Characteristics, structure and resources of the sector

Summary

Aquaculture has existed in Brazil since the beginning of the twentieth century, during the 1990s total aquaculture production increased from approximately 30 000 tonnes at the beginning of the decade to 176 531 tonnes by 2000 and 246 183 tonnes by 2002. Predominately based around small-scale farming units, in 1998 it was estimated that approximately 100 000 farms occupied an area of 80 000 hectares.

According to 2002 data, finfish species comprise 69 percent of Brazilian production with 169 858 tonnes, followed by crustaceans with 64 043 tonnes (26 percent), molluscs with 11 685 tonnes (4.7 percent) and frogs with 597 tonnes (0.2 percent).

Shrimp farms began operating in Brazil during the 1980s, but it was only after 1995, following the introduction of *Penaeus vannamei*, that the industry experienced a period of rapid development. In 2003 the total Brazilian production of *Penaeus vannamei* reached 90 190 tonnes produced from 14 824 ha of shrimp ponds. In some States, productivity reached 8 700 kg/ha/year with the best yields being obtained in the Northeast region, which was responsible for 95.2 percent of the total national shrimp production in 2003.

Mussel (*Perna perna*) production increased from 190 tonnes in 1990 to 11 760 tonnes by 2000, meanwhile oyster (*Crassostrea gigas* and *C. rhizophorae*) production also increased continuously during the period 1990 to 2000. A constantly increasing supply of oyster seed from hatcheries has led to a steady development of this sector, increasing from 55 tonnes in 1995 to 2 591 tonnes by 2002. Seaweed is currently farmed in pilot projects in three States in the Northeast region.

Freshwater fish and prawn farms generate jobs for more than 100 000 self employed farmers, generally these activities are integrated with other agriculture production activities on small scale farming enterprises.

Current per capita consumption of fish is low in Brazil at only 6.8 kg/year. Various marketing campaigns were initiated in 2003, focusing on both national and international markets for Brazilian aquaculture products.
Fisheries and aquaculture production account for only 0.4 percent of Brazil’s Gross National Product (GNP) however, if associated industries such as transport and value-added secondary processing are included GNP increases to a total of 2 percent.

The production of feed for the aquaculture sector totaled 263 000 tonnes in 2003 with a rise to 304 000 tonnes expected in 2004, an increase of 15.5 percent. This level of increase is well above what was expected and well in advance of increases seen in other sectors like poultry (5 percent), pork (3 percent), cattle (5.2 percent) and pet food (4.2 percent). Aquaculture feed was responsible for 0.6 percent of total Brazilian feed production in 2003 and is expected to reach 0.71 percent in 2004. The value of this production represents about US$ 310 million in gross income.

Brazilian aquaculture is expected to become increasingly competitive in international markets, with production continuing to increase on an industrial scale, accompanied by a constant improvement in product quality. With the creation of the Special Secretariat of Aquaculture and Fisheries (SEAP) in 2003, the aquaculture sector is experiencing a unique period of improved organization and development. Many investors have been waiting for the establishment of clear rules for lease permit and environmental licensing. Now that these aspects are well defined, many investors are looking to aquaculture as an interesting option for investment and this is expected to result in increased production and jobs generation in the years to come.

### History and general overview

Brazil is a country of continental dimensions, occupying an area of 8 547 404 km² it is divided in five main regions: South, Southeast, Middle West, Northeast and North. Brazil possesses 12 percent of the planet’s reserve of available freshwater, with more than two million hectares of marshlands, reservoirs and estuaries suitable for aquaculture, as well as 25 000 rivers across the country. Brazil has a coastline that stretches for 8500 kilometres and out of a total of 26 States, 15 border the Atlantic Ocean coast.

Aquaculture has existed in Brazil since the beginning of the twentieth century, during the 1990s total aquaculture production gained in strength when it increased from approximately 30 000 tonnes in 1990 to 176 531 tonnes in 2000. In 1994 aquaculture was responsible for 4.3 percent of the total fish production in the country, by 2003 the contribution from aquaculture had risen to 28.1 percent. Predominately based around small-scale farming units, Brazilian aquaculture produced 278 128 tonnes in 2003.

It was estimated in 1998 that approximately 100 000 farms occupied an area of 80 000 hectares. There are currently more than 64 species of aquatic organisms being cultured, with an enormous variety of native fish from the Amazon basin and from the central marshlands areas in the Middle West region.

Fee fishing outlets have had an important influence on finfish aquaculture development in the Southern region, prior to fish farming and processing industries being gradually developed. By the mid 1990s, competition for fingerlings was noticeable with fee fishing outlets always paying the better prices. This scenario stimulated the construction of hatcheries and today juvenile carp, tilapia and all cultured native species are fully available to the market. In the North region, small-scale units represent 86 percent of the number of fish farms, with systems varying between semi-intensive and small pond culture. Consequently, yield varies widely in this region from between 600 to 6 500 kg/ha/year. In the Northeast region, there is both extensive culture yielding 800 kg/ha/year and semi-intensive production which produces between 3 000 and 10 000 kg/ha/year. In the North and Northeast regions, native species and tilapia are the main cultured species, while in the South, Middle West and Southeast regions, tilapia, carp and catfish farms predominate. Polyculture farms utilising carp are present in almost every State and carp is currently the major fish species farmed in Brazil. A semi-intensive system using natural fertilization or integration with pig breeding is a common culture pattern in the South region.

Shrimp farms began operation in Brazil during the 1980s, but it was only after 1995, with the introduction of *Penaeus vannamei*, that the industry experienced a period of rapid development. Most of these farms are small scale (75 percent), followed by medium (9.6 percent) and large scale (5.52 percent). The average yield
increased from 1,015 kg/ha/year in 1997 to 6,084 kg/ha/year in 2003, against an international average of 958 kg/ha/year. In some states, productivity can reach 8,700 kg/ha/year with the best yields being obtained in the Northeast region which was responsible for 95.2 percent of the total national shrimp production.

Mollusc farming was introduced into Brazil in the 1960s but only since 1989 has this activity developed as an important economic alternative for small-scale fishermen. Besides the generation of income and employment, bivalve culture has had a noticeable effect in contributing to the stabilisation of traditional communities on their original lands. Today, there are no large companies in this sector and small farmers are organized into associations and cooperatives. Santa Catarina State in the South region is responsible for 93 percent of Brazilian bivalve mollusc production, other areas with good potential for mussel production are located on the coasts of the Southeast region. Pacific cupped oyster (*Crassostrea gigas*) is produced in the South region and native oysters species are produced on differing scales in almost every state from the South to the North regions. Scallop aquaculture is a recent activity in Brazil with no commercial farms to date, however, improvements in hatchery seed production of local species indicate that this technology will soon become commercially viable.

The potential for aquaculture on the north and northeast coasts is enormous, especially with seaweed and native oyster production. Seaweed, oyster and crab extraction is a common activity undertaken mostly by women in many fishing communities, in many of these places, aquaculture is providing the first self-employed jobs as it becomes associated with better resource management. Freshwater fish and prawn farms generate more than 100,000 jobs, generally these activities are integrated with other agriculture activities on small scale farming enterprises.

### Human resources

Shrimp culture in Brazil generates more employment per hectare than irrigated fruit culture, and in many municipalities it provides the first opportunity for employment to many unskilled workers. Shrimp production is creating 3.75 direct and indirect jobs/ha and it is estimated that 50,000 people are currently employed on shrimp farms.

In Santa Catarina State which is responsible for 97 percent of total Brazilian mussel production, aquaculture created 5,000 direct and 10,000 indirect jobs during the 1990s. About 90 percent of these aquaculturists are artisanal fishermen who discovered the potential of mariculture as an additional economic activity. Initially, mariculture was regarded as a second source of income however this has gradually been elevated to become the principal occupation, thus contributing to the stabilisation of traditional communities on their original land. Other States in the Southeast region, such as São Paulo, Rio de Janeiro and Espírito Santo also possess enormous potential for mollusc culture and they currently each have some mussel farms producing around 100 tonnes/year. With recent investments from the government into the sector, it is likely that mussel culture in these States will soon become as developed as in Santa Catarina.

### Farming systems distribution and characteristics

FAO Fisheries and Aquaculture Department
There are currently more than 64 species of aquatic organisms being farmed in Brazil including an enormous variety of native fish from the Amazon basin and from the central marshlands areas in the Middle West region. The main species are Nile tilapia (*Oreochromis niloticus*), common carp (*Cyprinus carpio*) including bighead carp (*Aristichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*) and grass carp (*Ctenopharyngodon idellus*) followed by the round fishes, 'pacu' (*Piaractus mesopotamicus*), 'tambaqui' (*Colossoma macropomum*), their hybrid 'tambacu' and the native catfish called 'turubim' or 'cachara' (*Pseudoplatystoma fasciatum*) and 'pintado' (*Pseudoplatystoma coruscans*). Some other native species such as 'pirarucu' (*Arapaima gigas*), 'matrinxã' (*Brycon cephalus*), and 'piracanjuba' (*Brycon orbignyanus*), have been farmed with promising potential. Rainbow trout (*Oncorhynchus mykiss*) was introduced into Brazil in 1949, and is now produced in the Southeast and South region.

Mollusc aquaculture is mainly represented by mussels (*Perna perna*), followed by oysters (*Crassostrea gigas* and *Crassostrea rhizophorae*) and scallops (*Lategopecten nodosus*). Crustaceans are represented by the whiteleg shrimp (*Penaeus vannamei*) and the giant river prawn (*Macrobrachium rosenbergii*). Although the shrimp sector is based on the exotic species *Litopenaeus vannamei*, the culture of the native species *Penaeus paulensis* in pen enclosures in coastal lagoons has shown promising results. In addition, there is the culture of turtles (*Podocnemis expansa* and *P. unifilis*), alligator (*Caiman crocodilus*) and seaweed (*Porphyra spp* and *Gracilaria spp*) on a pilot scale.

Marine fish culture is still in its infancy however a few promising species are being investigated, such as 'arabaiana' (*Seriola lalandi*), 'carapeba' (*Diapterus rhombeus*), grouper (*Epinephelus spp*) and snook (*Centropomus spp*). Among commercially fished and other valuable species which may potentially be cultured, the common snook (*Centropomus undecimalis*), the flounder (*Paralichthys spp*), the pompano (*Trachinotus carolinus*) and the peixe-rei (*Odontesthes bonariensis*) are notable.

### Practices/systems of culture

Fish culture is predominately carried out in ponds but cage culture is becoming popular in reservoirs and lakes. A minority of farms use raceways with producers using this system to farm tilapia in the Northeast region and rainbow trout in the South and Southeast regions.

In some states in the North region, "tambaqui" (*Colossoma macropomum*) is raised on meal (meat, rice, corn) until
the biomass reaches 2-3 tonnes/ha, following which extruded feed is offered until biomass reaches 5-6 tonnes/ha. Harvesting is frequent, selecting fish of an average weight of 1.5 kg. Integrated rice-fish culture is a common system in use in the South region, particularly in Santa Catarina where increasing numbers of rice farmers are undertaking fish culture in order to obtain organic certification for their rice crop.

Semi-intensive aquaculture in earth ponds is the main technology utilised in Brazil. Fish farmers in the South region prepare the pond sediment to improve primary production and use either polyculture of complementary species of carp or the integration of pig and carp culture. The use of 60 pigs/ha in an integrated system guarantees the production of 2 tonnes/ha/year of common carp or Nile tilapia.

Small fish cages of 2 m³ are extensively used in reservoirs all over the country. The use of cages to raise tilapia and native round fishes (tambaqui, pacu and their hybrid) is becoming very popular and it can be found in all major reservoirs in the country. Unfortunately, the lack of appropriate statistics on the number of farmers using cages prevents an accurate estimate of production being made at present.

Mussels are farmed using longlines, rafts or a mixture of longlines and poles installed in shallow intertidal areas. Oysters are either farmed using longlines or trays when the area is too shallow, rafts are also sometimes employed. Scallop culture is just beginning and have been cultures using longlines until now, currently there has been no mechanism for bivalve production and all work is undertaken manually, using simple technology and equipment. All floats are re-used containers from the chemical and soft drinks industry, in very poor areas, even plastic bottles are used to keep longlines at the surface.

Shrimps are produced in earth ponds with farms varying in size from less than 10 ha to 1 000 ha. Recent surveys reveal that 98 percent of shrimp farmers use feeding trays, 95 percent undertake soil treatment of culture ponds, 85 percent undertake measurements of water parameters, 71 percent use aerators and 55 percent use nursery tanks before transferring shrimps to grow-out ponds. Although most shrimp farmers do not treat their effluents, some new farms operate ponds with recirculation systems, with no water exchange during a growing season of three months. Organic shrimp production is also starting to attract the attention of some companies, which are beginning to obtain organic certification using low stocking densities and an integrated culture system with shrimps, fish, oysters and seaweeds.

**Sector performance**

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<th>Production</th>
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According to 2003 data, finfish comprise 61 percent of Brazilian production with 171 187 tonnes produced, followed by crustaceans with 90 190 tonnes (32.4 percent), molluscs with 10 807 tonnes (3.9 percent) and frogs with 626 tonnes (0.2 percent).

A total carp production of 50 400 tonnes represents 29.4 percent of the total farmed fish production with tilapia production at 64 857 tonnes representing 37.88 percent. Although Nile tilapia was introduced in 1971, significant commercial production has emerged only during the 1990s, as producers have assimilated sex reversal and other modern production technologies.

Presently, the State of Ceará is the leading producer of tilapia with 13 000 tonnes/year in 2003, followed by Paraná (about 12 780 tonnes/year) and São Paulo (9 740 tonnes/year). Ceará is located in the Northeast Region, while Paraná and São Paulo are located in the southern part of the country, with its sub-tropical climate. The South region is also the leading producer of carp, utilising polyculture in semi-intensive systems.

A recent census organized by the Brazilian Shrimp Farmers Association reported 14 824 ha of shrimp ponds producing 90 190 tonnes in 2003. The number of farms increased 33 percent between 2002 and 2003, and production has increased 50 percent over the past two years. There are now 36 shrimp hatcheries operating in the country with 32 of these are located in the Northeast region. Total shrimp post-larvae production in 2003
the country with 32 of these are located in the Northeast region. Total shrimp post-larvae production in 2003 was 16.4 billion. Total Brazilian freshwater prawn production amounts to approximately 500 tonnes.

Mussel production increased from 190 tonnes in 1990 to 11 760 tonnes by 2000, production then decreased to 8 608 tonnes in 2003 due to problems with the supply of mussel seed, lack of mechanisation, marketing problems and bureaucracy relating to the rationalisation of farm leases. Oyster production however, has increased continuously over the last decade and the regular availability of oyster seed from hatcheries has led to a steady development of this sector, increasing from 55 tonnes produced in 1995 to 2 196 tonnes in 2003.

The graph below shows total aquaculture production in Brazil according to FAO statistics:

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<th>Market and trade</th>
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Even today fee fishing outlets play an important role in Brazilian aquaculture, in Paraná state for example, local aquaculture development agencies report that 56 percent of farmed fish produced are supplied to these establishments, 31 percent are sold to fish processing industries, 11 percent sold directly from the farm gate to consumers and 2 percent are sold through street markets. In São Paulo and Paraná States, live fish hauliers pay US$ 0.68-0.86/kg for tilapia at the farm gate and then sell them onto fee fishing owners in the metropolitan areas for around US$ 1.07-1.21/kg. Processors are now struggling to produce fillets and other value-added products at competitive prices to enable the establishment of new markets for tilapia in Brazil, as well as to explore potential export markets.

Current per capita consumption of fish is low in Brazil - only 6.8 kg/capita/year. FAO recommends twice this amount, at least 12 kg/capita/year, for reasons of general health. Many marketing campaigns were initiated in Brazil during 2003 focusing on both domestic and international markets. To stimulate an increase in fish consumption, initiatives to include aquaculture products in public school meals have also been widespread during the past two years, with the expectation that the next generation of consumers will eat fish more regularly. Even so, with 180 million inhabitants Brazil is one of the largest fish markets in the world capable of absorbing most of its domestic finfish production over the next few years.

Shellfish production faces restrictions to international market access mainly due to the absence of a national shellfish sanitation program to regulate bivalve production areas, harvesting practices, processing operations, distribution chains and commercialisation.

Shrimp exports increased 1 423 percent in volume and 556 percent in value between 1998 and 2002, the main markets being the United States of America with 56 percent, followed by France (18.9 percent) and Spain (15.2 percent). The Brazilian Shrimp Farmers Association (ABCC) anticipates that the export of farmed shrimp in 2004 will reach 76 000 tonnes, realising a value of US$ 300 million.

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<th>Contribution to the economy</th>
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Fisheries and aquaculture account for only 0.4 percent of Brazil's Gross National Product (GNP), if associated industries such as transport and value-added secondary processing are included GNP increases to a total of 2 percent.

Shrimp culture increased rapidly after the introduction of *Penaeus vannamei* in 1992 and now is one of the most organized sectors within Brazilian aquaculture, almost solely responsible for the turnaround in the national fishery commercial balance over the last five years. Shrimp culture is one of the most important economic activities in the Northeast region, where shrimp is second in the list of most exported product. Brazilian shrimp exports reached 60 000 tonnes in 2003, representing 60.5 percent of the total Brazilian fishery export and generated US$ 230 million for the Brazilian economy.

The production of feed for the aquaculture sector totaled 263 000 tonnes in 2003 with a rise to 304 000 tonnes expected in 2004, an increase of 15.5 percent. This level of increase is well above what was expected and well
in advance of increases seen in other sectors like poultry (5 percent), pork (3 percent), cattle (5.2 percent) and pet food (4.2 percent). Aquaculture feed was responsible for 0.6 percent of the total Brazilian feed production in 2003 and is expected to reach 0.7 percent in 2004. The value of this production represents about US$ 310 million in gross income.

Surprisingly, the value of Brazilian fisheries products has been overestimated by FAO in the 2003 statistics, at a mean worth of US$ 3.95/kg, while the real value is approximately US$ 1.20/kg.

Promotion and management of the sector

The institutional framework

In 2003, President Luiz Inácio Lula da Silva created the Special Secretariat of Aquaculture and Fisheries (SEAP), directly linked to the Presidency of the Republic. SEAP was launched during the electoral campaign of President Lula, in the document 'A Letter Addressed to Fishermen', published in August 2002, and it established for the first time in Brazilian history a national policy for the aquaculture sector at Ministerial level. Its mission is to formulate, coordinate and implement guidelines and policies for the development and fostering of sustainable Brazilian fishing and aquaculture production. In order to undertake this mission, the Special Secretariat of Aquaculture and Fisheries operates a small staff allowing it to implement its policies and also function as a consultative service through a National Council for Aquaculture and Fisheries (CONAPE) composed of representatives of the government, public and the production sector.

The Special Secretariat of Aquaculture and Fisheries is now in the process of preparing a National Plan to ensure the development of an economically sustainable aquaculture industry. To achieve this, SEAP organized 26 state conferences in 2003 to elect delegates to the First National Conference on Fisheries and Aquaculture at which 1500 representatives from as many stakeholders in the industry as possible and from all levels attended. The future of the industry was the only agenda item and the result was an extensive compendium of suggestions which are now being used to guide the development of a National Aquaculture Development Plan.

The Federal Government is making strategic investments in the aquaculture sector, building hatcheries, installing aquaculture demonstration units and at the same time providing special financial credit lines for aquaculturists. National programs in support of aquaculture cooperatives, extension services, research and marketing are also now being planned.

The governing regulations

The Special Secretariat for Aquaculture and Fisheries (Secretaria Especial de Aquicultura e Pesca – SEAP), attached to the Presidency of the Republic and created by Law No.10.683 of 2003, is the main authority for the management and development of fisheries and aquaculture in Brazil. SEAP is vested with advisory, promotional, supervisory and administrative functions, it assists the President in the drafting of policies and guidelines, promotes actions aimed at the construction of infrastructure for the development of fisheries, aquaculture and the trade in fish products and implements programmes for the rational development of aquaculture, in cooperation with the Federal District, State and Municipal Authorities. SEAP is also responsible for the upkeep of the General Fisheries Register (Registro Geral da Pesca – RGP), the granting of licences, permits and authorisations for fisheries and aquaculture and for the transfer of 50 percent of the tax income and licence fees to the Brazilian Institute for the Environment (Instituto Brasileiro do Meio Ambiente – IBAMA), which is attached to the Ministry of Environment and Natural Resources (Ministério do Meio Ambiente e dos Recursos Naturais Renováveis – MMA).

Within the activities of SEAP, a central role is played by the National Council for Aquaculture and Fisheries (Conselho Nacional de Aquicultura e Pesca – CONAPE), which is vested with advisory and organisational functions, mainly concerning the matters listed in the previous paragraph.

Another focal institution for the management of fisheries is the Brazilian Institute for the Environment –
IBAMA, which replaced the Superintendancy for Fisheries – Superintendência da Pesca – SUDEPE, in 1989. Its responsibilities mainly concern environmental issues, such as natural resources conservation (including aquatic resources), environmental licences and water quality control. In 1998, part of the functions related to fisheries, and inherited from SUDEPE, were transferred to the Ministry of Agriculture, Livestock and Supply (Ministério da Agricultura, Pecuária e Abastecimento – MAPA), and more precisely to the newborn Department of Fisheries and Aquaculture (Departamento de Pesca e Aquicultura – DPA – da Secretaria de Apoio Rural e Cooperativismo – SARC). Eventually, in 2003 these responsibilities were reassigned to SEAP.

From a legislative point of view, the federal framework of aquaculture is quite fragmented. The Fisheries Code – Decree-Law promoting and protecting Fishing Activity (Código de Pesca – Decreto-Lei sôbre a Proteção e Estímulos à Pesca) (1967, as amended), which is the main piece of legislation regulating the sector, only dedicates three articles to aquaculture development. Consequently, through the Working Group on the Revision of Aquaculture Legislation created in 2003, SEAP is currently fostering the promulgation of an Aquaculture Law (Código de Aquicultura), which would recognise various farmers' rights. Proposals were due to be completed by December 31st, 2004.

In 1995, the Executive Group for the Fisheries Sector – GESPE (Grupo-Executivo do Sector Pesqueiro – GESPE) was created in order to promote the development of fisheries. The Group was in charge of proposing the National Fisheries and Aquaculture Policy to the Chamber for Natural Resources Policies (attached to the Presidency of the Republic), recommending legislative reforms required for fisheries and aquaculture and implementing the directives issued by the Chamber with regard to fisheries, however, the National Plan for Fisheries and Aquaculture presented in 1998 was never put into operation. In 2004, SEAP organized the First National Conference on Aquaculture and Fisheries in order to prepare a 'democratic and integrated policy on aquaculture and fisheries', as stated by the Presidential Decree issued on August 18th, 2003. With Normative Instruction No.1 of 2004, SEAP also created a Technical Working Group for the formulation of policies on aquaculture and fisheries cooperatives.

Lastly, fisheries and aquaculture research is carried out by the National Council for Research and Development - CNPq (Conselho Nacional de Pesquisa e Desenvolvimento) within the Ministry of Science and Technology – MCT (Ministério de Ciência e Tecnologia). Since the creation of SEAP, MCT and CNPq undertake annual meetings to decide aquaculture research priorities and publish calls for research proposals. The National Information System on Fisheries and Aquaculture – SINFESQ (Sistema Nacional de Informações da Pesca e Aquicultura – SINFESQ), established by Decree No.1.694 of 1995 and managed by the Brazilian Foundation Institute of Geography and Statistics is not yet operational.

For more information on aquaculture legislation in Brazil please click on the following link: National Aquaculture Legislation Overview - Brazil

| Applied research, education and training |

Institutions which include aquaculture within their curriculum are located in every Brazilian State, in addition to which there is one undergraduate and three graduate programs in existence specific to aquaculture, there are also 16 middle level courses, 42 undergraduate courses, 28 specialisations, 27 masters and 13 doctorate programs involved in this area. Brazil has 89 research institutions involved in aquaculture, 32 of which are located in the Southeast, 23 in the South, 21 in the Northeast, 8 in the North and 5 in the Middle West region.

Trends, issues and development

Brazil is already a superpower in the production of fish feed. The country is the world's second largest producer of soybeans and the world's third largest producer of maize. These are two ingredients which are gaining in importance in the production of fish feed and Brazil is also one of the few countries in the world which can guarantee GMO-free maize and soya.
In mollusc culture, strategic development plans are now being prepared and Brazilian missions are searching the globe for up-to-date technology and to investigate the establishment of technology transfers programs that will lead to increased national production. Implementation of sanitation and water quality programs are also being planned to increase product quality for both national and international markets.

There has been a trend toward increase tilapia production to the northeast states. Xingó reservoir for example, lies across the boundaries of three States and is sustaining a cage production of tilapia of around 4000 tonnes/year. The use of reservoirs for aquaculture is one of the main development programs to have been put in place by SEAP, the national program focuses on the six largest reservoirs located in different regions of the country, and projects a potential production of 18 million tonnes even if only 1 percent of the area contained within these six reservoirs is utilised for aquaculture.

In shrimp farming there is a tendency towards lower stocking rate densities down from 40 to 20 shrimps/m². Farmers are now realizing that high densities are associated with longer growing periods (120-160 days), low feed conversion ratios, elevated costs and environmental risks. Lower densities, however, allow harvesting every 50 days, reducing both environmental and economic risks. With lower production costs, these options for low density guarantee profits even given the current tendency of an international reduction in the price of shrimp.

Federal plans for marine aquaculture focus on native species of shrimp for the Rio Grande do Sul estate, on Pacific oyster, mussel and scallops for the South and Southeast regions, and on native oyster and seaweed for the Northeast and North regions. The farming of cobia (Rachycentron canadum) is also starting to attract some interest.

With densities as low as 4 shrimps/m², the first organically certified farms using polyculture techniques with shrimps, oysters, seaweed, fish and crabs have obtained a shrimp weight increase of 4 grams per week, compared to 0.5-0.8 grams per week obtained on traditional high density farms.

The aquaculture sector currently faces several issues for example, conflicts with environmental agencies and other users of common natural resources as well as market constraints caused by the anti-dumping action initiated by the United States of America, even so, the sector is well organised and is addressing these issues with appropriate strategies. Certification of the feed industries, hatcheries, farms and processing plants, training of small farmers in best management practices, mangrove recuperation, shrimp veterinary health programs, development of new markets and the adoption of a Code of Conduct for responsible shrimp farming are among the current activities being carried out by the Brazilian Association of Shrimp Farmers (ABCC).

Brazilian aquaculture will become increasingly competitive in international markets, with continuing increases of the industry's production capability and constant improvement in product quality. With the creation of the Special Secretariat of Aquaculture and Fisheries, the aquaculture sector is passing through a unique period of organisation and development. Many investors have been waiting for the set up of clear rules for lease permit and environmental licensing of aquaculture in federal waters, both in marine and freshwater environments (dams and reservoirs). Now that these aspects have become defined, many investors are looking to aquaculture as an interesting option for investment, and this is expected to result in increased production and jobs generation in the years to come.

References

FAO publications related to aquaculture for Brazil.

Bibliography

FAO Fisheries and Aquaculture Department


Related links

Agency for Extension and Technical Assistance – EMATER
Brazilian Association of Aquaculture – ABRAQ
Brazilian Institute of Environment and Renewable Natural Resources – IBAMA
Brazilian Society of Aquaculture and Aquatic Biology – AQUABIO
FAO FishStatJ – Universal software for fishery statistical time series
National Environmental Council – CONAMA
Water National Agency – ANA