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# COMMITTEE FOR INLAND FISHERIES OF AFRICA

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# INTERACTIONS BETWEEN INLAND CAPTURE FISHERIES AND AQUACULTURE AND THEIR CONTRIBUTION TO FOOD SECURITY AND POVERTY ALLEVIATION IN SUB-SAHARAN AFRICA

**SUMMARY**

This paper summarizes the contributions of inland capture fisheries and aquaculture to food security and poverty alleviation in Sub-Saharan Africa (SSA). The paper also briefly assesses the nature of the interactions between inland capture fisheries and aquaculture at the institutional, resource, socio-economic, environmental and bio-technological levels and portrays these interactions as synergies and opportunities, which governments and other stakeholders could capitalize on, for strengthening the contribution of the sub-sectors to food security and poverty alleviation. The paper notes that inland capture fisheries and aquaculture are important to many countries of SSA and must develop further and in harmony. However, interactions may threaten the harmony if not dealt with in an integrated manner. It advocates that caution be exercised in the introduction of alien species and the transfer of aquatic organisms within and between countries. The paper identifies the promotion of integrated catchment basin management and community resources management in coastal areas, together with greater emphasis on culture-based fisheries and fisheries enhancement systems, as key strategies for increasing the contribution of inland capture fisheries and aquaculture to food security and poverty alleviation in SSA.

## INTRODUCTION

1. The International Community, through a number of recent declarations[1], has emphasized the need to ensure food security and the sustainable management of natural resources, including fisheries. It is advocated that development interventions address the complexity and interactions which govern resource use; stressing the need to incorporate traditional knowledge within development programmes, and identifying poverty alleviation as a principal priority. No other region in the world merits collective action to address these issues more than Sub-Saharan Africa (SSA), a region which comprises most of the Member Countries of the Committee for Inland Fisheries of Africa (CIFA).

2. The purpose of this paper is to highlight the interactions between inland capture fisheries and aquaculture sub-sectors, while portraying the synergies and opportunities upon which governments and other stakeholders[2] could capitalize. The paper also underscores the challenges to be faced in order to promote sustainable fisheries management and aquaculture development, with a view to increasing their contribution to food security and poverty alleviation. This analysis is timely as inland fisheries and aquaculture both are important enterprises to many countries of SSA which should be developed further in harmony. However, the interactions between these sub-sectors could threaten the "harmony" if not dealt with in an integrated manner. These interactions take place on several fronts: institutional, social, economic (including markets and trade), environmental and bio-technological. The paper will contrast these interactions, calling attention to potential positive as well as negative relationships.

3. The paper is structured as follows: The various key terms and concepts in the paper's title are explained, followed by a succinct presentation of the contribution of the sub-sectors to food security and poverty alleviation. The paper then highlights the nature of the interactions and how they offer synergies, opportunities and/or challenges. The paper concludes with suggested actions by the Committee intended to optimise the benefits which can be realised from these interactions.

## EXPLANATION OF KEY TERMS AND CONCEPTS

4. The extraction/relocation of fish and other aquatic organisms from natural waters (rivers, lakes, reservoirs, wetlands flood plains, etc.) is one of the most ancient practices of food production which continues to be practised in rural Africa today. While the hunting of aquatic organisms dates to the dawn of human evolution, aquaculture, where human intervention is involved in enhancing production of aquatic organisms, was only introduced in SSA some 60 years ago.

5. Capture fisheries and aquaculture have a number of divergent as well as overlapping aspects. In general, fishers are hunter/gatherers and socio-culturally quite distinct from growers, including fish husbandryists. The essential components of these cultures influence the way they view their respective environments and its resources. Accordingly, it is often found, although there are notable exceptions, that fishers do not make good fish farmers and vice versa. This core distinction transcends many of the other interactions. Institutionally, fisheries output is often controlled by controlling the fishers themselves while aquaculture output is likely to be controlled by controlling the aquatic environment.

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[1] The World Food Summit Plan of Action FAO, 1996; The Millennium Declaration 2002; The UN World Summit on Sustainable Development 2002, Johannesburg Plan of Implementation.

[2] The word "stakeholders" as used in this paper includes also non-governmental organizations (NGOs) and civil society organizations (CSO).

6. Within this concept, an important difference between capture fisheries and aquaculture is the question of ownership, official or customary. Aquaculture involves an acceptance of ownership of products and often production facilities while capture fisheries exploit common property. Typically capture fisheries utilize open access resources in which the only human intervention is the harvesting of wild fish stocks. Aquaculture, on the other hand, involves systems where the grower exerts control over both the cultured organism and culturing environment. Cutting across the disciplines of capture fisheries and aquaculture are techniques known as **culture-based** and **enhanced fisheries**. Culture-based fisheries refers to fisheries which are maintained by stocking with material (fry, fingerling, post larvae, etc.) originating from aquaculture installations, i.e., hatcheries and/or nurseries. Enhanced fisheries refers to activities aimed at supplementing or sustaining the recruitment of one or more aquatic organisms and raising the total production or the production of selected elements of a fishery beyond a level which is normally sustainable by natural processes.[3]

7. Culture-based and enhanced fisheries are existing components of aquatic production systems in parts of SSA. Traditional knowledge and practices of enhanced fisheries, such as the brush parks or *Acadja* systems existed in pre-colonial times. From Namibia to Niger, rural folk have developed techniques for accumulating water and improving fish yield. Many of these practices are complex, involving different forms of resource access and allocation which are characteristically based on established and accepted values and beliefs.

8. Culture-based and enhanced fisheries are regarded as aquaculture if the stocked material is accepted as owned by an individual or a group (i.e., the "growers") throughout the grow-out period until harvested.[4]

## CONTRIBUTION TO FOOD SECURITY AND POVERTY ALLEVIATION

9. According to FAO, *"Food Security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"*.[5] By satisfying these conditions, a population can be considered to be "food secure". However, a nation as a whole cannot be regarded as food secure if groups within it remain chronically insecure.

10. Poverty has been for a long time considered to be simply a matter of having an income too low to meet basic subsistence needs; an international poverty line of US$1/caput/day is still used as a simple index to define the poor. Currently it is increasingly recognized that poverty is a complex, multi-dimensional concept and a process characterized by low income, poor health, low literacy levels, under-nourishment, inadequate housing and living conditions, and that people move in and out of poverty. Poverty is also seen as a reflection of structural imbalances in society, and is highly correlated with social exclusion, marginalization, vulnerability and lack of power. Because of this complex nature poverty is difficult to define, but even more difficult to measure.

11. Between 1995 and 2000, the average annual fish production in SSA was about 3.7 million tonnes, of which, about 1.9 million tonnes were from inland capture fisheries and about 180,000 tonnes from aquaculture. In other words, inland fisheries and aquaculture

[3] FAO Technical Guidelines for Responsible Fisheries No. 6 "Inland Fisheries" lists a range of practices that are deployed in inland waters to raise productivity and, in particular, production of selected species.

[4] In some cases, local administrations lease waterbodies to individuals or groups of persons for such purposes.

[5] FAO World Food Summit, 1996. World Food Summit Plan of Action, Paragraph I. In: Rome Declaration on World Food Security and World Food Summit Plan of Action; World Food Summit, 13-17 November 1996, Rome, Italy. FAO, 43 pp.

contribute to about 59 percent of the total fish production in SSA. Fish consumption represents approximately 21 percent of the total animal protein consumption in SSA, but capture fisheries and aquaculture make indirect contribution to food security through fish sales and exports that generates income which can be used to purchase other food items. Although aquaculture production in 2000 was only about 16 percent of that of inland fisheries, aquaculture harvests have increased by about 400 percent since 1995. In contrast, inland fishery production has remained relatively constant during the same period (Table 1).

12. *Per caput* fish supply during the 1995-2000 period ranged from 0.8 to 47.7 kg/yr with a regional average of 10.8 kg/yr. Annex 1 gives the average 1995-2000 available fish and fishery products for CIFA countries and their *per caput* consumption. Although global *per caput* consumption of fish is predicted to increase from about 16 kg/person in 2002 to between 19 and 21 kg/person in 2030 (live weight equivalent); *per caput* fish consumption in Africa is estimated to stagnate or even decline by as much as 3 percent, due mainly to increases in population[6] which increase demand under relatively constant supply.

***Table 1: Production 1995-2000 Sub-Saharan Africa (tonnes)***

| Sector | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|
| Marine Capture | 1,437,187 | 1,666,850 | 1,720/124 | 1,728,212 | 1,833,400 | 1,781,276 |
| Inland Capture | 1,918,222 | 1,802,344 | 1,858,272 | 1,926,337 | 1,951,303 | 2,138,852 |
| Aquaculture | 84,635 | 100,829 | 104,467 | 155,250 | 242,846 | 336,883 |
| TOTAL | 3,440,044 | 3,570,023 | 3,682,963 | 3,809,799 | 4,027,549 | 4,257,101 |

*Source: Compiled from FAO Fishery Statistics Capture Production and FAO Fishery Statistics Aquaculture Production.*

13. In addition to supplying a nutritious food, inland fisheries and aquaculture also make significant contribution to the process of improving food security through direct or indirect employment and income to many people. Of the 35 million people reported to be involved in fisheries globally, over 400,000 are estimated to be involved in inland capture fisheries and aquaculture in SSA.[7] The majority of these people have been described to be among the "poorest of the poor" from an income poverty perspective, meaning those living on much less than US$1 a day.

14. Generally, the levels of poverty in SSA remain high. Even where there has been economic growth, this has not generally filtered down to the level of inland fishers and subsistence aquaculture operators because of inequitable distribution of the benefits, population increases and the effects of the HIV/AIDS epidemic. In addition, until recently rural and inland fishing communities were further marginalized, as Poverty Reduction Strategy Papers (PRSP), which Governments intended to elaborate for benefiting from international assistance in their efforts to fight poverty, did not explicitly mention fisheries or small-scale fisheries. Inland capture fisheries and subsistence aquaculture were hardly mentioned.

## NATURE OF INTERACTIONS

15. World-wide, water is becoming a limited resource and activities that rely on aquatic environments have the potential of developing competition as the resource base shrinks and/or demand expands. Hence, both inland fisheries and aquaculture are competing for

[6] The State of World Fisheries and Aquaculture, SOFIA 2002. In press.

[7] FAO Fisheries Circular No. 929 Revision 3, 2002 and pers. comm.

scarce resources, sometimes at the same place and same time. Competition can take several forms in addition to competition for water; inland fisheries and aquaculture share government coffers for their support along with sharing users' time and consumers' capital. These various interactions can be synergistic, antagonistic or neutral.

16. The common denominator between inland fisheries and aquaculture is fish. In most cases this translates into both activities being overseen by the same government agency (e.g., Departments of Fisheries). However, the dissimilarities between the two interventions have led to institutional segregation in some cases where, for example, aquaculture is linked to animal husbandry and inland fisheries to forestry and wildlife. The difficulties in establishing effective institutional homes for aquaculture in SSA have been wide-spread and attributed to diluted capacity and a lack of continuity.

17. Institutional issues affect the local as well as the national level where decentralised extension services frequently have difficulties in dealing with fisheries support. Fishers and fish farmers often require different forms of technical support. Moreover, whereas fishers are more-or-less concentrated along the margins of surface waters, fish farmers can be widely scattered and difficult to reach. Where inland fisheries officers are occupied with regulation and control, there is an added dimension whereby government staffs are seen as constabulary and not as development assistants.

18. When institutionally or thematically separate, allocation of responsibilities between inland fisheries and aquaculture can become an important matter: Who accounts for which system? This dilemma is exemplified by the subjects of culture-based and enhanced fisheries. Within the premise of Paragraph 8 above, these systems where the recognition of ownership is established should fall within the domain of aquaculture, their output being accredited to aggregate aquaculture harvest.

19. Inland fisheries and aquaculture also have the potential interact at the resource level in a number of ways. Farmed fish may either purposefully or accidentally enter natural water bodies and compete with, prey on, or disturb the habitat of local fishery resources. In the case of enhanced fisheries or culture based fisheries, the enhanced fishery may promote additional fishing pressure that could impact non-enhanced fisheries. Disease transmission from farmed to wild fish may as well occur. The reverse contamination may as well be possible when wild fry (early life history stages) are collected for ongrowing in aquaculture facilities. Wild stocks and domestic stocks have further interactions as the former provide the basic genetic diversity that is necessary for genetic improvement programmes while aquaculture facilities may be used to increase numbers of rare or threatened wild aquatic species. The use of introduced or alien species, including alien genotypes, i.e. genetically altered fish, has the additional potential to impact fisheries. Many introductions have been made and a specific agenda item at this Session will discuss this issue.

20. Both capture fisheries and aquaculture require good environments, although interactions appear different with respect to land and water use. Changes in use patterns can have long-term effects. By converting mangrove areas to ponds, shrimp farmers have reduced the ecosystem services that many users rely upon, especially coastal fisheries. Such changes to natural habitats may cause changes to the diversity and fish life that depend on the mangroves and other habitats as breeding and nursery areas. These ecological changes can be accompanied by equally significant, or even more serious, socio-economic changes. Changing livelihoods through a shift in resource use can have important ramifications which, if unheeded, can result in serious conflicts and even exacerbate the conditions of those already disadvantaged.

21. There are many sides to the relationships at the resource level. In the past three decades, the inland aquatic environment has been subjected to far-reaching changes arising from human activities, particularly damming and wetland reclamation for agriculture.

These interventions may result in interactions between inland capture fisheries and aquaculture. The primary objectives for damming have been for hydroelectric power generation or for the promotion of irrigation agriculture. The conversion of river fisheries into reservoir fisheries generally results in a decrease in fishing yield, a change in catch composition and diversity. To compensate for this loss and to take advantage of a lacustrine habitat, aquaculture is often established. In addition to large dams, impoundments and reservoirs (small water bodies) have been created in many countries.[8] The existence of these water bodies has stimulated interactions between inland fisheries and aquaculture when enhancements are employed.[9] An example is the opportunity for the integration of irrigation and aquaculture (IIA). It is recalled that at its Eleventh Session, the Committee taking into account the synergies of IIA, endorsed the regional programme on integrated inland Water Resources Management in Drought-prone West African Countries.

22. Spatial interactions can be more direct in both influence and competition. Aquaculture facilities can compete directly with those of fisheries. In some instances shore-based fish farms can compete with fishing communities and fishing grounds. In more obvious cases, cage culture operations can be found within important inland fisheries. In this latter case there may well be positive interactions on one front where wild fish populations may benefit from feed intended for the cultured species. However, on another front, accumulation of feed below cages could have an overall negative environmental impact.

23. Pond construction close to rivers and lakes may alter aquatic habitats in profound ways. Clearance of terrestrial and littoral plants to open up pond areas may have consequences for local biodiversity; diversion of water by damming or through channels alters hydrological patterns that may have consequences for the surrounding natural environment, and the fisheries that depend on it. Besides physical changes in habitat, aquaculture may emit effluents such as waste, unconsumed feed, pathogens and even alien species (escapees) that could change the chemical and biological composition of the ecosystem.[10]

24. Joint use of the environment and sustainable sharing of resources to the ultimate benefit of communities requires that individual action not be treated in isolation but as part of a much larger whole: the hydrological system. This approach necessitates an understanding of the larger system including an intimate awareness of the intricate interactions that make it sustainable. For many inland fisheries and aquaculture systems, this dictates a watershed approach to development, charting the detailed webs of these biospheres. In some cases, for large inland waters it may be more effective to take an integrated shoreline approach, particularly where there are urban centres competing for resource use.

25. Although catching and farming fish produce a similar end product, the process and activities reaching that end are different. Women and children have important roles to play as harvesters, processors and distributors of fish. As many areas promote aquaculture as an alternative to fishing, the roles of all stakeholders need to be considered to avoid displacing certain members of society and to ensure that new opportunities can be realized.

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[8] The valorisation of small water bodies for fish production was discussed at the Eighth Session of the Commission in 1985 in Zambia. See also Marshall, B., Maes, M., 1994 – Small water bodies and their fisheries in Southern Africa, FAO, Committee for Inland Fisheries of Africa, CIFA Technical Paper No. 29, 68 pp.

[9] See Marmulla, G. (Editor). 2001. Dams, fish and fisheries; opportunities, challenges and conflict resolution. FI Tech. Paper No. 419. FAO Rome.

[10] Kyle, R. 1993. The introduction of the spotted killifish, *Nothobranchius orthonotus*, to Tembe Elephant Park, South Africa.

26. Inland fisheries and aquaculture also interact at the social and economic levels. In response to decreased catch and income from capture fisheries, governments are turning to aquaculture as a source of livelihood. In many instances, for example in Egypt, Madagascar and Mozambique, high value aquaculture products are targeted and regarded as export commodities. This has led to formerly open access fishing grounds that satisfied many customary needs, being owned or controlled by commercial producers or corporations, which may be from outside of the local area. This shift can be further complicated by the aforementioned socio-cultural elements where different segments of society catch and raise fish. As catch declines and governments look to aquaculture to fill the gap, aquaculture may be seen as a means of livelihood for former fishers who can no longer be supported by the fishery. However, if these individuals cannot adapt socio-culturally from hunting to growing they will not successfully make the transition.

27. The sub-sectors furthermore interact in regards to price and marketability of fish. In areas where capture fisheries are prominent, consumers may prefer wild to farmed fish, and the price of wild fish is often cheaper. In areas away from established capture fisheries where farmed products would be more competitive, there may not be the tradition of eating fish and therefore fishery products are not well received. Additionally, surplus catch from especially good fishing years can find their way into local markets quite remote from the capture fishery and may further depress market price for farmed fish.[11] Although this is good for the consumer, fishers suffer financially. Thus there is potential for conflict among stakeholders that must compete for land and water and must also compete in the market place.

28. Markets can develop synergistic or antagonistic interactions. Competition between capture and cultured products can arise, with market share often going to the cheaper wild product. However, in some cases cultured products are seen as important alternatives when wild-caught fish are not available due to natural or regulatory seasonality. Moreover, processors are increasingly looking to farmed fish to make up periodic shortfalls in their main wild product.

29. In areas where there is a demand for small-size product, there are positive relationships between inland fisheries and aquaculture since, to provide this product, the former would need to employ under-size gear and/or fish spawning areas to the detriment of the population while the latter could economically and sustainability produce this product.

30. The importance of fish trade in the region varies from country to country. However, as regional economic communities continue to expand, intra- and inter-regional trade is becoming a more prominent influence in all fish production enterprises. Africa has penetrated international markets as fish exports from inland fisheries have grown in the countries bordering Lake Victoria i.e. Kenya, Tanzania and Uganda, members of the Lake Victoria Fisheries Organization (LVFO). In other countries such as Madagascar and Tanzania, export of aquaculture products has been increased over the past decade. Fish exports have now made significant contributions to those countries' GDP.

31. High wastage is known to occur during processing and/or transportation of aquatic products. However, offal from processing wild stocks can be an important nutritional important for cultured organisms. As world supply of fish meal becomes an issue, with aquaculturists relying heavily on this product as a protein source for aquafeeds, many previously ignored by-products are now being considered as potential feed sources.

[11] In the reverse scenario, a case in point is the salmon industry in Europe and North America where increased production efficiency has led to inexpensive farmed fish bringing down the price of wild fish.

32. The development aspects of inland capture fisheries/aquaculture interactions are considerable. This often leads to commercial aquaculture being proposed as a development strategy. However, this development scenario based on theoretical economic gains and experiences in other parts of the world, often has not considered adequately the contribution that inland fisheries makes to food security and rural livelihoods; often it has not considered the value of ecosystem services provided by many inland water bodies; and has not adequately addressed resource issues particular to SSA. Clearly commercial aquaculture has great potential in SSA, and in its development, the interactions between fishing and farming will increase. The seminar, *African Experience in Commercial Aquaculture and Community Involvement in Fisheries Management,* to be organized parallel to this session will provide useful information on how to employ aquaculture as a mechanism for development change.

**THE CHALLENGE**

33. The interactions described above include institutional, social, economic, environmental and bio-technological aspects; areas for complementarity and areas of possible competition. The cross-cutting issue is one of finite resource availability in a world of increasing population and declining environmental quality. The challenge today is how to balance these factors to optimise the synergistic interactions while minimising the potentially antagonistic ones. Inland fisheries and aquaculture are different in many fundamental ways from their principal target populations to the technologies they employ; nonetheless, in an input/output equation they are direct competitors, competing for water as an essential inputs and markets for disposal of their output.

34. Acknowledgement of these interactions offers opportunities for sectoral development for increasing food security, alleviating poverty and improving rural livelihoods. The challenge is to find ways to ensure the mutual benefits to inland fisheries and aquaculture accrue within common aquatic environments. The two sub-sectors need to form partnerships as both depend on healthy aquatic environments and both are impacted by other development activities. This is a multifaceted task. It involves appropriate selection of natural species and their responsible adaptation to culture conditions.

35. In SSA, the challenge is to develop and strengthen conducive policies and appropriate institutional arrangements, and promoting good governance, which are fundamental for realising the opportunities. Good governance implies among other things: the promotion of inclusiveness (empowerment of poor stakeholders and decentralization), the promotion of lawfulness (governing structures at both local and national levels to abide by and enforce the rule of law), and the promotion of transparency and accountability.

36. To meet the challenge, governments, in collaboration with stakeholders, must have a clear and comprehensive strategy for the development of their aquatic resources. This should take a holistic approach given the multifaceted nature of resource use and the potential for conflict and competition. This strategic framework is all the more important as fiscal and human resources for many SSA countries are becoming more and more limited and the public sector is asked to do more with less; frequently in close collaboration with the private sector.

37. This strategy must unambiguously identify the roles of all stakeholders; assigning responsibilities and benefits. It should take an ecosystem approach, in most cases revolving around the watershed as the geographic area of delimitation.

38. Governments, development agencies and other stakeholders should accept that there could be merit in incorporating traditional knowledge within fisheries and aquaculture development programmes. Thus, studies should be undertaken to expand the knowledge

base of existing traditional knowledge in fisheries and fishery enhancements, to improve understanding of the complexities of resource utilization. Efforts should be made to build on existing enhancement practices, or merging them with modern know-how and technology.

39. Through these processes there is an inherent dependence on information. Effective and current information channels are necessary for the full spectrum of players involved in aquatic resource management to be able to make meaningful decisions and fully appreciate the aquatic systems in question. Information technology has rapidly developed globally but there are still real and apparent difficulties in information flow from rural areas and rural communities.

40. This implies that continuing research needs to be done to understand the dynamics and limitations of any ecosystem intervention that originates from inland fisheries and aquaculture. There is a need to better understand, for example, effects of escapees and biodiversity changes, and the consequences of pollution and habitat degradation on the local ecosystem. Governments should implement Environmental Impact Assessment (EIA) prior to embarking on activities which impact aquatic environment and should continue to monitor the ecosystem changes.

41. States and other stakeholders should work to effectively implement the provisions of the Code of Conduct for Responsible Fisheries and apply, as appropriate, the elements in the Guidelines for Inland Fisheries and Aquaculture.

42. The contribution of inland fisheries and aquaculture to food security and poverty alleviation has to be made more visible, and stakeholder participation improved. The potential role of inland fisheries and aquaculture in the economy should be stressed to promote cooperation of private and public interest. Capture fisheries and aquaculture development have to be seen and approached as an integral part of rural development using the Code of Conduct for Responsible Fisheries and, as appropriate, the Sustainable Livelihoods Approach, as useful tools.

43. Governments and other stakeholders could capitalize on the synergies and opportunities offered by the interactions between the sub-sectors:

- by adopting a precautionary approach when contemplating changes or introductions;
- through the promotion of policy on integrated resource management, and
- by achieving a better understanding of the socio-economic dimensions of sustainable resource management.

44. Since many countries are facing increased budgetary constraints, international assistance would be greatly required. However, it is imperative that each member country of CIFA identifies and prioritizes actions, implement what it can do and work to seek assistance.

**SUGGESTED ACTION BY COMMITTEE**

45. The Committee is invited to review the issues and suggestions highlighted in the paper and to provide guidance to members and FAO, as well as other agencies and international organizations, on how to:

- optimise the positive interactions between inland fisheries and aquaculture while minimising the negative aspects;
- build on the commonalities between inland fisheries and aquaculture in developing sustainable livelihoods and increasing food security;

- obtain better information on inland fisheries and aquaculture development, particularly with regard to their social and economic dimensions;
- encourage increasing private sector involvement in and support of inland fisheries and aquaculture;
- incorporate risk/benefit analysis and environmental impact assessment in aquatic resource development programmes, and
- in particular the Committee may wish to emphasize strategies for promoting integrated catchment (water basin) and community management of aquatic resources and optimising the contributions of inland fisheries and aquaculture to Member Country's economies.

ANNEX 1

**FOOD BALANCE SHEET OF FISH AND FISHERY PRODUCTS IN LIVE WEIGHT AND FISH CONTRIBUTION TO PROTEIN SUPPLY (1995-2000 AVG)**

| YEAR | PRODUCTION | NON-FOOD USES | IMPORTS | EXPORTS | TOTAL FOOD SUPPLY | POPULATION | PER CAPUT SUPPLY |
|---|---|---|---|---|---|---|---|
| | (tonnes in live weight) | | | | | (thousand) | (kilogram) |
| Benin | 40.873 | 0 | 8.333 | 682 | 48.524 | 5.880 | 8.3 |
| Botswana | 159 | 0 | 5.609 | 97 | 5.694 | 1.487 | 3.8 |
| Burkina Faso | 8.097 | 0 | 7.423 | 62 | 15.457 | 10.882 | 1.4 |
| Burundi | 12.896 | 0 | 200 | 5 | 13.092 | 6.194 | 2.1 |
| Cameroon | 103.968 | 0 | 72.586 | 1.192 | 175.362 | 14.075 | 12.5 |
| Centr.Afr.Rep. | 14.543 | 0 | 332 | 2 | 14.872 | 3.537 | 4.2 |
| Chad | 87.833 | 38.318 | 773 | 0 | 50.288 | 7.296 | 6.9 |
| Congo Dem.Rep | 180.311 | 0 | 113.439 | 87 | 293.662 | 47.859 | 6.1 |
| Congo Rep. | 44.723 | 0 | 17.709 | 645 | 61.791 | 2.807 | 22.0 |
| Côte d'Ivoire | 74.369 | 35.200 | 267.694 | 117.201 | 189.661 | 15.201 | 12.5 |
| Egypt | 503.034 | 545 | 210.900 | 1.555 | 711.910 | 64.924 | 11.0 |
| Ethiopia | 11.856 | 0 | 137 | 18 | 11.975 | 59.150 | 0.2 |
| Gabon | 47.298 | 0 | 9.685 | 2.028 | 54.987 | 1.154 | 47.7 |
| Gambia | 29.107 | 0 | 878 | 2.408 | 27.577 | 1.210 | 22.8 |
| Ghana | 444.576 | 0 | 158.389 | 70.059 | 532.905 | 18.300 | 29.1 |
| Guinea | 73.710 | 0 | 22.969 | 8.340 | 88.339 | 7.772 | 11.4 |
| Kenya | 188.463 | 199 | 11.163 | 38.465 | 161.800 | 29.019 | 5.6 |
| Madagascar | 128.433 | 4.549 | 9.981 | 29.941 | 103.924 | 14.860 | 7.0 |
| Malawi | 51.187 | 0 | 391 | 44 | 51.537 | 10.627 | 4.8 |
| Mali | 108.526 | 4.178 | 2.202 | 2.230 | 104.320 | 10.617 | 9.8 |
| Mauritius | 12.785 | 4.098 | 39.027 | 22.996 | 25.550 | 1.138 | 22.4 |
| Niger | 8.077 | 0 | 934 | 809 | 8.202 | 9.945 | 0.8 |
| Nigeria | 427.291 | 7 | 503.494 | 3.717 | 927.061 | 106.487 | 8.7 |
| Rwanda | 5.246 | 0 | 262 | 0 | 5.507 | 6.175 | 0.9 |
| Senegal | 407.055 | 28.368 | 12.321 | 132.867 | 258.145 | 8.849 | 29.2 |
| Sierra Leone | 67.030 | 0 | 2.502 | 12.059 | 57.497 | 4.194 | 13.7 |
| Somalia | 23.475 | 0 | 45 | 2.818 | 20.702 | 7.988 | 2.6 |
| Sudan | 48.500 | 0 | 250 | 81 | 48.669 | 29.502 | 1.7 |
| Swaziland | 142 | 0 | 6.707 | 1.183 | 5.667 | 881 | 6.4 |
| Tanzania | 338.863 | 6.719 | 271 | 33.481 | 298.937 | 33.021 | 9.1 |
| Togo | 17.297 | 0 | 43.545 | 3.794 | 57.053 | 4.177 | 13.7 |
| Uganda | 237.637 | 0 | 79 | 31.823 | 205.894 | 21.667 | 9.5 |
| Zambia | 72.148 | 0 | 1.544 | 214 | 73.486 | 9.822 | 7.5 |
| Zimbabwe | 15.655 | 0 | 18.031 | 1.679 | 32.024 | 12.053 | 2.7 |

*NOTES: FBS not calculated for Lesotho as trade statistics not available. Non-food uses for Chad account for wastage after harvesting and possible overestimation. Production, trade and supply data refer to fish, crustaceans and molluscs, including all aquatic organisms except whales and seaweeds. Information on changes in stocks is available for a limited number of countries only. In view of possible distortions in each of the components of the commodity balances (i.e. in data for catch, trade and population) as well as in coefficients used to convert product weight to live weight equivalent, per caput consumption data should be regarded as giving only an order of magnitude indication of consumption levels. Comparison with data for previous periods published in earlier Yearbooks may not therefore give a valid indication of real changes in consumption. a valid indication of real changes in consumption.*