



Summary

Fish is a key dietary ingredient in many coastal and landlocked African countries providing much-needed high-quality protein. The WorldFish Center cites a decline in the per capita supply of such protein in sub-Saharan Africa (SSA) which they attribute to a decline of fish from wild fisheries and rising population in the region. This paper contends that scarcity is primarily driven by sharply rising exports and the failure of aquaculture to meet predicted shortfalls despite significant inward financial resources from donor agencies. The availability of fish in SSA is discussed with the implication of possible non-action on other wild protein source. Pragmatic reasons beyond the frequently cited and well documented constraints for poor delivery of aquaculture are presented. Recent progress is given of small scale commercial aquaculture enterprises that are driven by strong local and regional markets. Nevertheless, it is concluded that a genuinely new approach is required to meet the 8.3 million tonnes of fish needed annually by 2020.

In Africa, fish is a significant source of animal protein accounting for up to 80% of daily animal protein intake (FAO, 2007). According to the WorldFish Centre the supply of fish in Africa is in crisis. The sub-Saharan African (SSA) region is the only region of the world where there is either no notable increase in per capita supply or

is declining and the apparent per capita fish consumption is the lowest in the world (WorldFish Centre, 2005). The main reason cited for this decline in supply is the levelling off production from wild catches and growing population (WorldFish Centre, 2005). Evaluation of recent data, however, suggest that other factors may be more important in contributing to declining national fish availability in the regions of African. This article explores availability of fish in the sub Saharan region and highlights the potential implications of inaction on other sources of animal protein and explores the potential role aquaculture could play to meet fish supply shortfalls. Based on 1997 levels, aquaculture output would have to increase by 267% by 2020 to maintain the current fish consumption level in Africa (Delgado et al. 2003). Despite numerous interventions to increase uptake of aquaculture, however, solutions to achieve this objective remains elusive.

Fish supply in SSA

Although available data on African fish production from capture fisheries is not robust, national fish landings reported to the Food and Agriculture Organisation (FAO) provide a useful insight into regional availability of fish. Contrary to the above, fish landings from sub Saharan waters have increased significantly and outpaced global average growth by 30 fold. By 2005 nearly 5.8 million tonnes of fish were landed in SSA. Whilst global fish catch increased by just 0.1%/year between 1995 and 2005 the annual increase in landings in SSA was higher at 3.2%/year. Excluding landings from Namibia and South Africa increased landings to 3.4%/year (Figure 1). Fish landings from national Economic Exclusive Zones (EEZ's) in the region may also be underreported as under resourced countries, take advantage of provisions within the United Nations Convention on the Law of the sea to grant fishing rights to foreign vessels to exploit their fisheries resources. (Aqorau, 2007). These vessels typically do not land their catch in local markets but rather export directly to more lucrative markets where the prices are higher. The European Union (EU) has consistently had the largest foreign fleet presence off West Africa, with EU fish harvests there increasing by a factor of 20 from 1950 to 2001 (Justin et al, 2004).

The EU financial support of its foreign fleet fishing in these foreign waters increased from about \$6 million in 1981 to more than \$350 million in 2001 with the effect of artificially increasing the profitability of fishing in African waters for EU boats, despite declining fish stocks (Justin et al. 2004).

The increases in fish catches were also higher than sub regional increases in population growth. Whilst fisheries in SSA grew by 3-4%/year, the average population increase in SSA was lower, at 2.5%/year between 2000 and 2005 (Table 1) and even lower in Southern Africa (1%/year). These data suggest that, at the sub-regional level, reduced fish availability may be attributable to other factors, notably exports which are encouraged under the Abuja Declaration on Sustainable Fisheries and Aquaculture in Africa (available at: www.fishforall.org/ffa-summit/outcomes.asp).

Removable of fish from African countries to international markets

Fish is a valuable resource that is in high global demand. This together with the pressing need for foreign exchange by African countries to import basic goods and services and limited tradable resources has necessitated a significant shift in diverting fish from local to international markets where fish fetches higher prices. In the last 15 years exports increased exponentially 3 fold in tonnage from 248 million tonnes to 728 million tonnes and 4 fold in value from \$ 427 million to \$1.34 billion. This understandable national strategy, however, has contributed further to growing trade deficits as significant quantities of fish, albeit of lower unit value are imported into the region.

In all sub regions except east Africa fish availability is stabilised though substantial imports resulting in similar or slight increases in apparent fish consumption in the last decade raising doubts on the contention that exports contribute to foreign exchange earnings. The sub region where apparent fish consumption has notably declined is the riparian countries of east Africa. The decline in consumption in east Africa however, is probably higher as the bulk of the export production are fillets and therefore the whole weights are likely to be underestimated. More appropriate adjustments for round weight in Kenya, Tanzania and Uganda would suggest that the caput supplies were lower at 2.3, 6.0 and 6.3 kg/capita/year instead of the reported 3.6, 7.0 and 7.7, respectively.

Role of wild fish in rural communities

Fish also plays a crucial role in household nutrition providing valuable and much needed high quality protein. Recent studies on fish consumption in fishing and non-fishing communities in Nigeria has shown that twice as much fish is consumed in fishing communities when compared to non fishing communities (Gomna and Rana, 2007) and that consumption can exceed 100kg/household/year, up to four times that of meat consumed (Table 3). Such high level of fish consumption, however, is probably due to there being no direct monetary cost for the fish and underlines the importance of managing open access wild artesianal fresh and marine water fisheries stocks in the region.

The long term availability of such fish, especially from fresh waters, may however be compromised by current practices. In Sierra Leone, for example, destructive fishing methods, whereby the season's juvenile fish in flood plains are caught, often daily by children, without allowing them to grow to mature sizes could be a factor feeding into the shortages in fish supply in the market.

Impact and importance of fish protein availability on other wild animal protein sources

Fish makes a significant contribution to animal protein intake in the region contributing an average of 40% of the animal protein intake in sub-Saharan Africa (available at: <http://www.fao.org>). This share, however, is highest in West Africa accounting for 69% in Senegal, 80% in Gambia 79% in Sierra Leone and 67% in

Ghana. Reduction in the availability of fish therefore can place pressure on other sources of animal protein. Recent studies in West Africa have illustrated that fish supply is causally related to bush meat availability (Justin S. et al. 2004). When fish becomes scarce hunting pressure increases and other wild life declines due to the diversion to these protein resources.

Can aquaculture play a role to meet fish supply shortfalls?

In the light of decreasing fish availability, the New Partnership for Africa's Development (NEPAD) endorsed an action plan, focusing on supporting capture fisheries;

improving fish market chains and increasing benefits from fish trade and supporting decision makers with such information and developing aquaculture (NEPAD, 2005).

Fish farming which incurs production costs, however, is often promoted in resource poor environments is expected to restore fish supplies from capture, a purely extraction based activity by asset deficient fishers and rural farmers.

Understandably, efforts to promote aquaculture to date, as the panacea to remedy fish supply shortfalls and promote food security since the 60's have repeatedly failed despite international and donor agencies having injected millions of dollars. To date these agencies were also unable to convincingly demonstrate the financial rewards of aquaculture to potential local investors and substantiated the scepticism of financial institutions and discouraged investment in the sector.

Reasons for poor delivery from African aquaculture have been repeatedly debated and have been well documented since the Kyoto conference of 1972. Limited institutional and human capacity and inadequate supply of fish feeds, seed and prohibitive transaction costs are frequently cited as constraints but non-delivery of these interventions for aquaculture development by international and national agencies is more probably attributable to (i) the homogeneous approach by development agencies to the 54 African countries on a continent that is collectively larger than United States of America, Europe and China; (ii) minimal ownership and perceived relevance of the research often dictated and directed by foreign experts primarily aimed at subsistence farming (iii) inadequate financial resources and commitment by national institutions to meet their post-project obligations; (iv) low morale and poor career structure for those charged with service delivery and governance; (v) failure to understand the cultural context of envisaged programmes, (vi) unconducive traditional land tenure systems, (vii) limited access to water resources despite the continent having abundant natural resources (viii) high cost of and poor accessibility to finance and collateral, (ix) a low appreciation of time management of households in target communities and (x) limited capacity by end users to manage the inherent risks of an alien activity.

In addition, the lack or weak policies and regulations are often cited as constraints. On the contrary, sound policies do exist but experience shows that even if these instruments are or were in place the resources and commitment required for

implementing such instruments are lacking. In the case of South Africa aquaculture uptake is hampered by overregulation and non transparent application of regulations and inappropriate application of first world policies for a socio-economic development agenda more akin to developing countries.

As a consequence aquaculture has remained a subsistence activity at best, further exasperated by a largely rural population and a poor rural economy in which disposable income is scarce. Production of fish is casual in small homestead farms and such an approach is unlikely to meet the predicted shortfalls of fish for the region (Figure 6). Such subsistence activity, nevertheless, arguably plays an important role in rural livelihoods.

In the region it is estimated that there are around 110 000 non-commercial fish farmers many of whom are classified as small scale subsistence farmers (Hecht, 2005). Whilst production from such systems is low, non-commercial aquaculture does play an important role in rural livelihoods, through contributing to food and nutritional security, and through temporary and part time jobs (Hecht, 2005).

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In rural communities the integration of fish farming with agriculture (IAA) can also enhance income for household. Studies in Malawi have shown that income of households adopting IAA practices were 1.5-1.8 times that if no aquaculture was practised. (Dey et al. 2006). Other studies suggest that fish contributes between 1-17% of household income (Andrew, et al. 2003). Similarly in Ghana, the income from a combination broiler and fish were 57% higher than if fish was only farmed. (Ofori, 2000).

In view of the low and unpredictable production from such systems, subsistence fish farming is unlikely to make any measurable contribution to national fish supply shortfalls.

New initiatives aimed at addressing these and other challenges of inward investment to promote aquaculture have recently been launched through NEPAD (WorldFish Center, 2005).

The way forward – transformation from subsistence to profit based farming activity

Prior to the recent NEPAD initiatives progress has been made in small scale commercial aquaculture. In recent years, the combination of rapid urbanisation in Africa (7-10%/year), declining fish supplies, rising fish prices and strong domestic and regional markets has created an opportunity for small scale commercial aquaculture around many African cities (Rana, et al, 2005). These key drivers combined with the preference for fresh fish has provided the necessary impetus for urban and periurban aquaculture enterprises with local investments. Such developments, however, will still have to contend with the importation of large quantities of cheap often subsidised fish such as frozen herring, mackerel and other frozen marine fish which

dominates imports, accounting for around 70% of total imported quantity in 2005 (FAO, 2007). One explanation for their popularity is their low unit price of USD\$ 0.5-0.7/kg, a price level which may well influence the current cost ceiling of any aqua farming activity. It is highly likely that as long as these conditions prevail aquaculture producers in urban and peri-urban zones will not be able to compete with these cheap imports and therefore aquafarmers may have to also focus on niche markets for large, live or fresh fish taking due cognisance of productivity, market preferences and investment risks and time. Nevertheless local private investment often by retired professionals, local businesses, individuals with savings have entered the aquaculture sector with expectations of meeting strong local demand and diversifying their income portfolios. This has resulted in a range of outcomes, the most notable being farming in and around cities.

Such small scale commercial peri-urban farming is most advanced in Nigeria where catfish is sold live at farm gates and in markets fetching Naira 300-400/kg in cities such as Lagos and Ibadan and Abuja. Such farms often use simple recirculatory systems especially in cities (Figure 8b) and ponds in peri-urban areas with production capacities of 10-600 tonnes/year/farm. Catfish are now grown at stocking densities of up to 300kg/m³ and fed on farm made pelleted diets and imported commercial diets.

The transformation of aquaculture from subsistence to economically viable enterprises is also taking place in several countries although many of these operations are still based on a low input low output scenario with yields typically around 500 – 1000 kg/ha. In Malawi around 4,050 farmers were farming fish in 9,500 ponds in 2002 (JICA, 2005).

have emerged in Malawi. A large-scale cage culture operation that is aiming to produce between 2,000 and 3,000 tonnes of *Oreochromis karongae* using a pond based system for fingerling production and circular floating cages for outgrowing in Lake Malawi. The second is a medium scale 8 ha pond culture operation in the Lower Shire valley at Kasinthula producing *Oreochromis mossambicus* and *Cyprinus carpio*.

Perhaps the most significant commercial finfish culture operation in SSA is situated on lake Kariba in Zimbabwe with a fully equipped fish processing and packing facility with an

inventory of around 3000 tonnes of Nile tilapia (P. Blow, personal comm.). This farm, however, exports most of its fish as fillets to the EU but in the last few years are taking advantage of the rapidly growing local and regional markets for fresh fish in Southern Africa.

In terms of unit value aquaculture development is probably most significant in South Africa where notable success has been achieved with abalone culture in capital and labour intensive farms (Figure 9) for export. In 2005, South Africa produced 830 tonnes of abalone for the export market worth \$28 million.

Smaller scale commercial production of rainbow trout has also been sustained. By 2005, 13 rainbow trout farms under the “Hands-On Aquaculture cooperative” scheme have been established to improve the living standards of Western Cape rural communities. To ensure sustainability the co-operative has signed a long-term market-uptake agreement for 200 tons of trout per annum with a local smokehouse. Individual farmers produce up to 6 tons per annum in cages sited in irrigation dams and creating further opportunity for additional local employment in secondary service sectors such as processing.

Conclusions

Despite the reported total increase in fish landing of over 1.7 million tonnes between 1990- 2005 in SSA being higher than the rate of population increase, the per capita supply of fish in parts of the region has declined. In regions where there was a slight increase in capita supply, this was achieved with imports of 1.77 million tonnes of fish at a cost of USD 1.5 billion in 2005. In the last 15 years exports increased 3 fold in tonnage and 4 fold in value (not adjusted for inflation). This increase has/is removing large quantities of fish away from national supply in part facilitated by subsidised foreign fishing fleets.

Aquaculture is portrayed as an alternative to meet shortfalls in current and future fish supplies. To date, however, aquaculture has failed to deliver largely due to lack of perceived and tangible economical benefits of the activity. Recent rising fish prices and strong domestic and regional markets have been recognised by local investors and commercial enterprises are emerging, especially in urban and peri-urban zones, using home-grown technologies. Recently NEPAD has launched a comprehensive initiative to consolidate and expand the aquaculture sector in Africa. Given the history of aquaculture development to date, the degree of success will depend on the capacity of its executors to come up with genuinely new and fresh approaches to well documented constraints to ensure future fish supplies. By 2020, SSA will require supplies of 8.3 million tonnes of fish annually for a predicted population of over a billion (UNESA, 2007) at current per caput supply of 7.7kg/capita/year (FAO, 2007).

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