A Study on the Status of Aquaculture Production and Trade in South Africa

Volume 2

Growth Potential of the South African Aquaculture Industry and Recommendations for Sector Development

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For:

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Executive Summary

The global economic outlook for aquaculture over the next twenty years is exceptionally positive. The world’s harvest fishery production has peaked and the increase in demand for fish products is being met by a growth in aquaculture production. Conducive conditions for commercial aquaculture development include suitable environmental conditions and species, infrastructure, technology, finance, skilled manpower, access to markets, a supporting set of public sector institutions, and appropriate policy and legislative support. South Africa possesses many of these fundamental attributes, and the aquaculture sector is poised for a rapid expansion phase. Commercial aquaculture can make a significant contribution to job creation and economic development in rural areas. However, the growth trajectory of South African aquaculture will be determined by the extent and nature of support measures provided by the public sector to remove constraints to development - particularly the zoning of land and water, and facilitating the provision of supporting infrastructure and services for aquaculture development. South Africa should therefore “tool up” in order to efficiently increase its aquaculture production capacity and take advantage of the market opportunities outlined in Volume 1 of this report (Industry Status and Diagnostic Report).

South Africa’s National Industrial Policy Framework provides the principles with which government can develop comprehensive sets of support measures for sectors with high growth potential. Based on our industry production survey and stakeholder consultation, it is projected that the South African aquaculture sector could grow from its 2006 production level (3,543 tons worth R218 million) to over 90,000 tons worth R2.4 billion in 10-15 years time - provided appropriate sectoral support is provided. Direct on-farm employment would increase from the current 1,390 direct jobs to over 23,000, plus an estimated 20,000 jobs in the service sector (processing, feeds, packaging, equipment and other production inputs, and services such as transport, security and research). The aquaculture sector thus has the potential to significantly supplement the traditional harvest fishery production and, where suitable environmental conditions and infrastructure exist, create economic development in rural areas.

In recent years, the government has made good progress in addressing some of the needs of the aquaculture sector. However, a comprehensive national set of strategies and “Key Action Plans” which address the production potential of the sector and the constraints which exist have yet to be formulated. State support for aquaculture sector development remains “patchy” and the limited industrial incentives available to the sector are not based on a national sector development strategy – as is the case in countries with successful aquaculture sectors such as Chile and Australia.

Recommendations to promote aquaculture sector development include:

- Aquaculture development nodes comprising water, land and infrastructure provided by government.
- Facilitated compliance with environmental legislation - existing regulations and an obstructive bureaucracy have become a major constraint to sector development.
- Access to industrial support measures, particularly with respect to support for sector level development and joint industry actions, and the development of the necessary services and infrastructure required to develop an internationally competitive production sector.
• A dedicated Aquaculture R&D Programme to establish production technology for high priority species.
• A national aquaculture training strategy to address the anticipated skills requirements of the growing industry and to develop a racially representative sector at all levels.
• State veterinary services for Aquaculture to enable SABS certification of product health.
• A National Aquaculture Strategy and Key Action Plans (KAP’s) based on the principles outlined in the National Industrial Policy Framework.
Section 1 Growth Potential of the Aquaculture Industry

1.1 The Opportunity: Declining Fisheries, Rising Aquaculture Production

The global economic outlook for aquaculture over the next twenty years is exceptionally positive - the world’s harvest fishery production has peaked and the increase in demand for fish products is being met by a growth in aquaculture production. Since 1973, the global aquaculture sector has grown at an annual compounded rate of 9.2% per annum, and until 2030, is projected to grow at 4.5% per annum (Brugère and Ridler, 2004). By 2020, increased demand is expected to cause the price of high value fish to increase by 15% in real terms (Delgado et al., 2003). Real prices for high value fish are expected to rise in response to increased demand, while those for other meat products will decline slightly.

In sub-Saharan Africa, fishery production is in sharp decline resulting in an increasing deficit in fish supply and a decline in per capita production. In contrast to other parts of the world, the growth of aquaculture in Africa has been slow to respond to the rising demand for fish products. The rising demand for fish will not be met from rural subsistence aquaculture production which has been extensively promoted in Africa, and thus African governments are now beginning to promote the development of large scale commercial aquaculture (Hecht, 2006). A recent FAO survey (Hecht, 2006) revealed that commercial aquaculture production is indeed taking off in various sub-Saharan countries in response to a doubling of fish prices in recent years. Conducive conditions for commercial aquaculture development include suitable environmental conditions and species, infrastructure, technology, finance, skilled manpower, access to markets, a supporting set of public sector institutions, and appropriate policy and legislative support.

South Africa possesses many of these fundamental attributes, and the aquaculture sector is poised for a phase of rapid expansion. Commercial aquaculture can make a significant contribution to job creation and economic development in rural areas. However, the growth trajectory of the South African aquaculture sector will be determined by the extent and nature of support measures provided by the public sector – particularly with respect to the zoning of land and water, and facilitating the provision of supporting infrastructure and services. South Africa should therefore “tool up” to efficiently increase its aquaculture production capacity and take advantage of market opportunities.

1.2 Market Prospects

South Africa is a well established producer of fishery products. Historically, these have been derived from its harvest fisheries. The country possesses a modern infrastructure which supports the production of a wide range of fresh and processed products for both the local and export markets. The products from the emerging aquaculture sector can thus integrate fairly seamlessly into this established value chain. A good example is cultured abalone which has almost completely replaced the wild harvested product, and has been accepted as an equivalent product.

South Africa’s fishery products have historically been abundant and relatively cheap, precluding the development of significant aquaculture output with its relatively high production costs. During the nineties, aquaculture producers primarily targeted the
international market - due to rand weakness and the relatively higher prices prevailing overseas. However, rand strength and externalities affecting international prices, including a massive growth in the production of many species at low cost in China, has highlighted the vulnerability of local producers relying solely on the export market. For example, South Africa’s prawn farms at Amatikulu and Mtunzini were forced to cease production in 2005 when the price of imported prawns from Asia fell to below their internal production costs. This, combined with the stronger rand, has prompted most local aquaculture producers to focus primarily on the South African market. For example, due to their relatively high production costs and low production volumes, established mussel, oyster, trout and ornamental fish producers are currently uncompetitive in the export markets. An exception is the abalone sub-sector where South Africa has established the South African abalone species as a premier international brand, and has become a technology leader in the field of aquaculture.

In recent years, a growing shortage of traditional fish products on the local market, such as hake and linefish, have resulted in a sharp rise in prices making aquaculture an increasingly viable production option to supply the local market. In the short to medium term, and due to the longish lead time to establish new operations (3-5 years), it is unlikely that aquaculture will meet the deficit in supply in the local market. Therefore imports of fish products are likely to rise. Significant volumes of Vietnamese catfish (Pangasius), Nile perch, Norwegian salmon, and mussels are already being imported. Thus the challenge to the local aquaculture sector is to tool up as rapidly as possible, supply the local market, and replace imports.

Due to the relatively high production costs of South African aquaculture products, it is unlikely that local producers will be competitive with local (Hake) and imported (Pangasius, Nile perch, tilapia) frozen white fish products. For example, the massive rise in the low cost production of tilapia in China has made frozen fillets available as an international commodity at prices as low $1.50-1.80/kg. Producers are thus looking to the fresh fish market where higher unit prices can be obtained for whole fish or premium quality fresh fillets.

A number of South Africa’s marine species are highly valued in the market and the outlook for marine aquaculture is particularly positive as an increasing number of species are commercialised. The production of abalone, mussels and oysters is well established with production growing steadily, and indigenous fish species are in pilot production including kob and yellowtail. Marine species that are set to become commercial in the next five years include sole, grunter, scallops, grouper, geelbek, and seaweeds.

In terms of the export markets, an opportunity exists to export whole fresh high value line fish species such as kob and yellowtail to the European markets. Major fishing companies such as Irvin & Johnson (Pty) Ltd have a track record of exporting fresh fish to Europe, and have established respected brands and relationships with buyers. South African abalone is a well established premium product in Asia with a firm and growing demand linked to the strong economic growth rate and increasing personal wealth in China. In contrast, the export prospects for oysters, mussels, trout, and tilapia are poor - due to relatively high local production costs and small volumes.
1.3 South Africa’s Environmental Endowment

South Africa’s environmental endowment for aquaculture is limited both in the marine and freshwater environments.

South Africa’s coastline is relatively exposed limiting offshore aquaculture to semi-sheltered bays such as Port Elizabeth, Mossel Bay, Plettenberg Bay, Vleesbaai and Saldanha Bay. Modern aquaculture sea cage technology now makes it possible to moor cages in these sites. However, conflicts with other uses and possible environmental impacts further restrict the options for the location of sea cages. In general, the public with its bias towards recreational use of the coast is strongly against aquaculture development. Therefore, strategic environmental assessments (SEAs) to identify the most suitable areas for cage aquaculture are required, and can be used to facilitate the sustainable development of sea cage farming.

Due to the high demand for coastal land and its high price, the potential for shore based aquaculture using pump ashore systems - such as those employed on abalone farms - is also limited along most of the coast. Perceived conflicts with other coastal uses usually impede new development proposals. It is thus important that areas of land are zoned for aquaculture development. Examples of such initiatives include the Namaqualand Aquaculture Park, and the Coega and East London West Bank Industrial development zones. A major opportunity for shore based aquaculture exists in the 300km strip of the Namaqualand coast where diamonds are mined. With the scaling down of mining, the Northern Cape Government and the mining companies have recognised the potential of aquaculture as an alternative and preferred economic activity.

A further opportunity is the “ranching” of hatchery reared organisms which are released into the sea. Sedentary molluscs such as abalone represent a particularly suitable candidate for this activity. Pilot abalone ranching projects in Namaqualand and Port Elizabeth have demonstrated that it is a viable production model. Abalone reseeding and the allocation of exclusive user rights to defined areas of coast is seen as a potential solution to the abalone poaching problem, and provides a means of restoring the productivity of abalone populations in the sea.

In the freshwater environment, South Africa’s climate limits aquaculture possibilities. The high summer, low winter temperatures precludes all year round production of warm water species (e.g. catfish, tilapia) - unless they are reared in environment controlled structures (tunnels, insulated buildings). The shortage of fresh water also severely restricts the geographical range within which aquaculture is possible. For cold water species such as trout, production is mostly restricted to areas with permanent cold streams flowing off mountain catchments. Some seasonal winter production of trout is practised in dams in the Western Cape.

In conclusion, suitable environments for aquaculture exist in particular geographic localities. At present, aquaculture production is not constrained by environmental potential, but South Africa does not possess conducive environmental conditions for large scale warm water pond culture (as is practised in Asia), large scale sea cage fish farming, or long line culture of oysters and mussels (as is practised in Chile and Norway).
1.4 Potential Contribution of the Aquaculture Sector

1.4.1 Total Production, Value and Employment

Based on the stocktaking and diagnostic analysis presented in Volume 1, a summary of the growth potential in terms of production and jobs derived from developing various culture species is presented (Table 1). Given current market trends, South Africa’s environmental potential for aquaculture, and the state of development of its industry, aquaculture production could realistically grow from the current level of 3,543 tons of production in 2006 (worth R218 million) to over 90,000 tons (worth R2.4 billion) over a 10-15 year horizon. However, the development of the sector will only occur if the current constraints to growth are addressed in a systematic way.

In 2006, direct employment on farms was 1817. This figure can be approximately doubled to 3,600 if the services sector (feeds, processing, security, transport, packaging, manufacturing of equipment, research, government services) is taken into consideration. For example, Troell *et al* (2006) reported that total employment in the abalone industry was 1,390 people. The analysis assumes that on-farm jobs and services sector employment were included. Their employment analysis is approximately double the official 2006 figure of 670 direct on-farm jobs. Therefore, if production grows to the projected level of 90,000 tons per annum, the industry has an employment potential of over 44,000 people. It is interesting to note that the aquaculture sector is more labour intensive than the fishing industry which employs approximately 30,000 people directly in vessels and processing, and annually produces of the order of 500,000 tons of product (Mather *et al*, 2002).
Table 1. Projected growth potential of the South African aquaculture sector over a 10-15 year horizon in terms of production, jobs and value.

<table>
<thead>
<tr>
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<td>Abalone</td>
<td>833</td>
<td>158.4</td>
<td>670</td>
<td>2895</td>
<td>551</td>
<td>2171</td>
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<td>Marine finfish</td>
<td></td>
<td></td>
<td></td>
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<td>Oysters</td>
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<td>23</td>
<td>8000</td>
<td>45</td>
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<td>400</td>
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<td>Prawns</td>
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<td>Seaweed</td>
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<td>3000</td>
<td>4.5</td>
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<td>33</td>
<td>10000</td>
<td>150</td>
<td>2500</td>
<td>1250</td>
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<tr>
<td>Tilapia</td>
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<td>1.2</td>
<td>40</td>
<td>10000</td>
<td>150</td>
<td>2500</td>
<td>2500</td>
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<td>Trout</td>
<td>1100</td>
<td>25</td>
<td>533</td>
<td>2300</td>
<td>52</td>
<td>767</td>
<td>130</td>
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<td>Salmon</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>600</td>
<td>21</td>
<td>12</td>
<td>120</td>
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<td>Ornamental fish</td>
<td>1.3</td>
<td>2.9</td>
<td>50</td>
<td>6.5</td>
<td>13.2</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Koi Carp</td>
<td>11.2</td>
<td>7</td>
<td>300</td>
<td>112</td>
<td>19.7</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>Carp (food)</td>
<td>40</td>
<td>0.6</td>
<td>20</td>
<td>100</td>
<td>1.5</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Bass</td>
<td>9</td>
<td>0.45</td>
<td>18</td>
<td>15</td>
<td>0.75</td>
<td>30</td>
<td>30</td>
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<tr>
<td><strong>Totals</strong></td>
<td><strong>3907</strong></td>
<td><strong>211</strong></td>
<td><strong>1805</strong></td>
<td><strong>93149</strong></td>
<td><strong>2496</strong></td>
<td><strong>23780</strong></td>
<td><strong>19951</strong></td>
</tr>
</tbody>
</table>

The growth projections that have been calculated for the particular species include the following assumptions:

**Abalone**

It is assumed that the current growth trend in abalone culture will continue, that the reputation of South African abalone as premier product is maintained, that the local industry remains cost-competitive, and that demand remains firm in China. This is a conservative projection, as it assumes that South Africa’s share of the international market remains constant, and that total abalone production from aquaculture and fisheries remains the same. At present approximately 2,000 tons of poached South African abalone enters the Chinese market per annum. This level of poaching is unsustainable, and in future, the illegal trade will decline as the resource becomes depleted. If managed correctly, abalone ranching (reseeding of hatchery reared abalone into the wild) could significantly boost production from the wild. It is thus entirely possible that South Africa could increase its market share. However, to do so, the industry must remain cost-competitive with other producers.

**Marine Finfish**

The major growth in aquaculture tonnage is projected to come from the growth in marine finfish production. The technological foundation for the production of various species has been laid and pilot commercial production initiated. To be a serious player in the target markets for these high-value, fresh fish species, volumes of the order of tens of thousands of tons are required. The collapse of the South African line fishery and the growing demand from the service and retail sector for seafood has created a significant local demand for fish products. South African fishing companies have established export
channels and customers in Europe who will readily accept product from South African companies that have a reputation for quality and reliability. HACCP and other export requirements are largely in place, and so provided South African producers are cost competitive, the production of high quality, fresh marine fish is set to take off. Industry representatives agreed that a projected 40,000t in 10-15 years was entirely possible. The major hurdle at this stage is the zoning of sufficient sea areas to support this level of production. Assistance from the state is urgently required in this regard.

Shellfish: Oysters, Mussel and Scallops
Oyster and mussel production is expected to grow organically, and production will primarily focus on the local market. Promising results have been obtained in the development of the technology for the production of the local scallop (*Pecten sulcicosulcatus*), and limited commercial production is likely to develop to supply the local market. It is not anticipated that South Africa will become a competitive exporter of these products.

Prawns
The projection for prawns is an optimistic one, and assumes that the investment in the super-intensive prawn farm in the Coega IDZ is successful.

Seaweed
Production for abalone feed is likely to grow as it has been demonstrated to be a viable option. Seaweeds have the potential to produce various non-food products (health products, alginates, fertilizers, plant growth hormones, anti-bacterial agents and other biotechnological products). At present, production for these products is excluded from the projections, but an R&D initiative could precipitate the emergence of seaweed production in the next decade.

Catfish and Tilapia
Product acceptance, and a lack of distribution networks for fresh catfish and tilapia into the lower price urban markets currently limits the development of the sector. While more research into these markets is required, it is probably realistic to assume that production of these species will grow. Primarily this will be due to:

1) A demand for fresh fish, particularly by African immigrants who traditionally consume these species.
2) Locally produced, whole fresh tilapia could compete with fresh marine linefish in restaurants and retail outlets at a significantly lower price. The European and USA markets have adopted tilapia as a new fish product relatively quickly.
3) The potential to distribute and sell live catfish saving processing costs and yielding a higher unit selling price.
4) The potential to produce these species at a relatively lower cost than marine linefish - due to the cheaper feed costs and production infrastructure.

Trout
It is anticipated that trout production will grow organically and supply the firm demand in the domestic market. In the near future, production from new operations in the Eastern Cape and Lesotho (Katse Dam) will raise the total annual tonnage produced to a conservative 2,300 tons. Scope exists to further increase trout production by means of sea based or intensive recirculating system production; however, this has not been factored into the projection as the relatively high developmental costs make their current economic viability questionable.
Salmon
Salmon production is included in the production projections as moves are afoot to rehabilitate the salmon culture operation at Gans Bay - which recently ceased production due to technical problems associated with the sea cages. Currently, there is a local market for fresh high quality salmon of the order of 600 tons per annum. Currently this market is supplied by imports.

Ornamental Fish and Aquatic Plants
It is anticipated that the ornamental fish and plant industry will grow, and in time result in import substitution. It is projected that local producers will increase their share of the local market from 15% to 60% - the level that it was at in the 1980s when Amatikulu Hatchery was still functional. Due to the significant export potential from South Africa, an optimistic projection is made for koi carp production. South African producers are experienced in production and export but are currently constrained by a ban on exports due to the presence of viral diseases (spring viremia of carp - SVC and koi herpes virus - KHV) in local stocks. Good progress has been made towards managing these outbreaks and with the necessary support from the state veterinary services exports could resume.

1.5 Infrastructure
South Africa possesses excellent basic infrastructural capacity and institutions to support the growth of the aquaculture sector. Aquaculture benefits directly from the service sector of the fishing and agriculture industries and the manufacturing, transport, engineering, financial and packaging sectors. A basic dedicated aquaculture service sector is already in place in the form of university and state R&D facilities, the SABS monitoring service, and dedicated aquaculture managers in government departments. All combine to enhance the competitiveness of the South African aquaculture sector.

An urgent infrastructural requirement is however the zonation and local infrastructure for aquaculture development nodes - both on land and in the sea. The state needs to move quickly to put this in place as sectoral growth is already constrained by access to sites.

A further urgent infrastructural requirement is for the state veterinary services to develop capacity to serve the aquaculture sector, both in terms of health management and export certification.

1.6 Human Capacity
A small, but highly skilled, and established cadre of manpower exists within government, and the private and service sectors, which is stimulating the growth of the sector. While university level courses are well catered for, no provision exists for tertiary technical, or SETA accredited in-service training courses in aquaculture. Given the projected growth in the sector and demand for skilled human resources, the lack of technical training services needs to be urgently addressed.

Furthermore, black people are under-represented in all skilled areas and within the University training system. Given the expected growth trajectory of the sector an opportunity exists to correct the industry’s demographics by means of directed bursaries and awareness-raising among young black people making career choices.
1.7 Technology

Aquaculture is a technology-driven industry, and modern technological tools are used to rapidly domesticate new culture species. Technological advances often provide a competitive advantage to aquaculture entrepreneurs. Access to, and the development of technology is an integral part of most aquaculture business strategies. Countries that are leaders in aquaculture production have invested heavily in the development of technology for new species. A good local example is abalone culture technology which is homegrown, internationally competitive, and globally, provides South Africa with a comparative production advantage.

South Africa is well endowed in research capacity to develop aquaculture technology, and possesses research funding facilities designed to promote company level competitiveness (THRIP and the Innovation Fund). However, a comprehensive sector level aquaculture technology R&D strategy or programme is absent and aquaculture researchers have to compete with other sectors for funding. This results in an uneven development of the sector, and opportunities are lost for lack of support. If South Africa is to promote aquaculture sector development, a more comprehensive approach to technology development is required, analogous to the Australian CRC (Cooperative Research Centre) Model. The CRC model represents an industry-driven partnership with government and research institutions that has resulted in a significant boost to the commercialisation of aquaculture opportunities.

A further option is technology transfer. Chilean aquaculture development has relied heavily on technology transfer, as historically, their research capacity was relatively weak. In this regard, attention should be given to government grants which promote access to and the transfer of appropriate aquaculture technology.

1.8 Finance

Potentially, there are a range of finance investment facilities that are available to the sector. However, access to them is often problematic - particularly those administered through the public sector. For example, the DTI’s SMEDP support measures were welcomed by the aquaculture industry, but applicants found the grants difficult to access due to the complex bureaucracy and rules associated with the scheme. A further constraint is the poor quality of business plans and concepts submitted for financing which do not pass due diligence assessments, and hence are rejected. Pro-active measures to engineer financing programmes for aquaculture development, and to develop bankable projects are required.

1.9 Competitiveness of South Africa’s Aquaculture

The preceding discussion demonstrates that the South African aquaculture sector is currently competitive in certain niche markets. However, the small scale of production of most products, and the lack of an established service sector, raises transaction costs and makes South African production costs relatively high in international terms. The only two sectors that have established a “critical mass” in terms of an established value chain and service sector are the abalone and trout sub-sectors. If aquaculture production is to grow to a level at which imports into the domestic market can be replaced, and export markets penetrated, certain state-led interventions will be required to remove growth constraints, and make South Africa’s aquaculture sector internationally competitive. These include:
• Zoning areas of land and water for aquaculture.
• Providing infrastructure at development nodes.
• Assistance in complying with environmental legislation.
• Training of human resources to meet the anticipated skills demand.
• Access to a full set of industrial support measures.
• State veterinary services for aquaculture and the inclusion of aquaculture under the Animal Health Act.
• Facilitated access to finance.
• Project conceptualisation and packaging.
• A dedicated R&D technology development programme.
• Grants for joint industry actions to develop services and infrastructure.

1.10 Institutional arrangements

Most of the institutional structures required to stimulate the development of South Africa’s aquaculture sector are in place. However, improved coordinated institutional action informed by policy and sector development goals and plans is required. Currently, positive initiatives that are in place include the Aquaculture Sector Working Groups, which bring government departments and stakeholders together; and the inter-departmental working group of national government departments.

In many spheres, a lack of awareness of aquaculture and a lack of personnel experienced in aquaculture development, constrains the deployment of full institutional power in support of aquaculture sector development. Thus, many government supported instruments that are potentially available to the aquaculture sector are not accessed by producers. To make better use of the institutions available to support aquaculture, a national aquaculture sector development strategy based on the National Industrial Policy Framework is required.

Public Sector

In recent years, good progress has been made by the public sector institutions in developing policy and interventions in support of aquaculture development. However, a single national policy, and a coordinated national strategy to realise the potential of the sector is still lacking.

Most national government departments now have a departmental aquaculture policy in terms of their legislated mandates, and dedicated aquaculture staff have been appointed within the National Department of Agriculture (DoA) and Department of Environmental Affairs and Tourism: Marine and Coastal Management (DEAT:MCM). Draft national aquaculture policies have been published for marine and freshwater aquaculture by DEAT: MCM and DoA respectively. A draft marine aquaculture sector development plan has been published by DEAT. The DoA via a Water Research Commission project is supporting the Provincial Agriculture Departments to develop aquaculture strategic plans, train manpower and rehabilitate defunct state hatcheries. The Department of Water Affairs has developed an aquaculture policy and guidelines for water use in aquaculture. The Department of Trade and Industry included aquaculture in its SMEDP scheme, and is currently assessing the case for a comprehensive set of support measures for the sector in terms of the recently published National Industrial Policy Framework. The current project is aimed at informing a more comprehensive package of support measures for aquaculture by the DTI. Evidence gathered in this study suggests that in view of the sector’s potential contribution to the country’s economic growth, a
A dedicated set of sectoral support measures is warranted. To drive such a process, a dedicated aquaculture support desk, and a more pro-active approach from the DTI is warranted. The development of a set of national support measures for aquaculture sector development should include a consultative process with other national and provincial government departments and industry stakeholders.

At a Provincial level, the Departments of Economic Affairs have appointed personnel (either directly or through dedicated agencies such as the Fishing and Mariculture Development Association and Aquaculture Institute of South Africa) to promote aquaculture development in the Western Cape, Eastern Cape and Northern Cape. Provincial aquaculture policy and development plans aligned with Provincial economic goals are in place in the Northern and Western Capes, and this has resulted in initiatives such as the Northern Cape Fishing and Aquaculture Sector Development Plan and the Namaqualand Aquaculture Park. The Provincial Departments of Agriculture in the Western Cape, Mpumalanga and Limpopo have dedicated aquaculture staff and programmes. Some aquaculture staff and facilities exist within the Free State and KwaZulu Natal Departments of Agriculture, but no strategic development plans have been developed. The provincial structures are seen as the key structures for rolling out the establishment of aquaculture development nodes and the associated infrastructure. Dedicated aquaculture development personnel in the provinces are also seen as the key to promoting aquaculture projects as part of their provincial growth and development plans, and municipalities' integrated development plans.

Private sector institutions
Aquaculture producers are relatively well organised with respect to producer associations for the various species. These organisations liaise with provincial and national government, and other organisations such as the SABS around specific interests and issues. In the marine aquaculture sector, producers sit regularly with DEAT: MCM in a working group to discuss industry issues. Collective interests of the sector as a whole are represented via the Aquaculture Association of Southern Africa (AASA), which is recognised as an interest group by government, and which communicates regularly with government via the national aquaculture working group.

Financial Institutions
A range of commercial and development finance institutions have a level of orientation towards aquaculture. Nevertheless, their ability to engage effectively in financing sector development is constrained by: 1) a lack of staff with aquaculture experience, 2) the lack of a programme approach to aquaculture investment – for example via development nodes, and 3) the poor quality of most individual applications for project finance. A more “engineered” approach to project conceptualisation and development is required.

A Coordinated Institutional Approach
In order to respond to aquaculture in terms of their mandates, individual government departments have now invested in some form of aquaculture capacity. A national inter-departmental aquaculture working group has got departments talking to each other, and a consensus of roles and responsibilities is emerging. The national aquaculture working group is a valuable forum for all aquaculture stakeholders to meet and discuss issues. However, a coordinated national strategy designed to realise the sectors’ potential has yet to be formulated. Given the foundation of preparatory work that has been laid by the public sector, and the significant socio-economic impact that could accrue to the development of the sector; it is an appropriate time to develop a national strategy and “Key Action Plans” with dedicated resources. Such developments should be based on the principles outlined in the National Industrial Policy Framework.
The DTI, as the lead government department tasked with the formulation and implementation of industrial policy, clearly has a pivotal role to play in leading the formulation of a national set of support measures and strategies to realise the potential of the sector.
Section 2 Recommendations for Sector Development

The project brief requested recommendations for the development of “large-scale commercial aquaculture”. The following recommendations are based on the expressed needs of industry, stakeholders, and the analysis presented in this report.

2.1 Aquaculture Development Nodes

There is a broad consensus both within industry and government circles that access to land and water for concentrated development within aquaculture development nodes is essential for stimulating investment into the aquaculture sector, and for opening up sufficient environment for production. Development nodes, analogous to industrial parks are economically efficient, lend themselves to efficient service provision, and are environmentally desirable as they promote concentrated development and discourage ad hoc, geographically dispersed operations which tend to conflict with other activities.

The provincial economic development agencies are the logical promoters of “aquaculture development nodes”, however, a range of assistance is required from the national departments and development finance institutions. For example:-

- Environmental scoping, risk assessments, management plans for cultured exotic species by the DEAT and provincial nature conservation departments.
- Infrastructure grants and loans from government and the Development Bank of South Africa.
- Access to a range of industrial support measures via an “aquaculture desk” within the DTI.
- Conceptualisation and project packaging of viable aquaculture investment opportunities. The Department of Science and Technology’s support for small farmer aquaculture development is a good example of this. Similar schemes could be promoted within “aquaculture development nodes”.
- Provision of veterinary support services from the DoA
- Research services and support from the DEAT, DoA and Department of Science and Technology.

2.2 Facilitated Compliance with Environmental Legislation

Industry currently perceives that compliance with environmental legislation is now the single most significant constraint to aquaculture development. Industry representatives frequently express desperation at meetings with government regarding the increasingly onerous requirements of environmental legislation. Large and medium sized companies with outstanding human resources and good corporate governance find it difficult, and very costly, to comply with environmental legislation; and for many small and medium size enterprises it is simply too onerous and costly. The DEAT and nature conservation agencies are aware of the problem, but since they lack an industrial development orientation, they do little more than listen sympathetically, and insist on compliance. Many environmental managers are simply against aquaculture in principle, are reactive, and will do nothing pro-actively to assist industry to meet their environmental requirements. Clearly, if aquaculture sector growth is to occur on any scale, this is a major issue that needs to be resolved by developing a systematic approach, and pro-active governmental intervention.
There is no simple solution to the problem - as environmental legislation affects all stages of the development of an aquaculture operation. Nevertheless, a range of proactive government interventions are possible, and could open the way for investment into aquaculture. These include:

- Strategic environmental assessments to evaluate where best to locate aquaculture development nodes i.e. those areas that have the lowest environmental impact and minimal conflict with other activities.
- Promote self-regulation through best management practice (BMP) schemes such as the Quality and Health Management Programme for the Western Cape.
- Develop guidelines on the use of exotic species, which species are acceptable, where they can be farmed and under what conditions. Risk assessments required by the National Environmental Management: Biodiversity Act for the use of exotic species are expensive and time consuming. Consideration should thus be given to a grant from government to undertake risk assessments in areas earmarked for strategic aquaculture development.
- Traceability and certification schemes to market indigenous species on the local market. Fishery managers within the DEAT are in principle against the sale of cultured indigenous species on the local market as they maintain they can be used as a front for the sale of wild poached product. Government should be proactive in developing traceability schemes to open local markets for producers.
- Environmental impact assessments. Even rudimentary EIA’s can easily cost several hundred thousand rands which is a significant deterrent to small and medium size enterprise development. An EIA grant for aquaculture development in preferred areas should be considered to stimulate investment and promote SMEs.
- Health management programmes. Aquaculture veterinary services are most rudimentary and most farms have stock (herd) health management schemes. Disease and drug free certification is a HACCP requirement for the export of products to the European Union. The SABS expects guarantees in this regard from the state veterinary services. Therefore, developing this capacity within veterinary services is a priority. The abalone industry funds its own water quality management programme and health management programme, but smaller aquaculture SMEs cannot afford this. Assistance should be forthcoming from the state to promote industrial competitiveness in this regard. For example, in Chile if a group of companies approaches the state with a common goal such as this, grant assistance is available for setting up the required service.
- Transport and sale permits. The movement of products is governed by a need for permits. Industry frequently experiences frustration at the non-availability of officials when they require routine permits. A more efficient, service orientated permit system is required.
- Water quality and product monitoring. The SABS and government require frequent water quality and product testing. While the costs of this can be absorbed by large and medium size enterprises, the cost (typically over R100,000 per year) is simply too high for small enterprises. Therefore, grant assistance from the state should be considered for small enterprises such as oyster, abalone and trout out-growers.
2.3 Access to Industrial Support Measures

In order to establish the South African aquaculture sector as an internationally competitive industry, access to a comprehensive suite of industrial support measures is required. This requirement is for two key reasons:

1) Pioneer farmers culturing new species for the first time are subject to much higher risks and transaction costs than those in established aquaculture industries - particularly those in countries such as Chile and Australia where significant government support has led to their industries gaining a “critical mass” of production and supporting services.

2) To promote partnerships between SMEs owned by previously disadvantaged people and the established industry, appropriate incentives and grants are required. Therefore, public sector investment in incentives, particularly for technology, training, export promotion, collaborative industry actions, infrastructure, and SME development in the seafood sector, are appropriate and will promote the establishment and growth of a competitive aquaculture sector.

South Africa possesses a wide range of industrial support measures which are largely equivalent to those offered in Chile and Australia; however, access to them for aquaculture entrepreneurs is seen as a major constraint. Specific problems that producers experience include:

• Poor awareness of the full range of incentives available, and the absence of a guide document. For example, the “Australian FishBook” provides a guide to the full range of industrial incentives available to the Australian aquaculture industry.
• Many support measures are not available to the aquaculture sector
• There are no user friendly contact points within the institutions administering the various incentives.
• Staff within the institutions have little knowledge of aquaculture.
• The rules and procedures for applying, evaluating and receiving the incentives are complex, not clearly articulated and time consuming. Most use consultants to apply, and in the case of research and technology development, the initiative usually comes from the research institutions as producers are unaware of the various research support measures.
• There is little or no promotion of the available aquaculture incentives.

An analysis of the industrial support measures available to the aquaculture sectors of Australia, Chile and South Africa revealed that South Africa lacks a comprehensive suite of support measures designed to realise the potential opportunities for sector development, and overcome existing constraints. As a result of the uncoordinated and partial support currently provided, significant constraints to growth remain, and sector development has been “patchy”. It is therefore recommended that:

1. A range of appropriate DTI industrial support measures be made available to aquaculture producers. Suggestions for specific support measures are provided in Volume 1 – Analysis of industrial support measures for aquaculture in Australia, Chile and South Africa.
2. Consideration is given to the establishment of an “aquaculture infrastructure fund” for the establishment of aquaculture development nodes. This would include funds for all processes and infrastructure to create zoned areas of land and water with a service infrastructure equivalent to an industrial park, so that aquaculture entrepreneurs can effectively be provided with “site and service”.

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“aquaculture infrastructure fund” could be implemented through the provincial economic development agencies.

3. Adopt a more engineered, project based approach to development finance. Instead of being reactive to individual finance applications, the provincial economic development agencies should promote the establishment of aquaculture development nodes, and should work with investors, industry experts and the development finance institutions to develop bankable projects for implementation.

4. An “aquaculture desk” should be established within the DTI. It should be managed by someone with development finance, and ideally aquaculture, experience. The manager would be responsible for leading the roll out of the aquaculture development nodes and in priority areas, “pushing” industrial incentives into the aquaculture industry. The DTI aquaculture manager would work closely with the aquaculture development managers in the provincial agencies (e.g. Fishing and Mariculture Development Association, Northern Cape; East Cape Development Corporation; Aquaculture Institute of Southern Africa, Western Cape), and be responsible for promoting the implementation of relevant aspects of aquaculture development plans such as DEAT:MCM’s “Marine Aquaculture Development Plan”, Northern Cape’s “Fishing and Mariculture Sector Development Plan”, the Western Cape Province’s “Aquaculture Policy”, and the Provincial Departments of Agriculture’s “Aquaculture Strategies”.

2.4 A Dedicated Aquaculture R&D Technology Programme

To a large extent, aquaculture competitiveness relies on the acquisition of technology for the culture of new species, and the improvement of existing technology to reduce risk and production costs. Leading aquaculture nations have invested heavily in technology development. In South Africa, all serious producers build research and technology development into their production budgets as they understand that this is the key to growth and remaining competitive.

While South Africa possesses strong research institutions, a systematic and dedicated approach to aquaculture technology development based on goals for sector development is lacking. Currently, research is ad hoc and based on company or researcher goals, rather than the sector’s needs.

It is therefore recommended that:

- A national aquaculture research and development programme(s) be established for establishing technology in key areas. The Australian Cooperative Research Centre facility provides a good model for industry driven research that is designed to establish new culture species and technologies. The “Innovation Fund” could possibly provide a vehicle for such a facility - assuming that a facilitated and customised programme for aquaculture was developed, and that the funding ceiling and project lifetime was adjusted upwards.
- Roles and responsibilities of National Departments, namely DTI, DST, DEAT and DOA, promoting aquaculture research be clarified and coordinated.
2.5 A National Aquaculture Training Programme

In view of the anticipated growth of the sector, there is a requirement for a national training strategy to meet the growing need for skilled, and racially representative, human resources.

It is recommended that:

- Aquaculture bursaries are made available for black students to study aquaculture at HEIs.
- Technical courses in aquaculture are established at Technical Universities and colleges.
- The agricultural Sector Education Training Authority (AgriSETA) establishes unit standards for aquaculture, in-service training, and accredited service providers.
- Provision is made for the in-service aquaculture training of public sector employees.

2.6 State Veterinary Services for Aquaculture

Growing aquaculture production and the need to certify the health of aquaculture products for export requires that the state veterinary services develop aquaculture capacity. Financial resources and a lack of vets trained in aquaculture health management are current constraints.

It is thus recommended that:

- Funds are made available to the state veterinary services for aquaculture services.
- State vets are sent for training in aquaculture.
- The state veterinary service collaborates with industry to establish appropriate monitoring and health management programmes.

2.7 Joint Industry Actions

Chile and Australia have useful sector level grants for joint industry actions. Equivalent grant support and facilitation of joint industry actions would greatly enhance the growth trajectory of the South African aquaculture sector by encouraging the development of critical infrastructure and services.

2.8 Seafood Industry Promotion

Support measures to realise the potential of South Africa’s seafood industry, both in respect of the fishing and aquaculture industries, is an area of distinct neglect. In contrast to the emphasis that has been placed on: 1) redistributing fishing rights to smaller and medium size enterprises, and 2) the development of aquaculture technology, there have been no programmes or initiatives to build the competitiveness of our seafood sector – which, due to the country’s natural resource endowment, has great potential. To date, there has been an implicit reliance on the established, larger fishing companies – with their in house R&D and marketing capacity – to maintain the competitiveness of South Africa’s seafood industry. It is suggested that a national approach to developing an internationally competitive SME sector in the seafood industry (equivalent to that of Australia) is required.
2.9 Access to Information

Australia has developed very effective measures to promote the necessary levels of information access that are required by industry. This has been achieved by means of information resources, advisory services and contact points. Beyond general information on regulatory compliance, available information for aquaculture development in South Africa is very patchy – especially for prospective new entrants into the industry. This is a major constraint to new entrants and investment into the industry.

2.10 A National Aquaculture Strategy

If the South African aquaculture sector is to realise its production potential, and associated socio-economic contribution, a national strategy and package of financial support measures will be required. These should be based on the principles outlined in South Africa’s National Industrial Policy Framework. The recommendations above make it clear that a comprehensive national strategy and “Key Action Plans” (KAPs) are required if an efficient and systematic approach to sector development is to be implemented. Valuable work has already been undertaken by individual government departments and institutions which has laid the groundwork for a “national aquaculture strategy”. In consultation with relevant stakeholders, the aquaculture working group established by the national departments is a valuable forum which could lead the formulation of a national aquaculture strategy.

It is recommended that:

- A task team comprising the key national departments, provincial agencies and stakeholder representatives collaborate to develop a “national aquaculture strategy and KAPs” - including a budget for new money from treasury for its implementation. The national aquaculture strategy would define goals, programmes and roles and responsibilities of the respective government departments.
References


