



**Reducing the negative impacts of fisheries  
on ecosystem structure and function  
and  
improving the management of West-African coastal wetlands<sup>1</sup>.**

by

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**Abstract**

Some worrying trends affecting the structure and function in the west-african coastal wetlands are identified, especially those related to the uncontrolled development of so-called small-scale or artisanal fisheries. Positive experiences in participative resource management and ecosystem restoration are highlighted. The important role of protected areas both for conservation and for development of sustainable exploitation systems is emphasised. Information is provided on the status of some of the biodiversity and productivity hotspots on the West-African coast between Nouadhibou and Guinea Bissau. Prominence is given to sites on the Mauritanian coast but where appropriate regional links are highlighted. A number of recommendations are made.

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## 1. Introduction :

### *'Small' is not always beautiful*

Though industrial fisheries certainly have negative impacts on ecosystem structure and function, especially through bottom trawling and generalised overcapacity, it is clear that the potential impacts of poorly or unmanaged so-called « artisanal » or « small-scale fisheries » are very much greater. Artisanal fisheries exploit inshore stocks and often cover nursery areas, they are much more difficult to control and, because of low capitalisation, can expand very rapidly, especially in areas of low food security, rapid population growth and high dependence on natural resources such as West-Africa.

The pattern being generally the same all over the planet the example of the evolution of fisheries in Mauritanian waters is instructive. Initially these were almost exclusively exploited by foreign fleets. The establishment of the EEZ and the presence of « virgin » stocks, allowing very high rates of return on initial investment, incited a group of relatively affluent nationals, traditionally linked to transsaharan trade, to become fisheries operators. When the industrial fisheries became less profitable due to over-exploitation (and the reduction of state subsidies), investments, after a short period into irrigated rice and other short term venture capital endeavours, were redirected as from the early nineties to artisanal fisheries.

The development of « artisanal » fisheries in Mauritania, followed a similar pattern as in the neighbouring countries, but happened later and developed much faster than anywhere else. Its development, quickly attaining an industrial and unsustainable scale, was « helped » by the explosive demography and the over-exploitation of fish stocks in neighbouring countries (CFFA 1999a), by the failure of irrigated agricultural development in the Senegal river valley and by the generally poor economic performance of the sahelian and west-african coastal countries. These factors, enhanced rural-urban drift and, as all capital cities are situated on the coast, increased pressure on coastal resources. One of the elements is the availability of a cheap labour force without fisheries background. These workers are employed for beach seining which only requires the boat crew to have any previous knowledge of fishing practices, and for the gutting of mullets for the export of their eggs.

### *Big operators, small (and new) fishermen*

In the entire West-African region the tendency is towards concentration of the ownership of fishing tools (canoe, outboard engine, nets) into the hands of a few large operators who employ a vast number of low income fishermen and land based workers. These are often trapped in a personal indebtedness relationship to the trader-operators. Through the development of highly performant fishing tools, fishing has been degraded from an activity requiring a high level of technical skills and a sound knowledge of the environment (see Hemmingway 1952) to an low-skill industrial activity. Moreover, most of the taboos on entry into the fishermen community have been lifted, allowing fishermen's populations to increase at a faster rate than the natural « recruitment ».

By licensing the canoes simultaneously in the various West-African countries operators can rapidly deploy the effort in function of the highest economic return (or the lowest level of surveillance or more commonly both). These trends disconnect the fishermen from their « terroir » and therefore their sense of responsibility for sustained management of

the resource. On the other hand, the resident fishermen have lost control over their fishing grounds and are being outperformed by the migrants.

### *Killer tools*

On top of the exponential growth of the number (and size and engine power) of vessels, the introduction of particularly destructive tools are a reason for extreme concern:

- drift nets of several hundred meters length (up to 800 m of 5 \* 5 cm mesh) : these are nearly as effective as industrial drift nets and have an important « by-catch » of marine turtles and sharks ;
- purse seines with 1 cm \* 1 cm meshes : these are acceptable only for offshore sardinella fishing, bait fishing for longliners and as a research tool. Now they are used inshore with disastrous effects on the mullet stocks and with considerable bycatch of anything from juvenile fish to dolphins. This type of gear has now become so abundant that it is even used on seagrass beds and in estuarine areas (Gambia, Saloum) making even the fishermen ashamed of the huge quantities of small juveniles they are discarding (soon they probably will be forced to eat those as there will be nothing else in their catches) ;
- the use of monofilament nets : though they are officially banned in some countries, the measure has not been popularised amongst the fishermen and no effective measures seem to have been taken against imports and sale (when you are poor you buy the cheapest net), with their concomitant ghost fishing after being discarded or lost at sea (seabirds, turtles, etc.);
- small mesh beach seines : these are highly destructive for juvenile fish (especially for young rays and skates), and are virtually in permanent use, moving up and down the sandy coast ;

All these gear types are characterised by low selectivity but it is obvious that even most selective of gears, such as octopus traps, when used in excessive quantities have important negative impacts.

Though the fisheries themselves are very poorly monitored (which is understandable because of the highly dispersed landing points, the high variety of gears, etc.) indicators of generalised over-exploitation are for example the presence on the markets of masses of dried juvenile sardinella (7-8 cm length) replacing the adult fish that formerly were the main protein source for the majority of the West-African poor people.

### *Mixed-up terminology, trade and aid*

On the institutional side there is a problem with the vague definition of what constitutes « artisanal » fisheries in spite of several attempts, notably by FAO/EU in 1995-96, for the harmonisation of legislations. For example in some countries it is « any vessel with an engine of less than 200 hp », thus lumping 4m long unmotorised canoes used for spear fishing in the mangrove with 25 m long pirogues doing 10 day trips or even small trawlers. Obviously, the last two categories should be classified as semi-industrial or industrial.

Moreover, the absence of any legal limitation on the number of licences, on gear type and size, on fishing effort as a whole, on the security of the fishermen (life jackets, distress signals) demonstrates the lack of awareness at decision maker (and donor) level of the threats and opportunities of small-scale fisheries development.

At the policy level economic pressures through the indebtedness of the countries and the donor-driven export oriented fisheries (European and Asian luxury markets, animal protein for farm animals and aquaculture), are of such importance that this often creates scarcity in the fish-producing country of this vital protein source for the urban and rural poor. This in turn incites the dispossessed fishermen to further « miniaturise » their fishery and move into the nurseries. It should not be forgotten that the sahelian and west-african coastal countries are, in general, at the extreme tail end of both the GNP/ inhabitant and the UNDP human development indices and that therefore their capacity for self-sustained development is low. The conservation and sustainable development of their coastal resources will therefore require a substantial long term effort by donors and development partners. Still, social cohesion is quite strong in some of the coastal communities and there are ways to effectively mobilise these forces.

## **2. Ways to cope :**

### **2.1. Involving the actors in resource evaluation and management.**

In most countries only a limited amount of resources is made available for scientific analysis and the government departments that claim the monopoly on fisheries research lack a certain flexibility and, being under strong pressures not to report anything « harmful » for the immediate economic returns, are often not very objective observers. With the rapid evolution of the fisheries, « fishing one step down the food chain » every time a resource runs out, there are often not enough data available to determine sustainable levels of exploitation within a reasonable time limit (i.e. before the fishery switches to the next stock).

#### ***The turning of the tide in the Rio Grande***

A very interesting alternative approach was tested in the Rio Grande de Buba estuary in southern Guinea Bissau (Tous 1998, Baran & Tous 1999). Originally the territory of a community practising subsistence fishing, it was progressively invaded by highly performant fishermen from northern Senegal and later by others from the south, partially from war-torn Sierra Leone. The high value fish was stored on ice and exported fresh by the first group, the second group mostly wreaked havoc with the local forests for smoking of shad (*Ethmalosa fimbriata*).

During the identification phase of the project, financed by Swiss development aid through IUCN, a wide information campaign was initiated and local leaders were identified. The information campaign worked both ways : the project staff warned of the impending dangers of unrestricted access to fisheries, the locals put forward their development needs.

There existed a peculiar local tradition of honesty for anything in communal ownership and, prior the project, there was hardly any monetary economy in the area. Therefore individual 'appetites' were low and funds to finance the technical changeover in fishing gear could, at a very early stage in the project, be transferred to the local groups who made sure that any outstanding loans to individuals were quickly repaid.

Self-confidence of the locals was enhanced by the open listening attitude of the experts sounding out their traditional knowledge of the resource and the by the fact that the resource management schemes IUCN proposed also made sense to them.

For example, during the barracuda (*Sphyraena afra*) spawning season (the target species on which biological data were becoming available through participative research), the fishermen voluntarily switched from nets to baited hooks on lines only. This incited the fisheries ministry to reduce the number of canoes licensed to fish in the Ria and to enforce the ban on gill-nets.

Policing is done collaboratively, the fishermen policing their own community (mostly through information campaigns) and only calling in help from the central government when non-compliance could not be solved locally.

With the reduction of fishing effort the resource base improved quickly (lower catch but higher total value) and the marketing problem became dominant. After a failed attempt by the women's collective to sell hotly spiced fish to fulani herders in the east of the country, the project returns to basics : identifying dynamic individuals, providing basic literacy and numeracy classes, improving transformation by salting and drying, initiating an information campaign on local and national radio and creating a weekly market at the nearest main cross-roads.

The campaign was a big success (sale of one tonne of fish each week) and had positive spin-offs on agricultural production and forest conservation. In triumph sacks of, admittedly strongly devalued, pesos were being dumped in the capital before the astounded faces of the officials in the fisheries ministry, the first time ever a loan to a fisheries development project was paid back in full !

### *Globalisation has reached the last coastal wilderness*

A similar approach is being implemented in the participative management of fish resources in the Banc d'Arguin National Park in Mauritania (Bouceif & Worms 1999). With the demise of the traditional mullet fishery after the introduction of purse seines in 1994-95, the Imraguen, the traditional fishermen on Mauritania's north coast, were compelled to direct their effort to shark fins for the east Asian markets. Very rapidly effort increased and impacts on the stocks became apparent and the bycatch of marine turtles also became an area of concern.

From rather simple indicators collected by a network of inquirers installed in each village of the Park i.e. measuring, sexing and determining the state of the gonads, it quickly became obvious also to them that the highest densities of certain species and the best months for exploitation actually corresponded to catching the female sharks about to release their young. Through an important effort to communicate at the level of understanding of the fishermen (« who would slaughter a highly pregnant goat ? ») the fishermen agreed to voluntarily limit the number of nets per vessel, to close certain areas in certain seasons and to release any turtles found alive in the nets on condition that the Park's administration would effectively police the area to eliminate any « cheater strategies », i.e. illegal entries by motorised canoes and semi-industrial fishing vessels.

The research and the consequent adaptive management are heavily dependent on the willingness of the fishermen to make available their excellent knowledge of the resource in a relationship of mutual trust.

Because of the regional character of the stocks very important efforts are also needed for exchange of experience between fishermen. Thus the story of the sharks in southern Senegal and the Gambia is highly instructive for the Imraguen and inversely, if these succeed

in arriving at a sustainable level of exploitation, feedback of this information to the Saloum and Casamance fishermen can be beneficial (Ducrocq 1999). Two species of cartilaginous fishes, *Pristis* spp. and *Rhynchobatos libberti* have already been driven into extinction in West-Africa and more are likely to follow, e.g. the hammerhead sharks unless region-wide measures of closed seasons and areas are taken. It is interesting to note that there was never a fishery targeted at those species and that their demise is purely an effect of bycatch of estuarine and lagoonal fisheries.

### ***Mullets galore (for a few years only)***

For the, theoretically artisanal but effectively industrial, mullet fishery (total catch in Mauritania in 1997 was estimated at over 13000 tons) a different strategy is being tested (Tous 1998b). Here the private sector, the fishermen, the government departments and the scientific community are starting to work together to take precautionary measures while the scientific data are being collected.

It is too early in the process to evaluate (the project is not even assured of funding for its initial three year phase) but the regular attendance of the dominant private sector operators at the meetings of the various committees and their financial participation in the research are encouraging signs (Abdel Latif 1999).

A major challenge will be the return to lower (sustainable) exploitation levels and, in collaboration with the Imraguen, increasing added value of the final product by improved traditional processing. From a sustainable production of some 15 tons a year of traditionally prepared ovaries, the so-called « poutargue » sold at a high retail price in specialised shops in Europe, the production is now mostly exported as lower price frozen eggs. As only the Imraguen possess the traditional know-how to make high quality poutargue a system of labelling (« appellation contrôlée Parc National du Banc d'Arguin, poutargue traditionnel Imraguen ») and an information campaign for the consumers could be highly profitable.

As the fishery is highly seasonal, scope exists for rapid evaluation of the percentage of ripe females in the catches and deriving measures from those. For example agreeing upon a minimum percentage of ripe females for the start of the campaign and on a maximum percentage of spent females for its closure could be a first step.

## **2.2. Effective protection and restoration of critical habitats**

From the previous it is clear that the protected areas of the region have at least served two functions. On the one hand they have created havens where some of the observed trends have at least been delayed. On the other hand, through their policy of restricted access and the presence of donors not only interested in development as measured in terms of growth of GDP, they have become a testing ground for projects integrating conservation with development.

Through these projects, and the comparison with the 'all engines go' development in the unprotected sites, the traditional users are beginning to understand that the protected status has in fact been beneficial by guaranteeing them the territorial rights. An important change of mentality has also occurred in the 'nature protection' lobbies and the conservation of sustainable exploitation systems within protected areas is now seen as a tool for the conservation of biodiversity.

Moreover, it is often relatively easy to bring these traditional systems up to date in a way that increases added value without increasing pressure on the resources. The next logical step is that these improved exploitation systems and pilot projects are re-exported to the 'real world'. It is only in this manner, if ever, that development will become sustainable and that biodiversity will truly be conserved.

### *The last stand of the monk seal*

The Cap Blanc peninsula on the northern border of Mauritania has the largest remaining population, estimated at between 100 and 130 individuals, of Mediterranean monk seals *Monachus monachus*, one of the planet's most threatened large mammals (Gonzalez *et al.* 1997).

Though the southern tip of the peninsula is protected as a satellite reserve of the Banc d'Arguin National Park this usually only offers refuge to a few lone males that have been unable to establish mating groups. The largest group of animals, that used to live on beaches have, under extreme hunting pressures since the arrival of the Portuguese in the 15th century, moved into the caves on the western part of the peninsula. Unfortunately the quaternary limestone caves (Riser 1991) collapse easily and thus are not a very safe refuge. Over-harvesting of preferred prey (octopus, spiny lobster) by the fisheries have lengthened the foraging trips of the lactating females. This in turn leaves the unweaned pups unattended for longer periods in the caves, and combined with the heavy swell, results in high mortality rates of the young. The colony has recently also suffered heavy losses, estimated at over 50% of the population, due to an unresolved cause, most probably a toxic dinoflagellate bloom.

Moreover the unresolved status of the territory of the former Spanish Sahara precludes the establishment of any effective transboundary protected area.

### *The 'touche minute' becomes hourly*

The « Baie de l'étoile », the large marine bay to the east of the Cap Blanc, an established nursery for sparids and formerly well known in sports fishing circles as « la touche minute », meaning any fishing rod would catch a fish every minute (mostly skates) is now clearly losing in biodiversity and productivity.

The causes are unknown but are probably linked to intensification of the artisanal fisheries, the number of motorised canoes having rapidly increased from a few hundred to several thousand (CFFA 1999).

The proximity of the economic capital Nouadhibou (with fish transformation industries, an oil refinery, a power station and the loading dock for the iron ore) is a potential source of pollution, as are the numerous shipwrecks littering the bay of Nouadhibou. Given that the current pattern in the area is a gyre, the residence time of the water is high (Wolff *et al.* 1993). This is a favourable condition for nurseries (see for example Hamerlynck *et al.* 1992) but may also imply a potential sink for pollutants.

With the rapid growth of the urban population, the city of Nouadhibou expands northward and the intertidal vegetation (the southernmost east atlantic saltmarshes with *Spartina*) is heavily overexploited by camels. This may be affecting the nursery function of these habitats.

### *The hottest spot*

So much has been written on the extreme ecological and economic importance of the Banc d'Arguin National Park (Wolff et al. 1992 ; Hamerlynck & Samba, 1997 ; Campredon & Gawler 1998 ; Hatti & Worms 1998) that it is hard not to enter into hyperbole.

Suffice it to say that changes in and around the Park are very rapid and that, in spite of the major efforts by the Mauritanian Government and its donors, pressures on its resources (archeological sites, plants, reptiles, fish, birds, mammals, etc.) are still increasing and the outcome of the battle is by no means certain.

The good news is that local awareness of the fragility of the system is increasing and that trawlers and motorised canoes have for the first time in decades effectively been ousted from the Park's boundaries, thanks to a three patrol boat surveillance system funded by WWF. Moreover, the approval of a new and stricter legislation is imminent.

### *Integrated coastal zone management for all*

Around Nouakchott (less than 5000 inhabitants in 1960, an estimated 700 000 today), as is the case with other west-african coastal capitals, there is an urgent need for measures against unplanned development.

To cite just a few problems coastal erosion south of an ill-conceived harbour (that is itself threatened by sedimentation) threatens to flood the shanty-towns built on low lying land. Increased infrastructure, overgrazing by camels and sand extraction for building have seriously fragilised the coastal dune, fisheries processing infrastructure is interfering with the development of tourism, etc. (see papers in Senhoury 1998).

The Mauritanian Government is in the process of the development of an integrated coastal zone management plan that reconciles development needs with conservation (Beaumont 1998). One of the major challenges has been to break the communication barriers that existed between the different government departments, each with its own sectoral projects (and donors) and opening up the process to civil society and the private sector.

Besides of the regular meetings in the capital, one most effective ways of opening the dialogue has been the ten day 'guided tour' of all the critical points on the 750 km long coast organised by the Mauritanian Navy.

This brought many of the decision makers and technical staff closer to the realities of the Mauritanian coast and facilitated personal contacts across departments.

In the immediate vicinity of Nouakchott there is the potential of developing a protected area in the new lagoon created by the coastal erosion south of the harbour (and which may soon be colonised by mangrove).

This small site, about halfway between the Banc d'Arguin and the Senegal river delta, is becoming an important staging post for migratory birds, but is encroached upon by artisanal fisheries camps. Because of its proximity to the capital it has an important potential as a site for training and for awareness building.

For this and other coastal capitals much could be learned by more intensive south-south exchanges within the subregion, the problems being similar from Nouadhibou to Lagos, with perhaps the most dense example around Banyuls, the Gambia.



Most of the trends observed elsewhere have already visible impacts here. There is coastal erosion linked to the over-exploitation of the mangrove and the uncontrolled beach tourism developments, loss of nursery function through over-exploitation and loss of intertidal habitat, etc.

It is also the country from which the Ghanaian-led over-exploitation of the cartilaginous fishes started and where new techniques are being introduced e.g. small mesh monofilament nets for soles that have an important bycatch of juvenile soles and sharks.

On the one hand, some of the nature reserves in the Gambia are well managed and attract considerable numbers of birdwatchers, a welcome source of foreign currency.

Some efforts for exchange of information and the elaboration of regional projects are being made by the « Réseau Ouest-Africain de Planification Côtière ». Subscription to its mailing list Reso-Envicotao@univ-brest.fr can be done through François.Cuq@univ-brest.fr. One of the most interesting proposals of this network is the publication of a map portfolio targeted at decision makers with best case (substantial changes in management are made) and worst case (we let the trends continue) scenarios for the West-African Coastal Zones in 2025. This initiative however lacks funding.

### ***Death and resurrection in the Delta***

The Senegal river delta and its associated wetlands (Chott Boul and Aftout es Saheli) have initially lost much of their value through the negative impacts caused by the hydraulic infrastructure developments. The Sahelian drought impelled the governments of Mali, Senegal and Mauritania to create the 'Organisation pour la Mise en Valeur du Fleuve Sénégal' (OMVS) and to proceed with the construction of two major dams in an attempt to develop irrigated agriculture, hydroelectric power and river navigation.

The approach has so far been entirely sectoral with huge investments into irrigated agriculture and tremendous losses to traditional multifunctional floodplain management of fishing, recession agriculture, forestry, dry season pastoralism, etc. The ground water recharge and water purification functions have also suffered.

The salt wedge dam at Diama (28 km from the river mouth), has been converted to a reservoir dam. Its closure in 1986 had disastrous ecological consequences on the estuarine part downstream of the dam with mass mortality of forests, both mangrove and floodplain, and the loss of fisheries, pasture and other traditional uses, resulting in strongly diminished quality of life and causing rural urban drift. Through the establishment of the Diawling National Park in Mauritania and the use of its drainage water to restore the estuary, these negative consequences have been partly compensated for (Hamerlynck *et al.* 1999). The rising (and virtually constant) level in the reservoir, intended to save on short term pumping costs for irrigation, is, having disastrous consequences raising saline groundwater levels, on the pastoral potential through invasive species such as *Typha*, on human and animal health (malaria, bilharzia, liverflukes, etc.), etc. Alternative management schemes have been proposed that would both improve upstream ecosystem health and downstream coastal productivity by simple technical measures such as maximum downstream salinity in the dry season and minimum height, maximum level increase per day and minimum duration of the flood in the wet season (Duvail *et al.* in press, Hamerlynck *et al.* in prep.).

A further menace on coastal resources is the start-up of the hydropower production at the upstream Manantali dam. It is to be feared that, given the generally disappointing results

of the agricultural development and the very shaky economic basis for the development of navigation, the countries will be 'forced' to reimburse the loans, contracted for the construction of the dams, entirely by the sale of electricity. This would imply the abolishment of the policy of artificial sustenance of the natural flood regime and consequently a reduction of the wet season releases downstream of Diama.

On the positive side excellent possibilities exist for the development of artificially managed wetlands, with high biodiversity and productivity returns especially in the lower delta and Aftout es Saheli areas (Messouad *et al.* 1998, Hamerlynck *et al.* in press). As elsewhere, the real challenge is changing the decisional structure of the water management and effectively opening the discussion to all stakeholders so as to guarantee the fresh water needs of coastal waters in relation to actual and planned dams (Hamerlynck 1999).

### *A forgotten biosphere reserve - a what ?*

The Sine Saloum estuary was classified a biosphere reserve some twenty years ago. It comprises a national park and some classified forests as core areas. However, virtually none of the resident populations had any knowledge of the biosphere status, what its borders are and what implications this status has for resource use. Encroachment on the area has been particularly strong both by agriculture and by fisheries. Here sharks and rays were, under Ghanaian trader guidance, first exploited (1975-1980) for the West-African markets of salted-dried fish and only later by the shark fin trade (1984-1985). Moreover, the ecosystem has suffered major negative impacts of a reduced fresh water inflow. Its shark fisheries collapsed rapidly and the fishermen went further and further afield in the direction of the Bijagos in Guinea Bissau and even Guinea Conakry. The ones that haven't given up fishing altogether are now targeting shad (*Ethmalosa*).

Institutionally there was little dialogue between conservation authorities and local inhabitants and capacity for marine surveillance remains low. Over the last few years a number of studies, accompanied by some pilot development projects, financed by the Dutch Government through IUCN, have opened up the communication channels and a five year management plan integrating conservation and development in a participatory approach has been drafted (Dia 1999).

It is difficult to obtain accurate information on the situation around the Casamance estuary. Still it is safe to assume that the trends are similar to those observed in the Gambia and Siné Saloum and that surveillance is even weaker.

### *Pretty, but poor*

The wide continental shelf, the archipelago of the Bijagos Islands and the coastal mangroves and estuaries of Guinea Bissau are, in spite of the absence of surveillance and therefore the continuous presence of a high, mostly foreign, artisanal and industrial fishing capacity, still to be considered as one of the hotspots for conservation and for productivity. A major effort has been done on the Integrated Coastal Zone Management Plan (IUCN 199 ?, complete reference please) and it is to be hoped that its implementation will find continued support from the donors.

A very interesting initiative in Guinea Bissau is the « debt for nature » swap which was implemented as a measure accompanying the establishment of the Bijagos Archipelago Biosphere Reserve (IUCN 199 ?). The Swiss Development Aid took over some high interest private bank debts that were weighing heavily on the national economy. Unfortunately, with

the recent civil war the effective implementation of the reserve's management plan has been seriously delayed. This also points to the critical impacts of insecurity and armed conflict on natural resources in the region, the events in the Mount Nimba reserve being another worrying example.

## **Conclusion**

From the experiences in the subregion many lessons can be learned but a few need to be highlighted :

- the terms small-scale and artisanal fisheries are deceptive and are, in view of the current level of effort, now devoid of meaning. It seems to make more sense to distinguish 'traditional' fisheries from 'semi-industrial' fisheries. Clear subcategories should be defined with restrictions on vessels and gears adapted to the type of environment and the resource being exploited. Decision makers and donors should be made to understand that small is not always beautiful nor sustainable. FAO could play a lead role in this respect.
- the impacts of the semi-industrial fisheries and the confinement of traditional fisheries to nursery areas should incite us, preferably through a participatory approach, to establish some level of protection in all lagoons, estuaries, mangrove, intertidal and shallow coastal areas. Granting territorial or priority rights to the resource adjacent communities is probably one of the most efficient ways to attain sustainability. Obviously this process will have to be accompanied by effective development action at the local scale ;
- all river basin authorities should take into account the environmental needs for water and not in the least the requirements of estuarine areas
- it is essential to build partnerships with all users be they small or large scale. The fishermen themselves are demanding scientific advice and regulatory measures ;
- the effectiveness of the research monopoly of the parastatal research institutes, with regard to rapidly evolving fisheries that require adaptive management, has to be questioned. The development of communication skills in those researchers ready to go out in the field and develop the partnerships under the previous point is essential ;
- use the precautionary approach but learn while doing. Let's stop hiding behind the lack of 'reliable scientific data' to maintain status quo or do nothing and let the world market decide. Development and conservation are both necessary ;
- donors are to encourage south-south exchanges at all levels but especially at the level of the immediate stakeholders, the fishermen themselves. Still, these exchanges require careful planning, continuous guidance and sustained follow-up. Otherwise they will only result in a faster dissemination of the most efficient and therefore destructive techniques ;
- tourism, the world's number one industry, is potentially an important engine for development in the region. Major efforts are required at all levels to make it contribute positively to ecosystem health and to reduce its negative environmental and social impacts ;
- the present system of fishing agreements between the West-African countries and the EU is incoherent and often at odds with agreed development (and

subsidy) policies. Still, the relative transparency of those agreements stands out in sharp contrast to the agreements with other nations of which little or no information is available. The West-African countries are to be encouraged to negotiate as a group.

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