes at national level*" (FIRMS Secretariat 2008a). The paper, that provided a planning proposal for NatFIRMS, including project Objectives, had been elaborated by the FIRMS Secretariat for on-going contacts with potential donors such as France, the USA or Canada. The decision taken by FSC4 to defer expansion of FIRMS membership to national institutions was recalled as well as the various discussions that had taken place at FIRMS technical meetings and with donors and made the need for a FIRMS-like process at national level more tangible. It was noted that the actual interest of countries in such initiative could be assessed through an international workshop to be organized by FAO, and would anyhow be tested based on actual funding support received. It was also noted that the extension process would be a parallel process to FIRMS, coordinated with it, but independent from it.

[5] The document FIRMS FSC5/2008/4 introducing the NatFIRMS project concept note elaborated by FAO to FIRMS' partners, for their awareness and comments, has already been thoroughly discussed with France.

[6] The NatFIRMS acronym will be used in this paper when referring generally to the initiative of opening the FIRMS membership to countries.

SCF5 members expressed some concern regarding: (i) the future audience of NatFIRMS considering that *most national agencies already had their own outlets and audiences*; (ii) the risk that NatFIRMS could anyhow slow down the further progress of FIRMS; and (iii) that proceeding with NatFIRMS would impact the future strategy of FIRMS itself, e.g. with respect to FIRMS membership. FSC5 decided therefore that the NatFIRMS issue will once again be addressed at FSC6.

Structure of the paper

This paper has been prepared to assist FSC6 members in their discussion on the subject, addressing specifically the concerns expressed. For this purpose, after a short introduction, the paper recalls first, the background of the NatFIRMS issue and the origin of FIRMS before examining the potential audience and benefits of the initiative, the risk of duplication of national efforts, the potential interferences between the ongoing FIRMS process and the NatFIRMS process. The paper concludes with a series of considerations regarding the co-development of FIRMS and NatFIRMS which the Steering Committee is invited to consider.

3. ORIGINS OF THE FIRMS PARTNERSHIP

The early days

Before the seminal global collaborative assessment published by FAO (Gulland 1971), there was no comprehensive information on the state of world fishery resources available to policy-makers, scientists, the media, the public, etc. Since his publication, this document has perhaps been the most widely cited fishery publication of FAO, illustrating the high global demand for authoritative reference documents on the state of resources and fisheries that can be used by a wide range of users for information, research, monitoring, policy-making, etc.

This publication has been progressively updated through more detailed regional reviews undertaken between in the 1970s and 1990s with the view to keep the FAO Committee on Fisheries (COFI) regularly informed, taking opportunity of the numerous regional projects funded by FAO, UNDP, NORAD, ICEIDA, DFID, ORSTOM, USAID, ICOD and other organisations during that period to support the work of the emerging regional fishery organizations: in the Indian Ocean (Cushing 1971, FAO 1977), Eastern Central Atlantic (Domain, 1976; Troadec and Garcia 1979; Belvèze and Bravo de Laguna 1980), Southeast Atlantic (Newman 1977; Wisokinski 1986), Western Central Atlantic (Naidu and Boerema 1972; KLima 1976; Stevenson 1981; Mahon et al. 1993), Mediterranean (Oliver 1983); Black Sea (Ivanov and Beverton 1085)Gulfs (Morgan 1985; Sanders and Morgan, 1989), Northwest Pacific (Chikuni 1985), Southwest Atlantic (Csirke 1987), South China Sea (Shindo 1973), Southeast Asia (Chullasorn and Martosubroto 1986; Devaraj and Martosubroto 1997), Pacific islands (King, 1986, Bour 1990, Conand 1990). A few years after Gulland's 1971 seminal review, the information on the state of global marine fishery resources started to be periodically updated for distribution at COFI (FAO 1978, 1979, 1981, 1983, 1985, 1897, 1989, 1992, 1994, 1995, 1997, 2003, 2005; Grainger and Garcia 1996; Garcia, De Leiva and Grainger 2004; Gulland 1978). Occasionally, special reviews have been published regarding specific sets of global resources of interest, often in connection with international events or agreements e.g.: Mesopelagic fish (Gjoesaeter and Kawaguchi 1980); highly migratory species and straddling stocks (FAO 1994; Maguire et al. 2006); High seas resources (Garcia and Majkowski 1992; FAO 1993; Bensch et al. 2008); Global tuna resources (Fonteneau and Marcille 1993; Majkowski 2007); or Deep sea resources (FAO 2005). Global reviews have also been produced by FAO (FAO-UNCED 1991; Grainger and Garcia 1996; Garibaldi and Caddy 1996; Garcia and Newton, 1997; Garcia and De Leiva 2003).

The synthetic reviews of the status and trends in the sector, occasionally produced for COFI's attention (e.g. Robinson 1984, FAO 1993) was upgraded to a more comprehensive and collaborative synthesis by the entire Fisheries Department (FAO 1993) formalized later into the

well known State of Fisheries and Aquaculture, SOFIA, now regularly presented at COFI (FAO 1997, 1999, 2000, 2002, 2004, 2007 and 2009).

Because of the growing demand, worldwide, for such authoritative compilations, the concept of world resources reviews was progressively extended to inland fisheries resources (e.g. FAO 1995; FAO 2003a) and aquaculture (FAO 1995;) and is progressively covering also the fisheries ecosystems. Finally, with the growing concern about the poor performance of fisheries management in many areas of the world, reviews of management systems are also being requested and the first two, covering the Indian and Pacific Ocean have been recently published (De Young 2006, 2007; Shotton 2006).

The underlying demand

There can be no doubt that there is a large demand (and therefore a large audience) for reliable information on fisheries and resources, globally as well as regionally and that, in that respect FAO has always fulfilled a unique function, including in support of specific special international events or as a special contribution to special issues of global relevance such as the preparation of UNCED, the UN Fish Stock Agreement, the large-scale pelagic driftnets resolutions, the adoption of the precautionary and ecosystem approaches to fisheries, the debates on deep sea resources and vulnerable habitats, etc. In addition, FAO global reviews have often been used as background in national reviews on the state of fishery resources (for comparative purposes), analysis of world trade, and many other non-FAO global communications on the state of world resources, e.g. by the World Resources Institute (WRI 1994; 1998), and many NGOs, the Millennium Assessment, universities, GreenFacts website[7], the World Bank (Garcia 2009), etc. The latter was prepared specifically in response to a demand by The Bank for information on the state of fisheries at national level, information considered by Bank experts as inadequate to support financial support programmes.

This long-term dedication of FAO to world resources monitoring and the intense use of its outputs in fishery science, resource monitoring, policy-making and global or regional management performance underscores the high demand for authoritative information on fisheries emanating from FAO member countries; national, regional and global institutions; research laboratories and universities; fishery consultants, the private sector, the media and NGOs. The Establishment of the Convention on Biological Diversity (1992), the Millennium Ecosystem Assessment (2001), the adoption of the Ecosystem Approach to Fisheries (EAF) in 2001 and the dreadful perspectives of climate change have exacerbated and broadened the demand, the use of which in the literature and in the media has significantly increased in the last 2-3 decades.

The formal demand and response

This high demand is confirmed by the formal FAO processes. In 1997 the First Session of FAO's Advisory Committee on Fisheries Research (ACFR) raised several concerns about the way fishery status and trends information was assembled and disseminated and it recommended that improvements be made. Following endorsement of the recommendation by COFI in 1999, the ACFR Working Party on Status and Trends in Fisheries considered shortcomings of present systems recognizing that the information needed improvements in terms of transparency, quality assurance, credibility, comprehensiveness, scope. It stressed that such improvements could be obtained through stronger partnerships between fishery organizations and scientists at the local, national and regional levels. ACFR elaborated for COFI a proposal for a plan of action which established, in 2001, a Technical Consultation on Improving Information on the Status and Trends of Capture Fisheries (Evans 2001). This consultation produced, in 2002, a draft Strategy for Improving Information on Status and Trends of Capture Fisheries, adopted by COFI and endorsed by the 104th FAO Council in 2003 (in brief the Strategy-STF). The UN General Assembly

[7] http://www.greenfacts.org/en/fisheries/index.htm

Resolution A/58/L.18 adopted in December 2003 on sustainable fisheries invited States to support the implementation of the FAO Strategy-STF at national and regional levels, giving particular attention to capacity-building in developing countries. FIRMS is a major instrument for implementing the STF-Strategy.

In line with the traditional mandate of FAO and responding to most pressing demands of its clients, the objective of FIRMS partners is to provide their clients with an additional, standardized and more easily comprehensible information that the detailed one contained in the scattered and technically complex conventional publications (assessment reports, etc.) for an easier monitoring of the status and trends of fisheries, their resources and their management, based on authoritative information sources. This is achieved through development of standards and protocols for information exchange. From that perspective, FIRMS is a major implementing mechanism of the FAO Strategy for improving information on status and trends of capture fisheries (Strategy-STF). Contributing to FIRMS is the way the FAO members can fulfil their commitment towards improved global monitoring of fisheries.

From a more general institutional angle, FIRMS is a technologically innovative way of delivering an essential and constant function of FAO, indeed its first priority in its constitution: the delivery of reliable aggregated information on food items and their production systems. The "clients" for this information, and hence the "audience" for the information systems developed, is a long standing, multi-facetted audience dealing with policy-making (fishery managers, advisers, scientists), education (Universities, high schools and the public at large), advocacy (through fishery or environmental NGOs) and general information through the media.

The low national capacity issue

Contrasting with this increasing concern and demand of information on resources and their ecosystem, for monitoring, policy-making and communication, the relative availability of formal information on stocks and fisheries has tended to decrease during the last decades, particularly but not only in the developing world, for a number of reasons:

1. The slow development of scientific research in many countries and the small (and decreasing) priority given to research on primary industries and on fisheries in particular.
2. With the mainstreaming of stock assessment procedures in management processes, the assessment work done by fisheries experts is not considered anymore as innovative and it is rarely accepted for formal publication. Victim of its own success, the assessment work has progressively dived into the grey literature arena while only new methodological developments remain in the forefront. The assessments became background information for routine planning and management processes or debates at national parliament levels… disappearing from the bibliography and global communication "radar". In compensation, the amount of work and publications on ecosystems aspects of fishing have increased, broadening the picture and often losing the individual stock details.
3. This process has been significantly accelerated in the developing world by the termination of all the large regional projects of FAO, UNDP and other donors that had supported the development of regional fishery commissions during the 1970s and 1980s. The glaring exception in this trend is the long-term support provided by NORAD through the long series of so-called *Fridtjoff Nansen projects* since 1975. Many of the scientists trained during these early times have either retired or have reached higher levels in the administration. They have often not been replaced or have been replaced by scientists with different skills (see bullet 3 below).
4. The significant difficulties encountered with traditional assessment of tropical multispecies and artisanal fisheries.

5. The progressive broadening of the demand on fishery research centres, for ecosystem assessments, ecosystem health, integrated management, aquaculture development etc., has dispersed the limited means available for stock-assessment *sensu stricto,* leading to a loss of operational capacity in resources assessment in many countries and regions compared to that available in the mid-1980s.

In contrast with this situation, many Regional Fishery Bodies, particularly those involving developed countries and major fishing nations have maintained and improved their monitoring quality as well as the diffusion of their information through internet, taking opportunity of the new developments in Information and Communication Technologies (ICT).

Also, in a few developed countries systematic efforts have been made -and unfortunately sometimes discontinued- to publish comprehensive paper reviews on the status of stocks for which the relevant information is available (see section 5 for more details).

The FIRMS response

A brief on FIRMS is given in Annex 1. In this global context of increasing demand for information at global and regional level and decreasing information availability (and quality, in many places) at national level, it has become increasingly difficult for FAO and its regional fishery bodies to maintain the quality and comprehensiveness of their global and regional resources and fisheries review. The shortage of stock-specific information has been, to some extent, tentatively mitigated by more intense analysis of the trends in reported landings (Garcia and Newton 1997; Grainger and Garcia 1996; Garibaldi and Caddy 1996; Garcia 2009) that can be seen as a proxy but not a replacement to conventional stock assessment and the development of national capacity remains a key concern (see below).

This first phase of FIRMS development involving regional organizations aimed at testing the proof-of-concept with institutions having both the mandate and the capacity to cooperate effectively. The development and consolidation of a trustable platform, usable by competent, well organized regional institutions, was a necessary first step, before an expansion of the monitoring approach to the national level for as comprehensive a coverage as possible. In the end, the relative comprehensiveness and the quality of the information uploaded in FIRMS will be an indicator of the progress made in monitoring national fisheries (and hence the global fishery system) through the FIRMS partnership. There is, however a capacity problem.

Raising national capacity

FIRMS has been developed (and NatFIRMS is proposed) as a response to the problem posed by the insufficient priority given by countries to global fisheries monitoring and hence the insufficient capacity allocated to this function. However, the perspective of an expansion of FIRMS to national membership and information is constrained by the insufficient capacity of many countries and of some regional institutions.

Because of this imperative problem, NatFIRMS is not considered simply as the extension of the present collaborative publishing system of the regional partners, but as a two-way system of collaboration in which the national partners take opportunity of their partnership to get the assistance they need to develop or improve their capacity to conduct recurrent assessments and to submit them to their policy-makers and to a global web-based system.

The web-publishing issue is recent and emerged with the development of internet platforms. In terms of difficulty it represents only the tip of the iceberg. The recurrent assessment issue is the iceberg itself. The inadequate capacity of many countries to assess their resources sufficiently frequently and with enough precision to be useful for decision-making has been a central concern for FAO (see section 2). A successful development of NatFIRMS will require the provision of assistance to the countries for both the undertaking of the assessments AND their publication on

FIRMS. The EU-funded ISTAM project[8] in Northwest Africa is a good example of what can be done and how to coordinate national capacity-building and development of collaborative information systems in support of a regional institution -in this case the Sub-Regional Fishery Commission (SRFC-CRSP) based in Dakar, Senegal.

Methodologies for data-limited situations were developed and diffused by FAO in the developing world for 4 decades. With the adoption of the EAF, the conventional assessments need to take more parameters into consideration, and the manuals and guidelines have evolved accordingly. The capacity-building efforts will need to extend this effort on the ground, adapting training to new needs.

The task of helping countries to produce and post on FIRMS the information about their fisheries and stocks raises also the capacity of FIRMS to do so without jeopardizing the maintenance and further development of the regional component. This concern calls for a reflection on the approaches that can be used to, on the one hand, bring national capacity up to needs and, on the other hand, align expectations to available capacity. The task is certainly important and demanding while the means are likely to be limited. NatFIRMS will therefore require an adaptive approach starting with low-level requirements and increasing the requirements as capacity builds-up, with the ability to handle different levels of capacity simultaneously. The steps could be as follows:

Step 1: assisted elaboration of simple inventories of stocks, fisheries, vulnerable species, etc., and simultaneous development of a national internet sub-site on which the national material published in FIRMS as well as regional information of national interest can be broadcasted (i.e. through linkages with the FIRMS website);

Step 2: assisted review of the state of these stocks (potential, relative fishing pressure, etc.) using quantitative and qualitative (fuzzy) indicators (when quantitative information is missing);

These two steps will be undertaken successively (or simultaneously if the local capacity permits it) and will be accompanied by an renewed effort for training in the assessment of stocks and exploited ecosystems, focussing on data limited situations. These efforts will be deployed in very close collaboration with the national fishery policy-makers and managers, and, as far as possible, under the coordination of the competent regional institution for fisheries. They will be combined with a renewed effort to develop the assessment capacity as well as the objective connections between assessments, management and development policy.

The funds needed to support this global effort will be raised by the FAO secretariat but also by the relevant regional institutions as part of their capacity-building efforts.

Contribution to EAF

As defined by FAO in its guidelines, EAF is an extension of the conventional management system, with broader, more systemic objectives and management measures to conserve a broader range of ecosystem components, within an area-based and more participative approach. Transparency is a must. Within FIRMS (and implicitly in NatFIRMS), resources can be defined very flexibly:

1. As a single-species stocks: e.g. Moroccan hake
2. As a multispecies stock: e.g. Mauritanian sea breams
3. As an area-based resource pool: e.g. the coastal small-scale fishery resources of Senegal

Nothing impedes FIRMS to evolve further in more ecosystemic definitions of the resources as and when national and regional systems will have the capacity to do so. Moreover, the FIRMS governance might be able to foster more rapid progress in that direction.

[8] http://www.ecoscopebc.ird.fr/EcoscopeKB/resources/agents/projects/fiche_istam.pdf

For any of these elements, FIRMS can handle more meta data such as data related to the intrinsic vulnerability of the species concerned, their eventual listing by IUCN or CITES, etc. Most of this information is already available in FishBase and could be simply connected to FIRMS which could, in turn, foster the vulnerability assessments of other species not covered at the moment in FishBase.

Similarly, the fishery inventory modules might consider the ecosystem in which the fleets operate and the degree of vulnerability of the concerned habitats.

In brief, FIRMS, its structure and its internal functions are not and will never be an impediment for moving towards an EAF-compliant system. One of the responsibilities of the FIRMS governance will be to ensure it.

Contacts established on NatFIRMS

Preliminary and informal discussions regarding their possible participation in NatFIRMS have been conducted by the FIRMS Secretariat with the Australian Bureau of Rural Science (BRS), the Canadian Department of Fisheries and Oceans (DFO), the Fisheries Informatics Centre of Viet Nam, the Institut Francais de Recherche pour l'Exploitation de la Mer (IFREMER), the Namibian Ministry of Fisheries and Marine Resources, and the United States National Marine Fisheries Service (NOAA-NMFS).

Conclusions

The enhanced focus on monitoring status and trends in fisheries and resources is grounded on a very long recognized and unique competence of FAO in that respect in response to a long standing and consistent demand from member countries (formally) and numerous clients. With the growing importance of such statements, for international institutions and NGOs, the pressure has grown for more frequent and more comprehensive reports on resources, fisheries, management systems, fishing fleets and fishing operations an to a growing extent, on the exploited ecosystems.

The only possible and logical response to such a challenge is to empower the regional fishery organizations and the countries themselves to contribute directly, under their own responsibility, the information that society was requesting. Fortunately, the rapid global development of computers, internet and Information and Communication Technologies (ICT) in general have completely modified the way information is collected, processed and communicated, offering opportunities for the FAO monitoring system to be modernized and enhanced. Interactive systems in which the information producers can insert and manage their own information are becoming the standard and improve timeliness, quality, and legitimacy. Riding this trend, and indeed innovating in the fisheries arena, the Fisheries Resources Monitoring System (FIRMS) was conceived, launched and progressively developed in partnership, starting with the mandated regional institutions.

The same ICT development offers opportunities for capacity development, e-training, e-meetings, distance-mentoring, etc. that are part and parcel of the NatFIRMS project. The implementation of NatFIRMS in numerous low-capacity countries and a few high-capacity ones, requires a dual approach:

1. in high-capacity countries (e.g. Australia, Norway; France), the same approach used for regional institutions may be used, essentially based on the adoption of international standards for joint publication;
2. in low-capacity countries, capacity-building in both assessments and their publication will be needed in support of a progressive, adaptive approach, tailored to local needs, using data-limited methods and qualitative indicators as required;

In the particular case of continent-countries (e.g. USA, China, India, Russia) the national problem is very similar to a regional problem, particularly in a federal government system and the approach will need to be tailored to needs expressed.

4. NatFIRMS POTENTIAL BENEFICIARIES AND AUDIENCE

This section of the paper addresses one of the concerns expressed by FSC5, namely the nature of the audience expected for NatFIRMS. It expands on that concern to include not only the audience, in a conventional sense, but the benefits that NatFIRMS members can draw from the Partnership. It might be useful to stress that, in some respect, the potential audience of NatFIRMS is the same as (or overlaps with) that of the regional organizations of which they are member, particularly when stocks or fleets (including foreign fleets) are shared.

It should be obvious that under the Law of the Sea Convention, the prime responsibility to provide the best scientific evidence on fisheries, to their nationals and to society as a whole, is on States, either individually or though the organisations they may have established for fisheries management purposes. It should also be obvious that it is in the interest of regional fishery organisations that the capacity of their coastal and fishing member states be enhanced. It has been stressed above that in many regions, such national capacity has indeed significantly decreased or has not kept up with changing requirements and technologies.

The concern expressed by FSC5 should therefore be considered from 2 angles: (i) the audience that NatFIRMS or national subsections in FIRMS would have; and (ii) the benefits that countries would draw from developing their national subsection in FIRMS.

In the following sections these concerns have been addressed through: (i) an analysis of the potential beneficiaries (and hence potential audience) of NatFIRMS and (ii) an examination of the synergies, as well as risks of duplication that would emerge as a result of NatFIRMS development. In addition, the positive and negative interactions between NatFIRMS and FIRMS have been looked at.

The audience concept

The term “audience” is understood in many different ways. In the context of this document, the audience is defined as the part of the society that is, or might be, interested in receiving information on the nature and characteristics of stocks and fisheries and on the ecosystems in which they operate. It can therefore be the actual audience (the number and types of people presently accessing the information) or the potential audience (all those that could be interested in such information). The target audience is the group of people who are expected to visit the website or that part of the potential audience that the information producers actively plan to reach. The actual audience (or outreach) may be smaller than the target audience if outreach efforts are insufficient or ineffective. It could be much higher than the target when clients other than the target group, which are part of the potential audience, get interested. An example is when environmentalists get interested in information on fishery stocks as indicators of the state of the environment.

The audience could be direct or indirect. The *direct audience* accesses the primary information directly for use in its original form or after some elaboration. The *indirect audience* accesses the information derived from the primary information. For example, fishery scientists (as providers and users of the information) and fishery advisers (as users and analysts) of the primary information would be part of the direct audience of FIRMS. Fishery or environmental ministers, who use the information elaborated by these scientists and advisers are part of the indirect audience. Indeed, the indirect audience might, in many cases, be more important for the *impact* of the system than the direct one. It is obvious also that the indirect audience (policy-makers) could become direct if the information system offers content of direct relevance to them, such as policy briefs or issue papers.

The audience is therefore a dynamic phenomena. It can be maintained, increased or lost. It depends on the information content (in quantity and quality), presentation (more or less attractive or user-friendly), and technology (more or less accessible to web-based crawlers). It also depends on

outreach efforts (e.g. “marketing”), the web culture of the potential clients, their access to web systems, and their understanding of the language used.

The audience depends also to some extent on whether the site is easily accessible or hidden in more complex websites. The search string “state of fisheries resources and stocks” did not detect FIRMS in the first 10 pages of return hits (i.e. the first 100 references). However, the search string “fishery resources monitoring system”, not surprisingly, returns 4 references to FIRM on top of the first page. The access is also rather easy from the general FAO website. This implies that the entry to FIRMS is easy for people knowing exactly what to look and where but much ore problematic for the others.

The audience and the information system may co-evolve with time and the audience may get larger and more diversified as the information system approaches maturity.

The audience of a global system like FIRMS is therefore multifaceted by definition, comprising a mix of user profiles with different educational background, levels of responsibility, computer knowledge, language ability and expectations. It is both local, national, regional and global. It is expanding from the fishery to the environmental arena.

Assessing the potential, direct and indirect, audience of FIRMS can be projected looking at the actual and *potential beneficiaries* of FIRMS information. The actual and direct audience of FIRMS can be examined fairly easily using statistical tools (such as *WebTrends*[9]) that help analysing the spectrum of actual contacts with the website.

Potential beneficiaries and audience

A priori, the beneficiaries of a resources monitoring system are numerous and are part of the fishery and environmental community. They draw benefits deriving from the improved coverage, availability, accessibility, authoritativeness and timeliness on stocks and fisheries assessments. The categories of beneficiaries, approximatively and subjectively ranked by the importance and relevance of the benefits for their lives, are listed below. The ranking is only indicative and could probably be improved with clearer ranking criteria.

1. Fishers and the fishing industry firms: draw formal information on the state of the stocks they depend on as well as stocks they may not exploit themselves yet. The information is also useful for the definition of their allocations and the planning of their investments and activities.
2. National fishery policy makers and managers: draw information useful for the formulation of their policies and plans and for the monitoring of their governance performance. This is particularly true if specific indicators are defined. Very often these “users” use their scientific advisers as interface with FIRMS-type systems.
3. National environment policy-makers and managers: draw information on one of the most important stressor of the coastal marine environment with systemic impact on the marine ecosystem.
4. Fishery scientists: are both producers and consumers of information on resources. Local scientists need a system to publish the national information they produce to ensure transparency. They also need access to a system where the present and past information is rationally stored and organized. They use such information to assess the resources; to understand the effectiveness of assessment and management approaches and tools. Scientists also benefit from access to non-national information on similar resources elsewhere, to undertake comparative and meta analyses on resources similar to national ones.

[9] www.webtrends.com/

5. Regional organisations competent for fisheries or environment management: which generally have an obligation to disseminate information on the status of fisheries, fish stocks and the environment and are often required to provide assistance to their member countries for these purpose.
6. International institutions: such as FAO, UNEP, IUCN, CITES, etc. which have the mandates to follow the state of the resources under their responsibility and of the environment.
7. Planners and financial institutions (as the World Bank): looking for information on potentials and state of the fishery resources, for investments on development or management.
8. Environmental NGOs: dealing with fisheries and the environment need information on fisheries resources in their own right as well as an important element of the biodiversity.
9. Fisheries NGOs: fishery associations, lobby groups, for which the state of stocks is an important arguments in national, regional or global negociations;
10. Consumers and ecolabelling agencies: need this information to guide them and their constituency on which are the well managed species that can be sustainably consumed.
11. The public at large: to have a basis upon which to judge whether the government provides adequate stewardship of both renewable resources and the environment;
12. Future generations: can obviously not presently access the system but will benefit from it later because of the long-term information they contain about the past state of the system and its trajectory (adaptive learning), reducing the risk of shifting baselines. For them, a FIRMS-type system is an investment.

The potential beneficiaries become the "audience" of the system when they start using it effectively. The degree to which they can use it depends on the degree of maturity of the system, in terms of coverage, accessibility, etc. As a consequence the real audience will change with time. Initially, as shown by web trends statistics about site visits, the main users are the scientists themselves who use the system to organize their findings. The policy-makers and managers benefit from that use in terms of more complete accurate information and hence, potentially, more effective measures.

The Secretariats of the Fisheries Regional Organizations themselves are also immediate beneficiaries of FIRMS as they receive greater consideration from their member countries that are able to manage their wealth of information with greater availability, responsiveness and transparency. FAO is also a main beneficiary: in the short term because an otherwise not available information central to its mandate improves; in the longer term because the capacities of the developing countries to produce such information increase. In the end, the process can only result in a better and more transparent monitoring, resource conservation and better implementation of the Code of Conduct for Responsible Fisheries, its strategies, action plans and guidelines.

The capacity of the developed and developing countries to satisfy these audiences and demands is very different.

Present audience

Comparing FIRMS Web trends during the last three years (see Fig. 6) it is clear that the number of visits has increased by about 60% between 2007 and 2008 while the number of pages viewed have increased by about 100% (Figure 1). The traffic has stabilized between 2008 and 2009, possibly reflecting the stabilization of the FIRMS partnership. During the three years the number of visits per visitor was stable around 1.3 visits/visitor while the number of pages per visit has decreased by about 22% (from 6.1 to 4.7 pages /visitor).

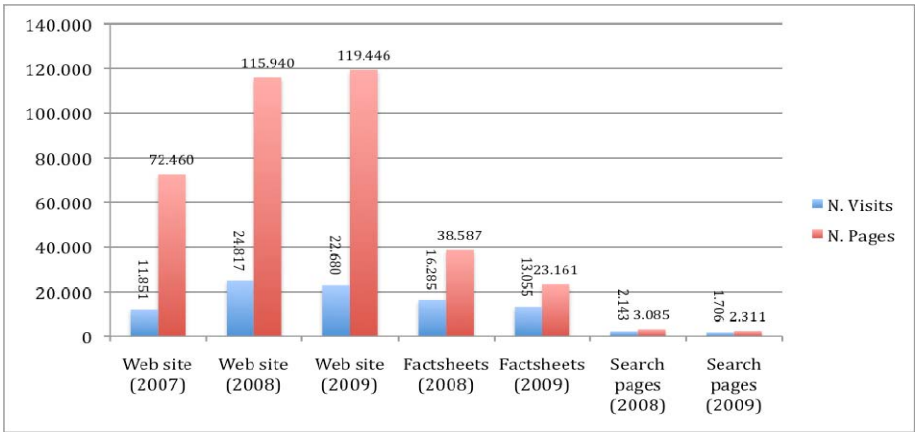

Figure 1: FIRMS Web statistics 2007-2009

Accessibility and traffic sources show that 80% of visits access FIRMS directly (i.e. the visitors know exactly where to go) while, on average, around 12% of the visitors access the system through search engines and the remaining 8% arrive through other sites such as fao.org, wikipedia.com, icatt.int, friendsofthesea.com, gfcm.org, nafo.int, seafdec.org, and ccsbt.org. This indicates a strong traffic coming essentially from the partners themselves and a very limited outreach.

The statistics indicate that, at the moment, the most important clients are the scientists involved in the development of FIRMS and their close contacts, either as information contributors (interacting with the site) or information users. This narrow range of audience is quite normal at this stage of development of a growing system that not yet well known out of the circle of developers, to the other potential users. While no analysis of this fact could be made, the low outreach could be the result of two convoluted factors:

1. Incomplete coverage, by regions or types of resources. Because of the present membership, FIRMS does not deal yet with all resources and is not useful enough for clients interested by a comprehensive picture. In particular, the system does not cover yet all the resources that attract societal attention. Tuna are covered in principle, but deepsea resources, for example are not.
2. Absence of syntheses. There is a high demand for syntheses. FIRMS will facilitate the elaboration of global or regional pictures across a large spectrum of resources. But this is not feasible at the moment because of the incomplete coverage.
3. Competition with the FAO syntheses. These syntheses (see the reference list), whether global (as in SOFIA) or by major types of resources, are in high demand. In the future, when FIRMS will be better populated, the syntheses will be of higher quality and they will be able to refer back to FIRMS and to the partners sites, attracting additional audience to FIRMS and to the sites of its partners. At the moment, however, these syntheses satisfy a demand that cannot yet be redirected to FIRMS. The citation records of these FAO publications would give an idea of the potential demand for a more comprehensive FIRMS.
4. No outreach strategy. There is not yet any outreach strategy for FIRMS. However, its audience could probably be diversified, even at the present stage of development if more and more specific efforts were made to this end. Until now, FIRMS has been presented in a few international conferences, eg OBI 2005, APEC 04_2007 but most efforts concentrated in presenting it directly to regional fishery organizations. More could be done to present the system to a broader range of users and such efforts should be undertaken jointly by all partners, with the support of the FAO Secretariat. It is also important that FIRMS be referred to in each partner site and be enriched with policy briefs and syntheses, etc. In brief

FIRMS might be more visited if, in addition to its fact sheets it will also give access to a global data base allowing cross cutting analyses (attracting more scientists) and to policy-relevant material directly connected to the state of stocks and fisheries. The audience will also increase if the site starts explicitly providing international standards, training facilities, etc. and becoming de facto an internet platform for the stock and fishery assessment community.

Conclusions

The concept of audience is complex and it is important to define properly what is being dealt with. It is clear that the potential audience of FIRMS, the same as NatFIRMS, as it relates to the potential beneficiaries, is very large. This is confirmed by the large audience of the FAO global publications on the state of fisheries. It is also clear that the present audience, constrained by the present characteristics of FIRMS, is limited. It appears that the expansion of FIRMS through the NatFIRMS initiative has the potential to greatly enhance the audience of FIRM itself. Overall the audience could possibly be increased also -probably to a lesser extend- through a specific strategy to increase the outreach that the FSC could design. It is likely that the development of a NatFIRMS initiative would indeed need to be an element of such a strategy.

5. POTENTIAL DUPLICATION OF NATIONAL EFFORTS

In developing NatFIRMS, a concern must be that the efforts should complement national and regional efforts and not duplicate or jeopardize them. At regional level, the present development of FIRMS indicates clearly that it fills a niche: helping regional fishery institutions to fulfil their obligations in terms of transparency and information, increasing their outreach through standardization and cooperation. Regarding NatFIRMS an examination of the risk of duplication was required and the following is the result of a simple inquiry through existing national websites. For convenience, the results are divided according to the level of development.

Developing countries

In most developing countries, there is no continuous mandatory process of monitoring of the state of national stocks. Assessments are produced occasionally, for general national development planning or fisheries planning, as well as for interventions by development banks or other development agencies. Occasional assessments, e.g. undertaken for crisis-solving in a subsector or area, tend to be fragmentary. They may also be made within a thesis in a university and in that case may be rarely updated. A significant part of the outputs more or less routinely generated remain difficult to access, buried in the grey literature of the country, and may rapidly forgotten or lost. There are noticeable exceptions.

In India, the Fishery Survey of India (FSI) operated by the Department of Animal Husbandry, Dairying, and fisheries of the Ministry of agriculture, established in 1949, is still operating with 13 research vessels providing *inter alia* monitoring of fishery resources for the purpose of regulation and management. It was not possible, however to find any detailed records on the state of India stocks, either for India as a whole or for its different States.

South Africa is another noticeable exception as this small developing country has developed a significant and high quality resources assessment capacity. Simple summary Fact sheets exist for the main fisheries[10]. No detailed information could be found about the various stock assessments.

There are also exceptions in areas covered by FAO regional fishery bodies established under Article VI or XIV of the FAO Constitution. These bodies promote collaborative resource assessments on the most important resources (strictly national, transboundary or shared) and promote international collaboration in support of such assessments. These assessment tend to cover the whole spectrum of

[10] http://soer.deat.gov.za/indicator.aspx?m=230

resources but their frequency depends on the financial resources available, the rate of accumulation of new knowledge, or the emergence of crises. For want of sufficient financial resources at both national and regional level, an important part of the single-species stocks remain un-assessed by conventional methods and are indeed rarely if ever identified. The situation, which in some areas has been degrading since the 1980s, is becoming unbearable as the economic situation of the sector worsens and consumers' pressure grows in the international market for ecolabelling. Continued ignorance is simply not an option

Developed countries

In developed countries, attempts were made to find the information on stocks status from a simple Google search. The results are briefly reported below.

In the USA, comprehensive assessments are available by regions, e.g. in the Northeast US[11]. The more detailed and complete information exists in the Regional Fishery Management Councils websites which, in general but not always, give a rapid access to fact sheets regarding the resources/fisheries/management information. Synthetic information was also found on the National Marine Fisheries Service site, remarkably updated to 31st December 2009[12,13]. It is a pity that the conventional publication *Our Living Ocean* (cf. NMFS 1999) has apparently been discontinued as it represented a quite exceptional effort to inform the Nation and the world about the state of US resources. However, a Fish Stocks Sustainability Index (FSSI)[14] is now regularly published quarterly by legal requirement.

In Canada, annual stock status reports have been found for the period 1993-2009 on the website of the Canadian Science Advisory Secretariat (CSAS)[15,16] but no easily accessible summary was found and it was not possible to find out how comprehensive that reporting is, i.e. what proportion of the existing stocks/fisheries are covered in the reports. However, a short summary report is produced in the annual Report of the President of the Treasury Board of Canada on the country's performance[17].

In France the IFREMER site is well documented on fisheries in general and the information on the state of the main resources is connected explicitly to the ICES diagnoses. The information available refers apparently only to the main target species and varies from no data at all to very comprehensive descriptions.

In Australia, Annual reports publish the state of each federally managed fishery every year and the 2008-2009 report was easily found (AFMA 2009)[18]. Fairly up-to-date reports were also found in the States fisheries websites consulted, e.g. in Western and South Australia[19] as well as Northern Territory (DPIFM 2006). These syntheses apparently cover only the stocks for which there are mandatory management plans. Synthetic publications are also found (see Figure 1) and the latest Fishery Status Report (or Wilson et al. 2008) is remarkable.

In New Zealand, a special site is dedicated to fisheries resources and fact sheets are easily available.

[11] http://www.nefsc.noaa.gov/sos/intro/
[12] http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm
[13] http://www.nmfs.noaa.gov/sfa/statusoffisheries/2009/fouthquarter/mapoverfishedstockscy_q4_2009.pdf
[14] http://www.nmfs.noaa.gov/sfa/statusoffisheries/2009/fouthquarter/q4_2009_fssi_summary_changes.pdf. The FSSI is a performance measure for the sustainability of 230 U.S. fish stocks1 selected for their importance to commercial and recreational fisheries. The FSSI will increase as overfishing is ended and stocks rebuild to the level that provides maximum sustainable yield.
[15] http://www.meds-sdmm.dfo-mpo.gc.ca/csas/applications/Publications/processSearch_e.asp
[16] http://www.pac.dfo-mpo.gc.ca/science/psarc-ceesp/ssrs/ground-fond-eng.htm
[17] http://www.tbs-sct.gc.ca/reports-rapports/cp-rc/2008-2009/cp-rc-eng.pdf
[18] http://www.afma.gov.au/information/publications/corporate/annual/ar08_09/ar08_09_part4.pdf
[19] http://www.pir.sa.gov.au/fisheries/commercial_fishing/blue_crab_fishery/fisheries_stock_assessment_reports

In Ireland (Marine Institute 2009), a very detailed report containing an exhaustive compilation on the state of stocks in 2009 was also found[20].

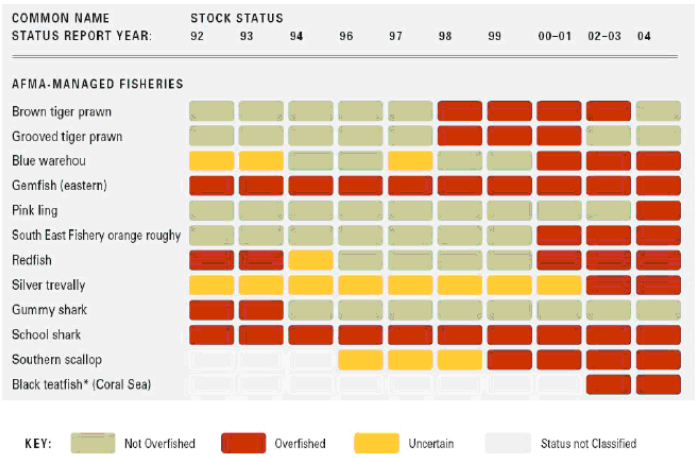

Figure 2: State of AFMA-managed fisheries in Australia (Source : McLoughlin 2004).

These remarkable efforts remain, however an exception and it is most often not clear whether the review covers all the existing stocks (very unlikely) or the ones for which information is available. In any case, whether the countries have a complete inventory of their stocks and fisheries is not clear

The national information is also streamlined and enhanced in the case of resources covered by a fishery commission such as NAFO[21] or NEAFC (Hoydal 2007) or a regional advisory institution as ICES. In the case of NAFO, the website offers information on both NAFO stocks and stocks in the EEZs of NAFO countries for which advice is requested. How diffused is this practice among regional organizations and how comprehensive that coverage may be in terms of coastal stocks and fisheries is not clear and needs to be ascertained as it offers an example of enhancement of national resources information through a regional mechanism.

Regional organizations and national resources

A number of regional organizations have advisory scientific mandates (e.g. SEAFDEC, FAO Article VI commissions) or full management mandates (e.g. CSRP, FAO Article XIV commissions) over national (EEZ) resources. A few sites have been examined. They tend to organize a wide range of information regarding the fisheries, their range, their history, the technology used, the available publications, etc. The Sub-regional Fisheries Commission (SRFC) in West Africa has an elaborated interface for information-sharing among members, publicly accessible (developed in collaboration with the EU-funded ISTAM project). The result is information-rich and appears as very promising as an instrument to further develop the cooperation among SRFC members and foreign research institutions. However, the available systems does not yet provide any integrated system or database of information on the state of fisheries or resources and, apparently, no comprehensive inventory.

Conclusions

This section does not pretend to provide an exhaustive analysis of all developed countries websites dedicated to fish stocks. However, the examination of a range of sites (see Annex 2) have not detected any duplication with developing countries' systems and found an opportunity to standardize the formats used in the developed world, opening the way to a truly global system. The overall results range from excellent to very disappointing and lead to the following conclusions.

[20] http://www.marine.ie/NR/rdonlyres/1F1CCD0E-E6AA-42F8-9FAB-98A70C1ABA35/0/TheStockBook2009.pdf.
[21] http://www.nafo.int/science/frames/science.html

In the developed world, well established research agencies exist with stable budgets and scientific complements, good electronic equipments etc., and assessments are regularly conducted at national level (e.g. in France, Norway, New Zealand, Canada) or state and federal level (e.g. in Australia, USA) and formally published. Without much prior information on its exact location but with patience and, sometimes, some luck, substantial information on stock status can be found on the web through Google. Knowing the local language and the institutions in charge of the stocks assessments is of significant help. The information offered is usually in the form of full standard reports, by stock/fishery, in html or pdf downloadable formats. It can also be presented in the form of fact sheets by stocks/species. Public access to databases (assuming they exist) is not provided so that the data has to be looked for sequentially in each report. Synthetic representation of stocks status indicators, sometimes produced in relation to policy development of performance assessment are apparently less frequent, or harder to find. Good examples have been found, however, in Australia and USA..

In the developing world, with few exceptions, the dedicated sites, when they exist, are disappointing, incomplete, out of date, and at best focussing on policy objectives and plans of action more than on actual state of the resources and fisheries. However, some developing countries sites are good. In general, only the main target species and, sometimes, fisheries are represented and there is little or no information on the stocks of associated and dependant species. Sometimes, an annual review summary is available. In many developing countries, scattered publications can be found on the Fisheries Departments websites.

What is obviously needed and exists only in a few developed countries, is a unique site where all the information, regarding the stocks, the fisheries, and their status and trends could be found online and not buried in numerous reports. In some developed countries, this may be available in pdf format, more or less regularly published. The document is often hard to find through Google and even through the local website search facility. We did not find a single example of an easily accessible database, presenting all fisheries and resources of a given country, or State within a country, in a standard way.

Because of the difficulty to find the information, we may have missed some and perhaps many but it seems evident from looking at most fishery laboratory and academic sites, that the state of stocks (and even more, the state of the fisheries) is not a principal preoccupation. It does not seem to be the information item on which the centre wants to show its performance. Communication material on the Centre mission and programmes is usually on the forefront. Aggregated production statistics are often available. But information on fisheries performance is not easily accessible, if not simply missing.

Therefore, most countries in the world do not have any centralised web-based information system on their fisheries and stocks with details on their characteristics. In the developing world, most regional FAO commissions do not have that information on national stocks arranged and accessible on the web even though WG reports could be found in the publication repositories. This information is, however, not made available in any other form. Small scale fisheries resources and fisheries are often dealt with in bulk or not formally reported anywhere. The numerous but small resources of most island countries are a case in point. The South Pacific Islands benefit from the support of the South Pacific Commission (SPC)[22] but while its Marine Resources Division site contains a wealth of information on activities and programmes, it was not possible to find any detailed record of the state of coastal fisheries stocks[23]. The country profiles[24] provided, mostly taken from FAO, are

[22] http://www.spc.int/corp/index.php?option=com_content&task=view&id=20&Itemid=82
[23] http://www.spc.int/coastfish/
[24] http://www.spc.int/coastfish/Sections/Community/countries_profile.htm

generally useful but contain also very limited information on the state of the resources. The information on tuna resources fisheries, however, are fairly detailed[25].

6. POTENTIAL BENEFITS FOR DEVELOPING COUNTRIES

There should be potential benefits for countries in joining a NatFIRMS collaborative initiative and considerations of relevance to this aspect of the issue were obtained at two meetings organized by FAO in 2009 in Thailand and Ghana.

The second FAO-SEAFDEC workshop on the assessment of fishery resources in South and South East Asia was organized in Bangkok, Thailand, 3-9 October 2009. The workshop aimed at improving the regional review on status of fishery resources (through the review of existing knowledge, capacity building, use of simple assessment methods) and the eventual publishing of the information. In relation to the latter, the objectives were to explore the possibility to use the FIRMS inventories framework to support national and regional level reporting. Experts from 10 countries participated (India, Bangladesh, Cambodia, Malaysia, Indonesia, Philippines, Myanmar, Thailand, China and Sri Lanka). The FAO secretariat of the meeting introduced the concept of inventories of resources and fisheries, discussing and experimenting with the participants the ways in which these inventories could support their reporting needs at national and regional level in South and South East Asia. The initiative, presented by the Secretariat was tested during the meeting. It was found interesting enough to agree on follow-up actions in India, Malaysia, Thailand, and Philippines to develop or improve existing national inventories and present selected case studies in FIRMS. SEAFDEC agreed to publish its FIRMS national shark fisheries fact sheets and requested to develop a new collection of national cucumber fishery fact sheets.

From a FIRMS perspective and the on-going issue for a place for national reports, this workshop provided evidence for the usefulness of an effective national reporting on resources status for regional monitoring and assessments. A consensus emerged regarding the need to report primarily according to sub-national eco-regions already defined. Compatible spatial units will have to be used for the reporting of fishery statistics, and the new SEAFDEC statistical framework should help in this regard. Because it might be practically impossible to report on status of all species, a selection of species should be made, based either on their commercial or ecosystem function importance, or for the fact that they migrate across boundaries and are shared stocks. Consensus was reached that regional assessments should in priority be based on these national inputs.

The FIRMS-CECAF workshop on the inventory of resources and fisheries was organized in Accra, Ghana, 7-10 December 2009. The meeting aimed to consolidate at regional level the inventories under on-going validation at national level, while building capacity in such inventory-based approach to information management and reporting. Fifteen countries out of twenty member countries were represented (Angola, Benin, Congo, Congo DR, Gabon, Gambia, Ghana, Guinea, Liberia, Mauritania, Morocco, Nigeria, Senegal, Spain and Togo). The participants' response to the question of the usefulness and benefits of the inventory was extremely positive, highly informative and reassuring regarding the directions FIRMS has taken. The main points are that:

1. The inventory provides the essential comprehensive view on the national (and regional) fishery system(s) and gives insights as to the available data and/or gaps and priorities for data collection;
2. The web publication provides a strong motivation for the scientists and technicians to develop and maintain the inventories; It facilitates the concentration and maintenance of strategic information;

[25] http://www.spc.int/oceanfish/Docs/Tuna%20Fisheries_1-2008.pdf

3. The process allows the pooling of presently scattered formation and indeed led to the "discovery" that there was more information available than previously imagined. A lot of paper-based "buried" information was revived in digital format and can be made available to a much larger public;
4. The initiative represents a useful investment and provides a skeleton to the structuring of national information system on stocks and fisheries;

It seems clear that in West Africa, NatFIRMS would meet with rather receptive national partners, in particular if the system could provide: (i) more map based interfaces; (ii) regional corners dedicated to the various FIRMS partners; (iii) ability to navigate through the related fisheries, and to identify fishery clusters; and (iv) smooth and streamlined ability to convert back and forth from Excel to the FIRMS fact sheet version.

Conclusions

There are tangible benefits for developing countries in the NatFIRMS initiative. Countries with insufficient capacity will be guided and coordinated in their formal inventory of fisheries and resources and the start-up on their simple monitoring system, first but indispensable step to sound adaptive management. For countries with higher available capacity, joining the initiative will contribute to formalize their ongoing assessment and reporting processes, to identify and fill the eventual gaps in the system, to organize and cross-link all documents generated throughout the knowledge based management workflow, and to demonstrate good governance to their general public. The development of a national version of FIRMS would clearly provide a framework to support these developments.

Based on the two workshops and the views of 25 countries from West Africa and Asia, there seems to be an *a priori* positive posture of national fishery research systems in relation to the idea to develop national inventories of resources and fisheries, indicating their state. Summing up the views expressed at the two meetings, the following points emerge:

1. No risk exists at the moment of duplication of efforts between the FAO and the national initiatives;
2. The process of developing the inventories is considered worthwhile and susceptible to stimulate and enhance the national efforts to develop resources and fisheries monitoring systems, providing mentoring and methodology, facilitating regional cooperation, assisting in the identification of gaps and priorities, providing incentives for "data archaeology" and for the setting up of an institutionalised system of monitoring;
3. The inventories themselves are considered useful outputs as their formal publication on the web (particularly in a regional context) provides additional incentives to the scientists and technician concerned;
4. Comprehensive inventories could easily become the basis for the establishment of a comprehensive system of indicators on the state of the national/regional resources and fisheries, further institutionalizing the monitoring as a national policy-making instrument.
5. The process of developing national inventories and the outputs and outcomes of such processes represents a useful investment as they could easily contribute or even provide a skeleton for the national information system on stocks and fisheries. Projects are already developing in that direction are already ongoing, e.g. in Guinea, Morocco, Mauritania.
6. In order to be successful, the NatFIRMS initiative needs to: (i) build on and complement the national initiatives, e.g. using the agreed national standards regarding the geographical units, ecoregions, fishery clusters, gear types; (ii) facilitating the work of national laboratories through user-friendly interfaces (e.g. map-based interfaces; allowing easy input and download

from and to national systems); (iii) facilitating the interaction of the regional communities (e.g. providing for some e-meeting facilities); (iv) be selective, focussing on the main species of interest.

7. INTERACTIONS BETWEEN FIRMS AND NatFIRMS

The NatFIRMS initiative is a foreseen development of FIRMS. It is a part of it. In line with the original aspiration to establish a truly global monitoring system, covering all resources and fisheries, including in areas within national jurisdictions and areas where regional fishery bodies do not exist, the Article 5 of the Partnership Arrangement[26] specifies that "*National institutions, mandated by a national government, and intergovernmental bodies, that hold responsibilities for the preparation or publication of fisheries information relevant to the framework of the partnership may become a Partner*.

The FIRMS Partnership has not so far been open to national membership although this evolution was foreseen from the onset. However, the present regional components of FIRMS expressed genuine concern about the possible negative consequences of such and expansion of the present (regional) membership to a national membership for the existing system development. The question is therefore whether the time is ripe for such initiative, from the present members point of view. It is indeed important to consider whether and how the development of NatFIRMS in the near future could influence, positively or negatively, the ongoing global process of federation of regional fisheries information. In an attempt to address the issue, the premises for such a development and the operational implications (conflicts and synergies) are considered below.

Timing

The discussion on the audience has highlighted an important point: the FIRMS audience and hence its success in accessing a broad audience depends on its comprehensiveness. FIRMS will not be comprehensive enough until a much larger share of the world stocks are covered. This can only happen when countries become effective members. And this is turn, require the regional institutions (whether or not they are already members of FIRMS) to assist their members in accessing FIRMS through the NatFIRMS initiative.

The conclusion is therefore that the earlier this happens, the faster will the FIRMS audience grow to the benefit of all partners.

Data quality control

There could be a risk of decrease in the information quality if the system expands too rapidly, particularly as a wide range of national capacities will be faced. The quality assurance scheme of FIRMS will therefore need to be strengthened to ensure an adequate level of quality, involving, as appropriate, the relevant regional institutions in the process. It is however inevitable that a broader range of criteria and types of assessments will be made available, e.g for small-scale fisheries, including the development of qualitative assessments for which quality criteria will be needed.

Regional support to NatFIRMS

It is obvious that the development of NatFIRMS in many places will need (and benefit from) linking with the regional institutions dealing with fisheries when they exist. This should not be a totally new situation. A number of regional present and potential FIRMS Partners, such as SEAFDEC and the FAO Regional Fishery Bodies, already deal with the state of resources and fisheries at national level and foresee that this information becomes part of the FIRMS asset under the ultimate peer review responsibility of the regional partner (when this is relevant). It follows from that reality that the role of many present and future FIRMS regional partners may not be

[26] ftp://ftp.fao.org/FI/DOCUMENT/FIGIS_FIRMS/2005/Partnership_Arrangement.pdf

restricted to that of a contributor of regional scale information e.g. on the status of shared (transboundary and straddling) stocks, since these Partners are already a channel and depository of national level contributions and provide some coordination, peer review and quality assurance. The fact that in such a nested approach the FIRMS Partners would need to take the responsibility to validate national inputs in their region following agreed criteria, before publishing, was indeed recalled and referred to at the 2nd FIRMS Technical Working Group (Rome April 2008).

Potential synergies

It must be stressed that the level of involvement in NatFIRMS, to be decided voluntarily by each regional partner, will depend greatly on its specific and geographic mandate. It is obvious that CCAMLR burden will not be affected. It is however also obvious that the FAO bodies, SEAFDEC, SPC, CPPS etc., already have a "national" burden and in that case, NatFIRMS might be a way to enhance their role and *increase effectiveness and impact*. For this group of institutions, the NatFIRMS process is a golden opportunity to improve their data and strengthen at least as much as it is a burden. A NatFIRMS process would be a golden opportunity to improve their members' responsible involvement, fostering an improvement of national systems and of their participation in a regional mechanism. In many cases, better information on national (often small-scale or sport fisheries) on tuna, for example would finally become available to the regional assessment groups, improving the diagnostic and the management. In addition, the accession of CECAF and its members to NatFIRMS could significantly improve the knowledge and flow of information on national tuna stocks and fisheries submitted to ICCAT.

For many others, the impact will depend an the extent to which they can or want to deal with national stocks and fisheries.

It has already been mentioned that the increased information coming from NatFIRMS would improve the overall image and *increase the audience* of FIRMS, including beyond the narrow circle of the fishery science community. It has also been mentioned that in so doing, FIRMS partner should increase the satisfaction of their members because of the *increased transparency* that the larger audience will bring. In addition, having to deal explicitly with a broader range of resources will objectively *increase the competence and involvement* of the regional institution within their mandate.

Potential overload

The NatFIRMS expansion should not have negative consequences on the ongoing cross-regional process which is the fundamental foundation for FIRMS The risk that some regional institutions might find it difficult, with the means available, to assist their members in their NatFIRMS process, as required and compatible with their mandate, is a genuine one that needs to be considered. The problem may not exist for institutions like SEAFO which do not have mandate in EEZ stocks or CCAMLR which already covers all the coastal Antarctic resources. It is more of a problem for institutions such as the FAO bodies, SEAFDEC, or CPPS which have a mandate in coastal resources as well as tuna fishery management bodies.

It is impossible to prescribe approaches to reduce the overload as the latter will depend on context but the section below, dealing with implementation has taken into account the need to avoid overload. It is important, however, to make sure that the operational functioning of the existing FIRMS platform connecting Regional Fishery Bodies is strong and resilient enough before any substantial growth in the Partnership. Alternatively, additional resources must be found to establish a progressive and parallel process, sufficiently autonomous to limit to tolerable levels the impact on FIRMS partners. In any case, it is obvious that the regional institutions support to their members in the process of accessing NatFIRMS can only be voluntary and that the FAO Secretariat will do all it can to assist in containing the burden within acceptable limits.

Governance and systems

The potential "intrusion" of a large number of national partners in FIRMS represents an obvious governance challenge. As stressed by FSC4, the practical issues regarding the organisation of the decision-making process and the sheer problem of arranging potentially very large meetings are not negligible. The FSC will therefore need to develop an appropriate governance process and modus operandi for an institution having to deal with enlarged contributions, or for the collaboration between *two FIRMS nodes* (regional and national) distinct but closely connected. In the first case, there might be room for a solution where regional partners might be mandated to represent not only their interest but also that of their member countries. Where there is no RFB able to channel national contributions, accession of the national information to the system will be possible only when the desired level of quality assurance is reached, including with the assistance of FAO. In the second case, the two sub-systems of information will need to be fully compliant with common standards and totally interoperable allowing the information to be seen as a unique federated universe.

Conclusions

The NatFIRMS initiative is a foreseen development of FIRMS and the interactions between the two initiatives are to be expected, taking opportunity of synergies and reducing conflicts. Assuming that sufficient additional resources are identified, the questions it raises are essentially related to timing. The danger of loss in quality can be reduced through the adoption of additional data quality standards, particularly for qualitative assessments and small-scale fisheries. The nature of the regional support to the expansion process is very different from the support some partners already provide to their members, but there is also a golden opportunity for regional partners to enhance with NatFIRMS their role and increase their effectiveness. However, overload will absolutely need to be avoided. The NatFIRMS development process (whether integrated with or parallel to the FIRMS process) will require enough resources to minimize the burden on regional institutions which, in any case, will freely decide the extent to which they want to get involved.

8. CO-DEVELOPMENT OF NATFIRMS IN FIRMS

The smooth and harmonious development of NatFIRMS in FIRMS will require a strategy, a plan and an approach that take into account the various needs and constraints identified above. Many considerations have been offered in the sections above that would be useful in developing such a strategy and plan. Some other considerations include:

1. Extra-budgetary funding. Funds will be actively sought to provide the support needed;
2. Updating frequency. In general, the state of stocks and fisheries does not change so frequently as to justify a continuous and real time refreshing of the national information, the burden of which would not be sustainable. The system should accept updates at any time but thorough updates might be undertaken only every 5 years or so, at dates most convenient for the countries (e.g. with the elaboration or assessment of the sectoral national development plans).
3. Coordination. The work could be coordinated regionally by the RFBs Secretariats. Where necessary, the coordination of national inventories and assessments could involve the FAO Regional Offices.
4. First inventories. Because of the training implied in many cases and in order to reduce the start-up burden, the first inventories (to be considered as "working" inventories to be improved progressively) could be undertaken with the assistance of the FAO Regional Offices staff and eventual consultants for which financial resources will need to be

identified. The ongoing inventories development in the CECAF area is indeed a test of that approach. Improving and updating the first inventory could be done later, at a pace compatible with the means available.

5. Role of regional projects. Regional projects dealing with resources (e.g. the Fritdjoff Nansen, projects under the High Seas Deep Seas initiative, or FishCode projects) might be able to help out and synergies should be sought with them. Other opportunities will emerge, e.g. through World Bank or other international and bilateral funding agencies' projects.
6. Synergetic development. In the longer term, and for the sake of sustainability, the recurrent updating of the system information could be coupled with existing information processes such as the FAO Country Profiles. As suggested by some participants in the Accra Workshop, the inventories could usefully be connected to the *FAO country profiles* that already provide some information on stocks, fisheries and management. It should therefore be possible to combine the inventory updating and the Country Profile processes, realizing economies of scale and achieving a more reliable product. The Country Profiles and their maintenance process could indeed constitute a first stage of publishing for some countries until they reach the monitoring quality level required by FIRMS. Similarly, the inventory process and the assessments could be integrated in the regional institutions mechanisms who already undertake similar activities, albeit perhaps not so comprehensively.
7. International standards. For developed countries, and for the resources not dealt with by RFMOs, the use of FIRMS standards for the development of their fact sheets would facilitate their contribution to the global system. Additional standards will probably need to be adopted for qualitative assessments and indicators

Conclusions

Ensuring a smooth development and co-evolution of NatFIRMS, within FIRMS or in parallel with it, is a challenge that could be faced if adequate resources are raised. The potential exists also for cooperation with a number of other projects. It will be important to align expectations with resource available and accept a progressive development at a pace determined by these resources. Coordination with regional institutions and with the FAO Secretariat will be essential. International standards will need to be strengthened and adapted to the new types of situations (data-poor systems, small-scale fisheries, etc.).

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Annex 1: A brief on the Fishery Resources Monitoring System (FIRMS)

Launching date: February 2004

Url: the website is accessible at: http://firms.fao.org/firms/en

Secretariat: provided by FAO Fishery Statistics and Information Service. nt.

Partnership. As of December 2009, the Partnership includes 13 International Organizations: (i) Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR); (ii) Commission for the Conservation of Southern Bluefin Tuna (CCSBT); (iii) Statistical Office of the European Communities (EUROSTAT); (iv) FAO; (v) General Fisheries Commission for the Mediterranean (GFCM); (vi) Inter-American Tropical Tuna Commission (IATTC); (vii) International Commission for the Conservation of Atlantic Tunas (ICCAT); (viii) International Council for the Exploration of the Sea (ICES); (ix) Indian Ocean Tuna Commission (IOTC); (x) Northwest Atlantic Fisheries Organisation (NAFO); (xi) Northeast Atlantic Fisheries Commission (NEAFC); (xii) Southeast Asian Fisheries Development Centre (SEAFDEC); and (xiii) Southeast Atlantic Fisheries Organisation (SEAFO). It is foreseen that, at some stage, national institutions will be invited to join the partnership. Positive pre-agreement contacts have been made with USA, Namibia, Australia, Vietnam, Australia, Canada, and France.

Observers. Comision Permanente del Pacifico Sur (CPPS); International Whaling Commission (IWC); Secretariat of the Pacific Community (SPC); Western Central Pacific Fisheries Commission (WCPFC).

Commitments. Partners are committed to providing the best scientific evidence (i.e. the most authoritative, verified, information) on the status and trends of fisheries, resources and management systems, and to document the quality of their data contributions. FAO, through FIRMS is committed to facilitate the development and improvement of the standard protocols needed for information transfer, federation, and publication on the web for general access. Such information is arranged in standard Fact Sheets. For each collection of Fact Sheets, the FIRMS Data Quality Assurance statements describe the set of criteria applied, enabling users to evaluate FIRMS information content. FIRMS also provides partners with the appropriate tools and training to ensure controlled dissemination of their high-quality and updated information. FAO is committed to maintain the FIRMS system and to provide secretariat support. In addition, FAO is committed to assist the Regional Fishery Bodies established under its aegis to contribute to FIRMS.

System content. FIRMS is intended to store, manage, update and provide access to information regarding: (i) Fisheries: the exploitation, usage and management unit; (ii) Aquatic resources : the fishery species and stocks (populations) exploited by fisheries; and (iii) Management systems: the institutional framework and set of rules used to reach management objectives. The initial focus has been on resources/stocks and fisheries that are monitored on the basis of an inventory conducted under the general framework of the 2003 FAO Strategy for Improving Information on Status and Trends of Capture Fisheries (Strategy-STF) that has been endorsed by FAO and the the United Nations General Assembly. The inventory of marine resources monitored by FIRMS partners ranges from broad regional resources and stocks to more local ones. The authoritative information is provided regularly by the Partners for species and fishing areas for which they have primary responsibility. In this way, FIRMS contains a unique, authoritative and comprehensive vision of the current state of the world's fisheries. As the partnership grows, so will the global inventory and reporting on marine resources and fisheries conducted under Strategy-STF. Information is presented in synthesized Fact Sheets and State of Resources Summaries. These include images, maps of geographical distribution, general biological and habitat characteristics, scientific assessment results, management considerations and status and trends statements. Every Fact Sheet is sourced

with relevant links, thus allowing for transparent traceability, citations of related references and, where available, noteworthy observations from other sources. To ensure consistency and a common understanding of the information shared, FIRMS has established core concepts, definitions and data modelling. Partners have agreed on protocols and standards for their reporting, which enhance the overall authoritative value and quality of the information shared in FIRMS.

System development. FIRMS is powered by the FAO Fisheries Global Information System (FIGIS) and benefits from its content management system and information exchange protocol features.

Annex 2: Main fishery sites examined

Australia

- http://www.afma.gov.au/information/publications/corporate/annual: Australian Fisheries Management Authority (AFMA)
- http://www.fish.wa.gov.au/docs/sof/2007/index.php?0200: Western Australia Fisheries Department
- http://www.pir.sa.gov.au/fisheries/commercial_fishing/blue_crab_fishery/fisheries_stock_assessment_reports: South Australia Fisheries (PIRSA)
- www.daff.gov.au\brs\fisheries_marine
- http://www.daff.gov.au/__data/assets/pdf_file/0004/1284511/Fishery_status_reports_2008.pdf : detailed report on the state of Australian domestic fisheries

Cambodia

- http://www.maff.gov.kh/eng/: Ministry of agriculture, forestry and fisheries: no information on resources. Site being re-developed

Canada

- http://www.fish.bc.ca/faq: Pacific Fisheries Resources Conservation Council (PFRCC): no detailed information found online. Latest annual report available 2000-2001
- http://www.dfo-mpo.gc.ca: Department on Fisheries and Oceans (DFO): information on scientific assessments available in pdf format for key species but uneasy access. No overview or database found. Assessment reports found at http://www.meds-sdmm.dfo-mpo.gc.ca/csas/applications/Publications/processSearch_e.asp
- http://www.tbs-sct.gc.ca/reports-rapports/cp-rc/2008-2009/cp-rctb-eng.asp: Treasury board of Canada Secretariat

Chile

- http://www.inpesca.cl/: Instituto de investigacion pesquera : private institute. No details on state of stocks

China

- http://www.cafs.ac.cn/english/map1-3.html: South China Sea Fisheries Research Institute (SCSFRI)
- http://www.cafs.ac.cn/english/map1-1.html: Yellow Sea Fisheries Research Institute (YSFRI)
- http://www.cafs.ac.cn/english/map1-2.html: East China Sea Fisheries Research Institute (ECSFRI)

France

- http://wwz.ifremer.fr/peche/la_peche_et_ses_acteurs/les_ressources: Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER)

Guinée

- http://lefur.jean.free.fr/boussou/index.htm:. CNSHB : Centre National des Sciences de Boussoura : Nice informative mirror website. Outdated since 2004. Failed connection to official website

India

- http://www.cmfri.com/html/cmfriEnviorn01.htm: Central Marine Fisheries Research Institute (CMFRI)
- http://www.fsi.gov.in/www1.htm/ Fishery Survey of India (FSI)

Ireland

- http://www.marine.ie/NR/rdonlyres/1F1CCD0E-E6AA-42F8-9FAB-98A70C1ABA35/0/TheStockBook2009.pdf.

Japan

- http://www.maff.go.jp/e/index.html: Ministry of Agriculture, Fisheries and Forestry
- http://fsf.fra.affrc.go.jp/bulletin/youranpdf/youran1989.pdf: Far Seas Research Laboratory (FSRL): information on state of stocks not found

Malaysia

- http://www.fishdept.sabah.gov.my/: Sabah Fisheries Department:

Mauritania

- http://www.imrop.mr/: Institut Mauritanien de Recherche Océanographique et de Pêches (IMROP)

Mexico

- http://www.inp.sagarpa.gob.mx/: Instituto nacional de pesca, La paz: not functioning
- http://app1.semarnat.gob.mx/dgeia/estadisticas_2000/informe_2000/07_Aprovechamiento/7.3_Recursos_pesca/index.shtml: some information on state of stocks, aggregated by category of state.

Morocco

- http://www.inrh.org.ma/: Institut National de Recherche Halieutique (INRH): description of activities and programmes. No state of resources or fisheries.

Namibia

- http://www.mfmr.gov.na/: Ministry of fisheries and marine resources: no visible information on state of stocks and fisheries

New Zealand

- http://fs.fish.govt.nz/Page.aspx?pk=16: Ministry of Fisheries (Fisheries Infosite): Dedicated site. 1000 species of finfish. 42 under management schemes. Fact sheets available.

Norway

http://www.fisheries.no/Fisheries Norway: a dedicated site of the Norwegian Ministry of Fisheries and Coastal Affairs. Easily accessible fact sheets for all key resources

Peru

- http://www.imarpe.pe/imarpe/: Instituto del Mar del Peru (IMARPE)

Spain

- http://www.ieo.es/inicial.htm: Istituto Español de Oceanografia (IEO)

Thailand

- http://www.fisheries.go.th/english/introduction.html: Fisheries Department:

Uruguay

- http://www.pes.fvet.edu.uy: Instituto de investigaciones Pesqueras (IIP)

USA

- http://www.noaa.gov/fisheries.html: National Marine Fisheries Service (NMFS)
- http://www.nwfsc.noaa.gov/: Northwest Fisheries Science Centre (NWFSC): no easily accessible fact sheets
- http://www.nefsc.noaa.gov/: Northeast Fishery Science Centre (NEFSC): easily accessible fact sheets by species
- http://www.nefmc.org/: New England Fishery Management Council (NEFMC): easily accessible stock assessment reports for all main fisheries/target species. No overall synthetic presentation of stocks under jurisdiction
- http://www.mafmc.org/ Mid-Atlantic Fishery Management Council (MAFMC): easily accessible species fact sheets and stock assessment reports for all main fisheries/target species. No overall synthetic presentation of stocks under jurisdiction
- http://www.safmc.net/: Southeast Atlantic Fishery Management Council (SEAFMC): easily accessible species fact sheets and stock assessment reports for all main fisheries/target species. No overall synthetic presentation of stocks under jurisdiction

- http://www.pcouncil.org/: Pacific Fishery Management Council (PFMC): easily accessible species fact sheets and stock assessment reports for all main fisheries/target species. No overall synthetic presentation of stocks under jurisdiction
- http://wpcouncil.org/pelagic.htm: Western Pacific Regional Fishery Management Council (WPRFMC): no visible fact sheets on resources status.

Regional sites

- http://www.nafo.int/science/frames/science.html : Northwest Atlantic Fisheries Organisation: (NAFO)
- http://www.neafc.org/system/files/fisheries_status_report_1998_2007.pdf: Northeast Atlantic Fisheries Commission (NEAFC)
- http://www.apfic.org/: Asia-Pacific Fisheries Commission (APFIC)
- http://www.seafdec.net: Southeast Asian Fisheries Development Center (SEAFDEC)
- http://www.csrpsp.org/ : Sub-regional fisheries commission, Dakar, Senegal (CRSP-SRFC)
- http://projet-istam.org/: Improved Scientific and Technical Advice for fisheries Management: (CRSP-ISTAM)
- http://www.cpps-int.org/: Comision Permanente del Pacifico Sur (CPPS)
- http://www.spc.int/corp/index.php?option=com_content&task=view&id=20&Itemid=82: SPC
- http://www.spc.int/coastfish/: SPC Coastal fisheries
- http://www.spc.int/coastfish/Sections/Community/countries_profile.htm: SPC Country profiles
- http://www.spc.int/oceanfish/Docs/Tuna%20Fisheries_1-2008.pdf: SPC tuna fisheries