

Investing in Africa: the WorldFish Center's African Strategy in summary

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Abstract

Across much of Africa, freshwater and coastal fisheries provide an important source of food and livelihood for many millions of people. In addition, the aquaculture potential of the continent has only recently begun to be developed. To help sustain these capture fisheries, support the emergence of aquaculture and foster the contribution of both to sustainable livelihoods and improved food security, the WorldFish Center is increasing its investment in Africa. The framework for this investment is provided by a new Strategy for Africa and West Asia 2002-2006 that identifies priorities for the Center's work in rivers and floodplains, lakes and reservoirs, coastal fisheries, aquaculture, policy research and capacity building. The present article summarizes the issues being addressed by the Center and describes initial research priorities.

Introduction

Africa's challenges are very much in the news and are the focus of attention for many in the international development community. From the ongoing conflicts in West and Central Africa to food shortages and famine in Ethiopia and southern Africa, the HIV/AIDS pandemic, persistent environmental degradation and the underlying slow pace of economic development, the scale of the problems is daunting. The launching of the New Partnership for Africa's Development (NEPAD) as a defining framework for the continent's economic and social development and a mechanism for stronger regional cooperation, has opened up new opportunities for the continent and a growing sense of urgency that these need to be seized. For the international agriculture research community, and notably for the CGIAR, this combination of challenge and opportunity has provided an important incentive to reassess where our efforts have the greatest impact. At the WorldFish Center, we have given careful thought to what the challenges in Africa mean for fisheries and aquaculture and the role of research and extension in responding to them.

Across Africa fisheries and aquaculture supply high quality food at low cost to millions of people, generate income for farming and fishing households, and play a central role in many local and national economies. Capture fisheries dominate this picture, providing well over 90 per

cent of fish harvested in the region (FAO 1999). However, aquaculture has grown steadily in recent years. For example, production increased from 60 000 t in 1990 to 340 000 t in 2000 in Egypt and from 7 000 t in 1990 to over 20 000 t in 1998 in Nigeria (FAO 1999).

Despite the productivity and importance of the region's capture fisheries and the promising though slow emergence of aquaculture, the current supply of fish falls short of demand. In Africa as a whole, per capita availability of fish is declining and in some countries the average diet contained less fish protein in the 1990s than in the 1970s. Africa is the only geographic region of the world where this has occurred. Current projections of supply and demand to the year 2020 indicate that the gap between supply and demand will continue to grow, even if current harvests of wild caught fish can be maintained and aquaculture continues to progress at the current rate (Ye 1999).

However, even these are fragile assumptions. There is currently widespread concern about over-fishing of both marine and freshwater resources across the region and many of the coastal and river habitats that sustain the fisheries are being degraded, their water supply diminished, and pollution increased in both coastal and freshwater systems. Unless action is taken to address these problems, the region's capture fisheries risk a sustained decline. If aquaculture is to realize its great promise and the successes

of Egypt and Nigeria are to be repeated in other countries and different farming systems, carefully targeted research and investment will need to be sustained over many years.

To help meet these challenges the WorldFish Center has developed a new Strategy for Africa and West Asia. We believe that sustained harvest of the region's capture fisheries together with continued development of aquaculture can provide the region with an enhanced and sustainable supply of fish protein and employment for millions of people. The Center's Strategy focuses upon four aquatic production systems: rivers and floodplains, lakes and reservoirs, coastal fisheries, and aquaculture; and a number of overarching policy studies and capacity-building activities. The Center seeks to generate research results that will help strengthen national and regional policies and capacity to sustain and enhance the development benefits from capture fisheries, while identifying and designing ways to overcome technical, economic and social bottlenecks to the development of aquaculture.

Challenges facing African fisheries and aquaculture

Capture fisheries

Africa's extensive rivers sustain important fisheries (Table 1), ranging from the large floodplains of the inner Niger delta in Mali to the forest rivers of Cameroon,

where surveys have shown fish to be the most important of all non-timber forest products. These river fisheries are severely stressed across much of the region, with inadequate management systems, intense fishing pressures and changes in water quality and flow regimes leading to declining productivity and yields. To address these challenges, a major investment is needed to understand and establish governance systems for river fisheries that foster sustainable levels of use, while also maintaining the water flow required to sustain them. In support of these efforts, the value of river fisheries needs to be better understood and communicated, and ways to assess water requirements should be developed and used to improve the information upon which water and fishery management decisions are based.

The continent's lake fisheries play an equally important role in many local economies. The annual harvest from most of these is in excess of 20 000 t/year (Table 2) (Lévêque 1999) and the fisheries of the largest lakes are of national and regional importance. Yet many of these lake fisheries face over-fishing compounded by eutrophication caused by urbanization, agriculture, and catchment degradation. Long-term sustainable use of lake fisheries will require better governance and significant improvements in the management of land and water use in the catchment areas.

Artificial reservoirs play a significant role in fisheries production in the region. Published annual harvest data show production ranging from 1 500 t from Manantali (Mali), 31 000 t from Lake Nasser (Egypt) and 40 000 t from Lake Volta (Ghana), with yields commonly around 50 kg/ha or above (Table 2) (Lévêque 1999). While some of this variation is due to the natural productivity of these artificial lakes, much of it is because of differences in the management regime, including timing and extent of draw-down and whether or not there has been any stocking. To fully exploit their potential, the management requirements of the individual systems need to be assessed and appropriate regimes agreed upon with key stakeholders.

Many thousands of small dams and small water bodies (SWBs) are also fished. In

Table 1. Fisheries production from some African floodplains

Floodplain	Area (km ²)	Catch (t)	Number of fishers	Yield (kg/ha)
Niger (Benin)	242	1 200		49.6
Niger (inner delta)	20 000	90 000	54 112	45
Niger (Nigeria)	4 600	14 340	4 600	31.2
Benoue	3 100	9 570	5 140	30.9
Pongolo	104	400		38.5
Shire (1970)	665	9 545	2 445	143.5
Shire (1975)	665	7 890	3 324	118.7
Yaérés (Cameroon)	7 000	17 500		25
Logomatia	600	300	70	5
Kafue (1970)	4 340	6 747	670	15.6
Kafue (1982)	4 754	7 400		15.6
Ouémé (1957)	1 000	10 400	25 000	104
Ouémé (1968)	1 000	6 500	29 800	65
Sénégal	5 490	30 000	10 400	54.7
Barotse	5 120	3 500	912	6.9
Cross	8 000	8 000	4 000	10
Nile (South)	31 800	28 000		8.8

Source: Lévêque 1999; Welcomme 1989

Table 2. Fisheries production from some African lakes and reservoirs

Systems	Surface (km ²)	Catch (t)	Yield (kg/ha)	Period
Reservoirs				
Kossou	900	4 700 - 9 300	67 - 147	1972-78
Lagdo	700	7 700 - 13 400	175 - 340	1985-91
Maga	360	700 - 3 600		1984-92
Manantali	500	1 500	30	1995
Sélingué	400	4 000	100	1995
Jebel Aulia	1 500	7 000 - 8 000	50	1975
Mtera	600	3 250 - 5 000	80	1986-91
Mwadingusha	1 000	674 - 8 000	50	1953-83
Kafue Flats	4 300	2 450 - 10 850	6 - 25	1957-82
Kainji	1 270	4 500 - 6 000	35 - 47	1974-78
Kariba	5 300	30 700	30 - 41	1990
Nasser	6 200	15 600 - 31 200	6 - 25	1981-91
Volta	7 400	40 000	55	1970-79
Lakes				
Turkana	7 560	350 - 22 000	9 - 16	1962-88
Baringo	130	152 - 600	10 - 50	1964-86
Naivasha	115-150	44 - 950	5 - 60	1964-86
Albert/Mobutu	5 270	23 900	47 - 65	1989
Chilwa	750	13 700	77	1989
Chiuta	200	1 100	75	1989
Edward	2 300	14 400	61 - 70	1989
Kivu	2 370	4 600	27 - 42	1991
Malawi	30 800	69 400	35 - 45	1991
Mweru	4 650	20 200	60	1990
Tanganyika	32 900	133 900	90	1990
Victoria	68 000	562 900	29 - 59	1991

Source: Lévêque 1999

eastern and southern Africa alone, there are an estimated 50 000 to 100 000 such SWBs (Haight 1994). Even though most of these have been built for purposes other than fisheries, are usually located in rural areas with difficult access, have low fish yield and revenue and are low in the government's list of priorities, there is potential for improving their yield. As efforts to improve water productivity at the basin level increase in the coming years, the potential of these water bodies to provide fish and income for rural people is likely to be developed (Dugan et al. 2002). Management of SWBs also provides an important transition to aquaculture in some areas.

Africa's extensive marine waters provide the bulk of the region's fish harvest (FAO 1999), with industrial fleets dominating the catch. However, artisanal harvest is significant throughout the region. For instance, the artisanal catch along the Atlantic coast of West Africa is in excess of 1 million t (Horemans 1998) and in Mozambique it is 80 000 t valued at US\$ 50 million. The economic and social importance of these fisheries is high. For example, in the coastal region from Mauritania to Angola there are estimated to be over 570 000 full-time artisanal fishers and many more farmers who fish part-time. In addition, some 1.8 million people in this area are estimated to be engaged in fish processing and marketing (Horemans 1998).

The importance of these resources is highlighted by the pressures upon them. Moreover, the collapse of other economic sectors combined with population increases and migration to coastal areas have led to an increase in the number of coastal fishers in many parts of the region. In the face of this increased fishing pressure, traditional management systems are rarely adequate to ensure sustainable use of these resources, and

the situation is further exacerbated by the impact of the market economy and environmental degradation (Horemans 1998). Urbanization, increased tourism and industrial expansion have all damaged important coastal ecosystems in many parts of the region. Pollution from land-based sources, increased sedimentation and changes in river flows as a result of building dams have contributed to the degradation of many others. These changes can have major impacts upon coastal fisheries and the people dependent upon them. Therefore, they need to be understood better, documented convincingly, and communicated effectively to key stakeholders if action to prevent and/or mitigate them is to be taken.

Aquaculture

Aquaculture will need to be developed progressively if the projected increase in the demand for fish protein in the region is to be met. There is also a growing recognition of the considerable potential of small-scale aquaculture to diversify livelihood options for poor farmers and increase their income while reducing their vulnerability, and also to improve land and water management.

The potential for aquaculture across the region is enormous. For sub-Saharan Africa (SSA) alone, Kapetsky (1994) has estimated that 9.2 million km² (or 31 per cent) of the land area is suitable for smallholder fish farming. If yields from recent smallholder development projects can be replicated elsewhere, only 0.5 per cent of this area would be required to produce 35 per cent of the region's increased fish requirements up to the year 2010 (Kapetsky 1995).

This potential for aquaculture remains largely untapped over much of the region at the present time. In 1999,

total aquaculture production in SSA was only 117 000 t, which is 0.4 per cent of the world production. Yields in most countries remain low, commercial operations have yet to develop in most areas, and fish farmers are relatively few in number (Moehl 2001). The precise reasons for the poor adoption of aquaculture by small-scale farmers have varied from case to case, but the fundamental cause is now widely recognized to be the failure of effectively integrating aquaculture into the farm economy (Harrison et al. 1994; Stomal and Weigel 1998; Brummett and Williams 2000). This in turn is due to several factors.

- Too much emphasis on the role of central government structures, both in terms of technical support and provision of inputs, and not enough on the farmers.
- Poor understanding of the household economies and rural livelihood strategies into which aquaculture has to be integrated and the constraints and opportunities they present.
- Poor understanding of the roles of people comprising the household and in particular the role of women.
- Poor understanding of social constraints.
- Poor assessment of markets.
- Too much emphasis on bio-technical methods rather than simpler, more readily adopted and more adaptable approaches.
- Inadequate extension services.

As a result, attempts to promote the development of aquaculture on small farms have failed to recognize the real needs of the farmers, assist them in adjusting aquaculture practices to their specific context, and so resolve the constraints of time and resources that limit the adoption of aquaculture.

Over the course of the 1990s, a number of initiatives have tried to remedy past shortcomings, in particular by placing greater emphasis on the development context (Stomal and Weigel 1998). Several of these new initiatives have pursued an integrated and adaptive action-research-development approach, rather than the compartmentalized approach of pursuing research followed separately by extension that characterized the failed efforts of the 1970s and 1980s. For example, in

Table 3. Countries where WorldFish Center's Regional Strategy 2002-2006 has been initiated

Fish Production System	Countries with initial WorldFish activities
Rivers and floodplains	Cameroon, Ethiopia, Ghana, Malawi, Nigeria, Zambia
Lakes and Reservoirs	Egypt, Ethiopia, Malawi, Mozambique
Coastal Fisheries	Egypt, Mozambique
Aquaculture	Cameroon, Egypt, Ethiopia, Ghana, Malawi, Mozambique, Nigeria, Zambia

Malawi, this integrated "action-research" approach developed by the WorldFish Center and our partners has resulted in the successful adoption of small-scale pond aquaculture by a growing number of smallholder farmers as an integral part of their farming practice (Brummett and Noble 1995).

Much greater investment will be required over the course of the coming decades to build upon these successes and realize the region's potential for developing aquaculture. As experience improves the understanding of the opportunities and constraints facing the adoption of aquaculture, new approaches can be developed to address the constraints and failings of the past. In particular the social, economic and institutional constraints to aquaculture need to be understood, and the approaches used adjusted to address them. A thorough understanding of the socio-cultural context and of the market forces that determine the return to the farmer is a prerequisite for designing successful aquaculture. The role of the government, the private sector, and NGOs should be clearly defined and supported. In particular, the training and extension system needs to be adapted to the dynamic environment within which aquaculture is being pursued and adopted.

As for most other crops, prices, demands on the farmer's time, environmental conditions, and a range of other factors will vary seasonally and annually, from province to province, and in many cases from farm to farm. This means that emphasis needs to be placed upon developing the capacity of the farmer as an entrepreneur by providing a wider suite of understanding and tools from which they can draw in order to adapt to the dynamic environment in which they are operating. The success of this approach has been demonstrated by the WorldFish Center through the use of Research and Extension Teams (RETs) in Malawi and more recently in Cameroon. However, this approach has to be adapted to a much wider range of locations for it to bring about the magnitude of change that is required to meet the growing need for enhanced livelihood and increased fish production from aquaculture in SSA.

In support of these approaches increased investment is required to address

technical and environmental constraints. These include the availability of high quality fingerlings at an affordable price, good quality low-cost feeds, control of disease, and efficient use of water resources. The impact of urban development and associated pollution on aquaculture is also of serious concern, as is the impact of aquaculture on natural capture fisheries. The possible loss of biodiversity as a result of escapes from aquaculture is likewise a major issue. To help understand such potential impacts the region's fish biodiversity needs to be better understood.

The Center's strategy 2002-2006

These challenges have to be addressed at many levels. Therefore, the Center's strategy (Box 1) seeks to build upon past work by the Center and its partners; complement other programs already underway, notably those of FAO, national and regional organizations, bilateral development assistance programs, and the NGO community; and identify a limited number of issues that the Center has particular expertise and opportunity to handle. This is an ambitious agenda that will take time to achieve and success will depend upon forging a wide range of partnerships within and outside the region. In the immediate future, priority will be given to the following areas of research and capacity building.

- Analysis of governance arrangements and valuation of capture fisheries in rivers, lakes, and coastal areas.
- Assessment of environmental requirements of river fisheries.
- Assessment of factors affecting production and benefits to poor fishers.
- Assessment of threats to capture fisheries in rivers, lakes, and coastal systems and ways to mitigate these.
- Assessment of means to enhance production from capture fisheries, notably in lakes and reservoirs, including the rehabilitation of depleted stocks.
- Improved understanding of the aquaculture adoption process and development of ways to foster adoption.
- Enhanced aquaculture productivity.
- Development and use of methods to maintain environmental integrity in

the face of aquaculture development.

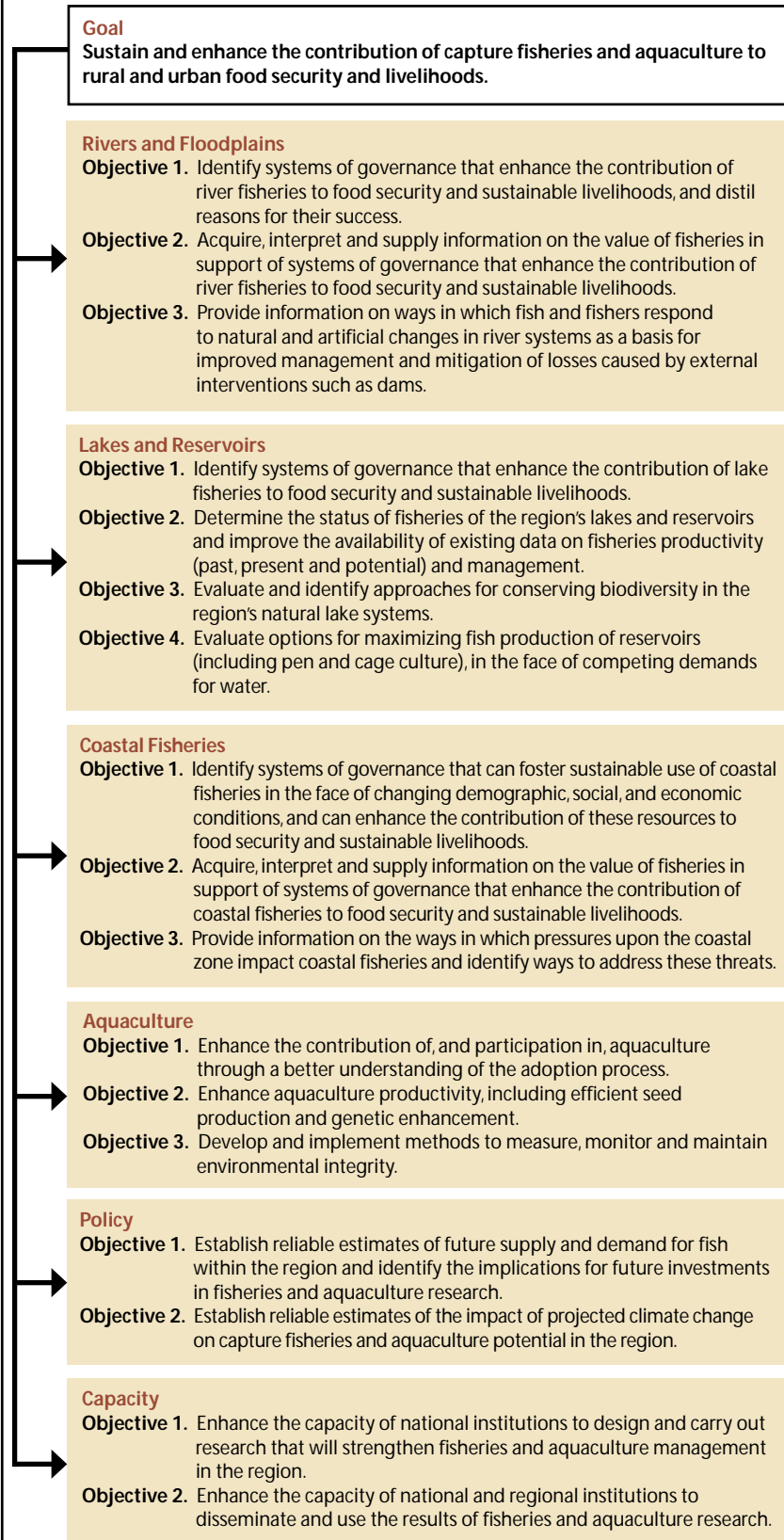
- Assessment of demand and supply of fish and its implications for fisheries development.

In pursuing these priorities, special attention is being given to working with national agriculture and fisheries research and extension institutions (Table 3), advanced research institutes, NGOs, and international institutions. Wherever possible, the Center will help to build capacity at the national level and special attention will be given to develop training programs.

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The goal and objectives of the WorldFish Center's Strategy for Africa 2002-2006 are set out below.



Box 1. WorldFish Center Strategy for Africa

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