The ecosystem approach to fisheries management

Concepts, criticism and a brief overview of the West African situation

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Content

Foreword

This paper was written in response to the following 2 questions asked by the Fisheries Directorate, Netherlands Ministry of Agriculture, Nature and Food Quality:

1. provide a short description of the present status of the debate on the Ecosystem Approach to Fisheries in developing countries.

2. which components or aspects should be considered in fisheries development programmes, with a view to west Africa?

1. Unsustainable fisheries: the costs to society, the causes and the recipes for change

A significant number of marine fish stocks have declined. According to FAO 52 % of the fish stocks are fished to Maximum Sustainable Yield (MSY) and 25% of the stocks are overfished (Valdimarsson, 2009). While reading these figures it should be kept in mind that a growing number of fisheries biologists believe MSY not to be a suitable target reference point for fisheries management. According to these scientists MSY should be considered more a limit (i.e. absolute maximum) reference point. In their view the 52% of the fish stocks that are fully utilized are fished beyond precautionary limits (Valdimarsson, 2009). Catch reported by FAO show only landed quantities of fish. Various attempts to estimate discarded catch resulted in varying figures: between 17.9 and 39.5 million tons by Alverson in 1994; and 7.3 million tons by Kelleher in 2004. A recent study of the amount of by-catch, defined as unused and unmanaged catch, estimated this to be 38.5 million tonnes, or 40.4% of the total marine catch (Davies et al, 2009).
In many marine ecosystems the species composition of fish populations, the average size of fish as well as the food webs have changed as a result of fishing pressure. In many places aquatic ecosystems are in decline as result of coastal degradation and pollution.

The cost of failed fisheries management
The great economic loss to society resulting from the over-exploitation and degradation of marine resources was estimated by Arnason, Kelleher & Willman (World Bank and FAO, 2009). These authors estimated the difference between actual and potential economic benefits of marine resource exploitation on a global scale, and found the value to be ranging between 24 and 72 billion US $/year (average: 50 billion US $). This loss to global society, called ‘the sunken billions’ could be recaptured if fisheries could be reformed by restoring stocks to higher levels by reducing catch capacity and ending perverse subsidies.

The causes of unsustainable fisheries
The causes of unsustainable fisheries and for failed fisheries management were analysed and summarized by several expert panels, such as those gathered during workshops held in Bangkok (February 4-8, 2002) and Mauritius (February 3-7, 2003). The main findings are summarized in Annex 1.

S. Garcia and de Leiva Moreno (2003) summarized the situation as follows: "the clearly demanded shift to EBFM *(= Ecosystem-based Fisheries Management – PvdH*) and wider application of the precautionary approach, supported by generalized use of sustainability indicators systems, requires more investments in governance, better science, more efficient decision making, more deterrent enforcement, higher levels of participation, decentralization, transparency, as well as better matching between jurisdictions and ecosystem boundaries."

Ray Hilborn (2007) argues that the sum of all experiences with fisheries management types and approaches in the past century is equal to so many experiments and offers a rich resource for analysis from which elements for success can be extracted. "Over the last century there have been trials […..] in thousands of fisheries around the world, and there are numerous lessons to be learned from the successful ones. The future of fisheries sustainability will depend on our ability to understand the key elements of these successes and apply them well."

Hilborn (2007) states "That many fisheries continue to be overexploited and in decline is not for lack of scientific understanding but, I believe, is primarily a result of competing pressure for sustained employment and continuation of fishing communities, as well as poor governance." Hilborn concluded: 'It is almost universally recognized that the future of sustainable fisheries lies with much less fishing effort, lower exploitation rates, larger fish stocks, dramatic reduction in bycatch, increased concern about ecosystem impacts of exploitation, elimination of destructive fishing practices, and much more spatial management of fisheries, including a significant portion of marine ecosystems protected from exploitation. I believe this vision is broadly shared within the fisheries management and the ecological communities."

In their evaluation of the EAF project in the Benguela Current (the ecosystem that borders South Africa, Namibia and Angola) Cochrane et al (2007) conclude 'The over-riding institutional problem for all three countries was insufficient capacity. This problem was already considered to be affecting the ability of the fisheries management agencies to fulfil their responsibilities. Lack of capacity was considered to be particularly serious in relation to research and management but also extended to other services such as policy, economics and social sciences." It should be noted that 2 of the 3 countries participating in this project (South Africa and Namibia) are considered to have reasonable to good fisheries management systems in place. In a recent evaluation of progress in the implementation of ecosystem based management of fisheries in 33 countries South Africa scored nearly 60 %. Namibia and Angola were not part of this evaluation (and the Netherlands scored just over 40%. Pitcher et al, 2009).

Noting the 'dismal state of world fisheries' Bundy et al (2008) state that "Lack of scientific information is no longer a legitimate explanation; an assessment of presentations at the Fourth World Fisheries Congress revealed that we have plenty of natural science to address questions concerning sustainable fisheries. More natural science may not make much difference, although there is an encouraging shift toward multidisciplinary research." The authors point at a lack of corporate responsibility, social justice and ethics in ecosystem-based management as the major cause of what they call the ' dismal state of world fisheries'. They argue that the classical view of an ecosystem base that provides food and services upward to humans placed at the top of the pyramid is no longer valid. This view should be inverted with humans placed at the basis of the pyramid. Ecosystems are unsteady and depend on the actions of humans to become or remain in a healthy and steady

state. The application of corporate responsibility, social justice and ethics in ecosystem-based management will ensure that the human actions will contribute to or maintain ecosystem health and stability.

The authors of the World Bank study 'The sunken billions' recognize the importance of science and an ecosystem approach to fisheries, but identify perverse economic incentives that reflect a failure of fisheries governance regimes as the principal driver: "As stated in the World Summit on Sustainable Development Plan of Implementation, sound science and an ecosystem approach are fundamental underpinnings of sustainable fisheries (Articles 30, 36). However, the principal drivers of the overexploitation in marine capture fisheries and the causes of the dissipation of the resource rents and loss of potential economic benefits are the perverse economic incentives embedded in the fabric of fisheries harvesting regimes, reflecting a failure of fisheries governance." They continue: "Sustainable fisheries are primarily a governance issue, and the application of the fishery science without addressing the political economy of fisheries is unlikely to rebuild marine fish wealth. Restoration of marine fish wealth and rebuilding the flow of net benefits implies fisheries governance reforms with an increased emphasis on the economic and social processes, informed by, rather than centered on, biological considerations and recognizing solutions and opportunities provided in the broader economy outside the fisheries sector."

'The way forward' as suggested by 'The sunken billions' study is summarized in Annex 2 and focuses on political, economic and social reforms and actions.

Improved governance as basis for ecosystem based fisheries management

A number of authors share the view that only in cases where fisheries governance is effective a transition to EAF is possible. Reviewing the implementation guidelines for an EAF Garcia & Cochrane (2005) state that 'The capacity available in fisheries management institutions, particularly but not only in most developing countries, will usually not be sufficient to implement an EAF effectively. Reinforcement will be needed, especially if responsibilities are decentralized."

After analyzing a number of successful cases of fisheries management Hilborn (2007) concludes that there are no general solutions because the type of incentives will differ from fishery to fishery. "Although incentives appear to be the strongest tool, a prerequisite to success, however, is effective governance. Without it, any attempts at sustainability will fail."

Conclusion

Failure to manage fisheries effectively is commonly blamed for the poor state of many marine fish stocks and fisheries.

The lack of capacity to manage fisheries effectively is not only a major cause of the poor state of marine ecosystems and over-exploitation of aquatic resources. It also is a major stumbling block for the adoption of an ecosystem approach to fisheries.

2. Taking the marine ecosystem into consideration – concepts and criticism

Attempts to manage fisheries with more consideration for the aquatic ecosystem of which the target fish species are part, have developed when it was realized that the current attempts to manage fisheries have failed in many places. In 2001 FAO organized in Reykjavik, Iceland, the Conference on Responsible Fisheries in the Marine Ecosystem (Sinclair, M. & G. Valdimarsson, eds. 2003). This conference brought experts from different science disciplines and from the fisheries sector together and resulted in the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem. The proceedings of this conference give an overview of the status of scientific thinking about the ecosystem approach at that moment in time (FAO, 2003). The pressure on governments to introduce a form of fisheries management that takes the (effects of fishing on the) whole ecosystem into consideration further increased as result of the World Summit on Sustainable Development (WSSD, Johannesburg, 2002). The WSSD Plan of Implementation (POI) calls for the development and implementation of an Ecosystem Approach to Fisheries by 2012 (PoI, paragraph. 29d).

The available literature on ecosystem management in a marine context was reviewed P. Christie et al (2007). These authors concluded that "there is neither agreement on what terms to use nor on ecosystem information use in marine environmental management, despite several significant efforts". They inventoried the various terms and concepts used and placed them on a scale that has on one end current fisheries management (also called TROM- Target Resource Oriented Management) that only considers the fisheries for, and status of populations of target fish species. On the other end is Ecosystem Management (EM) which tries to manage the ecosystem and all human activities in it. In such management fishing is just one of many possible uses of the ecosystem. There are at present no practical examples of EM in the marine sphere. It is commonly believed that such systems are to complicated to manage. Referring to the possibility to manage only one component of aquatic ecosystems, fish stocks, Niels Daan remarked "The big mistake is suggesting that you can manage fish stocks. (..) In my opinion, we can only manage human activity." (cited in Gewin, 2004). This unability to manage ecosystems is also recognized by FAO: "Although ecosystems cannot be managed as such (they are simply too complicated), we do have some experience in managing human activities through the incentive structures to which humans respond. Thus, we have the ability to manage people and their impacts on ecosystems." (Valdimarsson and Metzner, 2005)

In between current ('classical') fisheries management and Ecosystem Management Christie et al place current management with Ecosystem Considerations (EC), Ecosystem-Based Fisheries Management (EBFM), the Ecosystem Approach to Fisheries (EAF), Ecosystem-based Management, Ecosystem Approach to Management and the Large Marine Ecosystem management. See Annex 3.

2.1 ***Ecosystem-Based Fisheries Management*** examines current fishery management practices and postulates that an improved understanding and management of stock interactions, stock-prey relationships, and stock-habitat requirements will result in more sustainable fisheries.

EBFM does not take the management of target species for fisheries as highest priority, but the management of the whole ecosystem of which target (shell-)fish

species are part. The overall objective of EBFM is to sustain healthy aquatic ecosystems and the fisheries they support. In particular, EBFM should

- avoid degradation of ecosystems, as measured by indicators of environmental quality and system status;
- minimize the risk of irreversible change to natural assemblages of species and ecosystem processes;
- obtain and maintain long-term socio-economic benefits without compromising the ecosystem; and
- generate knowledge of ecosystem processes sufficient to understand the likely consequences of human actions. Where knowledge is insufficient, robust and precautionary fishery management measures that favour the ecosystem should be adopted (Pikitch et al, 2005).

A prerequisite of EBFM is the ability to control and account for harvests and fishing effects by preventing over-fishing and reducing by-catch and impacts of fisheries on the ecosystem (Christie et al, 2007).

2.2 The *Ecosystem Approach to Fisheries*

(EAF) differs from the EBFM approach by balancing societal economic needs with ecological functions. The Food and Agricultural Organization of the United Nations (FAO) defines EAF as "an approach to fisheries management that strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecological meaningful boundaries". The FAO approach is perhaps the most elaborated effort to make an EAF operational using reference points and ecosystem indicators. According to FAO (FAO 2003; FAO 2005) "EAF's main objective is the sustainable use of the whole ecosystem and not just the target species. It's main purpose is to plan, develop and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems".

While implementing EAF is the responsibility of fishery agencies, its full implementation will require collaboration with and cooperation from all agencies responsible for managing other activities that impact on the aquatic ecosystem (e.g. coastal zone development, offshore mining and oil and gas extraction).

A difficult marriage

EAF represents the marriage of two different perspectives, namely *ecosystem management* and *fisheries management*. Ecosystem management aims to conserve the structure, diversity and functioning of ecosystems through management actions that focus on the biophysical components of ecosystems. *Fisheries management* aims to satisfy societal and human needs for food and economic benefits through management actions that focus on fishing activity and the target resource. Hilborn (2007) described the divide that still exists between fisheries managers and fisheries scientists on one hand, and conservationists and ecologists on the other with regard to different approaches to the problem of unsustainable fisheries. In contrast with the views of ecologists (called the ecological community) such as Worm c.s. (who analysed the global fisheries situation and projected an end of commercial fisheries in 2048 - Worm et al, 2006) there is the more detailed and differentiated analysis by fisheries scientists and fisheries managers, called ' fisheries community' in Hilborns article: "… the fisheries community does recognize the difference between fisheries that are well managed and those that are not while the ecological community does not, instead seeing only problems and ignoring or discounting management systems that lead to ecological, social, and economic success." On the solutions proposed by

the two groups Hilborn states that “The ecological community almost unanimously recommends marine protected areas as a central part of the solution, while the fisheries community sees stopping the competitive ‘‘race to fish’’ as the principal ingredient in success. The primary tool to stop this race to fish is to change incentives from those that encourage fishing fleets to expand to more and bigger boats to those that encourage sustainability and stock rebuilding. The tools most often cited as key to setting appropriate incentives are now often called ‘‘dedicated access’’ and include community quotas and allocation, fishing cooperatives that internally allocate fish, territorial fishing rights for communities, groups or individuals, and individual allocation of catch quotas.”

On MPA’s being the solution favoured by the ecological community Hilborn (2007) comments: “Fisheries scientists are very suspicious of this prescription, foremost because protected areas are not a central feature of successful fisheries and because protected areas are simply a patch to the problem of overexploitation that does not address the basic causes, including the race to fish. Fisheries scientists certainly see protected areas as an important part of the toolkit and have used closures of spawning and juvenile rearing areas as a common element of traditional fisheries management.”

The principles of EAF

The key principles addressed by EAF are:

- *fisheries should be managed to limit their impact on the ecosystem to an acceptable level;*
- *ecological relationships between species should be maintained;*
- *management measures should be compatible across the entire distribution of the resource;*
- *precaution in decision-making and action is needed because the knowledge on ecosystems is incomplete;*
- *governance should ensure both human and ecosystem well-being and equity.*

FAO states that the wider principles for an ecosystem approach as identified by the Convention on Biological Diversity (CBD) in any environment, terrestrial or aquatic (see Annex 4), are also useful, relevant and important in EAF and are consistent with the 5 key principles mentioned above. FAO does not promote a radical change from the existing, current fisheries management. It views EAF as an extension and broadening of current (target-species focused) fisheries management and foresees a gradual introduction of ecosystem considerations into current management practices. FAO has formulated broad guidelines on how to make the transition from current fisheries management to EAF, including what steps to take when an EAF is adopted. (FAO, 2003). FAO publications guide fisheries scientists and managers with (mathematical) models (Plagányi, 2007) and with reference points for management (Caddy & Mahon, 1995; Caddy, 1998).

The EAF approach recognizes that humans are an integral component of the ecosystem and that the many (sometimes competing) interests of people in fisheries and marine ecosystems have to be addressed. Recognizing that social and economic considerations are equally important to the ecological considerations FAO also developed guidance on the socio-economic components of the EAF (FAO, 2006; De Young et al, 2008).

The WSSD Plan of Implementation (POI) requires the development and implementation of an EAF by 2012. In the course of time criticism on this target, and on EAF itself is increasing. Senior FAO fisheries experts note that:

"The 2002 WSSD-POI deadlines did not result from any realistic planning. They require the use of an EAF by 2012, together with the elimination of destructive fishing practices; establishment of networks of MPAs; adoption of time/ area closures for the protection of nursery grounds; adoption of coastal land-use and watershed planning; and integration into marine and coastal area management. The deadline may not be realistic because, according to the POI, problems such as illegal fishing, over-capacity, and loss of biodiversity have to be largely solved before that date, while their solution might depend, in part, on an early implementation of an EAF. Obviously, different administrations will establish their own target dates, based on local conditions, but pressure will be high to have something significant to report at an eventual WSSD + 10 meeting." (Garcia and Cochrane, 2005).

Critical comments on the FAO Guidelines for EAF came from Tudela and Short (2005) who note: ''Nevertheless, the FAO Guidelines suffer from a lack of concretion that rends them of little operational use."

Six years after the Reykjavík conference took place Christie et al (2007) note "We are not aware of any regions where this (*i.e. the EAF - PvdH*) approach is actually taken although the foundations are evolving in some countries and regions (e.g., the Southwest Indian Ocean)". The fact that a country's transition to an EAF is most likely gradual may be the cause of such attempts to remain unnoticed, even for a group of conscientious researchers such as Christie c.s.

2.3 Large Marine Ecosystem (LME) approach

On a regional level, the Large Marine Ecosystem (LME) program has for a number of years already aimed to put the EA to management into practice. K. Sherman et al (2005) write about the LME program "… a broader, place-based approach to marine ecosystem assessment and management, focused on clearly delineated ecosystem units, is needed and is presently under way, with the support of financial grants, donor and UN partnerships, in nations of Africa, Asia, Latin America and eastern Europe. Large marine ecosystems (LMEs) are natural regions of coastal ocean space encompassing waters from river basins and estuaries to the seaward boundaries of continental shelves and outer margins of coastal currents and water masses. They are relatively large regions characterized by distinct bathymetry, hydrography, productivity, and trophically dependent (see www.edc.uri.edu/lme and http://www.lme.noaa.gov/LMEWeb/downloads/lme64_blackwhite.pdf).

It is within the boundaries of 64 LMEs that
1) 90% of the world's annual yield of marine fisheries is produced
2) global levels of primary production are the highest,
3) the degradation of marine habitats is most severe, and
4) coastal pollution is concentrated and levels of eutrophication are increasing

Since 1995, the Global Environment Facility (GEF) has provided substantial funding to support country-driven projects for introducing multi-sectoral ecosystem-based assessment and management practices for LMEs located around the margins of the oceans. At present, 121 developing countries are engaged in the preparation and implementation of GEF-LME projects, totalling $650 million in start-up funding. A total of 10 projects including 70 countries has been approved by the GEF Council, and another 7 projects involving 51 countries have GEF international waters projects under preparation" (Sherman et al, 2005).

The LME programs start with a trans-boundary diagnostic analysis (TDA) process, to identify key issues, followed by a strategic action program (SAP) development process for the groups of nations or states sharing an LME, to remediate the identified trans-boundary issues. These processes are critical for integrating science into management in a practical way, and for establishing appropriate governance regimes (Sherman et al, 2005).

The LME programmes apply a 5 module approach. These modules are concerned with

- productivity,
- fish and fisheries,
- pollution and ecosystem health,
- socio-economics, and
- governance.

The productivity indicators include spatial and temporal measurements of temperature, salinity, oxygen, nutrients, primary productivity, chlorophyll, zooplankton biomass, and biodiversity. For fish and fisheries, indicators are catch and effort statistics, demersal and pelagic fish surveys, fish population demography, and stock assessments. Pollution and ecosystem health indicators include quality indices for water, sediment, benthos, habitats, and fish tissue contaminants . Socio-economic indicators deal with Integrated assessments, Human forcing and Sustainability of long-term socio-economic benefits. Governance indicators deal with Stakeholder participation and Adaptive management.

Of the 5 modules, 3 modules apply science-based indicators that focus on productivity, fish/fisheries, and pollution/ ecosystem health, and the other 2 modules, socio-economics and governance, focus on economic benefits to be gained from a more sustainable resource base and from providing stakeholders and stewardship interests with legal and administrative support for ecosystem-based management practices. The first 4 modules support the TDA process, while the governance module is associated with periodic updating of the SAP development process. Adaptive management regimes are encouraged through periodic assessment processes (TDA updates) and through updating the action programs as gaps are filled.

About the progress of the LME programmes Christie et al (2007) note “There is demonstrated progress in some areas like the Alaskan Bering Sea region of the US, the Gulf of Guinea, the Benguela Current area in southern Africa, and the CCAMLR region (seas around Antarctica). Few of these ecosystems fall within the management authority of a single state, thus there remain significant obstacles to deal with multi-lateral fisheries management of shared stocks, much less with developing ecosystem approaches.”

Mahon, Fanning & McConney (2009) criticize the modular structure of the LME programs. They argue that this structure may be appropriate to make assessments of the LME but it hampers interventions: “The compartmentalization in the LME approach implies that the science activities, especially the productivity module, stand alone from governance, rather than in support of it. It perpetrates the perception that governance can not take place without first carrying out a great deal of scientific research. It is widely accepted that governance of natural resource systems should be informed by science. However, there is often the need to get governance processes started with minimal science. There may be situations where the amount of science that can be afforded for a particular system may be so little as to be

negligible, with little expectation of the situation changing in the near term. Indeed it has been argued that there are instances where natural science may be of limited value and management can only be people based. It has been shown that there are options for improving governance even in data-limiting situations."

After noting that also the socio-economic and governance indicators are science-based, (these sciences not being natural science but sociology, anthropology, economics and political science) Mahon et al (2009) comment that "There is also lack of clarity as to exactly what is contained in the modules. They appear to be mixed and have fuzzy boundaries. There are, for example, elements of governance in the 'fish and fisheries' and 'pollution and health' modules. Similarly, aspects of socio-economic sustainability that are highly related to most of the governance issues mentioned above, are to be found in the 'socio-economics' module."

"Current thinking on good governance suggests that it is more appropriate to approach governance interventions at the LME scale through multi-level governance policy cycles." (Mahon, Fanning & McConney, 2009)

2.4 Are EAF and EBFM top-down approaches?

The EAF concept seems to spread to national and lower levels as result of international policy documents (such as produced by FAO) and resolutions at international conferences such as the one in Reykjavik and Johannesburg. This process seems to be top-down in character. Christie et al (2007) note that "Most EBFM approaches are de facto oriented to a management approach exemplified by top-down control whereby national agencies practice sectoral fisheries management. It is assumed that the real and perceived failure of these institutions to perform is a function of their lack of ecosystem approach and not simply management failure or lack of capacity. This may not be true and deserves much more detailed analysis. It might be stated that where top-down control is effective, the prerequisites are present to forge ahead with an EBFM approach. Absent such abilities, EBFM, narrowly construed, cannot be implemented in many contexts. A key element here is that a top-down and data-rich approach is assumed to be a prerequisite and therefore an obstacle to implementation."

Christie et al (2007) note that "How the developing country context will influence ecosystem approaches is poorly understood. Most recommendations are coming from developed nation contexts and perspectives and may contribute to the tendency to suggest top-down approaches. Command and control management mechanisms have generally failed in postcolonial contexts. Increasingly, some proponents are suggesting that EBFM requires the use of participatory processes and local knowledge in order to engage multiple stakeholder groups and fill information gaps, a trend in various forms of resource management."

Conclusions

The EAF has developed in response to perceived failure of current fisheries management approaches. Guidelines on how to implement EAF in practice exist but still may need some development as to their practicality. The recommended approach is a gradual extension of current (target resource oriented) fisheries management practices with actions that take the interactions with the wider marine ecosystem and especially fisheries impact on the ecosystem into consideration.

The transition of current fisheries management towards an EAF approach is spreading, but slowly. Obviously even a gradual extension of current fisheries management towards EAF as promoted by FAO is hard, especially for developing

countries. The cause for the difficulties with adopting the approach are most likely linked to insufficient capacity.

The LME programme is at present the most significant programme that addresses human impacts on a whole marine ecosystems but critical remarks about its modular approach have recently been published.

The EAF spreads as result of international agreements and conventions such as the WSSD (Johannesburg, 2002). Such a process may become top-down in character and care needs to be taken that participatory processes and local knowledge are used.

3. EAF in west Africa

3.1 Support to current fisheries management

In west Africa many local, national and (sub-)regional projects and programs aimed at improving the management of fisheries in various ways have taken place in the past decades. Many of these projects received support from a range of bi-lateral and multilateral donors, and from International Non-governmental Organizations. As far as these projects and programs have been successful they can be considered as support to the basic requirement of EAF: an effective fisheries governance system. As was concluded in Chapter 2 without effective governance any attempt to execute an Ecosystem Approach to Fisheries management has little prospects for success. In this sense any support to a more effective 'classic' (current or TROM) approach to fisheries management in west Africa can also be considered as support to EAF in the region. In the recent past the Netherlands Government has supported various national governments and (sub-regional) bodies dedicated to aquatic resource management such as

- support to the fisheries research undertaken by IMROP in Mauritania,
- support to the meetings of the FAO working group on the Assessment of Small pelagic Fish off Northwest Africa,
- the Regional Coastal and Marine Conservation Programme for West Africa (PRCM project; *web site and basic documents*: http://www.prcmarine.mr/
- the " Regional policies for sustainable fisheries for small pelagics in Northwest Africa" project that is based at the Secretariat of the Sub-regional Fisheries Commission (CSRP) in Dakar, Senegal. (*Website and documents*: http://www.cofish.org/conferences/csrp-atelier/)
- Public Private Partnership program for west Africa
- The BO project "Ecosystem-based fisheries in West Africa"

3.2 Extension of current fisheries management with ecosystem oriented components

Many of the national fisheries-related institutes and departments and (sub-)regional fisheries management bodies existing in the region have received or are receiving support to develop and execute (components of) fisheries management that can be considered as extension of the current approach to fisheries management towards EAF. Examples are

- the Netherlands supported **research aimed at reducing by-catch of sharks and other large animals** in the pelagic trawls that are used by Dutch and other European freezer trawlers fishing in the Mauritanian and Moroccan EEZ;

- the project **Appui à la mise en oeuvre du Plan Sous Régional d'Action Requins (PSRA-Requins**) This project is based at the secretariat of the CSRP in Dakar and is at present in it's second phase (2008 – 2011). The project's specific objective is to conservation of the shark stocks in West African by reduction of the fishing effort and improvement of the living conditions of the communities that depend on the fishery for sharks. The project is funded by MAVA foundation (Switzerland) and DGIS, the Netherlands.
  Basic documents:
  http://www.csrpsp.org/projets/Fiches%20des%20projets/version%20FR/FdP_PRCM_PSRA-Requins-FR.pdf , see also
  http://ipsinternational.org/fr/_note.asp?idnews=5048

3.3 Management of marine ecosystems

Projects and programs that intended to improve the management of a whole marine ecosystem started in 1995. The first was the project titled, **"Water Pollution Control and Biodiversity Conservation in the Gulf of Guinea Large Marine Ecosystem"**. The project was funded by the Global Environment Facility (GEF), and was implemented with the technical assistance of UNIDO, UNDP, UNEP and the US-NOAA (under the United States Department of Commerce).

3.3.1. The second phase of this LME project is called **The Guinea Current Large Marine Ecosystem project.** This project is at present executed by UNIDO in cooperation with the Interim Guinea Current Commission (established in 2006) and involves 16 west African coastal states. It has a secretariat in Accra, Ghana.
Basic documents: http://igcc.gclme.org/downloads/TDA_book.pdf and
http://igcc.gclme.org/downloads/GCLME_SAP.pdf
Web site: http://igcc.gclme.org

3.3.2. From 2005 to 2007 the secretariat of the CSRP hosted the preparatory phase of the **Canary Current Large Marine Ecosystem Project**. This project will be supported by FAO and/or UNEP and will involve the countries bordering the Canary Current LME: Morocco, Mauritania, Senegal, Gambia, Guinea Bissau, Guinea and Cape Verde. The project will have a duration of 5 years and a total budget of $ 27.5 million. The start of the project is expected to be in 2010.
Project document:
http://www.gefweb.org/uploadedFiles/Projects/Work_Programs/Project%20Document(4).pdf

3.3.3 The EAF-Nansen project of FAO: this project started substantively from early 2008 and has a five-year time frame. The project is executed by FAO in close collaboration with the Institute of Marine Research (IMR) of Bergen, Norway and funded by the Norwegian Agency for Development Cooperation (Norad). The EAF-Nansen Project is set to strengthen regional and country specific efforts to apply the ecosystem approach to fisheries in a number of developing countries. The initial focus of the project is on Sub-Saharan Africa LME projects: the Canary Current LME, The Gulf of Guinea LME, The Benguela Current LME, the Agulhas && Somali Current LME and the Southwest Indian Ocean Fisheries Project SWIOFP.

The EAF Nansen project is based on 34 years of collaboration between FAO, the Norwegian Agency for Development Cooperation (NORAD) and the Institute of Marine Research (IMR) of Bergen, Norway. Since 1975 the Nansen Programme carried out fisheries resources and environment surveys in developing countries in

Africa, Asia and Latin America using the vessel R/V Dr Fridtjof Nansen operated by the IMR. The early phases of the programme focused on exploration of fisheries resources for development, and later resource evaluation (or assessments) and monitoring with standardized information collection systems. Many west African coastal states have very limited fisheries research and stock assessment capacity and the studies by the Dr Fridtjof Nansen research vessel have been very important (and often the only) source of fisheries-independent information about the marine resources of Africa. Since the early 1990s the programme expanded on its original scope of undertaking national and regional surveys to also include capacity building in fisheries research and management (institutional strengthening in partner countries), and organization of post-survey meetings to provide fisheries administrations with results of surveys. Emphasis was placed on countries and institutions in Northwest Africa, the Gulf of Guinea and South Western Africa. The EAF - Nansen Project has been mainly funded by NORAD and is implemented in close collaboration with the fisheries administrations in the partner countries. It has 5 components:

- EAF Policy and management
- Ecosystem assessment and monitoring
- Capacity building
- Support to regional research vessels
- Planning and dissemination

Web site: http://www.eaf-nansen.org/nansen/en

3.4 Suggestions for support of the process towards EAF in west Africa:

In west Africa there is much space for improvement with regard to the capacity to manage fisheries effectively. Depending on the country the physical infrastructure, institutions and human capacities that are needed for effective fisheries management on local, national and (sub-)regional level are assessed as very weak (nearly non-existent or inactive) to fair/sufficient. This is the case for policy development and (participatory) planning, fishery data collection and research, (co-)management, Monitoring, Control & Surveillance of fishing activities (MCS), reducing IUU fishing, as well as basic education, training and support to supplementary sources of income for fishery-dependent communities. Support aimed to improve the effectiveness of fisheries management in the west African region that is in line with the 7 conclusions of the Mauritius workshop and the summary list of Garcia & de Leiva Moreno (see page 9 and Annex 3) would contribute to strengthening the foundation of, and capacity needed for implementation of EAF.

The projects and programmes mentioned in paragraph 3.1 – 3.3 are already worked-out and existing opportunities to support the evolution of current fisheries management towards EAF in west Africa. The national departments, institutes and organizations (whether GO or NGO) involved in these projects and programmes as well as the (sub-)regional and international bodies all have most likely ideas, strategies or action plans ready that may at present not yet have secured the funds that would allow a smooth implementation or a wider outreach of activities. It is recommended that when projects aimed to support EAF in west Africa are seriously considered, every next step is taken in consultation with west African national, (sub-)regional or international institutes and organizations. Support to an existing programme, or to a well-chosen, strategic component of an already existing project or programme may be more effective than the set-up of a new project.

One activity that would be fully in line with an EAF, is close to the sphere of influence of the Netherlands and would build on Dutch support already rendered earlier to the region are activities concerned with reduction of by-catch by European fishing vessels active in the region. Activities related to general application of technical devices aimed at reducing by-catch of sharks and rays by Dutch and other European vessels active in the region (Zeeberg et al, 2006) and of under—sized fish from demersal (shrimp) trawls, could have a significant impact on the conservation of a group of fish that is under pressure (sharks and rays) and on maintenance of healthy stocks of commercially important fish species such as hake. Support could be aimed at development, technical improvement and instalment of such technical devices as well as control on the actual application at sea in case application would become obligatory.

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Annex 1. Major outcome of international workshops addressing the issue of unsustainable fisheries

The **Bangkok workshop** (4-8 February, 2002, reported in Greboval, 2002) grouped the many factors that contribute to unsustainable fisheries in 6 types;.

- Inappropriate incentives, including market distortions: Currently, many fisheries operate in response to incentives (economic and others) that promote unsustainable practices rather than sustainable ones.
- High demand for limited resources: Demand for fish is seen as expanding for most markets, with sustainable supply becoming increasingly limited. Higher prices may provide an incentive for further input expansion – generally more so in fisheries that are already overexploited.
- Poverty and lack of alternatives: Conditions of poverty and lack of employment or livelihood alternatives still occur on a significant scale, particularly but not only, in developing countries.
- Complexity and inadequate knowledge (social, economic, bio-ecological): The complexity of many fisheries systems as well as inadequate information and understanding make it hard to identify proper courses of action.
- Lack of governance: (conflicting objectives, lack of attention, will and authority): The inability to implement required management measures by legitimate authorities (including the absence of appropriate institutions) contributes to unsustainability.
- Interactions of the fishery sector with other sectors, and the environment: These factors are in most cases beyond the control of the fisheries sector but need to be better accounted for.

The workshop identified eight types of measures that could be taken to address the factors of unsustainability listed above. These are not presented as solutions, but as steps towards sustainability.

1. Rights: The granting of secure rights to resource users (individually or collectively) for use of a portion of the catch, space, or other relevant aspects of the fishery.

2. Transparent, participatory, management: The granting of a meaningful role to stakeholders in the full range of management (e.g. planning, science, legislation, implementation).

3. Support to science, planning and enforcement: Providing the resources necessary for all aspects of management of the fishery.

4. Benefit distribution: Using economic tools to distribute benefits from the fishery to address community and economic sustainability.

5. Integrated policy: Planning fisheries, including setting explicit objectives that address all the dimensions of sustainability and the interactions among the factors of unsustainability.

6. Precautionary approach: Application according to FAO guidance.

7. Capacity building and public awareness raising: Development and application of programmes to better inform policymakers and the public at large about main fisheries issues.

8. Market Incentives: Using market tools in situations where they are appropriate for addressing factors of unsustainability.

The workshop in **Mauritius** (3 – 7 February 2003; reported in Swan & Greboval, 2004) came to the following general conclusions:

- Poor governance is a major cause for the inability to reach sustainable fisheries.

- Failure to have good governance, in itself, is sufficient for fishery management to fail.

- There is a need to grant secure rights to resource users (individually or collectively) for use of a portion of the resource, space, or other relevant aspect of the fishery. Inappropriate incentives and lack of good governance are often predominant issues preventing sustainability and both link to the absence of secure rights.

- There is a widespread need for capacity building, training, education, awareness building, and sharing of knowledge relevant to fisheries management for all stakeholders.

- Fishery management has usually focused primarily on the bio-ecological component of sustainability, but has often failed even on this dimension of sustainability, possibly because it did not pay enough explicit attention to the other components of sustainability. Achieving sustainability requires a blend of a conservation perspective and the social and economic perspective of those directly associated with the fisheries. Either alone will not succeed. The social component of sustainability is insufficiently covered by fisheries management instruments in general.

- There is a need to make better progress in the implementation of international instruments relating to sustainability at the national and regional levels;

- Achieving sustainability is often impeded because there is a lack of will to make management decisions or because decisions that have been made are not enacted either due to a lack of will or a lack of capacity to act on them.

Annex 2. The way forward according to 'The Sunken Billions' (World bank and FAO, 2009)

1. Use the results of this study to raise **awareness** among leaders, stakeholders, and the public on the potential economic and social benefits from improved fisheries governance.

2. Foster **country-level and fishery-level estimates** of the potential economic and social benefits of fisheries reform and of the social and political costs of reform as a basis for national-, or fishery-level dialogue.

3. Build a portfolio of experiences on the process of fisheries reform with a focus on **the political economy of reform**, process design, change management, social safety nets, and the timescale and financing. Draw on the knowledge and lessons of reforms in other sectors, in particular with regard to the impact on the poor and the effectiveness and equity of adjustment mechanisms.

4. Progressively identify a portfolio of **reform pathways** based on a consensus vision for the future of a fishery founded on transparency in the distribution of benefits and reforms that increase social equity. Common elements of such pathways could include effective stakeholder consultation processes; sound social and economic justifications for change; and an array of social and technical options, including decentralization and co-management initiatives to create more manageable fishery units. A reform process will bend the trusted tools of fisheries management to new tasks. Sound scientific advice, technical measures such as closed seasons, and effective registration of vessels and existing fishing rights are likely to form synergies with poverty reduction strategies, transitions out of fisheries, social safety nets, and community co-management.

5. Review fiscal policies in order to phase out **subsidies** that enhance fishing effort and fishing capacity and to redirect public support measures toward strengthening fisheries management capacities and institutions and avoiding social and economic hardships in the fisheries reform process.

6. In an effort to comply with the World Summit on Sustainable Development Plan of Implementation call for restoration of fish stocks, countries could, on a timely basis provide to their public an assessment of the **state of national fish stocks** and take measures to address the underreporting or misreporting of catches.

7. Countries can further justify reforms in fisheries by recognizing that responsible fisheries build resilience to the effects of **climate change** and reduce the carbon footprint of the industry.

Annex 3.

Unsustainable	**Sustainable with damage to the ecosystem**		**Sustainable / functional ecosystem**				**Ecosystem intact**
Current management	Current management with Ecosystem Considerations	Ecosystem, Approach to Fisheries	Ecosystem-Based Fisheries Management	Ecosystem-based Management	Ecosystem Approach to Management	Large Marine Ecosystem Management	Ecosystem management

Continuum of fishery ecosystem state targeted by, or accepted in various fishery management models.

Adapted from Christie et al, 2007: p. 241

Annex 4.

Convention on Biological Diversity: Principles of the Ecosystem Approach

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.

Principle 2: Management should be decentralized to the lowest appropriate level.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem management programme should:

a) reduce those market distortions that adversely affect biological diversity;
b) align incentives to promote biodiversity conservation and sustainable use;
c) internalize costs and benefits in the given ecosystem to the extent feasible.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.

Principle 6: Ecosystems must be managed within the limits of their functioning.

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.

Principle 9: Management must recognize that change is inevitable.

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.