



REPUBLIC OF NAMIBIA

# NAMIBIA'S AQUACULTURE STRATEGIC PLAN



MAY 2004

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## **1 A WORD FROM DR IYAMBO, THE MINISTER OF FISHERIES AND MARINE RESOURCES**

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The Government of Namibia has identified aquaculture (fish farming) as a prime priority development area. Both Vision 2030 and NDP2 documents summon our urgency to develop aquaculture. The policy and legal framework are in place. This will be our compass to ensure a thriving aquaculture industry. We have opted for a novel approach; the One-Stop-Shop. This will remove unnecessary impediments and ensure efficiency, effectiveness and swift coordination.

Namibia's aquaculture is in its infant stages. Opportunities for accelerated and sustained growth are without bounds. The process through infancy into a fully-fledged industry should be nurtured through public private partnership.

The aquaculture edifice should be firmly underpinned by strong pillars. These include access to affordable finance, prudent strategies to ensure training, research /technology, marketing, infrastructure development, quality control /assurance etc. These are non-negotiable pre-requisites for a viable aquaculture development.

Aquaculture has the potential to significantly contribute towards sustained food security, income to rural households, enhance revenue generation for the State through exports, re-enforcement of employment and inwards investments. Our vision is to see new supportive industries germinating and flourishing.

I extend an invitation to investors and experts to reflect on the possible new industries and spin-offs. In my view, the following are few potential new businesses: pharmaceutical, construction, fish feed production, vegetable/crop growing, marketing, etc. Namibia enjoys comparative advantages. The unpolluted rich Benguela Current off the Namibian Coast holds untapped potential for marine culture. Namibia has a well-developed seafood processing and distribution network. This will be a twin to aquaculture. Namibia's well-established telecommunications infrastructure, peace, political stability are added values.

We look forward to the establishment of a vibrant and profitable aquaculture industry by the year 2030.

## **2 INTRODUCTION**

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### **2.1 WHY DEVELOP A PLAN FOR AQUACULTURE AND WHAT DOES THE PLAN INCLUDE?**

The Plan is developed to provide guidance on the regulatory framework, business climate, public acceptability, and strategies to ensure training, research, marketing and infrastructure development.

It explains where we are now and where we are going with aquaculture in Namibia. It is the tool that is needed to form a framework to support aquacultural activity, both private and public, and to encourage the growth of this industry during a critical stage of development.

It provides a situation analysis and recommended actions in all strategic areas that impinge on aquaculture development in Namibia. It indicates targets for employment creation, investment, training and the value of production during the next five years. The recommended actions, if implemented, will overcome existing constraints and take advantage of opportunities in the aquaculture industry.

### **2.2 WHEN WILL THE RECOMMENDATIONS BE IMPLEMENTED?**

The Aquaculture Strategic Plan has a five-year horizon: 2004 – 2009. The Plan proposes a series of both short and long-term recommendations.

### **2.3 WHAT IS AQUACULTURE?**

On a technical level, aquaculture is defined in Namibia's Aquaculture Act (no. 18 of 2002) as "the farming and ranching of aquatic organisms". On the popular level, aquaculture is sometimes referred to as "fish farming". For the purposes of this Strategic Plan, the term "aquaculture" will include all aspects of the technical definition and will discuss the industry and science as a whole.

"Marine aquaculture" and "inland aquaculture" will be used to differentiate between the location and nature of the type of aquaculture. "Marine aquaculture" includes structures (trays, pens, enclosures, nets, etc.) that are located in, on or close to unaltered marine waters. "Inland aquaculture" includes on-land facilities and utilizes ponds, tanks, and enclosures that are dependent upon the culturist for maintenance of water quality, food supply, and waste removal. Examples of aquaculture that involves both inland and marine components include hatcheries and re-circulating systems.

When the term "aquaculture" is used in this Plan it includes both public and private operations. There is widespread interest in Namibia in both privately owned and operated aquaculture activities, as well as enhancement and propagation efforts that will augment recreational and commercial harvests. In addition, this Plan advocates public/private aquaculture partnerships.

### **2.4 WHAT IS THE PURPOSE OF THE AQUACULTURE STRATEGIC PLAN?**

The Strategic Plan represents the foundation for addressing the complex, multifaceted issues associated with aquaculture and removing unnecessary impediments to the aquaculture industry. This effort represents a planning process that commenced during the formulation of the Aquaculture Act and the institutional framework that is necessary to transform the Act into real actions, and will continue to build a long-term structure for

aquaculture development. The Strategic Plan is not intended to “solve” all aquaculture related issues now, but rather it is intended to chart a course for identifying key issues and solving problems in a cooperative and comprehensive manner. If the plan can assist in facilitating the process to establish a vibrant and profitable aquaculture industry, it's main purpose and goal will be achieved.

## **2.5 WHAT IS THE AQUACULTURE STRATEGIC PLANNING APPROACH?**

The Government initiated in consultation with industry and other line Ministries, the strategic planning process. This included on-going site visits to aquaculture facilities, discussions with industry and current and potential aquaculturists, international literature reviews, and regional public meetings. The recommendations developed by this process are contained in the Plan.

## **2.6 WHY SHOULD THE GOVERNMENT DEVELOP THIS INDUSTRY?**

Aquaculture offers tremendous opportunities for Namibia. This growth industry can improve food security, reduce poverty, create employment and increase inward investment to the country. In addition, aquaculture represents a sustainable economic use of our coastal and inland living aquatic resources – which means that aquaculture activities can be continued into the future, providing economic opportunity without depleting non-renewable resources.

With our wealth of diverse marine and freshwater resources, concentration of marine fisheries, and strategic location and access to the world's largest seafood markets, Namibia is a natural place for the development of aquaculture.

Worldwide aquaculture is forecast to be a major growth industry into the 21<sup>st</sup> century. In response to increasingly constrained global supplies of wild finfish and shellfish and growing consumption of seafood products, aquaculture production has expanded in many regions of the world.

According to the Government's VISION 2030 document<sup>1</sup>, by the year 2030:

*“Aquaculture will have grown to become a thriving industry. Namibian aquaculturists will have capitalised on the country's productive advantages such as unpolluted, nutrient-rich waters and the development of wet aqua-feeds from the industrial capture fisheries. Investors will have developed a marine aquaculture sector that utilises intensive rearing methods to produce various types of high-value finfish and shellfish, destined mainly for the export market. Inland extensive and semi-intensive freshwater aquaculture systems will provide food, income and employment for rural communities”.*

Aquaculture is also identified as a development priority in Namibia's second National Development Plan (2001-2005).

## **2.7 THE NEED FOR BALANCE**

The Government of Namibia recognizes the need to support aquaculture in a manner that is compatible with the other existing uses of Namibia's marine and inland waters. Specifically, diverse needs (such as private property rights, wild capture fisheries, navigation, and recreation) that aquaculture will compete with must be analysed.

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<sup>1</sup> Namibia Vision 2030. Policy Framework for Long-Term National Development. Office of the President, Private Bag 13356, Windhoek. August 2003.

Without question, aquaculture must be balanced with other compatible activities. A balance can be struck, however, because all these activities have much in common – and most importantly, they all require sustained high water quality.

Aquaculture in Namibia can function as an opportunity to galvanize disparate interests to work toward common goals including: diversified, sustainable economies for isolated rural areas, both inland and coastal; improved viability of non-productive areas; minimized upstream sources of point and non-point pollution; and education of our children on the value of a healthy ecosystem that can support renewable natural resource-based food production.

### **3 BACKGROUND AND JUSTIFICATION**

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#### **3.1 POLICY, OBJECTIVES AND STRATEGIES**

##### **3.1.1 Policy and legal framework for aquaculture development**

Current policy for this developing sector is laid out in the policy paper: *Towards the Responsible Development of Aquaculture (2001)*. Under this policy, Namibia is committed to observing the principle of optimum sustainable yield in the exploitation of living natural resources and ecosystems. The Government therefore has an obligation to promote and regulate responsible and sustainable development and management of aquaculture within national water bodies of all types.

The main objective of Namibia's aquaculture policy is the responsible and sustainable development of aquaculture to achieve socio-economic benefits for all Namibians and to secure environmental sustainability. The policy rests on four strategies:

- (a) Establishing an appropriate legal and administrative framework for aquaculture, including establishing systems of tenure for commercial aquaculture;
- (b) Establishing appropriate institutional arrangements for aquaculture;
- (c) Maintaining genetic diversity and the integrity of the aquatic ecosystem; and
- (d) Ensuring responsible aquaculture production practices.

However, the economic support to the industry should also be incorporated as an objective to ensure that seed money to stimulate the industry is made available.

In 2002, the Aquaculture Act was passed by Parliament and came into force in June 2003. This prescribes, *inter alia*, the procedure for obtaining aquaculture licences, monitoring, regulation, processing, marketing, environmental safety measures and consumer health and safety issues.

##### **3.1.2 Aquaculture in the context of the second National Development Plan**

Aquaculture is identified as a development priority in NDP-2. Sector-specific objectives relating to aquaculture are detailed in the Fisheries and Marine Resources Chapter of NDP-2:

- *Promote aquaculture activities in and around the productive unpolluted and nutrient rich waters off the coast of Namibia.*
- *Facilitate improvement of actual activities pertaining to aquaculture, by exploring the culture of other species, such as prawns, clams and*

*other kinds of fish, whether in freshwater or seawater, depending on scientific advice.*

The Government foresees the role of aquaculture of freshwater species to enhance food security, generate incomes and improve rural livelihoods and investment. Freshwater aquaculture will be mainly a community-based, co-operative activity, using labour intensive methods. Production from freshwater aquaculture activities will be destined primarily to ensure food security in local communities, as well as for local, regional and international markets.

The Government foresees the culture of marine species through the use of intensive systems, requiring significant capital and technical expertise, producing high value species intended primarily for export markets. Consequently there will be a major role and a great opportunity for foreign investors in the further development of marine aquaculture.

### 3.1.3 Aquaculture in the context of VISION 2030

According to the Government's VISION 2030 document<sup>2</sup>, it is envisaged that by the year 2030 aquaculture will have grown to become a thriving industry. Namibian aquaculturists will have capitalised on the country's productive advantages such as unpolluted, nutrient-rich waters and the development of wet aqua-feeds from the industrial capture fisheries. Investors will have developed a marine aquaculture sector that utilises intensive rearing methods to produce various types of high-value finfish and shellfish, destined mainly for the export market. Inland extensive and semi-intensive freshwater aquaculture systems will provide food, income and employment for rural communities.

The Government of Namibia has therefore identified aquaculture as a top priority area for development.

## 3.2 AQUACULTURE INDUSTRY IN NAMIBIA

Three Spot Tilapia (*Oreochromis andersonii*)



Aquaculture commenced in the late 1800's with introduction of carp, bass and tilapia to state-owned and private dams. There was negligible production up to the mid-1980's, then private sector interest increased. Prominent aquaculture experts from a number of countries conducted studies and indicated that Namibia's fledgling aquaculture sector has great development potential.

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<sup>2</sup> Namibia Vision 2030. Policy Framework for Long-Term National Development. Office of the President, Private Bag 13356, Windhoek. August 2003.



Oyster lines off Pelican Point, Walvis Bay  
(NamAqua and Beira Investments)



### 3.2.1 Marine aquaculture (mariculture)

Commercial marine aquaculture is currently dominated by oyster production in Walvis Bay, Swakopmund and Lüderitz. Both Pacific oysters (*Crassostrea gigas*) and European oysters (*Ostrea edulis*) are grown. Culture methods include baskets suspended from rafts and longlines and on-shore raceways and ponds.

Six companies are currently in operation, which collectively employ around 85 people. Most have plans to expand and other farms under construction.

Current production is 6 million oysters (about 600 tonnes) per annum, worth N\$12 million.

Oyster trays suspended from lines fixed to drums off Pelican Point, Walvis Bay.



Oysters ready for market.



Due to the rich algal growth Pacific Oysters can reach harvest size in as little as eight months (compared with 3 years in Northern Europe). As a result, Namibian oysters have a reputation for quality in Southern Africa. One farm also produces European oysters, which are not affected by a virus called *Bonamia* which kills oysters, and attain a size rarely seen in Europe. Currently most production is exported to South Africa, but the Ministry is developing a quality assurance programme with a view to securing access to EU markets.

**Seaweed** (*Gracilaria verrucosa*) is grown by one company in the Lüderitz lagoon. The growth rate for this species is very high. The main product generated by this species is agar. Both the yield of agar and the strength of the gel it produces is very high. At the present time, approximately 10 hectares is under cultivation, with more suitable areas

available for expansion. Annual production is around 120 tonnes of dry-weight seagrass per annum. Which currently employs 50 people.

Seaweed (kelp).



Abalone.



**Abalone** (*Haliotis midae*) culture has developed rapidly in neighbouring South Africa, driven by high prices and demand in Asian markets. One abalone farm in Namibia has already been built in Lüderitz, and has started production with an annual yield of 15 tonnes and employs a total of 15 persons.

Currently there is no culture of marine finfish in Namibia. There is interest in farming an endemic species, **Dusky Kob** (*Argyrosomus inodorus*), which has shown potential in trials and is very similar to the Australian Mulloway which is already farmed. Water temperatures are suitable for several European species, of which **Turbot** (*Psetta maximum*) is perhaps the most promising. There is also a possibility to grow Juvenile **Rock Lobster** (*Jasus lalandii*) in large numbers in some part of the coast.

### 3.2.2 Freshwater aquaculture

Although culture of freshwater fish is in its infancy, excellent freshwater culture development potential exists along rivers such as the Okavango, Kunene, Orange and Zambezi, as well as lakes and dams. The production of *Tilapia* and crayfish in the brackish water resources in the Oshikoto Region can also be considered for future development.

The Ministry is currently involved in developing pilot-based intensive freshwater aquaculture in the Caprivi, Kavango and Omusati Regions. The long-term strategy of this activity is to apply the lessons learned to other regions. Local species already adapted to culture requirements shall be the first priority (e.g. catfish and tilapia).

Catfish.



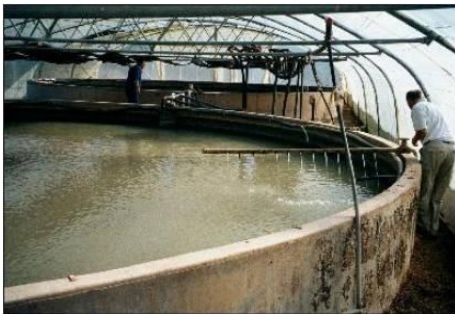
Tilapia.



Tilapia (*Oreochromis andersonii*) and catfish (*Clarias gariepinus*) are currently produced commercially, for example at Hardap. At the Inland Aquaculture Centre (Omahenene/Onavivi), Omusati Region, a hatchery and nursery to raise fingerlings for small-scale farmers has been developed. The Centre will also make fish available for the local market.

Reliable data on current production and employment in the freshwater aquaculture sector are not currently available. However, it is known that at least 15 tonnes of fish, primarily tilapia and catfish, are produced per annum by EcoFish Farm at Hardap. Freshwater crayfish and prawn are also a potential still to be developed by the private sector.

Tilapia culture, Hardap



Fish fingerlings



### 3.3. WHAT IS THE POTENTIAL FOR AQUACULTURE IN NAMIBIA?

Namibia enjoys a competitive advantage for aquaculture in terms of access to fresh and especially marine waters and a wealth of diverse marine and freshwater resources well suited to coastal and inland aquaculture. In particular the unpolluted rich Benguela current off the Namibian coast holds great potential for marine culture. Namibia is developing world-class research institutions that will be able to give priority to aquaculture technology and science and give Namibia a unique advantage in this expanding industry. Namibia also has a concentration of marine fishing companies that are poised to profit from the growth of the aquaculture industry and are already

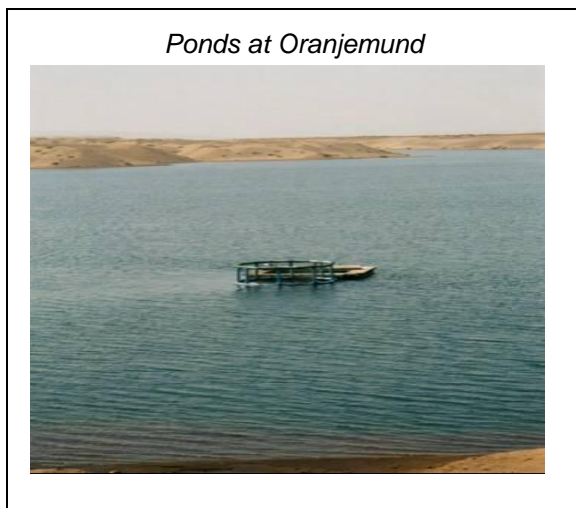
strategically placed in some of the largest seafood markets in the world – the EU, USA and Southeast Asia as well as our own developing market in Africa. Namibia's well-established seafood processing and distribution network is ready to deliver aquaculture products to domestic and world markets. Namibia must seize the opportunity to foster this growth industry given political stability in the country, peace and prime infrastructure such as telecommunications, roads etc.

Namibia's productive advantages for aquaculture development can be summarised as follows:

- Policy and legal framework (Aquaculture Act, no.18 of 2002) already in place for the development of a responsible aquaculture sector.
- 1,500 km largely uninhabited coastline.
- Excellent security along long stretches of coast.
- Unpolluted and highly productive marine waters.
- Perennial rivers, lakes and dams currently not utilised for aquaculture.
- Availability of inexpensive fish by-products from established fish sector processing captured finfish for inclusion in wet aqua-feeds.
- Already well-established processing, packaging and marketing systems.
- A well-established telecommunication and infrastructure in place.

However, as in any country, numerous inhibiting factors must be addressed. These include:

- A relatively exposed, high wave energy coast.
- A need to provide information to the public, financial institutions and the wider business community on the potential of aquaculture.
- Algae blooms and sulphur eruptions.
- High number of predators (seals) on the coast.
- Difficulties in accessing affordable capital.
- Non-availability of good quality feed and seed.
- Availability of qualified personnel, extension services and training.

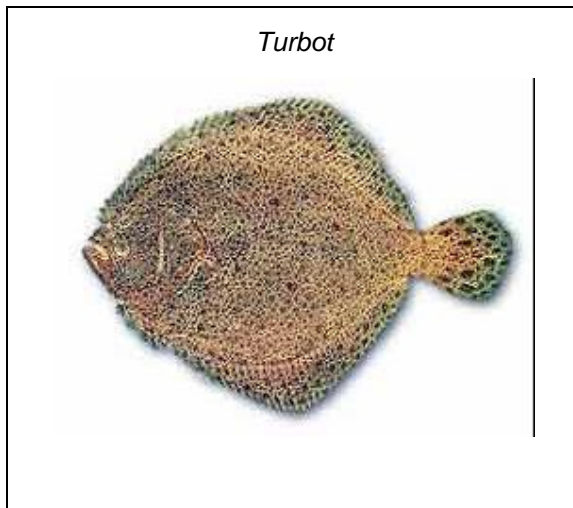


### **3.3.1 Marine species with aquaculture development potential**

Regarding marine species, there is huge expansion potential for the existing oyster, mussel and algae operations described above.

Sea ranching as well as culturing of abalone is a real possibility and several foreign companies have shown keen interest in

establishing operations on the Namibian coast.

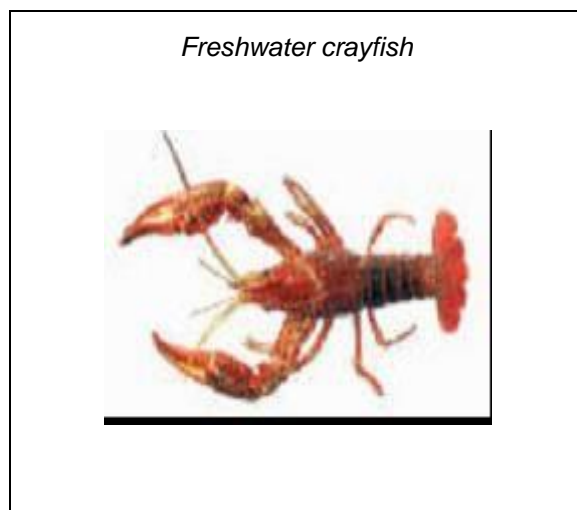
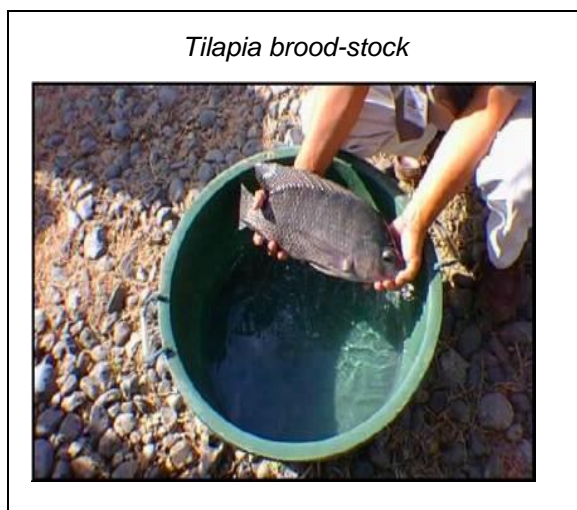


Pilot raft of scallop (*Pecten* spp.) and clams (*Venerupis* spp.) have shown promising results and several companies plan to commence new operations with these species.

Culture of hake (*Merluccius capensis*), dusky cob (*Argyrosomus inodorus*) and rainbow trout (*Oncorhynchus mykiss*) in coastal raceway systems or in the ponds created by diamond-mining at Oranjemund hold great promise. Other possible contenders for mariculture in Namibia include rock lobster and marine shrimp.

### 3.3.2 Fresh-water species with aquaculture development potential

Regarding freshwater species, tank and pond culture of tilapia and catfish is already well established in some locations. Freshwater prawn and crayfish (e.g. the Australian fresh water crayfish, marron) are also possible candidates.



The culture of ornamental species for the aquarium trade may be a possibility for Namibia.

Indigenous freshwater species would find a ready market and being small fish, culture operations do not need copious supplies of fresh-water, a major consideration for any freshwater enterprise in Namibia.

*Catfish*



*Tiger prawn*



*Carp.*



### **3.4. AQUACULTURE PRODUCTION TARGETS**

The rapidly growing domestic and international demand for aquaculture products offers great opportunities to Namibia through increased employment opportunities and job creation in the industrial sector including new and traditional spin-off industries that support aquaculture and seafood manufacturing. Spin-off opportunities include feed production, and pharmaceutical production, veterinarian services, processing, packaging and cold storage, transportation, equipment manufacturing (feeding machines, pumps, cages, nets, boats, etc) and marketing.

#### **3.4.1 Job creation**

A conservative estimate for the development of the industry is one that grows in value from the current N\$20 million to N\$ 250 million in 2009, with direct employment expanding from the current 422 people to 1,640 people in 2009. This employment rate only takes into account the labour used directly on the farms. The peripheral industries such as harvesting, processing, transportation, cold storage, marketing, cage construction, pumps, fish-feed production etc. will increase proportionately and provide

in excess of 1000 additional jobs. Pending on the financial support available to the industry job creation can triple.

### **3.4.2. Global trends in aquaculture**

According to the Food and Agriculture Organisation of the United Nations, in 2000 global aquaculture production was 45.7 million tonnes, worth an estimated US\$56.5 billion. Finfish accounted for 55.9% by value, molluscs 16.8%; aquatic plants 9.9%, and crustaceans 16.6%. The annual increase between 1970 and 2000, in world aquaculture production for the period 1999-2000 was 6.3%.

In 2000, mariculture production accounted for 22.98 million tonnes (53% of total aquaculture production) worth US\$23 billion. Freshwater production accounted for 20.63 million tonnes (45.1% of total aquaculture production) worth US\$24.6 billion. Brackish water production accounted for 2.11 million tonnes (4.6% of total) worth US\$8.8 billion.

Production of tilapia has been spectacular. From negligible production in 1970, production of Nile tilapia, Mozambique tilapia and similar species soared to 1.3 million tonnes in 2000. By 2003, tilapia exports from China to the USA reached 88 000 tonnes. Thailand is also a large Tilapia producer with annual production of 200 000 tonnes, worth US\$6 billion. In the coastal region of Thailand mariculture production exceeds 300 000 tonnes per year.

Currently Vietnam produces 20 000 MT *Tilapia* and production to increase to 200 000 MT by the year 2010.

Global production of salmon in 2001 was just over 2 million tonnes, of which farmed salmon accounted for 1,324 million tonnes. Of this farmed production, Norway accounted for 39%, Chile 34%, UK 10% and Canada 7%. Chilean salmon and trout exports in 2001 were worth US\$964 million.

Oyster cultivation in Ireland has now been established in about 200 enterprises in 11 coastal counties and production currently stands at 5,000 MT with production expected to increase from to 11,500 MT by 2006 under the National Development Plan.

Cultivation of catfish species has also grown steadily. Production of catfish has grown from virtually zero in 1970 to 422,000 tonnes in 2000.

Total production of salmonids has risen from less than 100,000 tonnes in 1970 to 1.533 million tonnes in 2000. Atlantic salmon, rainbow trout and coho salmon are the dominant species, in order of mass of production.

From negligible production in 1970, shrimp production in 2000 was 1.087 million tonnes, valued at US\$6.88 billion, representing 26% of total world shrimp production that year. *Penaeus monodon* is the main cultured species, followed by *P. vannamei* and *P. chinensis*.

Mollusc production has grown from just over 1,000 tonnes in 1970 to just under 11,000 tonnes in 2000. Main cultured mollusc species in decreasing order of production are Japanese oyster, Japanese carpet shell, yesso scallop and blue mussel.

Aquatic plant aquaculture production has grown from around 1,000 tonnes in 1970 to just over 10,000 tonnes in 2000. Main species include Japanese kelp, laver, cotoni and wakame.

Total aquaculture production in Asia in 2000 was 41.7 million tonnes valued at US\$46.3 billion, which accounted for 91.3% by weight. Outside Asia, Europe accounted for just over 2 million tonnes, Latin America and the Caribbean 800,000 tonnes, North America 500,000 tonnes, Africa 399,390 tonnes and Oceania 200,000 tonnes.

### **3.4.3 Aquaculture growth in Africa**

Africa, however, has been slow to develop aquaculture potential. Total aquaculture production within the Africa region in 2000 was 399,390 tonnes, worth US\$951 million. This represented a mere 0.9% by weight and 1.7% by value of global production for that year. Since 1997 production in Egypt has grown very rapidly, and now accounts for just less than 350,000 tonnes of Africa's total production. Nigeria is the second most important producer at around 25,000 tonnes. It's obvious that the potential of Africa is yet untapped.

At Lake Kariba, Zimbabwe, one commercial company, Lake Harvest Ltd., employs 500 people in the production and processing of tilapia. Current annual production is around 3,500 tonnes. This farm is currently the largest tilapia producer in Africa. By the year 2005 production is set to increase to 5,000 tonnes.

## **4 SITUATION ANALYSIS AND RECOMMENDATIONS**

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### **4.1 REGULATORY FRAMEWORK**

Situation analysis Namibia is developing a coordinated approach to aquaculture development and regulation. Central to this effort must be the creation of institutional arrangements that promote aquaculture and coordinate the various agencies and other entities involved in regulation and support. Currently in place and in force are:

- Namibia's Aquaculture Policy Towards Responsible development of Aquaculture (March 2001)
- The Aquaculture Act (No. 18 of 2002)
- Aquaculture (Licensing) Regulations (3<sup>rd</sup> December 2003)

#### **4.1.1 Recommended actions**

- a) The Ministry of Fisheries and Marine Resources, through the office of the Director of Aquaculture (DoA), will serve as the single point of contact for all existing and prospective aquaculturists. The Ministry will actively assist all aquaculturists in compliance with appropriate regulatory requirements. The DoA will coordinate the streamlining of the regulatory review process as well as carry out required monitoring responsibilities to meet environmental regulations.
- b) To ensure the regulatory streamlining of aquaculture activities the "One Stop Shop" concept will be introduced i.e. aquaculture applications made in accordance with the Aquaculture Act should be coordinated, with the Ministry as the lead coordinating agency. This covers all eventualities from initial license application, observance of monitoring requirements, to final harvest and processing of the aquatic product. The One-Stop-Shop approach has been recognized to be investor friendly in many other countries.



- c) A user-friendly "Aquaculture Regulatory Handbook" will be produced. This Handbook will outline the permit requirements, review time frames, jurisdictional authorities, application fees, contact persons, necessary licence application documentation and materials, and review processes for the different types of aquaculture. This handbook will guide prospective aquaculturists, financial institutions, other stakeholders. The Handbook will be available on the Ministry's web-site.
- d) The Directorate of Aquaculture is tasked with overseeing the implementation of the Act, establishment and maintenance of links with the regional, national and international aquaculture communities as well as regional governments and local authorities. The Directorate is responsible for the implementation of the Strategic Plan and the regular review thereof to meet existing needs.
- e) The Aquaculture Advisory Council, to be established under Section 3 of the Aquaculture Act, will include representation from a broad spectrum of interests including industry, national, regional, local and traditional authorities. The Aquaculture Advisory Council will advise on policy matters and issues pursuant to the Aquaculture Act as requested by the Minister responsible for aquaculture.
- f) The Ministry shall be the lead agency for the promotion of aquaculture in Namibia and will work closely with the Ministry of Trade and Industry, the Namibia Chamber of Commerce and other marketing organizations. This will ensure that existing and planned promotional and marketing programs for Namibian produce are extended to include aquaculture.
- g) Adequate provisions will be made for effective enforcement of the legislation, and to ensure proper compliance with aquaculture licence terms and conditions.

## **4.2 ECONOMIC DEVELOPMENT AND MARKETING**

### **4.2.1 Situation analysis**

Employment and economic activity generated by the domestic aquaculture industry is estimated to be 422 people in 2004 and will increase to about 1600 by 2009. This does not include those jobs in secondary industries, including transport, storage, processing, manufacturing, distribution and sales of aquaculture products. No figures are available for employment associated with purchases of equipment, supplies, feed, seed, and financing.

While the aquaculture industry continues its strong growth overseas, Africa in general and Namibia in particular continues to lag far behind in the development of its industry. To remedy this, the Government will endeavour to provide this fledgling industry with opportunities for start-up capital, research and development funds, marketing and promotion support, and education and training. These efforts must take an approach whereby the State uses industry expertise and experience to help it identify germane areas of applied research that will actively promote the development of the national aquaculture industry. Likewise, the industry can help guide and develop useful financing programs, appropriate education programs, and effective marketing and promotion efforts.

#### **4.2.1.1 Obstacles to Financing**

Affordable start-up capital has been difficult to access, and there has locally been little investment in technology that would reduce capital equipment costs. This requires exposure of the financial institutions to the benefits of aquaculture and the sustainable profitability of the industry as a whole. The availability of information for the finance community on technology, market conditions and production costs would allow for confident investment and steady growth, and economic models for successful aquaculture operations would further favourable perceptions of aquaculture by the financial institutions.

#### **4.2.1.2 Marketing and Promotion Support**

Product marketing and promotion is key to the success of any business, and aquaculture is no exception. Aquaculture is a new business activity for Namibia and the wider SADC Region, and consumers are not generally familiar with the business or its products. Opposition to aquaculture development often stems from a misunderstanding of aquaculture operations. Aquaculture products, having been farmed under controlled conditions, possess unique product characteristics that can be used in their promotion and steps must be taken to promote awareness of aquaculture products in all branches of the media. The public must be made aware of the nature of aquaculture and be exposed to the many benefits of aquaculture to their local communities and the state. There is a clear need for public education programs regarding aquaculture - how it works and what its benefits are. Namibia can also capitalize upon the favourable image of Namibian seafood its unpolluted environment.

#### **4.2.1.3 Aquaculture Technology**

The aquaculture industry is not limited solely to companies that produce finfish, shellfish and aquatic plants. The industry, if considered in its broadest sense, includes individuals and firms involved in research and development, and associated technologies such as feed mills, monitoring instrumentation, grow-out systems (pens, tanks, etc.) disease identification and control methods, breeding methods and environmental controls.

UNAM and the Polytechnic of Namibia, the personnel at the Fresh Water Fisheries Research Centre and the National Marine Information and Research Centre (NatMIRC) are in the process of focusing research effort into aquaculture activities throughout the country. The Government should attempt to secure funding to provide seed money to enhance aquaculture research and development.

#### **4.2.2 Recommended actions**

- a) The Ministry will work closely with the international organizations, institutions and technical societies and trade shows, to showcase Namibia aquaculture products, track information on seafood markets and international trade opportunities, coordinate with the marine capture industry in their promotion of Namibia fishery products, and incorporate Namibia aquaculture products into the Fish Consumption Promotion Project.
- b) The Ministry will conduct an annual survey of the Namibia aquaculture industry. Information to be gathered in the survey would include annual production and value figures, employment, future expectations, current constraints to the industry, etc. and could be disseminated either as part of

the Ministry annual report, or a separate report. Such information is critical so as to monitor industry development, the marketing of products and the documentation of the socio-economic value of the industry.

- c) Develop a Namibia-Grown Seal to be put on packaging to promote Namibia aquaculture products.
- d) Establish an Internet web site, linked to the Ministry's web site, which would advertise Namibia's aquaculture product availability and prices.
- e) The Ministry will conduct a seminar specifically for the business institutions (including Chamber of Commerce) to acquaint business/finance-orientated organisations with the various forms of aquaculture possible in Namibia.
- f) The Ministry will inform the public/private finance institutions about industry developments and successful models in order to encourage funding and will also work with local communities to encourage aquaculture as an element of community economic development planning. Regularly scheduled seminars, distribution of printed materials and video production to focus on economic benefits to government and local communities would be a good implementation approach.
- g) Develop a buyers guide to Namibia aquaculture products to be distributed locally, regionally, nationally and internationally. This will attract and inform buyers about Namibian aquaculture products.
- h) The Government should consider options and endeavour to establish an Aquaculture Development Fund that can assist potential aquaculturists to establish self-sustaining businesses. Institutions currently available that possibly could provide funding support for Aquaculture appear in **Annex 1**. Funds available under the Aquaculture Development Fund shall be used for the following:
  - a. State funding of a revolving loan fund could serve to leverage private capital. There is a direct correlation between those countries with growing aquaculture industries and direct State funded support. Implementation could be achieved by creating lending criteria and a Steering Committee or other structure to advise with expertise from industry, academia, finance and other government agencies.
  - b. Encouragement and support, as appropriate, of participation of aquaculturists at premier international seafood trade shows, the promotion of Namibia aquaculture products at regional seafood festivals, and facilitating local seafood festivals. This participation not only advances practical knowledge, state-of-the-art techniques, and up dated methodology but also provides unique opportunities to expose Namibian products to an international audience.
  - c. Incentives to attract and promote possible investors are to be considered e.g. tax rebate, low interest rates, EPZ status.

## 4.3 ENVIRONMENTAL MATTERS

### 4.3.1 Situation analysis



Environmental considerations cover two main considerations: site selection and site assessment.

#### **Site Selection**

Site selection and appraisal is an important consideration prior to developing any aquaculture facility. Ideally, a detailed base line survey covering all environmental parameters (chemical, physical and biological) taking into consideration both water and soil should be undertaken where possible. The Government will assist small and intermediate enterprises in meeting all sites selection and monitoring requirements.

For all areas designated as Aquaculture Development Zones (ADZ), the responsibility for collecting and compiling this information, as far as it is possible, resides with the Government.

Maps are the traditional tools used to visually display information and locate and monitor the physical environment. The recent explosion in information technology now offers many more mapping formats than previously available. Maps, once developed for aquaculture zones can guide applicants for aquaculture licenses to appropriate sites and help simplify the license application process. Regulatory officials reviewing license applications rely on standardized maps, which facilitates the recording of baseline and operational monitoring data. Planners developing and modifying zoning and land use designations in harbour areas will also benefit from the development of these maps and the accompanying coastal and marine resource data sources. On-going annual field investigations that verify current baseline information and establish precise locations of crucial data and information will continue to be essential.

#### **Monitoring**

Good water quality is an important prerequisite for successful aquaculture. Maintaining a healthy coastal environment is not only important to the organisms to be cultured at a site, but also for flora and fauna that are indigenous to the site, and to the migratory species that circulate through and around the site.

Maintaining good water quality requires frequent monitoring. Effective monitoring can detect changes in environmental quality that result from aquaculture operations, as well as other impacts to coastal areas. In addition, monitoring can quantify the scope and duration of environmental impacts.

#### **4.3.2 Recommended actions**

- a) The Government will encourage local communities and municipalities to develop land use and aquatic resource management plans and other coastal resource related managements plans, which incorporate opportunities for public and private aquaculture as well as commercial and recreational fisheries.
- b) Aquaculture Extension Officers in the Ministry will assist small and intermediate enterprises in meeting all site selection and monitoring requirements.
- c) In accordance with existing aquaculture legislation, intensive aquaculture enterprises will be required to meet all requirements relating to Environmental Impact Assessments.
- d) Government agencies will cooperate to produce a base map incorporating all relevant coastal and inland features for which data are available at the most practicable scale.
- e) Adopt a three-step monitoring definition process which (1) evaluates each proposed aquaculture project in terms of its potential environmental impact, (2) defines, in conjunction with the licensing process, baseline data acquisition to be implemented and (3) delineates operational (long-term) monitoring criteria, together with a regimen for their implementation, to be incorporated in the aquaculture licence conditions. This information is essential for agencies responsible for environmental protection and management.
- f) All collected data will be integrated into a national aquaculture data base to be administrated by the Directorate of Aquaculture.
- g) An aquaculture application package will be developed which includes: basic background information on aquaculture in Namibia, including regulations, licensing, site selection requirements, operational monitoring requirements, etc. This can be added as a web page on the MFMR web site.
- h) Aquaculture Development Zones will be identified in line with the Act using the data generated for the production of maps as described above.

## **4.4 AQUACULTURE EDUCATION AND TRAINING**

### **4.4.1 Situation analysis**

Education and training are essential for the growth of aquaculture in Namibia. Other countries with successful aquaculture have implemented comprehensive education programs including university degree programs, vocational training, extension services, and public/private education, research, and development activities. Many have integrated public university systems with industry directed research, extension services and degree aquaculture programs. There are presently very few opportunities for aquaculture training and education in Namibia.

Currently, the University of Namibia is offering aquaculture subjects in collaboration with the University of Rhodes, South Africa. Formal education programs combined with industry-driven research have proven beneficial to aquaculture development in other countries. Aquaculture education programs in secondary schools and vocational-technical schools can easily be integrated into the national curricula. Biology, chemistry, engineering, business and writing skills are all necessary components to the multi-disciplinary field of aquaculture.

Public education programs can generate the public support necessary for aquaculture to develop. The public sector currently needs information regarding aquaculture operations and benefits. This lack of information results in a negative attitude and a public perception of aquaculture. For inland (freshwater aquaculture) in particular, local communities will control aquaculture activities, but positive public support is needed for expansion of all aquaculture, both inland and coastal. Public-private partnerships in aquaculture can be very effective. Private involvement ensures cost efficient and industry relative projects. Public involvement ensures public benefit, consistency with other projects, and a broad overview e.g. water quality monitoring, habitat maintenance/restoration, equitable distribution of benefits, etc. Information transfer is critical to the success of all aquaculture.

### **4.4.2 Recommended actions**

- a) The Ministry will undertake training needs assessment study. This study will identify the training needs of the aquaculture sector and recommend appropriate actions for developing human resource capacity in support of aquaculture in Namibia. The scope of the study will cover both marine and freshwater aquaculture training needs for researchers, students, technicians, fish farmers and fish farm workers, government administrators and managers.
- b) The Government should consider grants and incentives for secondary schools to implement aquaculture curriculum and small-scale aquaculture facilities. The emphasis of aquaculture in Namibia's curriculum goals for secondary schools should become a priority.
- c) Funds should be sourced for aquaculture degree programs at universities and colleges. UNAM and the Polytechnic of Namibia should consider to develop coordinated programs with each other specializing in research and technical modules pertaining to aquaculture.

- d) The Ministry will provide aquaculture extension services. Extension officers have been very effective in other countries in providing training and assistance to aquaculturists.
- e) Government should make available adequate funding for aquaculture training, education, and extension at secondary, vocational, and college levels.
- f) Develop a public relations campaign designed to enlighten citizens about what aquaculture is, how it works and the importance and benefits of the industry.

## **4.5 RESEARCH AND DEVELOPMENT**

### **4.5.1 Situation analysis**



Government involvement in mariculture research is to be undertaken at the Marine and Coastal Resources Research Centre in Henties Bay. In 2003 a stakeholder's workshop identified the key areas of priority work for the centre in support of mariculture, for the next few years.

In regard to freshwater aquaculture, the Ministry has a Freshwater Research Centre at Hardap, Hardap Region, where commercial trials involving freshwater species such as tilapia, catfish and freshwater crayfish is undertaken in cooperation with a commercial aquaculture company. The Government is committed to establishing a new research Centre at Bagani, Kavango Region.

In addition, the Government is currently developing community-based farms in Caprivi, Kavango and Omusati Regions. The long-term strategy of this activity is to apply the lessons learned to other regions.

It is essential that the Ministry and UNAM coordinate research and development activities for maximum support of marine and freshwater aquaculture.

#### **4.5.2 Recommended actions**

- a) Establish a competitive grant program to foster research and development. Funds should be allocated to aquaculture research and development as an industry. The Government should set identification of Research and Development grant criteria.
- b) Encourage industry driven and initiated research and innovation programmes. Such programmes should facilitate and expand cooperative efforts between industry and the research community while acting as an information transfer source.
- c) The indigenous aquatic organisms in Namibia should be studied to identify those with a high potential for aquaculture, both for local and for international export.
- d) The Ministry should link up with international institutions specialising in aquaculture
- e) The Ministry to handle as per the Aquaculture Act the opportunities regarding culture of alien species.
- f) Fish feed is a major factor influencing the cost of the final product. Alternative ways of feeding these organisms should be studied to produce fish feed and or cereal for the local market.
- g) Research will be done into possible disease outbreaks as well as naturally occurring toxic conditions to enable the Ministry to have qualified people to identify, handle and if necessary refer such occurrences to the Competent Authority.
- h) Research into techniques and operating systems must be done to ensure compatibility with the variability extremes of the Namibian environment.
- i) Aquaculture close to the perennial rivers in the North-East of Namibia will have huge beneficial impacts on the daily lives of the communities, especially those depending on the subsistence fishery. These impacts should be studied to mitigate any possible negative impacts aquaculture may have on them.



## **4.6 AQUATIC ANIMAL HEALTH CERTIFICATION AND QUARANTINE INSPECTION**

### **4.6.1 Situation analysis**

Namibia needs to protect existing aquaculture, capture fisheries and native fauna, and the people who depend on them, from the possible devastating effects of exotic aquatic animal diseases. This must be accomplished based on internationally accepted, science-based assessments and procedures, as are outlined in the International Aquatic Animal Health Code of the Office International des Épizooties (OIE), and the Sanitary and Phytosanitary Agreement (SPS Agreement) of the World Trade Organization (WTO).

Legislation has subsequently been developed in line with stated policy related to (i) quarantine inspection and health certification of aquatic animals, and (ii) the more general area of international trade (importation/exportation) of live aquatic animals. The development and implementation of a national strategy for aquatic animal health management must be viewed as a continuous, long-term activity. However, there are a number of issues and actions that require immediate attention, including planning and hiring trained diagnostics staff. Additionally, training of technical staff takes time, two to three years for completion of an MSc or for training of a diagnostician, and three to five years for completion of a PhD.

### **4.6.2 Recommended actions**

- a) Government is to establish a Competent Authority to deal with aquatic animal health issues, including quarantine and health certification. High-level action is needed to develop a National Aquatic Animal Health Strategy and the necessary infrastructure, capacity and expertise to implement it.
- b) The Government will ensure that policies, legislation and enforcement with regard to the import/export of live aquatic animals are harmonised.
- c) The Government will endeavour to harmonize its aquatic animal health policy, legislation and procedures with that of its neighbouring countries and trading partners.
- d) The Ministry will conduct a review of procedures used to evaluate and conduct proposed new species introductions and adopt a process that is in harmony with international guidelines (i.e. ICES Code of Practice).
- e) With regard to disease concerns, the importation process should be made more rigorous to include an Import Risk Analysis (IRA) for each request. It is also important that IRAs be done on current practices (i.e. the movement oyster spat, the ornamental fish trade), as well as on the planned introduction of such species as scallop and abalone.
- f) In order to protect against incursions of exotic diseases, Namibia will develop meaningful health certification requirements to be met by exporting countries.
- g) The Competent Authority will need to establish a disease surveillance and monitoring program to support reporting to the OIE.
- h) To provide access to accurate data that is essential to developing an effective National Strategy for aquatic animal health and for import risk analyses, the Competent Authority should implement procedures to

accurately track imports and exports of live aquatic animals (including species shipped, quantities by species, origins and destinations, importers and exporters, purposes, etc.).

- i) The Competent Authority should establish an aquatic animal health laboratory to act as the national lead centre (focal point) for aquatic animal health.
- j) As there is currently no aquatic animal health expertise within Namibia, the Government will need to hire and/or train specialized staff. In order to speed up the process of establishing capability, the Government will train staff in fish health diagnostics.
- k) The Ministry's aquaculture extension staff will have basic aquatic animal health management included in their training programme
- l) Namibia will continue to seek increased international linkages through participation in FAO regional programs, the OIE, and through bilateral donor agencies.

## **4.7 FOOD SAFETY AND QUALITY ASSURANCE OF AQUACULTURE PRODUCTS**

### **4.7.1 Situation analysis**

Currently, inspection and quality assurance of fish and fishery products for the marine capture fisheries is very well developed. For aquaculture products, the Competent Authority should adhere to the Hazard Analysis Critical Control Point (HACCP) principles.

It is a requirement of the Aquaculture Act that, for the purpose of aquaculture, a water quality monitoring system must be established and maintained to provide timely information to licensees of the occurrence or imminent occurrence of any pollution or natural phenomenon such as Harmful Algal Blooms (HAB) which may have a harmful or detrimental effect on the aquatic environment or any aquaculture product. Harmful algae, in particular, represent a significant human health hazard and pose a serious threat to fisheries and aquaculture.

### **4.7.2 Recommended actions**

Within this framework Namibia will consider the following actions at short and long-term level:

- a) For the foreseeable future, the Ministry of Trade and Industry will continue to be the Competent Authority for the establishment of the necessary fish inspection and quality assurance infrastructure, including the control of aquaculture products. A project could be developed with this aim, if necessary with international assistance.
- b) In regard to the specific public health aspects related to the farming of bivalve shellfish (oysters, mussels, clams, scallops), the Ministry will facilitate the establishment of a National Shellfish Sanitation Program (NSSP). A water quality and HAB monitoring programme will form an integral part of the NSSP.
- c) The Ministry will, along with other appropriate Government agencies, assist commercial aquaculturists in establishing HACCP systems in the production, handling, distribution and marketing of all cultured species.

## **5 CONCLUSION**

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Namibia has many productive advantages for the further expansion of aquaculture as an economically viable business. Namibia now has in place the necessary policy and legislative environment for the expansion of aquaculture, two major pre-requisites for the development of aquaculture. With focussed and consistent Government support for the industry, Namibia's aquaculture sector will achieve accelerated growth. The private sector and public sector need to become real partners in order to encourage the growth of this industry.

The Aquaculture Strategic Planning process marks the first coordinated effort to support aquaculture in Namibia. The Strategic Plan represents the foundation for

addressing the complex, multifaceted issues associated with aquaculture and removing impediments to the aquaculture industry.

The Strategic Plan and its implementation will be reviewed regularly.



**Annex 1: Institutions that possibly would fund Aquaculture Projects in Namibia.**

<b>Agricultural Bank of Namibia</b>	Potential sources of affordable finance
<b>Namibia Development Bank</b>	Potential sources of affordable finance
<b>IFAD (International Fund for Agricultural Development)</b>	IFAD offers conventional credits as well as capital participation and grant funds  (US\$ 100,000-1 million for innovative pilot projects and research and training) in apex institutions, as well as credit guaranties, start-up capital or micro-insurance and micro-leasing.
<b>UNDP</b>	UNDP works with grant funds ranging US\$ 50,000-150,000 per financial institution.
<b>AfDB (African Development Bank)</b>	AfDB offers grant funds (only for institution building), credit and credit-guaranties – the size depending on the projects.
<b>BMZ Ministry of Economic Cooperation and Dev. (KfW, GTZ, DEG)Germany</b>	KfW grant funds and soft credits go to governments for refinancing Micro Finance Institutions. The trend at the moment is going to guarantee - systems and the financing of Apex- funds.  GTZ: grant funds for technical co-operation to government and financing institutions. Commercial capital participation to second tier Institutions and via DEG.
<b>IFC (International Finance Corporation)</b>	<ul style="list-style-type: none"> <li>- Credit-conditions are orientated to market conditions.</li> <li>- They will take over a certain amount of risk.</li> <li>- New programs only financed to maximum 25%.</li> <li>- Products, commercial credits, capital participation, Financial Risk-Management products, intermediary finance and guaranties.</li> </ul>

**Annex 2: Key references on aquaculture in Namibia.**

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