

The Aquaculture Sector in Mozambique: Strategy, present Status, plans for Future Development and Legal Framework

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Abstract

The government of Mozambique in recognition of the importance of aquaculture for the socio-economic development and poverty alleviation has defined aquaculture as one of the top priorities activities to be carried out. As a result of it, the fisheries sector prepared a 10 years strategy of aquaculture for aquaculture development (2008-17) with three major objectives: (1) to step up the sustainable development of aquaculture, (2) to increase the current levels of annual production of marine prawns and other aquatic species (animal and vegetable) intended for export, and to guarantee community food security, and (3) Establish a legal, normative and institutional framework for appropriate and effective management of aquaculture.

Some of the works accomplished by the National Institute for Aquaculture include the inventory for potential areas for aquaculture (to help identifying appropriate areas for commercial operations). construction of demonstration units of ponds, training courses for extensionists and small farmers, support for installation of private units for fingerling production, dissemination of aquaculture activities through partnerships with schools, institutes, and universities, and educational programs via radio and television using local languages have been taking place all over the country as a way to promote the small scale aquaculture.

Plans for future development include fingerling production (large scale and certified quality), building fish feed factories in areas with higher feed demand, Increase local and foreign investment increasing public investment of the provincial and local Governments for aquaculture and Maximize the benefits of inter-sectorial coordination (Agriculture and Environment Affairs).

The success of aquaculture operations in Mozambique, as in any other developing country depends indeed largely by biosafety measures taken for disease control and correct implementation of legislation in place.

Hygiene and sanitary requirements for the Export of Fishery Products

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Mozambique is exporter of various products of fishing, including aquaculture, for markets with special emphasis on the demanding EU market. In order to have access to the international market the country implements a series of public programs for the control of hygiene and health of aquaculture farms and processing establishments of products for those markets. For aquaculture products are specifically implemented national programs to control environmental contaminants and control of veterinary drug residues.

Recently, the country has began a program to monitor the epidemiological situation of the country in relation to diverse pathogens with special attention to the white spot virus. This program involves several institutions and it will soon get support of technical assistance from OIE experts (International Organization for Animal Health) and FAO.

Potential for Aquaculture in Mozambique, Environment Conditions, and the Cultivated Marine and Fresh Water Species

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Abstract

Mozambique is a country that has a coastline of over 2780km and is the third longest in Africa with a number of rivers, lakes, dams with high potential for aquaculture associated with a natural environment for aquaculture environment. The country has a potential for the marine aquaculture in ponds some 77600 hectares of land, 32 100 hectares for cultivation in floating cages and 10.6 hectares for the cultivation of seaweed. Potential species to cultivate include cobia (*Rachycentron canadum*), grouper (*Epinephelus* sp), tiger prawn (*P. monodon*), white shrimp (*P. indicus*), mussels (*Perna perna*) oysters (*Pinctada embricata*) and seaweed. There is also potential for growing tuna, lobster and mangrove crab (*Scylla serrata*).

For freshwater aquaculture, Mozambique has about 258,000 hectares favorable for the practice of aquaculture. There is an ongoing survey and mapping of these areas at national level. In addition to these areas large bodies of water formed by dams, rivers and ponds can be used for cultivation in cages or restocking. The species of greatest potential for freshwater culture include tilapia (*Tilapia* spp), african catfish (*Clarias gariepinus*) and carp (*Cyprinius carpio* and *Ctenopharygodon idella*).

Apart from large bodies of water and huge areas of land ripe for aquaculture, the country has good water quality with average surface temperatures around 25 and 30 degrees Celcius, optimal salinity (10-15ppm), some infra-structure to market the product, such as roads commercial ports in three regions (North, Central and South), electrical power grids and telephony network in expansion and available almost in all main Villages.

Abstract High quality fingerling availability and dissemination in Mozambique

By

C. W. Schnell – Xibaha Limitada

1. The need for good seed. It seems as if commercial farmers need to find out for themselves that one cannot make a profit today with any strain of Tilapia. You need a strain where the whole group stocked in a pond or a cage grows at the same speed and fast. After the first harvest and calculating the profits, the farmer normally starts looking for better quality fingerlings.

2. The Xibaha strain from Vilankulo. The company called Xibaha Limitada in Vilankulo imported genetically improved strains from Thailand and uses it in a breeding program which prevents inbreeding and assures that the best genetic material is used for each successive generation. It aims to develop its own new strain for Mozambique in a few years' time. At the moment eight groups of different strains are available for multiplication, each group has its own genetic improved qualities.

3. Dissemination through INAQUA provincial delegations. The majority of the all male sex reversed fingerlings sold in Mozambique is done to INAQUA which has their own group of farmers they supported with the quantities each one requires. INAQUA also started to stock lakes with mixed sex Niloticus and Mossambicus fingerlings with the view of replacing poor quality inbred stock with a better quality for the community to harvest in future. Small quantities of mixed sex fingerlings are not supplied to small farmers because of the threat that they might start breeding their own inbred and poor quality fingerlings.

4. Direct deliveries to farmers around the country. Commercial farmers also purchase their fingerlings from Xibaha because this is the only source of a genetically improved fingerlings bred from a breeding nucleus of well managed breeders.

5. Accreditation of hatcheries. If commercial farmers wish to breed their own fish on their own farms, Xibaha enters into a contract with such farmers to assure that they do not follow bad practices and in the end produce inbred offspring. The agreement boils down to destroying old breeders after two years and acquiring new ones, by this time more improved breeders, all from the Xibaha breeding nucleus.

Commercial Operation on Marine and Freshwater Aquaculture: The Process of Approval of an Aquaculture Project

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Aquaculture, because of its intersectoral nature, touches many sectors at several levels of government. Each has a different role to play and each enters and exits the process at different times. However, each sector, regardless of their sectoral mandate, seeks to: ***Promote integrated and sustainable approaches to the development of major economic uses of the aquaculture potential to optimize benefits and minimize negative impacts.***

The following lists the major sectors that are involved in the aquaculture review and approval process. Other sectors may be involved occasionally and where required, CPI (Centre for Investment Promotion) will identify and contact them for involvement in the approval process. CPI acts as a one-stop permitting center for the investor through liaising with other institutions that review and approve a project. They Provide the investor with information on establishing and conducting business in Mozambique.

The Ministry of Fisheries acts as the ultimate authority and provides oversight for approving aquaculture projects once individual or institutions have completed their reviews and issued their approvals. The Ministry of Fisheries also archives the approval process documents to create a public record of the process (Decree 35/2001 of 13 of November). An administrative review of the package of collected documents acquired during the approval process is submitted by the National Institute for Aquaculture Development (INAQUA) to ensure that all required documents are present and that overall compliance with the permitting process was achieved. INAQUA will perform a feasibility study to determine suitability of the project from the viewpoint of technical and economic feasibility. Elements of environmental and social impacts will also be included as they relate to the technical aspects of the proposal according with the legal mandate: Fisheries Act (1990) and Decree 35/2001 of 13 of November.

Ministry of Agriculture is responsible for granting land use rights. They review the land application to determine availability of the land and whether it will be allowed according to the type of ownership of the land (Land Act, 1997 and Decree 66/98 8 of December).

Ministry of Public Works and Housing is responsible for granting water use rights and ensuring water quality. Determination as to whether the volume of water needed is available and can be extracted without conflict or environmental damage (Water Act, 1991).

Ministry for Coordination of Environmental Affairs coordinates the permit review process that issues the Environmental Permit (Environment Act, 1997, Decree 45/2004 29 of September).

INVESTING IN AFRICAN AQUACULTURE

BY

HEMPEL, E.

Presented by Erik Hempel, Hempel Consult, Norway

Abstract

African aquaculture is very much in its infancy, and in spite of many attempts, few have succeeded in building a sustainable activity. The objective of this presentation is to take a look at what is needed to create a successful and sustainable aquaculture industry in southern Africa.

At the outset, it is important to be clear about one's objectives, and to be honest about the status quo. The presentation consequently suggests some general objectives for the industry in the region, and presents the latest information on where the industry stands today.

The presentation then goes on to list what factors need to be in place, and how they can be developed. Factors such as natural resources, environment, and infrastructure, both physical and legal/administrative, are explored. Important inputs, including expertise, technology, finance and management are also discussed.

In the context of an extended value chain, the author explains how upstream activities, core activities and downstream activities all have to be in place for the industry to succeed.

The presentation focuses on commercial, "industrial" aquaculture rather than community-based, small-scale operations. The objective is to create an aquaculture industry that can supply local markets as well as produce for exports, while creating local employment and contribute to the general economic development of the country.

In this context, it is important to be clear about what should be the role of the government, and what the government should not be involved in.

It is also pointed out that most aquaculture projects tend to pay far too little attention to market considerations, and most overlook the importance of the domestic and regional markets while focusing too much on foreign markets.

The presentation will also show an example of how a large, integrated tilapia farm in Malaysia and a similar operation in Zimbabwe were built by applying these ideas.

The Investment Climate in Mozambique and the Code of Fiscal Benefits and Incentives

By

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Abstract

This presentation will provide an overview on the climate for investment in Mozambique, and illustrates the main investment opportunities especially in the fisheries, but also in agriculture, energy, infrastructures and tourism sectors. The main objective is to provide an overview of the country, which includes its strategic geographical location and macroeconomic indicators, and familiarize on its favorable investment policies.

The investment climate in Mozambique is positive and conducive to doing business, with its preferential access to the SADC markets (which offers access to 250 million consumers), free access to international markets such as Japan, Canada, China, the AGOA and the European Union and bilateral treaties and agreements with about 25 countries.

More reasons to invest in the country include the Government's incentives in the form of fiscal benefits (general and specific), favorable legal framework, law on investments, regulation on investment law and taxation systems. Furthermore, the main imports and exports and top 10 investors in the first half of 2011 illustrate the main products and sources of trade and FDI to the country, as well as indicate the growing interest to invest in Mozambique.

Market for Aquaculture Products of Mozambique and its Relation with other International Markets

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Abstract

Aquaculture is a fast growing activity in relation to fishery. Recent figures indicate a 6.5% world annual growth rate for aquaculture production, against 0.45% annual growth of capture fisheries. If this persists, in few years to come, the world production from aquaculture will overcome the production of capture fisheries. The main contributors are mainly Asian countries led by China which contributes with more than 50% of aquaculture production in the world.

The aquaculture industry in Africa is still infant due to the abundance of good production of capture fisheries. Egypt is by far the biggest producer in Africa with 80% of total production. The average per capita consumption of fish in this continent is around 9 kilograms, and in Mozambique the per capita consumption of fish has increased from 6.5 to 9 kilograms in the past 10 years and it has been projected to reach 12 kilograms in 2019, where the aquaculture contribution is expected to be at 80 thousand tons.

It is expected that in near future, developing countries take lead in aquaculture industry in the world. It will contribute significantly as a source of income and protein for people. One thing interesting in aquaculture for the African continent is that its fast growing projected for the future might overcome the well known traditional income from cotton, coffee and sugar crops.

The exportation of fisheries sector in Mozambique represents currently 4% of the total exportations of the country and the contribution for the GDP is at 2%. These are indicators that bring a great challenge for the fisheries sector, in particular for the aquaculture sub-sector. The potential is enormous and less than 1% of it is currently exploited.

Aquapemba Marine Finfish project, a perspective of past development challenges, current solutions and future development.

By

Gavin Johnston (Aquapemba) and Nick Joy (Loch Duart)

Abstract

Aquapemba Lda is an offshore marine fish farming venture that was initiated in 2008. The company has completed its primary pilot scale operations which focussed on the assessment of structural operational requirements to operate a commercial venture of this nature in Northern Mozambique. A description of this phase will be provided and how it has led the company into the second phase of development. The current secondary pilot phase is more focussed on the fish production aspects of growth, feed and marketing the fish under commercially simulated conditions. The attainment of satisfactory results will ultimately lead to market driven commercial expansion (Phase 3). We expect this to enable an annual production of between 2000 and 8000 tons with sustainable employment for several hundred people.

We will address the broader issues of production, processing and marketing and the associated difficulties of financing such a venture. Aquapemba Lda is the first commercial offshore fish farm along the East African Coastline and being the pioneering company we are burdened with the extra load for cutting the trail in terms of policy and bureaucracy. We intend to engage with government and interested development finance institutions to assist us in taking the project into the commercial phase and beyond, so we can demonstrate the potential that we believe is possible.

Presentation of MoZambezi Tilapia's Farming project

By

Kurt Louis Heyns, Managing Director, Mozambeze

Abstract

There is huge potential in Aqua Culture in Mozambique and in particular fish farming in Cahora Bassa. It has the perfect conditions for Tilapia and the potential to be the biggest supplier of Tilapia for the SADC region. We have had incredible support from the government of Mozambique, especially the Ministry of Fisheries. We believe that we can help to develop or stream line systems with the government for the industry of aquaculture and make it easier for current developments and encourage future developments. MoZambezi has some pending issues to solve but we believe we have conquered all the major criteria and obstacles and should be in full development by mid 2012. Some very important environmental guarantees and parameters need to be established for Cahora Bassa to support and protect the fishing industries. I would like to suggest that we start a fish farming associations and partnership or working forum with INAQUA and begin to work on these developments as soon as possible. This can be run over the internet so everyone can work together. I believe BJØRN's presentation in Norway at the AQUANOR trade show, was a very good summary of the parameters needed to encourage aquaculture investments in Mozambique. I hope it will be mentioned in the conference. I would like to end by thanking the Ministry of Fisheries, INAQUA and the organisers and sponsors of the conference. Together we can succeed and I hope that this is the beginning of a great future for Aquaculture in Mozambique. Thank you.

Feeding Fish to Feed the Nation

By Ramon M. Kourie

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Abstract

The availability of quality fish seed and quality feeds are seen as precursors for aquaculture growth in Africa (USAID, 2009; NFDS, 2009). Fish demand in Mozambique is strong having an estimated annual market demand of 63,500 tonnes. Due to this strong local demand and local supply shortfalls, imports of fish from Namibia and Angola have climbed to 25,000 to 30,000 tonnes per annum (NFDS, 2009).

Government in Mozambique have been proactive in anticipating local demand shortfalls enacting policies to foster an ambitious aquaculture development plan targeting a production output of 11,000 tonnes by 2014 and 80,000 tonnes in 2019. Currently total aquaculture production is estimated at 1000 tonnes per annum.

The availability of affordable locally produced and high-quality extruded feeds for fish and shrimp coupled with the introduction of appropriate feed based aquaculture technologies it is expected to dramatically accelerate aquaculture production growth. Innovative and appropriate feed based low-value freshwater aquaculture technologies for tilapia and catfish include 1) 80:20 LVHD cage-cum-fish pond model and 2) LVHD cage culture in public water bodies. These low cost technologies are already contributing to significant aquaculture growth in Ghana (INFOSA, 2011) and are anticipated to positively impact aquaculture growth in Mozambique.

Mozambique's is blessed with a favorable coastline and an abundance of high value marine fish species endemic to local waters which are in high demand all over the world. Complementing existing shrimp farming activities in the country feed based marine finfish aquaculture offers unmatched opportunities for investment at the moment. The list of candidate and promising marine finfish species includes groupers, ducky cob, cobia and a host of species from the *Sparidae*, *Serranidae* and *Moronidae* families.

The importance of locally produced extruded feed can therefore not be overstated. Extrusion technology today enables production flexibility of tailored extruded feeds to match the ideal feed specifications for the target species including floating, slow sinking and sinking feeds down to a particle size of 0.8mm directly discharged from the extruder die plate. Extruded feeds offer improved production performance and improved growth rates as a result of the gelatinization of the starch component of the feed, improved water stability and improved digestibility in cultured fish and shrimp. The elements of importance which are often overlooked in extrusion aquatic feed plants are the grinding plant and steam pre-conditioning. A mid-barrel valve to control Specific Mechanical Energy (SME) and a back-pressure valve to control shear stress and SME assists to regulate important product properties such as bulk density, size and uniformity of cell structure, starch gelatinization, shape definition and water and fat absorption.

The development of a well planned and engineered multi-species extruded aquatic feed plant offering total process flexibility is essential to support the coming aquaculture growth phase in Mozambique.

EMERGING MARKETS IN VIEW OF NEW AQUACULTURE PRODUCERS

by

Fatima Ferdouse

INFOFISH

Global fish and seafood trade returned to the positive tracks in 2010 after a slight dip linked with the financial crisis world-wide. The extent of recovery, however, varied market to market.

The leading aquaculture producers - China, Norway, Thailand, Vietnam, India reported higher exports. Cross references in the importing countries, traditional and emerging, also confirmed this positive development. With more than 90% share in global aquaculture production, Asia continues to support rising demand for fishery products in domestic and export trade.

By the third quarter of this year, seafood demand in the western markets was being affected by the growing economic uncertainty among consumers, but many emerging markets maintained their 2-digit growth rates. Out of the top fourteen markets that posted positive trends, seven were from the Asia/ Pacific region. Imports also increased in Russia, Brazil, Mexico and many other countries in the Middle East and West Africa.

In the developing world, we have also noticed greater attention on domestic and emerging markets, due to the rising demand and better prices for aquaculture products ranging from the higher priced farmed shrimp to lower priced *pangasius* catfish and tilapia. There is also a price premium for high quality and organic fishery products that ranges from 30-400%.

In the aftermath of the global economic and financial crisis, the developing world is increasingly becoming a drive of the global economy, where they see opportunities in their immediate neighbours – not just traditional markets far away.

Coastal Environment Quality and Resource Species for Mariculture

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Abstract

The development of mariculture depends amongst other on two key factors, namely environment suitability and market availability. Associated with these two factors a number of marine species can be selected, both indigenous and exotic. In Mozambique the structure and functioning of the coastline can be divided in 3 main systems: estuarine intertidal mud flats surrounded by mangrove forests in the south and centre-north; marine rock and sandy intertidal flats, and fully marine seashore and bays, these last two mostly along the northern coast. The centre-north coast (21°10' - 10°32' S) is fully tropical and therefore more suitable for aquaculture of tropical marine species.

The northern coast of Mozambique (10°32' - 17°20' S) is predominantly coralline and rocky, occasionally disrupted by small but deep bays, estuaries and sandy beaches of oceanic waters favourable for finfish, seaweeds and bivalves. This coast contrast with the centre-north zone (16°14' - 21°10' S) formed mostly of coastal swamps and areas of tidal influence formed with alluvium soils, muddy flats, and extensive mangroves, highly suitable for marine prawns and euryhaline fish such as Mullet *Mugil cephalus*.

Mozambique has some marine species environmentally suitable for aquaculture and regarding potential domestic, regional or international markets. Amongst crustaceans, the penaeid prawns are given particular emphasis notably for Black Tiger *Penaeus monodon* and the Indian White *Fenneropenaeus indicus*. Warm temperature for most of the year and unpolluted brackish waters turn these coastal systems suitable for euryhaline low in the food web marine species. Amongst seaweeds two major species were tested suitable for aquaculture, *Kappaphycus alvarezii* and *Eucheuma spinosum* in the northern sand and rocky intertidal flats. Finfish indigenous species range from a few groupers *Epinephelus* sp., seabreams *Rabdosargus* sp. and snappers *Lutjanus* spp. More recently both dusky cob *Argyrosomus japonicus* and Cobia *Rachycentron canadum* have been tested successfully in Pemba Bay. The most suitable fully marine environment lies along the northern rocky and coralline coast of deep bays for onshore and offshore aquaculture. Marine bivalves highly suitable for mariculture are restricted to Perna mussel *Perna perna*. Yet

the northern coast in particular is highly suitable to other but exotic and commercial species such as Pacific oyster *Crassostrea gigas* and Manila clam *Venerupis philippinarum*.

Due to the diverse nature of Mozambique coastline and considering the relevance of the market in selecting the right species, the prospect for mariculture is further extended regarding a range of exotic tropical species, currently commercially farmed. However, introduction of exotic specimens should be only encouraged under the terms of bio security from introduction of diseases and alien potential pathogen and ecologically detrimental organisms.

The Aquaculture and Fisheries Investment Partnership – A working group of the Partnership for African Fisheries

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The Partnership for African Fisheries (PAF) is a flagship programme of the **NEPAD Agency** (NPCA), funded by the UK **Department for International Development**.

The programme intends to advance African fisheries thinking, investment and outputs by:

- Development of a coherent approach for reform in fisheries through an inclusive think-tank process that promotes change through communication, learning and advocacy and a robust policy process which is informed by best international practice.
- Clarifying and publishing the potential benefits that the African fishery sector has to promote pro-poor economic and social growth.
- Sharing and expanding knowledge and experience in tools, systems and policy requirements needed to tackle illegal fisheries as an integral part of improved fisheries governance.
- Preparing innovative and equitable approaches to investment and trade in African fishery products

The Aquaculture and Fisheries Investment Partnership is a working group of the Partnership for African Fisheries. Our belief is that a sustainable fisheries and aquaculture industry that contributes to growth is not only attainable, but essential. Our vision is that growth will be driven by investment. Our mission is to bring together influential partners to identify the opportunities and constraints to investment in the sector, and to bring solutions through this process.

Established in January 2011, we are an informal partnership led by the Development Bank of Southern Africa. Founding members include the University of Greenwich, the NEPAD Agency, GIZ and the Global Partnership for Fisheries, based at the World Bank. Membership requires no contribution, other than a commitment to exploring to possibilities offered by the fisheries and aquaculture sectors in Africa.

We have undertaken a number of studies on financing in the fisheries sector. We have held the first meeting of the working group. Now we are developing an information memorandum to attract investment in an African Fisheries and Aquaculture investment fund, targeting SMEs in the fisheries and aquaculture value chains. This will be presented for the first time at the Pemba conference. We have also received commitment in principle from the donor community to fund an entrepreneurship programme that will support the investment fund.

We recognize that many challenges exist, but we believe that by focusing on what works, we can develop the tools that take the fisheries and aquaculture sectors in Africa to the next level.

