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Rebuilding our marine ecosystems, protecting our future

Key findings of the International Symposium on Marine Fisheries, Ecosystems and Societies in West Africa – Half a century of change

Dakar, Senegal, 24-28 June 2002

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Rebuilding our marine ecosystems, protecting our future

The International Symposium on Marine Fisheries, Ecosystems and Societies in West Africa – Half a century of change, Dakar, Senegal, 24-28 June 2002

The symposium in context

"When you don't know where you're going look where you've come from." (African saying)

Concern over the possible overexploitation of fisheries resources in the North Atlantic was first raised some 100 years ago, in 1903, when the International Council for the Exploration of the Sea was created to provide scientific advice to managers in view of remedial action. Today, it is estimated that overall marine biomass in that part of the world represents as little as between 5% and 10% of what it was then. The combined impact of overfishing, technological advances and pollution – the second of these factors enabling us to exploit almost every corner of our oceans now – has led us to a situation in which the stability and, indeed, the very fabric of our marine ecosystems is under threat, not only in the North Atlantic, but in other seas as well. This is clearly disastrous in environmental terms. And, just as importantly, it is also a potential and sometimes very real tragedy in economic and social terms.

The fishing industry in Western Africa is an important source of food not only for the people in the region, but well beyond. It is also an important provider of revenue and employment and a mainstay of many local communities. In recognition of the importance of fishing to their societies and economies, six West African countries – Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mauritania, and Senegal(1) – decided to join forces to address the challenge of responsible management of marine resources within the **Sub-Regional Fisheries Commission (SRFC)**.

(1) These countries have recently been joined by Sierra Leone.

Under pressure

The once rich marine resources off the north-west coast of Africa, exploited for centuries by African and European fishermen alike, have come under increasingly intensive pressure in recent decades. In the main, this has been from long-distance industrial fishing fleets venturing further afield, supported by technological advances in fishing techniques which make it possible to track and capture fish in more and more habitats. Analysis of data collected over the past 50 years shows that biomasses of major valuable bottom fish are only a small fraction of what they were even as recently as 30 years ago, and that the pressure is such that marine ecosystems in certain areas are in danger.

Aware of the need to pool resources to better rationalise the exploitation of marine resources and ensure their conservation, the countries in the SRFC decided to strengthen their sub-regional co-operation through collaboration with European and other international research institutes. In 1999, they signed a project agreement with the European Union to establish co-operation in order to develop and improve access to data resources. This **Fisheries Information and Analysis System (FIAS)** project was funded through the 7th European Development Fund (EDF) and coordinated by the Joint Research Centre (JRC).

The **FIAS** project was intended to gather, harmonise, treat and analyse the available data on marine resources and fishing trends with a view to providing national administrations and economic actors with the necessary knowledge base on which to ground policy decisions. It also aimed to develop the capacity for ongoing national and sub-regional research which could effectively support the management of resources in such a way as to ensure their long-term sustainability. It did this by bringing together research teams from the six African countries and from Europe to carry out joint work on datasets previously dispersed and, for all intents and purposes, largely inaccessible.

Selling fish at the market in Guinea

Meeting of minds

The international symposium **'Marine fisheries, ecosystems and societies in West Africa – Half a century of change'**, held in Dakar, Senegal, on 24-28 June 2002, was organised through the FIAS project by collaborating partners from the SRFC countries[2], European research institutes[3], the Food and Agriculture Organization (FAO) of the United Nations, and the 'Sea Around Us' project based at the University of British Columbia (UBC), Vancouver, Canada. It was attended by scientists, fisheries managers, public administrations, professional organisations, and local and international non-governmental organisations (NGOs).

The objective of the conference was to synthesise the knowledge available on the state of fishery resources in this part of the ocean and their evolution over the past 50 years. In addition, it aimed to link the assessment of the ecosystems with social, economic and institutional analyses that would enable a new level of understanding of the degree of threat to sustainable development, and exploration into ways of rebuilding lost natural and economic productivity. A major part of the conference content was based on the findings and results from the FIAS project over the preceding three years.

Bringing it all together

Much research has been carried out in the West African region and extensive data now exists on the evolution of fishing trends and their impact on marine resources. Nevertheless, literature based on this research is widely scattered, published in different languages, and often inaccessible or not easily adaptable for decision-making purposes. The FIAS project helped to bring together, analyse and make accessible some of this information. The data looked at concerned, in particular, changes in the structure and intensity of exploitation (local small-scale versus industrial fishing, technological advances, etc.), modifications in ecosystems (decrease in the biomass of certain groups, shifts in species, and composition of marine populations), and adaptations in the industry and its governance.

The present brochure provides a summary of the proceedings of the Dakar symposium, which have been divided into three main parts:

- Data Access and Analysis –
  The foundation to safeguarding the future
  a) Support to research and decision-making –
  The tools
- Overexploitation –
  A threat to the sustainability of the sector
  a) Fisheries and landing trends
  b) Impact of fisheries on populations, biomass and ecosystems
- Managing resources to safeguard the future
  a) Socio-economy and governance, diagnosis and new approaches

(2) Institut Mauritanien de Recherches Océanographiques et des Pêches (IMROP), Mauritania; Centre de Recherches Océanographiques de Dakar Thiaroye (CRODT), Senegal; Centre National des Sciences Halieutiques de Boussoura (CNSHB), Guinea; Centro de Investigaçao Pesqueira Aplicada (CIPA), Guinea Bissau; Instituto Nacional do Desenvolvimento das Pescas (INDP), Cape-Verde; Fisheries Research Unit (FRU) of the Fisheries Department, Gambia.

(3) Institut de Recherche pour le Développement (IRD), France; Ecole Nationale Supérieure Agronomique de Rennes (ENSAR), France; Institut Portugais de Recherches en Sciences et Technologies de la Mer (IPIMAR), Portugal; Instituto Espanol de Oceanografia (IEO, Tenerife, Spain; Joint Research Centre (JRC), Space Applications Institute (SAI), Marine Environment Unit (MEU), Italy.

Tuna waiting to be put into cold storage

PART ONE

Data Access and Analysis – the foundation for safeguarding the future

Session I: Support to research and decision-making – the tools

The first session of the Dakar symposium addressed the need for accurate and reliable data on which to base the decision-making process. Although extensive data has been collected, much of this has remained largely inaccessible, is often inconsistent, and analysis has not been sufficient to develop a clear picture of the evolution of ecosystems over time.

Reliable knowledge of the diversity, complexity and dynamics of regional marine ecosystems is often more difficult to collate for developing countries. Problems faced in the SRFC region included the dispersion of data, shortage of human and financial resources, linguistic barriers, lack of harmonisation, and difficulties in accessing and analysing the data available. The FIAS project made a conscious decision to break with previous practice of simply funding more basic data collection and to focus instead on enhancing the region's ability to make better use of the work already carried out. The emphasis was on **building the capacity** of the region to effectively preserve and use collected data.

It quickly became apparent that, although hundreds of research surveys had been carried out in the region, at often considerable cost, their use frequently remained limited either geographically (their results were not shared outside the country or particular institute conducting the survey) or in time (their results were of immediate interest to a particular project being conducted but did not remain available for future wider use). The tools developed by FIAS should facilitate analysis and allow for the ongoing improvement of information resources over time.

A common reference

A first step in the harmonisation of regional data was the normalisation of the scientific nomenclature of the marine fishes of the North-West African sub-region. The oceans off the north-west coast of Africa are extremely rich in marine fauna. In various zones, temperate, subtropical and tropical fauna exist side by side, or alternate with the seasonal movements of water currents, which results in significant biological diversity. Based on the global database of all fish species, Fishbase (www.fishbase.org), as well as established national listings, participants in the FIAS project produced an authoritative list covering some 1 060 fish species that exist in the region.

An important part of this work was the linking of all species both with their correct scientific names and with their common names in the national languages of the sub-region. An effort was also made to provide a truly comprehensive listing including all known species in the regional ecosystems, not just those with commercial value. Indeed, new approaches in the evaluation of marine resources have shown that lesser-known and non-

commercial species may play an important role in the food web and help to maintain the stability of the system. This list, available in both paper and electronic format, has noticeably improved the regional and national knowledge base, providing **a common and harmonised reference tool**.

Improving data access and conservation

An important element of FIAS was the explicit choice to work with the information that was already there and to extract new knowledge from existing data. Official statistics are an invaluable source of information and great efforts are devoted to their compilation (over 600 technical agents in the six countries of the SRFC are involved in the collection, management and analysis of fisheries statistics). It is commonly acknowledged, however, that these statistics are not sufficiently accessible or used. In many cases, information is effectively 'lost' as printed copies become unavailable or people involved in the management of databases move on and the systems fall into disuse. One major task of the project was to somehow track and bring together all existing data, cross-check for inconsistencies, and introduce procedures to ensure greater harmonisation between datasets.

In this respect, the potential of new information technologies was clearly recognised. A team of researchers within FIAS worked on the development of a computer software tool designed to improve access to regional statistics generated by administrative, technical and scientific agencies. The resulting software – **StatBase** – allows for the integration, compilation and restitution of fisheries statistics from multiple sources. It is now used by several statistical services of the region for this purpose. Available on the web (www.csrp-afrique.org/site-siap/fr/outils/statbase.html), the software and database are also widely accessible to a broad range of users, making it possible for them to consult fisheries statistics for the region with far greater ease than in the past.

SRFC-FIAS website

However, the process is an ongoing one and various challenges are still being faced. A study on Senegalese marine fishing statistics and problems encountered in their integration into StatBase, highlights the difficulties experienced in collecting data, the need to optimise and pool resources, and the importance of carefully controlling the quality and consistency of the data produced.

Trawling for better data

A similar process was engaged in gathering data from the large number of scientific trawl surveys conducted in the region over the past decades. The resulting **TrawlBase** database brings together data from some 338 of 484 identified surveys from as far back as 1886. As with the data collected in StatBase, the high risk of data loss and its often limited use were identified as significant obstacles to establishing an accurate picture of the evolution of marine resources and ecosystems in the region over time. Trawl surveys offer a valuable source of information for establishing an inventory of the region's fauna and estimates of the available biomass for fishing. TrawlBase made a significant contribution to the harmonisation of existing data and its integration into a central database, which makes it easier to access and use. It is essential that this work be continued in order to ensure the **valorisation and long-term accessibility** of the data being collected.

Paving the way for new analyses

These newly established sets of coordinated and harmonised data open the door to **new types of analysis** which could considerably enhance the ability of managers

Sarpa salpa

and decision-makers to evaluate complex situations and assess the impact of various courses of action. A group of researchers developed a **statistical model** for representing the joint dynamic of the evolution of marine resources and the fishing activities practised in the region. This model – which takes into account not only the intensity of fishing effort but also the varied impact of different fishing tactics – applied to the harmonised data gathered by the FIAS project, should make it possible to more accurately assess the impact of exploitation on fishing stocks and to make projections into the future. It is hoped that this will provide a valuable contribution to the decision-making process and the management of fish stocks by allowing decision-makers to estimate the potential impact of the various courses of action open to them.

Using new tools

The use of **geographic information systems (GIS)** is developing rapidly in many fields and their potential applications in the area of marine sciences are being increasingly exploited. GIS provide powerful tools for aiding analysis in that they make it possible to map concurrently the different types of data originating from different sources.

A GIS application in the southern part of the Canary Current ecosystem illustrates how the system can help to perform spatio-temporal analyses, monitor fishing activities and identify possible relationships between species distribution and habitat. Using data from both TrawlBase and StatBase, the study looked at the exploitation of three species – the 'thiof' or white grouper (*Epinephelus aeneus*), the octopus (*Octopus vulgaris*) and the lesser African threadfin (*Galeoides decadactylus*). Another study used GIS to look at fisheries management in the northern part of the Gulf of Guinea ecosystem. Both studies demonstrate the possibilities offered by GIS to position simultaneously in space the distribution of fishing resources, fishing zones of various fisheries, and environmental characteristics such as hydrology, bathymetry, sedimentology, etc.

These superimpositions facilitate the study of the relationships between resources and their habitats, which are at the heart of the ecosystem-based approach. The authors, in both cases, however, stressed the need for caution in using these new tools. Although they provide a powerful method of communication – not just to scientists and policy-makers but also for the public at large – their reliability depends very much on the availability of dependable, geo-referenced data and on a high level of quality control over the way that this data is used. The most important phase, therefore, remains the collection, harmonisation and quality control of the source information.

Fishing for fresh interpretations

A key message from this section of the symposium was the pressing need to consolidate and improve the information base available to managers and policy-makers. Significant progress was made towards improving the harmonisation and reliability of data within the region and its accessibility to all those concerned with marine conservation. A shift in focus was noted towards a greater emphasis on the effective use of data to provide an overall vision of the state of marine resources and the measures needed to ensure long-term sustainability. It is clearly not sufficient to carry out endless surveys at great expense – the capacity and the tools must be in place to make full use of the data collected, not just in the short term but also for long-term analysis. The gathering and analysing of all the available data in this way also served to highlight gaps in knowledge and give indications of areas where future research is most needed.

PART TWO

Overexploitation – a threat to the sustainability of the sector

Session II: Fisheries and landing trends

Scraping the ocean bottom

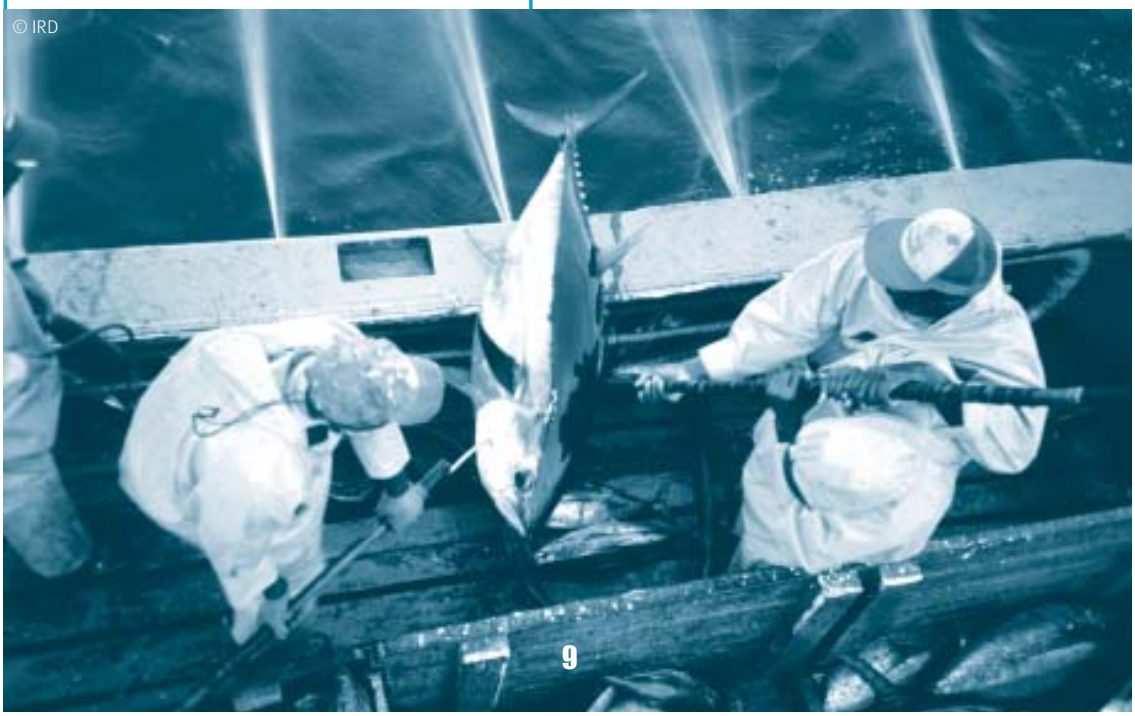
The seas of the East Central Atlantic (FAO Zone 34) are rich in marine resources and have been historically exploited by foreign fishing fleets to supply a growing international demand for fish and other marine products. The presence of European fleets has been strong over time. However, it was the former Soviet Union (and other members of the former Soviet block) that have had a dominating presence in terms of catches until the late 80s, while some East Asian countries had smaller fishing operations. At the same time, national industrial (mostly through joint ventures with foreign fishing interests) and small-scale fisheries have also been growing, contributing to the increasing overall pressure on resources.

Net gains

If we look at the evolution of the presence of distant water fleets (DWFs) in this part of the ocean over the past 50 years we can see a very sharp increase (followed by a more recent decrease) in both the number of foreign fleets and the quantities of fish being caught. According to FAO statistics, catches amounting to only a few hundred thousand tonnes in 1950 in this zone reached nearly 3.5 million tonnes in 2000, having exceeded 4 million tonnes towards the end of the 1980s. This is not solely due to foreign fleets, however. At the same time, traditional small-scale fishing in SRFC countries was also modernised and diversified. The regional small-scale fleet (SRFC countries combined) went from 3 000 boats in 1950 to nearly 19 000 in 2000, with a massive increase in motorisation allowing greater areas to be covered. National industrial fishing fleets have also emerged and developed in this period.

The combined pressure on marine resources is considerable. Thanks to the fishing access agreements negotiated with the coastal countries of the SRFC, combined fishing fleets have been able to feed the growing demand for marine resources on the international market. But Western African countries are paying the price in terms of depleted fish stocks, struggling domestic fishing industries, fleet over-capacity, inequitable access, and struggling artisanal fleets. The studies presented in Dakar seem to concur that, due to the changes and evolutions over the past 50 years, the fisheries of the SRFC region have now reached maximum capacity – or indeed exceeded it.

Tuna fishing in the Atlantic, Mauritania



Session III: The impact of fisheries on populations, biomass and ecosystems

Plenty more fish in the sea?

A number of complementary studies, presented at Dakar, attempted to assess the impact of this growth in fishing activity on the marine resources of the region. Based on the data gathered by FIAS, the studies looked at the effect of fishing effort over time and at the impact on different functional levels of the marine environment – stocks (monospecific), populations (multispecific) and ecosystems. Past research had tended to look specifically at stocks of the most commercially valuable fish only, rather than at overall biomass and the state of the ecosystem, and had been conducted over shorter time spans. This was the first attempt to undertake a long-term, global analysis of the situation. The results of these studies seem to indicate significant changes in the marine ecosystems in this part of the ocean.

Pressure kills

The primary emphasis was on the major demersal (bottom-living) communities of fish, which are the main source of financial revenue and, therefore, also the first source of concern with regard to overexploitation. Species such as the 'thiof' or white grouper, the African threadfin, the red pandora, the red mullet and the red porgy were studied in particular. The authors assess that these species are all fully exploited – or even overexploited. Indeed, a number of studies reveal a drastic decline in the biomasses of these major species over the past 15 years – now representing as little as between 5% and 10% of what they were then. This, in itself, should be enough to cause significant alarm.

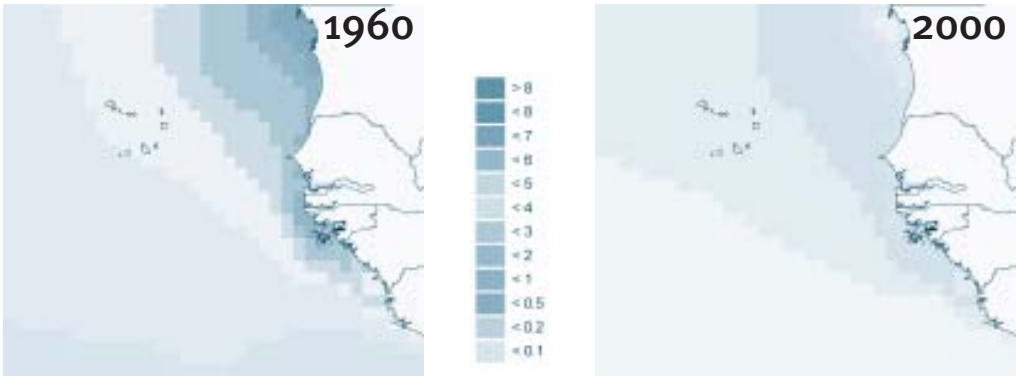
Some of these species are highly sought after and are of major economic – and sometimes also symbolic – importance to the national communities. In Senegal, for example, the 'thiof' or white grouper used to be the main national dish and had great symbolic value. Once very common, this fish can hardly be found off the coast of Senegal where it has become extremely rare.

The significant pressure being exerted on fish populations by overfishing are clearly having an impact. It is estimated that over two-thirds of resources of major fish populations in the Eastern Central Atlantic can be considered to be either fully exploited or depleted. This indicates that there is little room for further expansion of harvest from these stocks and that further development of fishing effort will only result in lower biomass and catch rates – as, indeed, we are already seeing. The results seen in Dakar are consistent with studies that indicate that this region was already overfished in the 1980s.

Knock-on effects

The impact of overfishing on specific species of fish is clearly of great concern, although it is not the only concern. If we look at the overall effect of fishing activity on marine ecosystems as a whole, a wider picture emerges. For the most part, the greatest pressure on marine resources has been on the longer-living pelagic

Sorting fish for freezing



Biomass trends for demersal and large pelagic fishes (excluding small pelagic and mesopelagic fishes) based on 17 Ecopath models from Mauritania, Cape Verde, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone and the open waters of the central east Atlantic (in t/Km²)

and demersal populations. The significant reduction of these species has had knock-on effects for the ecosystems concerned.

The evolutionary strategies of longer-living species and smaller species with a short lifespan varies and they respond differently to pressure. The longer-living species tend to give structure to ecosystems and are important to maintain stability over time. But, as a result of relentless fishing, the biomass of the long-lived species has been considerably reduced. This has led to the establishment of a new balance in which shorter-lived, opportunistic species have increased their populations to fill the gap. We have thus seen the growth of populations of certain species of fish and invertebrates such as shrimp and octopus. Although this is not of immediate economic concern – because fisheries can simply shift their efforts to these new and economically valuable resources – in ecosystem terms, it is potentially catastrophic.

As a result of this new balance, the overall vulnerability of ecosystems has increased tremendously. Shorter-lived species are more vulnerable to environmental pressures and we are seeing sometimes significant variations in population size from one year to another. This is because the effects of environmental changes are immediate and can lead to important reductions in stocks from one season to another. The consequences for the fisheries depending on these stocks for their livelihood are clear.

Thiof at the Gueule-Tapée market in Dakar, Senegal

Future prospects

The natural resilience of marine ecosystems needs to be preserved in order to protect both the marine environment and the livelihoods of the people, communities and countries that depend on this natural resource. To do this, it is essential to look at the system as a whole and to estimate the impact of fishing strategies in the longer term. New management strategies must be developed which take account of this 'ecosystem approach'.

Moreover, when the high-value octopus and other invertebrates are, in turn, over fished and replaced by species further down the food web, with lower economic value, then the full extent of the ecosystem shift will be felt in economic and social terms. It may, at that stage, be very difficult to re-establish the old production balance. The process of renewal could take a very long time or may indeed not be possible at all.

PART THREE

Managing resources to safeguard the future

Session IV: Socio-economy and governance, diagnosis and new approaches

The progressive introduction of Exclusive Economic Zones (EEZs) in the 1970s gave countries jurisdiction over the marine resources in an area of up to 200 nautical miles from the coast. This, as part of the overall build-up to the adoption of the UN Convention on the Law of the Sea (UNCLOS) in 1982, led to profound changes in the way in which marine resources were monitored and managed. UNCLOS – which came into force in 1994 – provided, for the first time, a universal legal framework for the rational management of marine resources and their conservation for future generations, while the EEZs placed an additional responsibility on coastal fishing states for the sustainable management of fish resources within their jurisdiction.

As coastal countries progressively claimed their EEZs, they also increased restrictions, and foreign fleets were obliged to negotiate fishing access agreements. This meant that potentially there was more control and that it should have become easier to monitor fishing activity more accurately. However, this also placed significant demands on institutional capacity and most countries in the region still have incomplete national legislation, monitoring, control and surveillance in place to support effective management of their EEZ. Nevertheless, for the countries of West Africa, with abundant marine resources, these access agreements have provided an important source of revenue for their governments. In certain cases, however, the fisheries management approaches adopted have resulted in very high levels of exploitation of marine resources that often conflict with other national social and economic objectives and threaten the very marine ecosystems on which the country depends.

Limiting access

The number and scale of access agreements with foreign operators has increased considerably and, combined with the growth in local fishing operations, has significantly intensified the pressure on a reduced resource base.

The development of national policies on fishing in the region is marked by relationships that coastal countries maintain with distant-water fishing countries that are often former colonial powers (Spain, Portugal, France), but also with Italy, Greece, the former USSR, Japan, China, Korea, etc. In this context, the current fishing agreements with the European Union (EU) have occupied a decisive place in the fishing economies of these countries since the late 1980s, and generate considerable government revenue. In the current situation, where pressure on resources is increasing, it is necessary to re-examine these agreements and associated subsidies within an overall logic of resource management and economic equity.

The problem of subsidies and, indeed, of access agreements which do not set a limit on catch quantities is that the market signals are not coming through. In other words, the increasing scarcity of the resources in question is not properly reflected in prices. It is therefore clear that we cannot rely exclusively on market forces to control the situation.

International pressure

The increasing conflict between traditional and industrial fisheries for space, markets and labour should also be re-examined. A better understanding is needed of the nature of the conflict, the interactions between these two types of fishing and their impact in economic, ecological and social terms. The SRFC countries are net exporters of marine products and the fisheries sector is highly integrated into international markets. Consequently, it is also strongly influenced by them. International markets have a profound impact on price, fishing strategies, processing and marketing, the structure of the industry (increasingly producing for export rather than national or regional markets) and employment.

Casting the net, Ivory Coast

Whilst international demand for marine products provides important revenue for governments and for larger-scale fishing operations, it is sometimes to the detriment of local populations. The pressure on prices is such that in certain cases local produce becomes unaffordable and national consumption is decreasing. This leads to a situation in which the economic survival of the sector becomes dependent on the external factors. This is far from ideal from an economic viewpoint and should also give rise to concern from a food security point of view.

Another aspect of the integration into international markets is the pressure on fishing operations to meet increasingly strict hygiene and sanitary standards. This has already triggered significant capital-intensive investments in production and handling. Artisanal operations unable to meet international standards are, as a result, increasingly under threat. In this context, a number of development projects seek to address this problem, e.g. by improving sanitary conditions at artisanal landing places.

The new, larger-scale operations are generally less well integrated into the local economy and provide less employment. This has an important impact on social structure and economic well-being of local populations – particularly for women who historically have played a pivotal role in the processing and marketing of marine products in local and regional markets.

The analysis of social, economic and ecological change over the last five decades illustrates that the fisheries sector can continue to be a source of government revenue and an engine of local and international development. However, this will only be sustainable if fishing pressure is drastically reduced, particularly with regard to demersal resources, and if more effective and comprehensive management practices are implemented.

The way forward

A lack of understanding of ecosystems function and how they interact with social and economic systems has contributed to the present sorry state of affairs. The narrow organisation of research along single-disciplinary lines has not helped. The Ecosystem Approach to Fisheries (EAF), which is gaining in strength and influence, provides a more holistic approach for the future management of fisheries resources. The EAF is an extension of conventional fisheries management, recognising more explicitly the interdependence between human well-being and ecosystem health and the need to maintain the productivity of ecosystems for present and future generations. Together, the EAF guidelines, and the 1995 Code of Conduct for Responsible Fisheries adopted by the FAO Conference, provide the crucial framework for any effective approach to fisheries management.

Pirogue in Senegal

CONCLUSIONS

No time to lose

The conclusions of the symposium point to a clear and pressing need to act now to reduce fishing pressure significantly if we are to save this precious resource. To a large extent, this is in the hands of the national governments and the different players in the economic sector. However, because international trade connects citizens in Europe, Japan and other importing countries with West Africa, the problem is clearly of concern beyond the Western African region. Consequently, the message which emerges is that we can all contribute to ensuring that systems are put in place which allow for the responsible management of the Western African marine ecosystems and fisheries for future generations.

At the 1992 Earth Summit in Rio de Janeiro, world leaders agreed on a comprehensive strategy for 'sustainable development' – meeting our needs while ensuring that we leave a healthy and viable world for future generations. One of the key agreements adopted at Rio was the **Convention on Biological Diversity** (CBD). The EU and all six countries in the SRFC are signatories to this Convention – a pact which sets out a number of commitments for maintaining the world's ecological balance as we go about the business of economic development.

Together with more than 150 countries from around the globe, those signatories were also party to the **UN's World Summit on Sustainable Development** (WSSD) which was held in Johannesburg, South Africa, in September 2002. The Johannesburg Summit offered a major opportunity to further develop our understanding of the issues surrounding sustainable development and focus more specifically on the practical measures needed to ensure that the Rio 'vision' can become a reality. The Dakar Conference can be seen as part of the preparatory activities which paved the way to the new understanding that emerged in the WSSD.

As far as sustainable fisheries are concerned, it is clear that restoration must be the watchword because of the advanced state of degradation of marine resources. In the WSSD implementation plan, the summit leaders made a commitment to restore fish stocks "where possible" by 2015, thus breaking, for the first time, the vicious cycle of shifting baselines and the creeping accommodation of increasing degradation. They even prescribed certain measures to achieve this trend reversal by agreeing on the establishment of networks of marine protected areas by 2012.

The declaration adopted by the participants of the Dakar Symposium expresses the awareness that changing course will not be easy and will engender initial costs. But it also conveys the firm determination that not to do so will be infinitely more costly and devastating, and that dialogue-based solutions can be found that establish a new balance between immediate and future costs and benefits.

Local fishing boats in Cape Verde

ANNEX

Symposium Declaration and Conclusions

Participants in the summary session of the Dakar symposium adopted the following 'Declaration' and 'Conclusions' with regard to the outcome of the various sessions and the results of the FIAS project:

The evolution of fisheries and their landings

For half a century, both traditional and industrial fishing fleets have undergone considerable development in West Africa. In SRFC countries, the number of pirogues, for example, has increased six-fold (from 3 000 to 18 000), while corresponding motor power has multiplied by 400. Foreign industrial fleets, many of which have very old origins, also experienced sustained growth, at least until the early 1990s. From this time, they were subject to very tight restrictions in access rights, while the development of national industrial fleets accelerated in many countries.

Added to this quantitative growth in fleets are qualitative changes in key words: technological progress and transformations, diversification and specialisation, spatial expansion. From these changes follows a considerable growth in pressure exerted on the whole of fish resources in West Africa.

At the same time, the volume of landings increased, currently reaching 3.5 million tonnes for all of West Africa. Small-scale fishing's contribution to this production is significant, coming to 400 000 tonnes in the six SRFC countries, for example. This overall increase in catches masks, however, disparate situations. In many countries and production zones, landings are on the decline – sharp in some cases. Many fisheries have experienced a drop in catches.

The FAO estimates that 34% of fisheries are currently in a mature phase and 33% in a senescent phase. These figures confirm the rapid deterioration of situations observed in West Africa. Some data collected by foreign fleets reveal a substantial reduction in the abundance of demersal resources over the period. Scientific campaigns led by Spain, for example, indicate that yields on the Saharan coast went from more than 2 000 kg/60' in the 1940s to about 300 in the 1990s.

This situation makes reliable fishery observation systems more essential than ever. The FAO statistics provide precious information, from over a long period and across a wide scale. More recently, national systems have been put in place to gather more precise data which is

Waiting for the day's catch in Mauritania

necessary to monitor resources and exploitation. These national systems must be reinforced and their results utilised on a sub-regional, regional, and international scale.

Fisheries' impacts on populations, biomasses, and ecosystems

The work carried out in the FIAS project, geared toward updating stocks, reveals situations of overexploitation for a varied group of monospecific stocks chosen for their ecological and fishing representativeness. Even if these biomass estimates may vary with the methods used, the tendency towards decline remains very marked, even for species not targeted by fisheries. They reach 75% in 15 years in Senegal and 70% in ten years for croakers in Guinea.

The population study seems to point to an instability of species structures and profiles that is increasingly erratic from one year to another. Population structure thus appears weakened and seems to follow an unpredictable process.

Species abundance decreases most sharply among higher trophic levels, and the progressive fishing phenomenon towards lower food chain levels seems confirmed in the study zone by FIAS project results. An increase in abundance levels and/or of catches of certain species that are short-lived or that belong to low trophic levels is noted over the period.

In some countries the emergence was noted of species that, unfortunately, do not serve as viable substitutes to abundant dermersal biomasses. Whereas this emergence could in some cases be connected to environmental changes (triggerfish, for example), others could be attributed to changes in trophic relationships tied to fishing (molluscan shellfish, crustacea, etc.). Ecosystems controlled by predation seem to shift to ecosystems controlled by the environment.

This evolution is particularly worrisome for the fishermen. They have so far been able to transfer their efforts to emergent resources, but the fear is that after having overexploited fish, and then cephalopods and/or shrimp, they then move to very impoverished ecosystems that are unable to bear substantial, sustainable exploitation.

Socio-economy and governance, diagnosis and new approaches

The history of West African fisheries clearly shows the complementarity between small-scale and industrial fishing, which must be taken into consideration in regulating access (not just industrial versus small-scale fishing, or foreign versus national, but fishing as a whole). The conclusions of fishing agreements regarding coastal demersal fish stocks, which are being clearly overexploited, do not bode well for the future.

The opposition between conservation and development can also be transcended. The multifunctional nature of West African fisheries, which fulfil economic objectives (jobs, income), provide food security, and generate foreign currency, confirm the complementarity of resource conservation and product development: resource management conserves substantial revenue.

Small-scale fishing in Guinea

These different functions must be taken into consideration to nourish a concerted development, supported by multidisciplinary research that is integrated with society.

Summary

The four actors representing the profession – industrial and small-scale fishing, a sub-regional fishing organisation, and a non-governmental organisation – confirm the state of advanced deterioration of most stocks in the region. This state of decline is deeply perceived by the majority of fishermen in the region.

Reduced overall effort is in order, but the operative modalities give rise to different approaches towards equity and transparency, especially for small-scale fishermen who are often poorly represented in their diversity.

To improve management, the concepts of participation and co-operation in national policies were affirmed, but these remain to be improved on a regional scale. Some tools were mentioned, such as the Protected Marine Areas, for conserving or restoring exploitable resources, but controversy remains over these.

The achievements of the FIAS project

By piecing together long temporal series, the FIAS project was able to show that in SRFC countries a substantial drop of demersal resource biomasses took place and that the effects of fishing on this drop could no longer be doubted. Some short-lived species (cephalopods, for example) show different patterns of change, but in these cases as well, the effect of fishing is obvious and overexploitation is often confirmed.

Current demersal biomasses occurring in countries of the sub-region are well below those that will secure high and sustainable production. Demersal stocks are, from this point on, at abundance levels that make them very sensitive to environmental effects.

The FIAS project's strengthening of sub-regional and international collaboration allowed for the highlighting of these facts in a particularly clear and unequivocal way.

... and their implications

Fishing efforts overall must sharply drop off at the sub-regional level, in particular for demersal resources, in order to recover high and sustainable biological production and to minimise the risks of negative effects on the environment.

We are conscious of the socio-economic implications of this reduction, but there is no longer any doubt about its necessity.

National capacities, as well as sub-regional and international collaboration (as was achieved in the FIAS project), must be strengthened in order to fill the scientific gaps that still exist.

To maintain and develop the data at the sub-regional level and to sustain the benefits of the FIAS project, the capacities of the SRFC, in particular, must be strengthened.

Dakar, 28 June 2002

List of papers presented at the symposium

PART ONE

- **Normalisation of the Scientific Nomenclature of the Marine Fishes of the Northwest African Sub-region**

Vakily, Camara, Mendy, Marques, Samb, Júlio Dos Santos, Sheriff, M. M. Ould Taleb Sidi & Pauly

- **StatBase: A Generic Approach for Managing Multi-Sources Fisheries Statistics**

Thibaut, Chavance & Damiano

- **Senegalese Marine Fishing Statistics in the Regional Database StatBase**

Barry, Thiao & Ndaw

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- **TrawlBase-Siap: A Software to Manage Trawling Survey Data**

Guitton & Gascuel

- **Modelling the Joint Dynamics of the Exploitation and the Resource**

Laloë, Samba & Pech

- **GIS & Fisheries Management in the Southern Part of the Canary Current Ecosystem**

Beibou, Diallo, Mbye, Berthier, Tandstat & Caramelo

- **GIS & Fisheries Management in the Northern Part of the Gulf of Guinea Ecosystem**

Solié, Mendes Almeida, Berthier, Tandstat, Amorim & Caramelo

PART TWO

- **Trends in Gambian Fisheries & Fisheries Statistics**

Mendy

- **The Portuguese Industrial Fisheries in Northwest Africa During the 20th Century**

Ribeiro, Goncalves, Moreira & Stobberup

- **Chronicles of Catches from Marine Fisheries in the Eastern Central Atlantic for 1950-2000**

Garibaldi & Grainger

- **Towards Reconstructing Half a Century of Change in West African Fisheries**

Chavance

- **Mapping Marine Fisheries Catches of West Africa: 1950 to 2000**

Watson

- **Trends in the By-Catch of Shrimp & Hake Fisheries in Mauritanian Waters, 1950 to 2000**

Diop, Sobrino, Fernández, García & Ramos Martos

Notes

- **Major West African Fisheries: Typology & Distribution Since 1950**

Chavance & Chavance

- **Port-Etienne & the Mauritanian Coastal Fisheries in the First Half of the 20th Century**

Tous, Diop, Dia & Inejih

- **Thirty Years of Trawling Pink Shrimp *Penaeus notialis* in the Senegal-Guinea-Bissau Area**

Caverivière & Thiam

PART THREE

- **State of Exploitation of Five Demersal Fish Species off the Senegalese Coast**

Barry, Laurans, Thiao & Gascuel

- **Trends in the Abundance of Major Species Exploited in Senegal**

Laurans, Gascuel & Barry

- **Stock Diagnosis & Abundance Trends for Demersal Resources in the Countries of the CSRP**

Gascuel, Laurans, Sidibé & Barry

- **Emergence of Three Demersal Species in West Africa: Common Features & Differences**

Caverivière

- **Long-term Trends in Demersal Fishery Resources of Ghana in Response to Fishing Pressure**

Koranteng & Pauly

- **Ecosystem Overfishing: A Namibian Case Study**

Willemse & Pauly

- **Demersal Fish Communities off West Africa 1987-1999: Changes in Distribution & Species Composition Derived from Bottom Trawl Surveys**

Jouffre, Domalain, Thiam, Traoré, Caverivière, Domain & Inejih

- **Structure of Demersal Fish Assemblages Based on Trawl Surveys in the Continental Shelf & Upper Slope off Guinea-Bissau**

Amorim, Mané & Stobberup

- **Changes in Diversity & Dominances in Demersal Survey off Senegal and Guinea**

Domalain, Jouffre, Thiam, Traoré & Wang

- **Size Spectra Analysis of Demersal Fish Communities in Northwest Africa**

Thiam, Traoré, Domain, Mané, Monteiro, Mbye & Stobberup

- **Exploration of a Preliminary Model of the Marine Ecosystem of Guinea**

Guénette & Diallo

- **Changes in the Coastal Ecosystem of the Cape Verde Archipelago over the Last Two Decades: A Simulation Study Using Ecosim**

Stobberup, Ramos, Coelho & Erzini

- **Mass-Balance Trophic Model of the Senegambian Ecosystem**

Samb & Mendy

- **Trends in Fish Biomass off Northwest Africa, 1960-2000**

Christensen , Amorim, Diallo, Diouf, Guénette, Heymans, Mendy, Ould Taleb Ould Sidi, Palomares, Samb, Stobberup, Vakily, Vasconcellos, Watson & Pauly

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- **Assessment & Diagnosis of Four Demersal Coastal Fish Stocks in Guinea**

Sidibé, Gascuel & Domain

- **Comparative Evolution of Demersal Fisheries Resources Abundance in Guinea Between 1985 & 1998**

Sidibé, Laurans, Gascuel & Domain

- **A Review of Knowledge on the Environment of Fisheries Resources in the Republic of Guinea**

Colomb & Le Fur

- **An Ecopath Model of the Sine-Saloum Delta Biosphere Reserve (Senegal)**

Villanueva, Tito-De-Morais, Weigel & Moreau

- **Observed Changes in the Central-Eastern Atlantic over the Last 50 Years: An Analysis Using Catch & Biomass Trophic Spectra**

Gascuel

- **Detection of Fishing Impact on Northwest African Demersal Communities Using Constrained Ordination**

Jouffre, Domalain, Traoré, Thiam, Domain & Inejih

- **Improvements on the Guinea-Bissau Ecopath Model with an Exercise on Simulation the Effects of Fishing**

Amorim, Duarte, Pires, Guerra, Morato & Stobberup

PART FOUR

- **History of Mauritanian Fisheries: Tension Between the National Ambitions & International Pressures**

Cherif

- **25 years of Cephalopod Fishery Management in West Africa: Lessons Learnt & Recommendations**

Failler, Inejih, Deme & Idelhaj

- **History of Fishing, Fishing Agreements & Public Policies in West African Countries**

Catanzano & Rey-Valette

- **Interactions Between Industrial & Artisanal Fisheries in the History of West Africa Fishery**

Rey-Valette & Cunningham

- **A review of the Ecosystem Approach to Fisheries**

Garcia

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EC European Commission, Directorate-General for Development, Directorate for Development Policy and Sectoral Questions, rue de Genève, 1049 Brussels, Belgium – **www.europa.eu.int/comm/development/** European Commission, Directorate-General for Research, Directorate for International Scientific Cooperation, square de Meeûs, 1049 Brussels, Belgium – **www.europa.eu.int/comm/research/iscp/index_en.cfm** – **www.cordis.lu/inco2/src/docs_pub.htm**

SAUP 'Sea Around Us' Project, Fisheries Centre, 2259 Lower Mall, Vancouver, The University of British Columbia, B. C. V6T 1Z4 Canada – **www.seaaroundus.org**

C.N.S.H.B. Centre national des sciences halieutiques de Boussoura, B.P. 3738/39 Conakry, Guinea – **dg@cnshb.org.gn** – **www.cnshb.org.gn**

C.R.O.D.T. Centre de recherches océanographiques de Dakar-Thiaroye, B.P. 2241, km 10, route de Rufisque, Dakar, Senegal – **www.isra.sn/crodt.htm**

Ensar École nationale supérieure agronomique de Rennes, 65 route de Saint-Brieuc, CS 84215, 35042 Rennes, France – **www.agrocampus-rennes.fr**

FAO Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy – **fao-hq@fao.org** – **www.fao.org**

IEO Instituto Español de Oceanografía, Puerto Pesquero S/N, Apdo. 285, 29640 Fuengirola, Málaga, Spain – **www.ieo.es**

IMROP (ex-C.N.R.O.P.) Institut mauritanien de recherches océanographiques et des pêches, B.P. 22, Nouadhibou, Mauritania – **imrop@imrop.mr** – **www.imrop.mr**

IPIMAR Instituto de Investigação das Pescas e do Mar, av. Brasilia, 1449-006, Lisboa, Portugal – **www.iniap.min-agricultura.pt**

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