

INBDP Aquaculture in the Middle East 2009



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Content

- 1.0 Background and Purpose**
- 2.0 Working Method**
- 3.0 Introduction**
 - 3.1 Climate
- 4.0 International Organisations**
 - 4.1 FAO - Food and Agriculture Organization of the United Nation
 - 4.2 RECOFI - Regional Commission for Fisheries
 - 4.3 RAIS - Regional Aquaculture Information System
- 5.0 The Kingdom of Bahrain**
 - 5.1 Aquaculture in Bahrain
 - 5.2 The institutional Framework and Governing Regulations
 - 5.2.1 Governing Regulations
 - 5.2.2 Licence Process
 - 5.2.3 Financial Support
 - 5.3 Research and Education
 - 5.3.1 National Mariculture Centre (NMC)
 - 5.3.2 Education
 - 5.3.3 Research & Development Programmes
 - 5.4 Private Companies
 - 5.5 Production
 - 5.6 Plans ahead
 - 5.7 Key Actors and Operators within Aquaculture/Fish Farming
- 6.0 The Sultanate of Oman**
 - 6.1 Aquaculture in Oman
 - 6.2 The Institutional Framework and Governing Regulations
 - 6.2.1 Governing Regulations
 - 6.2.2 Licence Process
 - 6.2.3 Financial Support
 - 6.3 Research and Education
 - 6.3.1 Research Centres
 - 6.3.2 Education
 - 6.3.3 Research & Development Programmes
 - 6.4 Private Companies
 - 6.5 Production
 - 6.6 Plans ahead
 - 6.7 Key Actors and Operators within Aquaculture/Fish Farming
- 7.0 The State of Qatar**
 - 7.1 Aquaculture in Qatar
 - 7.2 The Institutional Framework and Governing Regulations
 - 7.2.1 Financial Support
 - 7.3 Research
 - 7.3.1 Aquatic & Fisheries Research Centre
 - 7.4 Private Companies
 - 7.5 Production
 - 7.6 Plans ahead
 - 7.7 Key Actors and Operators within Aquaculture/Fish Farming
- 8.0 The Kingdom of Saudi Arabia**
 - 8.1 Aquaculture in Saudi Arabia
 - 8.2 The Institutional Framework and Governing Regulations
 - 8.3 Research
 - 8.3.1 The Fish Farming Centre
 - 8.4 Education, Training, Regulations
 - 8.5 Production
 - 8.6 Key Actors and Operators within Aquaculture/Fish Farming

9.0 The United Arab Emirates

9.1 Aquaculture in the UAE

9.2 The Institutional Framework and Governing Regulations

9.2.1 The Ministry of Environment and Water

9.2.2 Governing Regulations

9.2.3 Financial Support

9.2.4 Registration and Approvals

9.3 Research

9.3.1 MRRC

9.3.2 Plans ahead

9.4 Production

9.5 Key Actors and Aperators within Aquaculture/Fish Farming

10.0 Summary

10.1 SWOT – Middle East

11.0 Recommendations and Market Entry

1.0 Background and Purpose

Innovation Norway was initially asked to conduct a market survey by a group of operating companies within aquaculture in the following GCC countries:

- Bahrain
- Oman
- Qatar
- Saudi Arabia
- The United Arab Emirates

The co-operating partners wished to obtain relevant market information and knowledge about the Gulf region. They would like to investigate whether there is any base for marketing and sales opportunities.

Their target was to obtain a complete survey of:

- Political decisions and guidelines regarding fish farming
- On land and off-shore fish farming companies
- Expected investments
- Expected areas of investment; on land and off-shore
- Average income level of fish farming companies
- Income opportunities for the companies
- The competence level of the personnel within fish farming
- Potential local partners
- Governmental financial support to the fish farming industry

However, this project was changed to an Innovation Norway Business Developing Project (INBDP).

2.0 Working Method

The assignment is carried out by collecting and analysing information through internet searches, telephone interviews and meetings with relevant key players in the market.

It is important to note that certain information in the GCC countries is not always easily available. Certain subjects are not willingly discussed and hardly anyone would like to declare sensitive subjects as investments, strategies and figures about their company. However, when such information is given it may not be factual.

We have chosen a common introduction for all the countries as most of them share the same coastline and waters as well as facing similar future challenges. We have also carried out a SWOT analysis and given recommendations for the five GCC countries in a summary.

Please note that there is little recent information on Saudi Arabia and some of the facts date back to 2000/2001.

The Gulf Co-Operation Countries, GCC was founded in 1981 and includes Saudi Arabia, Kuwait, Bahrain, Qatar, UAE and the Sultanate of Oman.

3.0 Introduction

The world population is on the rise, as is the demand for aquatic food products. Production from capture fisheries at global level is levelling off and most of the main fishing areas have reached their maximum potential. Sustaining fish supplies from

capture fisheries will therefore not be able to meet the growing global demand for aquatic food.

At present, the aquaculture sector contributes to just over 40 million tonnes, excluding aquatic plants, to the world aquatic food production. According to recent FAO predictions, in order to maintain the current level of per capita consumption at the minimum, global aquaculture production should reach 80 million tonnes by 2050. Aquaculture has a great potential to meet this increasing demand for aquatic food in most regions of the world. However, in order to achieve this, the sector will face significant challenges.

The GCC countries rely on the rest of the world for 90% of their food and feed requirements.

The growing demands of an ever-increasing population, combined with the need to reduce dependency on imports, are adding to the potential for agribusiness industries in these developing markets.

The Gulf is facing pollution from desalination plants and construction projects and there are occasional pollution scares due to heavy traffic of oil transportation and tanker accidents.

Most of the research institutions in the GCC countries are currently working towards increasing the local fish population by releasing fingerlings into the open sea.

3.1 Climate

The Arabian Peninsula is a great desert peninsula in extreme south-western Asia, bounded on the north by Jordan and Iraq, on the east by the Gulf and the Gulf of Oman, on the south by the Arabian Sea and the Gulf of Aden, and on the west by the Red Sea.

The climate is extremely arid; few places receiving more than 178 mm of rain a year and no permanent streams exist. Summer temperatures reach as high as 54.4 C in some areas.

4.0 International Organisations

4.1 FAO - Food and Agriculture Organization of the United Nation

The organisation leads international efforts to defeat hunger. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information. They help developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices and ensure good nutrition for all. Since the founding in 1945, they have focused special attention on developing rural areas, home to 70% of the world's poor and hungry people. www.fao.org

Please see FAO's reports on the countries covered in this report on:

<http://www.fao.org/fishery/naso/search/en>

<http://www.fao.org/fishery/countryprofiles/search/en>

4.2 RECOFI - Regional Commission for Fisheries

The main objective of the Regional Commission for Fisheries (RECOFI) is to promote the development, conservation, rational management and best utilisation of living marine resources, as well as the sustainable development of aquaculture within its area of agreement.



Present country members are Bahrain, Iran, Iraq, Kuwait, Qatar, Oman, Saudi Arabia and the United Arab Emirates.

www.fao.org/world/regional/rne/statut/region/page57/page57_en.htm

4.3 RAIS - Regional Aquaculture Information System

The overall aim of the RAIS is to facilitate networking and sharing of aquaculture information, responding to the specific information needs for sustainable development of aquaculture in the region. In particular, RAIS has been established to respond:

- to the increasing needs of a developing aquaculture industry in the region;
- to facilitate the exchange of aquaculture information;
- to assist the private and public sectors to have quick and easy access to information required for decision making;
- to the increasing public demand for transparency and accountability concerning aquaculture development at national and regional level;
- To give more visibility to the regional aquaculture development.

<http://www.raisaquaculture.net>



5.0 THE KINGDOM OF BAHRAIN

The **Kingdom of Bahrain**, (Arabic: مملكة البحرين), is an Arabic island microstate in the Gulf ruled by the Al Khalifa regime.

Saudi Arabia lies to the west and is connected to Bahrain by the King Fahd Causeway, which officially opened on 25 November 1986. Qatar is to the southeast across the Gulf of Bahrain. Bahrain has an estimated population of 1.2 million, and its size is approximately 665 square kilometres.

With its highly developed communication and transport facilities, Bahrain is home to numerous multinational firms with business in the Gulf.

Petroleum production and refining account for over 60% of Bahrain's export receipts, over 70% of Government revenues, and 11% of GDP (exclusive of allied industries), underpinning Bahrain's strong economic growth in recent years.

Aluminium is Bahrain's second major export after oil. Other major segments of Bahrain's economy are the financial and construction sectors. Bahrain is focused on Islamic banking and is competing on an international scale with Malaysia as a worldwide banking centre.

Bahrain is actively pursuing the diversification and privatisation of its economy to reduce the country's dependence on oil. As part of this effort, in August 2006 Bahrain and the US implemented a Free Trade Agreement (FTA), the first FTA between the US and a Gulf state. Continued strong growth hinges on Bahrain's ability to acquire new natural gas supplies as feedstock to support its expanding petrochemical and aluminium industries.

Unemployment, especially among the young, and the depletion of oil and underground water resources are long-term economic problems.

The global financial crisis is likely to result in slower economic growth for Bahrain during 2009 and 2010 as tight international credit and a slowing global economy cause funding for many non-oil projects to dry up.



5.1 Aquaculture in Bahrain

The Kingdom of Bahrain has a potential for fish farming when considering the advantages offered by the climate, location, coastal area, and market. Most types of aquaculture activities are feasible and a wide range of aquatic species could be cultured. Bahrain, by virtue of its location, possesses rich finfish and shellfish resources, some of these have already been identified as potentially suitable for aquaculture development by the National Mariculture Centre (NMC), which forms part of the Directorate of Marine Resources.

In the long-term, it is felt that investment in the development of an aquaculture sector will contribute to the food security and self-sufficiency of Bahrain and its ability to earn foreign exchange through the export of aquatic products.

5.2 The Institutional Framework and Governing Regulations

The Directorate of Marine Resources within the General Directorate for the Protection of Marine Resources which in turn forms part of the Public Commission for the Protection of Marine Resources, Environment and Wildlife is a leading government agency responsible for the management and development of the aquaculture sector. The Directorate also liaises with other government bodies on issues relating to aquaculture development.

Within this Directorate there are a number of different sections and units with responsibility for aquaculture development and sustainable management issues.

5.2.1 Governing Regulations

The government has recognised the importance of regulation to ensure the sustainable development of aquaculture, as an unregulated and uncontrolled aquaculture sector will lead to many environmental, economical and social problems. All the rules and regulations relating to aquaculture are set within one framework that is transparent, enforceable and interlinked with other laws and regulations applicable within the Kingdom as well as relevant international law.

The Royal Decree on Exploitation and Utilization of the Marine Resources, issued in 2002, has provisions for controlling the culture of organisms using aquaculture such as licensing and quality issues. According to Law No. 20 of 2002, a company may not undertake any aquaculture activities without permission from the authorised government body (Directorate of Marine Resources), a feasibility study and an environmental impact assessment. The Directorate also controls the collection of seed from the wild. Aquaculture laws and regulations in Bahrain are currently being revised and up-dated within a regional cooperation committee under the umbrella of the FAO Regional Commission for Fisheries (RECOFI).

The government's strategy is designed to guide the sustainable growth and management of Bahrain's aquatic resources for the production of high quality fish and seafood, also for the generation of wealth and employment for the local population. The Aquaculture Development Strategy rests on two important aspects:

- Enabling the aquaculture industry to expand and remain competitive; and
- Promoting new species development.

All strategy initiatives are being designed to promote sustainable development – “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Recognising the importance of environment, the Directorate of Marine Resources is committed to eco-friendly and environmentally sound aquaculture development.

5.2.2 License Process

License type	processing time
Mariculture activities, fish and prawn culture and fish farm culture facilities	15 working days
Extraction and transport of sand from the sea	30 working days
Import, export and/or sale of fish and marine products	10 working days
Import, export and/or sale of ornamental fish and aquarium accessories	10 working days

Required documents

License type	Required documents
Mariculture activities, fish and prawn culture and fish Farm culture facilities	- Application letter - Copy of CPR card (Passport for non-Bahrainis) - Business plan or feasibility study
Extraction and transport of sand from the sea	- Application letter - Copy of CPR card (Passport for non-Bahrainis) - Details of proposed work
Import, export and/or sale of fish and marine products	- Application letter - Copy of CPR card (Passport for non-Bahrainis)
Fishing	- Application letter - Copy of CPR card (Passport for non-Bahrainis) - Completed application form no. MRD/MEG-01 (available at the Directorate or the BIC) for boats - Completed form no. MRD/MEG-02 (available at the Directorate and the BIC) for barrier traps (hadhrah) - Copy of vessel registration certificate - Copy of vessel rental contract, if vessel is rented - Loan application form, if applicable
Import, export and/or sale of ornamental fish and aquarium accessories	- Application letter - Copy of CPR card (Passport for non-Bahrainis)

Application Procedures

The application process can be initiated by submitting a commercial registration application. The Ministry of Industry and Commerce will provide the investor with a letter requesting the approval of the General Directorate of Marine Resources. The investor should then approach the Directorate and provide all the necessary documents. Upon receiving the Directorate's written approval, the investor can proceed to complete the commercial registration procedures. The investor will be contacted if additional information is needed.

General Conditions

The General Directorate for the Protection of Marine Resources licenses among others the following business activities:

- Import, export and/or sale of fish and marine products
- Import, export and/or sale of ornamental fish and aquarium accessories
- Mariculture: fish and prawn culture and fish farm culture facilities
- Any other investments in marine resources

Applicants for all license types must satisfy the following conditions:

- Not to be a government employee
- Not to have a any other business registered under his/her name

Applicants for a fishing license must satisfy the following conditions:

- To be a citizen of Bahrain or any of the GCC countries
- To own or lease a seaworthy vessel suitable for the fishing activity

A license is issued for a period of one year and must be renewed annually.

5.2.3 Financial Support

There is no financial support or incentives from the government.

5.3 Research and Education

5.3.1 National Mariculture Centre (NMC)

One of the main objectives of Mariculture is to strengthen the food security of the country and provide a suitable protein source for consumption. With this in mind the Directorate of Fisheries & Marine Resources began a feasibility study jointly with the Food and Agriculture Organization of the United Nations as a result of which work began on establishing a National Mariculture Centre (NMC) at Ras Hayan area in 1982. Some of the main objectives of the centre are:

- To create the scientific and technical base for the development of Mariculture operations in Bahrain
- To conduct appropriate scientific research projects and developmental programs on Mariculture of living marine resources
- To develop suitable culture systems for the conducive environmental conditions of the Kingdom.
- To assist and encourage private sector investments in commercial/industrial fish farming and similar activities in the country.
- To mass produce seeds of suitable and commercially important species for the fish farming sector.
- To grow fingerlings to market size fish in the suitable culture systems for the local and international markets.
- To train national staff in aquaculture technology.
- To assist stock enhancement programs through the mass production of seeds/fry/fingerlings to protect the local endangered marine resources.

To fulfil the above objectives a series of biological studies were done on various fish species to determine their suitability for aquaculture. Some of these studies dealt with lengths/weights relationships, age determination, maturation, spawning seasons and food and feeding habits. Based on these studies it was possible to select some suitable candidates for culture.

NMC has successfully achieved the mass propagation of seed from the following commercially important local species: Rabbit fish (*Siganus canaliculatus*), sobaita sea bream (*Sparus hasta*), gilthead sea bream (*Sparus aurata*), mangrove red snapper (*Lutjanus argentimaculatus*), brown-spotted grouper (*Epinephelus coioides*), streaked rabbit fish (*Siganus javus*) and green tiger shrimp (*Penaeus semisulcatus*). The success has been such that the NMC has begun to supply marine finfish seed to other member countries of the GCC region.

Given the state of freshwater resources in Bahrain, all efforts have been diverted towards marine species, land-based culture activities which, where they exist, are carried out in tanks.

Pilot-scale projects using cage production systems are oriented to promote this type of system. Bahrain is a small island nation with limited land resources. The expansion of extensive land-based developments would be at the expense of the marine environment, as a result, land-based shrimp culture, for example, is from a practical point of view not feasible. It is advantageous, however, for the country to promote private sector investments in intensive tank-based marine culture activities and open-water cage culture.

Human resources

The Director of NMC has a PhD. All technical staff is well educated and trained in marine culture sciences with many years of experience in this field. The technicians are school graduates with extensive training and experience. All are working in different areas of marine culture research, such as hatchery techniques, live food production, juvenile and grow-out production, nutrition and fish pathology. The NMC has a staff of 42 persons.

5.3.2 Education

The Bahrain Centre for Scientific Research and the Biology Department of the University of Bahrain also conduct related academic oriented research in this field.

The University of Bahrain offers a BSc. degree course in marine science within the Biological Sciences Department.

5.3.3 Research & Development Programmes

Production of the grouper (*Epinephelus coioides*) at Bahrain's National Mariculture Centre

Participating institutions NMC
Brief description this project was intended to produce fingerlings under Bahrain environmental conditions including grouper brooders maintenance and eggs incubation.
Objectives To sell for private sectors, release programs and for limited grow-out activity.
Start date 1993
End date continue
Coordinator Marine Resources Directorate
E-mail ajshams@batelco.com.bh

Production of Sobaity bream (*Sparidetes hasta*) at Bahrain

Participating institutions Marine Resources Directorate
Brief description This project was conducted since 1997, including broodstock maintenance, egg incubation, larvae rearing and nursery.
Objectives The objective of producing Sobaity fry at NMC is for sale to private sectors, release programs and for limited grow-out activity.
Expected outputs or main results Sobaity hatchery production at NMC exceeding one million fry and covered all activities.
Start date 1997
End date continue project
Coordinator Marine Resources Directorate
E-mail ajshams@batelco.com.bh

Production of Gilthead Sea bream (*Sparus aurata*)

Participating institutions NMC
Brief description this project was an agreement between the government and the private sector. Sea bream larvae is imported from Europe and reared in the hatchery and nursery for about 100 days until reach 1 to 2 grams and then sell to the private sector
Objectives Investment promotions
Start date 2005
End date continue
Coordinator Marine Resources Directorate
E-mail ajshams@batelco.com.bh

5.4 Private Companies

Currently, only one private company has a technical cooperation agreement with the Directorate of Marine Resources aimed at developing marine culture activities. This is Awal Fishing Company, an associate to Asmak International in the UAE. Awal Fishing Company is a hatchery that also delivers fish seed/juveniles to the government. In the coming months Awal Fishing Company have plans to open pre-production facilities as well.

Asmak transport the juveniles from Bahrain to their fish farms in UAE and Oman (which has recently reopened after closure due to red tide algae).

There are approx. 25 persons employed Awal Fishing Company.

For more information about this company: www.asmak.biz

5.5 Production

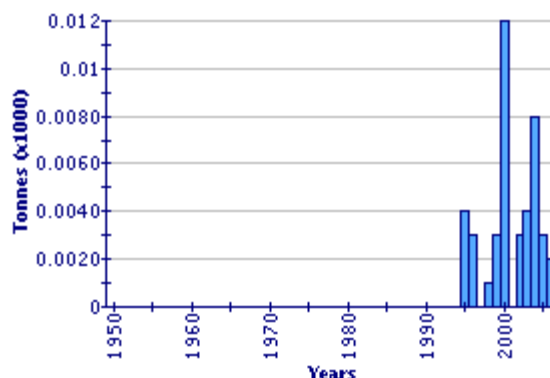
The NMC completed the 2008 production season with a total production of 4,956,470 juveniles of three species of fish.

This included 507,035 juveniles of the Sobaity bream (*Sparidentex hasta*), 193,659 juveniles of the brown spotted grouper (*Epinephelus coioides*) and 4,255,776 juveniles of the gilthead sea bream (*Sparus aurata*).

The NMC puts emphasis on the production of commercially important and endangered fish like the grouper, as part of its stock enhancement programs. In 2008, 100,000 juveniles of grouper and Sobaity were released in various marine habitats. The aim is to double this number in 2009. The gilthead sea bream juveniles are mainly used in fish farming activities in the GCC region as part of a private sector fish farming incentive program.

The graph below shows total aquaculture production from 1950.

**Reported Aquaculture Production in Bahrain
(from 1950)**



(Source: FAO Fishery Statistics, Aquaculture production)

5.6 Plans ahead

The Directorate of Marine Resources is in the process of preparing a master plan for future development of the aquaculture sector that will provide strategies for a controlled development of the sector. The NMC will be expanded and equipped with all necessary equipment and culture facilities to conduct the necessary research.

This master plan will contain different sections relating to issues such as legislation and the integration of the approval process, environmental monitoring, fish disease control, sustainable management and development. This master plan will also include the nature of involvement of the different government authorities as well as the private sector in the management process of this sector.

More research in different fields of aquaculture is needed for improved future management of this growing sector. The main areas of research that could be focused on in future are:

- Identification of the most suitable local and exotic species for culture.
- Environment monitoring programmes.
- Fish health and disease control.
- Enhancement of the legal and administrative framework.

5.7 Key Actors and Operators within Aquaculture/Fish Farming

Directorate of Marine Resources

Public Commission for the Protection of Marine Resources, Environment and Wildlife

General Directorate for the Protection of Marine Resources

Directorate of Marine Resources

Director Dr. Abdulredha J. Shams

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National Mariculture Centre (NMC)

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Private:

Awal Fishing Company

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Tel: +973 1722 6588

Fax: +973 1172 24150

Contact: General Manager

Email: info@asmak.biz

Website: www.asmak.biz



6.0 OMAN

Sultanate of Oman

(Arabic: عُمان قنطلس), is an Arab country in southwest Asia on the southeast coast of the Arabian Peninsula. It borders the United Arab Emirates to the northwest, Saudi Arabia to the west and Yemen to the southwest.

The coast is formed by the Arabian Sea on the south and east and the Gulf of Oman on the northeast. The country also contains Madha, an exclave enclosed by the United Arab Emirates, and Musandam, an exclave also separated by Emirati territory.

Oman is a middle-income economy that is heavily dependent on dwindling oil resources, but sustained high oil prices in recent years have helped build Oman's budget and trade surpluses and foreign reserves. As a result of its dwindling oil resources, Oman is actively pursuing a development plan that focuses on diversification, industrialisation, and privatisation, with the objective of reducing the oil sector's contribution to GDP to 9% by 2020.

Some of these projects may be in jeopardy, however, because Muscat overestimated its ability to produce or secure the natural gas needed to power them. Oman actively seeks private foreign investors, especially in the industrial, information technology, tourism, and higher education fields.

Industrial development plans focus on gas resources, metal manufacturing, petrochemicals, and international transshipment ports.

The drop in oil prices and the global financial crisis in 2008/2009 affected Oman's fiscal position, but Oman is expected to show improved growth in 2010, although in a moderate and sustainable rate.



6.1 Aquaculture in Oman

The Sultanate of Oman has a long history of fishery, but little experience with aquaculture. However the potential is there; with the good climate, the long coast towards both the Arabian Sea and the Gulf of Oman, and the area in North-East, the Musandam area, also called "Little-Norway", with mountains, islands and fjords. According to the Ministry of Fisheries Wealth, Oman also has political stability, economic transparency (amongst no.10 of Arabic country with regards to corruption) and a good legal system.

One of Oman's biggest challenges within fish farming are sites (competition with other ministries; housing, tourism, oil&gas, environment) and the red tide.

The Ministry of Fisheries Wealth has conducted a lot of research the last years in order to locate sites and decide on species to be breed. They are more or less ready to welcome investors to Oman.

Development of an aquaculture sector will contribute to the food security and self-sufficiency in Oman, and within 2020 their aim is to be able to produce 250,000 metric tons of fish. This will create employment opportunities and an estimated economic growth up to 1 million USD.

Oman will focus on both on land and offshore farming in order to reduce the risk (red tide etc).

Undersecretary Mr. Hamed Said Al-Oufi and Mr Saoud bin Hamood bin Ahmed Al-Habsi was in Norway in June and visited amongst other EWOS. They are also in contact with the research environment in Norway.

6.2 The Institutional Framework and Governing Regulations

The Ministry of Fisheries Wealth and its Department of Fisheries and Development are the governmental body responsible for aquaculture in Oman.

The Quality Control Centre and the Aquaculture Centre are both under the Ministry.

6.2.1 Governing Regulations

The main law governing aquaculture in Oman is the "Law of Fishing and Protection of Living Aquatic Resources".

The Government has recently revised all rules and regulations regarding aquaculture and fisheries. The new material is for the time being only in Arabic.

Innovation Norway, UAE will be informed when English material is to be obtained, and the material will then be available from us and the Ministry of Fisheries Wealth in Oman.

No foreign species will be allowed to be farmed in Oman.

The Ministry has also made guidelines for best management, for both regular farming and organic farming.

This manual, available as a free downloadable pdf-file from (www.raisaquaculture.net), was commissioned to provide guidance to aqua culturists on issues surrounding sustainability and eco-friendly development of new and existing facilities. The manual incorporates general sections on site selection and facility construction as well as methods for managing water, solids and other effluents. Chapters on feeds and feeding

include consideration of feeding methods and feed handling, use of medicated feeds, aspects of pond fertilization and best management practices or BMPs (Best/Better Management Practise)for use of wastewater and excreta.

The manual also incorporates sections on preventing escapees, controlling predators and general management of animal health and welfare and BMPs for facility operation and maintenance.

Six appendices are integrated into the manual and these provide species and system-specific BMPs for cage culture, shrimp farming, marine bivalve cultivation, issues surrounding salinization, broodstock selection and occupational and community health and safety.

The introduction to the manual outlines how BMPs should be incorporated into daily operations as well as a consideration of their limitations. The manual was designed with extension and fisheries officers in mind, providing step-by-step guidelines to standard operational procedures for monitoring and assessing environmental and sustainable production systems. As such, the manual has significant value also in offering practical advice and guidance to producers in their efforts to attain eco-friendly production.

6.2.2 License Process

The Department for Fisheries and Development is the one-stop-shop for investors within Aquaculture.

Investors can apply the department for setting up companies/farms. The Department will coordinate with the Ministry of Housing and Ministry of Environment and other ministries/departments if necessary. The Department finally issues the licence.

The Ministry would not initiate a timeframe from application to a licence permit.

Each individual investor must survey the site given to them and assess risks and benefits, even when the site is selected from their map.

6.2.3 Financial Support

There is no financial support or incentives from the government. They can give technical support and help to connect with the Oman Development Bank in order to apply for loans.

6.3 Research and Education

6.3.1 Research Centres

Quality Control Centre

This control centre certifies all fish exported out of Oman. All the quality centres in Oman are EU certified.

Aquaculture Centre

The Centre is located in Muscat, the capital of Oman, approx. 45 km from Seeb International Airport.

The Aquaculture Centre was established in 2006. All aquaculture activities and research were conducted by the aquaculture laboratory under Marine Sciences & Fisheries Centre from 1992 to 2006. Then the Ministry of Agriculture & Fisheries established the Aquaculture Centre to cope with the expected expansion in aquaculture sector in Oman.

The objectives of the Aquaculture Centre include:

- Conduct applied research in the field of aquaculture

- Apply modern technologies of aquaculture and hatchery which are suitable to the environmental conditions in Oman
- Conduct research on the possible local species for aquaculture
- Enhance the stock of endangered fish species
- Monitor the commercial aquaculture projects
- Conduct research on the diseases of cultured fish
- Evaluate the aquaculture project submitted by private companies
- Cooperate with private sector for developing aquaculture sector through joint research projects
- Educate the public about aquaculture activities

The centre has 3 departments: Aquaculture laboratory, Aquaculture development section, and Environmental monitoring; with units at Salalah, and at Sultan Qaboos University.

The Centre includes several laboratories such as chemical analysis laboratory, algae lab, food processing laboratory. It also includes a hatchery unit.

A new Aquaculture centre is currently under construction and estimated completion is by June 2010.

6.3.2 Education

Skilled labour is always a challenge.

The Institute for Fishermen Training in Oman is educating 30-40 students a year. Technicians for fish farming will be recruited from this institute.

Sultan Qaboos University has both basic education programmes and masters and PhDs programmes.

The Ministry also send people abroad for higher education. Currently one student is on a PhD programme in Malaysia.

6.3.3 Research & Development Programmes

There are several ongoing research and development programmes:

Atlas of Suitable Sites for Aquaculture

Project title	Atlas of suitable sites for aquaculture
Participating institutions	Aquaculture Centre
Brief description	During this project, specific sites will be evaluated for their suitability for commercial aquaculture operations. An Atlas of the entire coastline will be produced using satellite imagery and overlaid with pertinent information for aquaculture
Objectives	1. Determine suitable sites for aquaculture operations. 2. Establish infrastructure needs for commercial aquaculture.
Expected outputs or main results	The major output from this project will be a comprehensive site atlas for the Omani coast including biological, physical and geological information useful for the siting of commercial and experimental hatcheries and farms.
Start date	2008
End Date	2010
Coordinator	Dr. Fahad S. Ibrahim
E-mail 1	fahad@squ.edu.om

Breeding of Native Red Sea Bream

Project title	Breeding of native red sea bream
Participating institutions	Aquaculture Centre, Directorate General of Fisheries Research, Ministry of Fisheries Wealth.
Brief description	Commercial aquaculture projects started in Oman with an introduction of exotic species. Government policy states that only indigenous species will be farmed in the future.
Objectives	This research will investigate the possibility of breeding and rearing native red sea bream
Expected outputs or main results	Successful breeding, larval rearing and grow-out of red sea bream under Omani conditions.
Start date	2008
End Date	2010
Coordinator	Dr. Fahad S. Ibrahim
E-mail 1	fahad@squ.edu.om

Diversity, Stocks and Aquaculture Potential of Sea Cucumber, *Holothuria Scabra*

Project title	Diversity, stocks and aquaculture potential of sea cucumber, <i>Holothuria scabra</i>
Participating institutions	Aquaculture Centre
Brief description	The project consists of two phases I: reproductive biology and?
Objectives	The main and overall objective of the project is to apply sea cucumber culture technology as a means of enhancing natural stocks and producing adult animals through culture
Expected outputs or main results	Production of seed for stock enhancement and aquaculture purposes
Start date	2008
End Date	2010
Coordinator	Khalfan M. Al-Rashdi
E-mail 1	omanaba@yahoo.com

Production of Cultivated Clownfish

Project title	Production of cultivated clownfish
Participating institutions	Aquaculture Centre
Brief description	Development of technologies suitable for the production of various species of marine ornamental finfish using clownfish as a model animal.
Objectives	Establishment of viable techniques for the artificial rearing of marine ornamental finfish.
Expected outputs or main results	Development of a nascent ornamental finfish industry in the Sultanate of Oman
Start date	2009
End Date	2011
Coordinator	Khalfan M. Al-Rashdi/Dr. Fahad S. Ibrahim

6.4 Private Companies

Currently, there are two private/semi-private companies operating within aquaculture. This is Asmak Quriat International Co. LLC and Bentout Seafood Products.

Asmak Quriat International is a subsidiary of Asmak International in the UAE. They are engaged in fish farming (which has recently reopened after closure because of the

red algae in 2008) of sea bream and sea bass and they also have a tuna fattening programme.

For more information about this company: www.asmak.biz

Bentout Seafood Products is a scrimp farm.
No information is available on the internet.

Another company in Oman looking into the aquaculture sector is **Oman Fisheries Company**.

We meet with Mr. Said Rashid, General Manager 15th February 2010:
Oman Fisheries was established in 1987 and is listed in the security market. It is a semi private company owned 24% by the Government and the rest by fishermen. It used to have 24,000 shareholders but today has 15,000. One individual can own up to 75%.

They have 5 processing plants across Oman, which are all EU approved. They also have processing plants in Yemen, Dammam, Bahrain and a representative office in Vietnam.

A pilot project was set up in 1999 with the Greek company Salonda in order to farm sea bream. It was not technical viable as a hatchery was not available locally as well as fish feed. It all had to be imported. The ideal thing is to own, control and operate the whole value chain. The projects would have been possible if feed and hatchery had been available locally.

In according to Mr. Said the people are waiting for support from the Government. The fisheries sector has not been prioritised in Oman. Before the Fisheries did not have their own ministry, and agriculture and animal wealth had more support. There is also competition between the fishery sector and tourism sector.

Oman Fisheries Company has no experience with Norwegian Aquaculture companies, but in 1998 they had a joint venture with a Norwegian company. Lenten fish which is the smallest fish in the ocean was caught by trawling up to 4 million MT was caught in Oman and processed into fish feed on a factory boat. This project was destroyed as the Ribbon Fish destroyed the nets and the Norwegian crew was too expensive. The project was closed within a year.

One of their main competitors is companies in Dubai which import fish from e.g. Vietnam, change the labels in the free zone and sell it as a UAE product - to avoid import tax to the GCC. Oman Fisheries Company also has an office in Hamriya Free zone in Sharjah.

The local species that can be farmed commercially in according to Mr Said is Cobia, Hammour and Sea-Cucumber.

Land based farming requires a minimum guaranteed from the marked, since the investments is larger than offshore.

*Over fishing is difficult to control: fish, scrimp, lobster
Because of rise of population the future must be prepared and look into farming more seriously.*

Favour for Oman, according to Mr. Said:

- *Heavy metal pollution of the Gulf from Kuwait and along the Iranian coastline; because of nuclear plants, desalination, oil pollution etc.*
- *Oman's long coastline does not have these challenges*
- *Oman has currents so the water is changed often.*

6.5 Production

We can read both from FAO and from RAIS that aquaculture production is very little and has no effect on the national economy.

year	scientific	common	tonnes
2006	Thunnus albacores	Yellow fin tuna	32
2006	Sparus arata	Gilthead sea bream	114
2007	Penaeus indicus	Indian white prawn	85
2008	Sparus arata	Gilthead sea bream	34
2008	Penaeus indicus	Indian white prawn	86

Source: www.raisaquaculture.net

Tilapia is also farmed in Oman, but not on a commercial basis.

6.6 Plans ahead

The draft of a " National Aquaculture Atlas" was delivered to the Ministry of Fisheries Wealth in December 2009. The underlying concept of the "Atlas Project" was to provide an accurate and authoritative guide to potential aquaculture sites in the Sultanate of Oman using contemporary technologies and expertise from Europe, North America and the Sultanate (including FAO).

The document, which includes sections on the types of aquaculture and species suitable for industrial exploitation in Oman, has as its major part, cartographical details of the nation's coastline using satellite imagery. A 1:150000 scale was used and forty satellite images are incorporated into the Atlas. Each satellite image has been overlaid with colour-coded symbols and blocks to illustrate various oceanographic, biological and physical features that might influence siting of aquaculture facilities. These include built up areas, agricultural lands, wadi mouths and positions of harbours, ice manufacturers, EU-approved processors, major roads, bathymetric contours, sabkhas, mangroves and other details.

For seven national regions, brief notes are presented regarding general characteristic features of the area, including oceanographic information such as weather and bathymetry, regional circulation and tides, sea surface temperatures and salinities, wave action and photosynthetic pigment levels and environmental data. The presence or absence of sea grasses and algae, mangrove stands, corals and marine invertebrates, turtles and bird life, and the existence of current and potential coastal protected areas are included.

Finally, the Atlas highlights the potential for aquaculture activities in the Sultanate of Oman and provides recommendations for development of specific sites.

Currently there are 12 sites allocated. The Ministry has applied for these sites to be booked for aquaculture.

It is estimated that the Atlas will be ready approx. April 2010.

When all this is ready they are planning a promotional program for Omani and foreign investors.

6.7 Key Actors and Operators within Aquaculture/Fish Farming

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7.0 QATAR

The State of Qatar

(Arabic: دولة قطر), is an Arab emirate in Southwest Asia, occupying the small Qatar Peninsula on the north-easterly coast of the larger Arabian Peninsula. It is bordered by Saudi Arabia to the south; otherwise the Gulf surrounds the state. It has a population of 824,789 and an area of 11,437 km².

Qatar has experienced rapid economic growth over the last several years on the back of high oil prices, and in 2008 posted its eighth consecutive budget surplus.

Economic policy is focused on developing Qatar's no associated natural gas reserves and increasing private and foreign investment in non-energy sectors, but oil and gas still account for more than 50% of GDP, roughly 85% of export earnings, and 70% of government revenues.

Oil and gas have made Qatar the highest per-capita income country and one of the world's fastest growing.

Proved oil reserves of 15 billion barrels should enable continued output at current levels for 37 years.

Qatar's proved reserves of natural gas are nearly 26 trillion cubic meters, about 14% of the world total and third largest in the world.

The drop in oil prices in late 2008 and the global financial crisis has reduced Qatar's budget surplus and may have slowed the pace of investment and development projects in 2009 and 2010. However, Qatar is still presenting budget surplus and have strong investment willingness.



7.1 Aquaculture in Qatar

Aquaculture is not a traditional activity in Qatar and there is today no significant aquaculture production. Qatar is a small country where onshore production is not an alternative. They will rely on cage culture. They do not have any infrastructure regarding aquaculture, so they need to establish aquaculture in all aspects.

Investors are careful to enter the aquaculture especially after the problems UAE and Oman has experienced with the red algae (tide).

7.2 The Institutional Framework and Governing Regulations

Ministry of Municipal Affairs and Agriculture (MMAA) is the authority that controls the fisheries and aquaculture sector in Qatar and the Fisheries development section within MMAA is the executive unit for aquaculture.

Law No. 4 of 1983: Exploitation and Conservation of Living Aquatic Resources in Qatar, regulates the aquaculture in Qatar.

7.2.1 Financial Support

The government try to encourage the local to invest and engage in aquaculture. But the government do not give any financial support.

Investors can apply for bank loan on special terms if they want to invest in aquaculture.

7.3 Research

Qatar has for the time being no on-going research within aquaculture. They are however in the process of building a research centre, which main task is to release juveniles to the sea to stop the decrease and hopefully increase the local fish population.

7.3.1 Aquatic & Fisheries Research Centre

The government are in the process of building up the research centre; Aquatic & Fisheries Research Centre at Al Wakrah.

The current project is for the design of the first large scale aquaculture facility in Qatar. Even though the Aquaculture department has been carrying out pilot scale studies, a full-fledged facility for carrying out research in various areas of aquaculture and fisheries has not been established so far, and the current project is intended to cater to the above requirement. The successful establishment and functioning of this facility will thus help the development of aquaculture industry in Qatar. The Research Centre will also establish a hatchery for the endangered species, and set out fingerlings to raise the declining fish population.

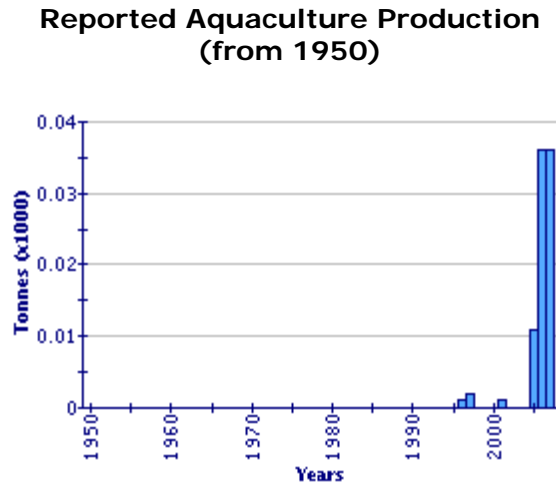
They now get juveniles from Bahrain to release into the sea.

7.4 Private Companies

There is a small private company, producing Tilapia, but it is not commercial.

7.5 Production

The graph below shows total aquaculture production in Qatar.



(Source: FAO Fishery Statistics, Aquaculture production)

7.6 Plans ahead

Qatar is in the process of building the aquaculture from scratch. They have no infrastructure at all within aquaculture but are now building a research centre and its corresponding facilities.

7.7 Key Actors and Operators within Aquaculture/Fish Farming

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8.0 THE KINGDOM OF SAUDI ARABIA

The **Kingdom of Saudi Arabia, KSA** (Arabic: **مملكة العربية السعودية**), is an Arab country and the largest country of the Arabian Peninsula. It is bordered by Jordan on the northwest, Iraq on the north and northeast, Kuwait, Qatar, Bahrain, and the United Arab Emirates on the east, Oman on the southeast, and Yemen on the south. The Gulf lies to the northeast and the Red Sea to its west. It has an estimated population of 27.6 million, and its size is approximately 2,150,000 square kilometres.

Saudi Arabia has an oil-based economy with strong government controls over major economic activities. It possesses more than 20% of the world's proven petroleum reserves, ranks as the largest exporter of petroleum, and plays a leading role in OPEC. The petroleum sector accounts for roughly 80% of budget revenues, 45% of GDP, and 90% of export earnings. About 40% of GDP comes from the private sector.



Roughly 6.4 million foreign workers play an important role in the Saudi economy, particularly in the oil and service sectors. High oil prices through mid-2008 have boosted growth, government revenues, and Saudi ownership of foreign assets, while enabling Riyadh to pay down domestic debt.

The government is encouraging private sector growth - especially in power generation, telecommunications, natural gas exploration, and petrochemicals - to lessen the kingdom's dependence on oil exports and to increase employment opportunities for the swelling Saudi population, nearly 40% of which are youths under 15 years old.

Unemployment is high, and the large youth population generally lacks the education and technical skills the private sector needs. Riyadh has substantially boosted spending on job training and education, infrastructure development, and government salaries. As part of its effort to attract foreign investment and diversify the economy, Saudi Arabia acceded to the WTO in December 2005 after many years of negotiations.

The government has announced plans to establish six "economic cities" in different regions of the country to promote development and diversification. The last five years of high oil prices have given the Kingdom ample financial reserves to manage the impact of the global financial crisis, but tight international credit, falling oil prices, and the global economic slowdown has reduced Saudi economic growth in 2009 and 2010.

8.1 Aquaculture in Saudi Arabia

Saudi Arabia occupies 80% of the area of the Arabian Peninsula and is bordered on the west by the Red Sea and on the east by the Gulf.

There were 149 freshwater and marine farms in operation in 2001 with the majority of production (3,918t in 2001) coming from freshwater aquaculture, primarily Tilapia species. Marine aquaculture however is expanding rapidly, particularly shrimp farms on the Red Sea coast in the region of Jizan and Tihama Plains. Other marine species either in commercial or pilot-scale production include grouper (*Epinephelus coioides*), sea bream (*Sparus auratus*), rabbit fish (*Siganus caniculatus*) and mullet (*Mugilidae* spp). There is also interest at a feasibility level, in culture of lobster, molluscs, seaweed and ornamental fish.

Supporting infrastructure is good with modern harbours being located in a number of strategic locations, including Dammam and Jizan.

Imported fish and fish products account for around 62% of total supply in Saudi Arabia. Demand will continue to outpace supply in the foreseeable future as the population grows and local supply comes under pressure from both changing environmental conditions and overexploitation.

Although aquaculture has been seen as a major alternative source of fresh fish supply and is growing rapidly, production from this sector has not grown fast enough to meet increased demand. Saudi Arabia will therefore be increasingly dependent on imported products to meet its fish demand.

http://www.fao.org/fishery/countrysector/FI-CP_SA/en

8.2 The Institutional Framework and Governing Regulations

The UN Convention on the Law of the Sea (1982) was signed by Saudi Arabia on 07 December 1984, and ratified on 24 April 1996. The Ministry of Agriculture and Water (MAW) is responsible for the implementation of economic plans and programs for fisheries in addition to agriculture, water development, desalination, irrigation, animal resources and locust control.

http://www.fao.org/fishery/countrysector/FI-CP_SA/en

8.3 Research

Saudi Arabian aquaculture research and development programs are carried out in the Fish Culture Project of the King Abdulaziz City for Science and Technology, and the National Fish Farming Centre. University aquaculture research exists, but only at the undergraduate level. The Fish Culture Project conducts research on freshwater fish culture, while the national Fish Farming Centre conducts research on saltwater fish and shrimp.

Saudi Arabian aquaculture research projects have been conducted in; water quality, culture technology, local climate and environmental conditions, nutritional requirements, genetics and strain improvement, disease diagnosis and control, and the feasibility of exotic fish and shrimp development.

Progress has been excellent in recent years, and local and exotic species of freshwater and saltwater fish and shrimp continue to be evaluated, to identify suitable species for commercial development.

The government actively supports the industry with research and development, as well as extension programs that provide brood stock, hatchery-reared seeds, essential technical and commercial information, and training.

http://www.icdf.org.tw/web_pub/20020702140316aquasaudi.pdf

8.3.1 The Fish Farming Centre (FFC)

The Government of the Kingdom of Saudi Arabia has been actively promoting an ambitious food self-sufficiency programme and provides financial incentives and appropriate technical support to the private sector. Aquaculture has been included in this programme and therefore the Ministry of Aquaculture and Water together with the cooperation of FAO established the Fish Farming Centre (FFC) in 1982 on the Red Sea coast, 50 km north of Jeddah.

The Centre is a marine aquaculture research institution which undertakes research and development programs to identify the most suitable fish and shrimp species for culture and the optimal culture systems suited to the conditions found in the Kingdom. It undertakes the initial research programs, and then scales up to pilot scale to test and demonstrate the production systems and techniques. It has a marine hatchery facility, four culture systems (ponds, pens, cages and tanks), Baobab tilapia culture facility, laboratories and aquarium display area.

Saudi Fisheries Company (The Saudi branch of ASMAK) also undertakes commercially-orientated research including surveys and resource assessments.

The purpose of the project is to create within the Ministry of Agriculture and Water, a centre of technical expertise for fish and prawn culture which can direct and support the development of aquaculture in the Kingdom with research and development projects. This team of specialists will develop the application of existing technologies and production systems suited to local environmental conditions. They will advise and guide investors and entrepreneurs for the growth of the aquaculture industry in the Kingdom.

<http://www.fao.org/docrep/field/003/AC296E/AC296E00.htm>

http://www.fao.org/fishery/countrysector/FI-CP_SA/en

8.4 Education, Training and Regulations

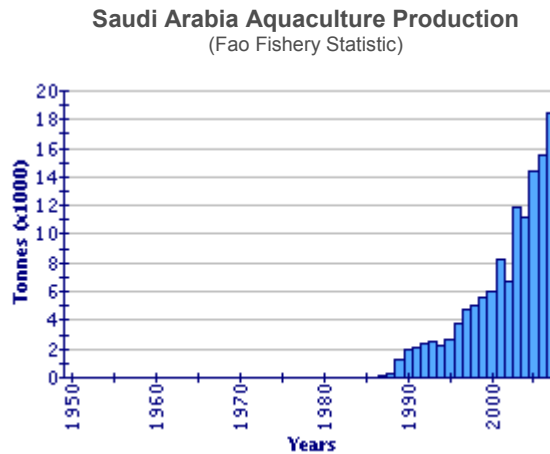
There is a shortage of experienced management and skilled aquaculture technicians in Saudi Arabia, which has highlighted the need for additional education and training. There is currently no formal aquaculture education program, although King Abdulaziz University in Jeddah and King Faisal University in Al Ahsa offer undergraduate aquaculture courses.

The Saudi Ministry of Agriculture and Water has formulated strict industry regulations to protect the nascent aquaculture industry, particularly from outbreaks of viral diseases.

The Ministry of Agriculture and Water, and the King Abdulaziz City for Science and Technology have played key roles in encouraging aquaculture development by providing information, training and guidance to farmers.

8.5 Production

The graph below shows total aquaculture production in Saudi Arabia.



http://www.fao.org/fishery/countrysector/FI-CP_SA/3/en

8.6 Key Actors and Operators within Aquaculture/Fish Farming

Private:

Coral Reefs Trading Est.

Coral Reefs Trading have been serving globally with high quality ornamental Red Sea fish since 1995. With high demand of their supplied services & products they decided to diversify their business activity for a wider range of customers covering different aspects of aquaculture & livestock rearing. Coral Reefs Trading Establishment is the main aquaculture, livestock & feed mill service supporting company in Saudi Arabia. The mission of the company is to assist fish, shrimp, poultry & dairy farmers in terms of their requirement including, feed, feed additives, equipments and any other items as per their need.

<http://www.coralreef.com.sa/about.php>

Jazan Development Company

Jazan Company for Agricultural Development (Jazadco) is one of the companies contributing to the specialised area of agricultural activity started in 1993. It focuses on the cultivation of tropical fruits and runs the largest agricultural enterprises in the region of Jazan.

Shrimp farming project:

A project-intensive farming system of 109 hectares with production capacity 1400 tons, and completed the second phase of the expansion project, a total water area of 91 hectares of farming system, the multiplier for large volumes and achieve better prices out of the vicious competition resulting volume 40/60 the wide world, especially East Asian countries. And the completion of this stage in the cultivated areas increased to 200 hectares, the project to reach the total target production capacity, estimated at about 2000 tons of white shrimp as planned in 2008.

Draft aquaculture knights:

It is in progress to complete the registration procedures for fish Knights limited company with capital of 25 million riyals, and the rate of contribution of 50% to 40% Jazadco's fish Tabuk, 10% of the company Cillonda Greek, technical and strategic partner for each of the company Jazadco and fish in the area of Tabuk fish farming.

<http://www.jazadco.com.sa/en/index.php>

National Prawn Company

National Prawn Company is a global leader in environmentally friendly aquaculture scrimps farming. It is strategically situated south of Jeddah in Saudi Arabia and has leading-edge technologies that adhere to sustainability and high quality aquaculture farming standards. With a 3000 strong workforce the company maintains a completely self-sufficient farming operation – from power and water through to pond, plant and infrastructure construction.

The last few year they also have made plans for farming king fish, cobia, barramundi, mahi and milk fish using aquaculture installations on waste coastal desert land.

National Prawn Company is also in the process of opening a regional sales office and a cold store in Dubai.

<http://www.robian.com.sa/home.html>

ARASCO

ARASCO was founded in 1983 as a pure agricultural services company and has been expanding since then. Arasco is the largest fish feed factory in the region and are planning to move into aquaculture. Today, ARASCO's portfolio includes several strategic business units (SBU's) in areas that include feed milling, corn refining, dicalcium phosphate production, poultry processing, logistics, bulk handling, agrochemicals, and analytic services. The team of ARASCO exceeds 1,800 employees located throughout the Kingdom of Saudi Arabia.

<http://www.arasco.com/>

Al Refaei General Trading & Contracting Group

Al Refaei General Trading & Contracting Group has recently established a joint venture with Artic Blue Seafood (Norway).

The company is covering the whole value chain within the fish sector; from aquaculture and processing to restaurants.

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www.kacst.edu.sa



9.0 THE UNITED ARAB EMIRATES

The **United Arab Emirates (UAE)**

(Arabic: دولة الإمارات العربية المتحدة) is a federation of seven states situated in the southeast of the Arabian Peninsula in Southwest Asia in the Arabian Gulf, bordering Oman and Saudi Arabia. The seven states termed emirates are:

Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah. It has an estimated population of 6.4 million, and its size is approximately 83,600 square kilometres.



The UAE has a relatively open economy with a high per capita income and a sizable annual trade surplus. Successful efforts at economic diversification have reduced the portion of GDP based on oil and gas output to 25%.

Since the discovery of oil in the UAE more than 30 years ago, the UAE has undergone a profound transformation from an impoverished region of small desert principalities to a modern state with a high standard of living. The government has increased spending on job creation and infrastructure expansion and is opening up utilities to greater private sector involvement.

The country's Free Trade Zones - offering 100% foreign ownership and zero taxes - are helping to attract foreign investors.

Higher oil revenue, strong liquidity, housing shortages, and cheap credit in 2005-07 led to a surge in asset prices (shares and real estate) and consumer inflation. The global financial crisis and the resulting tight international credit market and falling oil prices deflated assets resulted in slower economic growth for 2009. Dependence on oil and a large expatriate workforce are significant long-term challenges.

The UAE's strategic plan for the next few years focuses on diversification and creating more opportunities for nationals through improved education and increased private sector employment.

9.1 Aquaculture in the UAE

The United Arab Emirates is one of the pioneers in aquaculture among the countries of the Gulf Cooperation Council. The country is endowed with many natural lagoons, bays and creeks, most of them encircled by mangrove swamps providing ideal spawning and nursery grounds for a wide variety of fish and shrimp species.

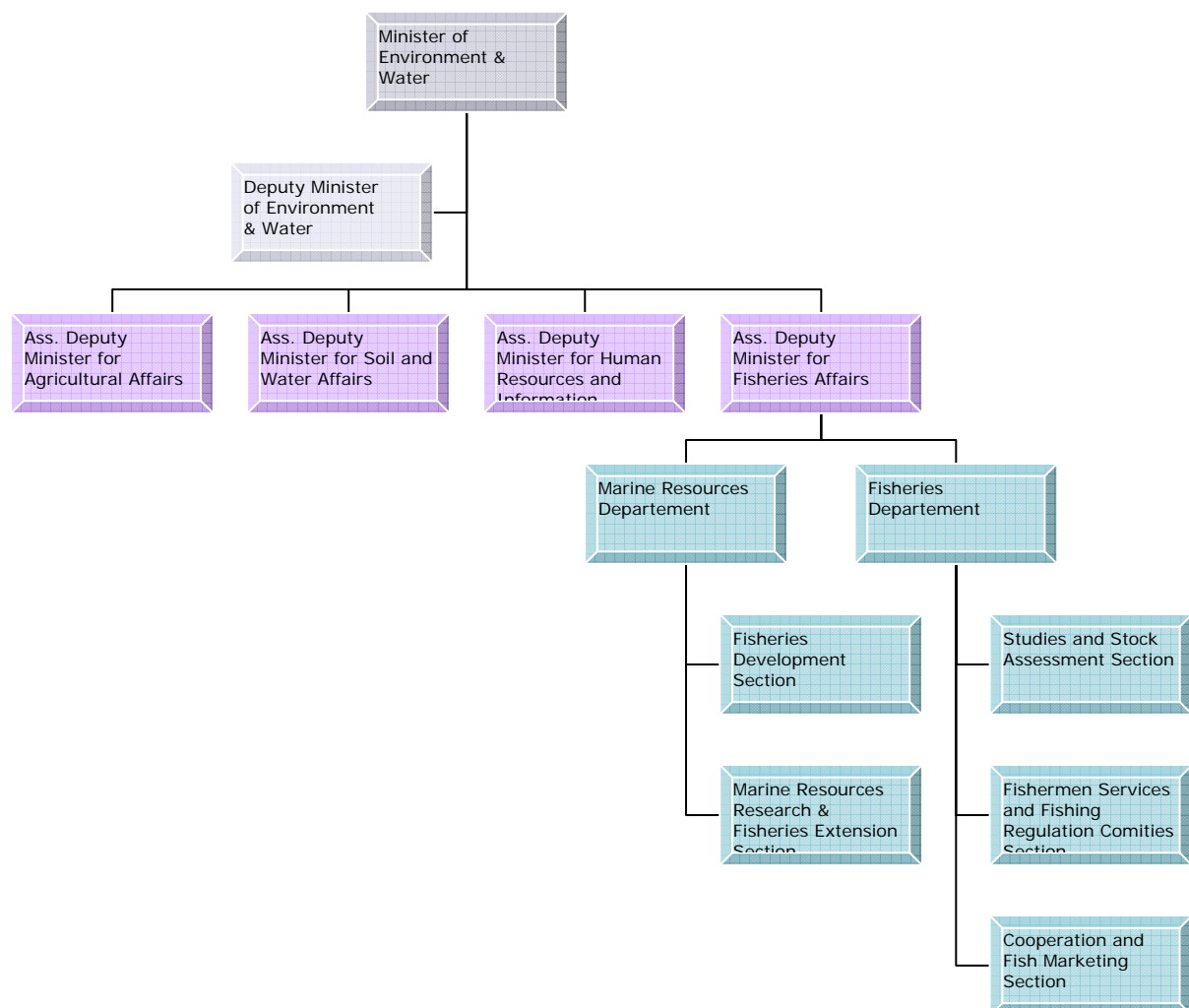
UAE has achieved food security in the availability of fresh fish. The Government feels that the annual restocking fish fingerling programme into the sea is making a contribution to the wild fish stock of the region, which indirectly helps the economy. In addition, the export of fish through private enterprises is contributing to the country's economy.

There are several countries about to enter the aquaculture market in the region, amongst others Korea, Turkey and Greece.

9.2 The Institutional Framework and Governing Regulations

9.2.1 The Ministry of Environment and Water

This is the supreme authority that controls the fisheries and aquaculture sectors in the UAE. A new organisational structure is under development and will be published shortly on the web page of the Ministry of Environment and Water.



9.2.2 Governing Regulations

During 1999, the Ministry of Environment and Water introduced the Federal Law No.23 and 24 regarding the exploitation, protection and development of the living aquatic resources in the waters of the United Arab Emirates. This is a comprehensive regulation governing many aspects concerning fisheries, fishing activities, coastal zone management, marine resource and environmental protection, conservation of endangered marine species and coral reef areas.

Aquaculture activities are also covered by this law under Articles 34 to 38 (Reference No. 7, Section 2.5). Accordingly, firms engaged in aquaculture should not cause pollution to the environment, are not allowed to introduce alien species without prior permission from the Ministry and should follow recognized hygienic procedures in handling, stocking, packing and transportation of fish.

http://213.42.20.69/assets/docs/MoEW/decisions/Federal_Laws/law23_e.pdf

http://213.42.20.69/assets/docs/MoEW/decisions/Federal_Laws/rule24_e_1999.pdf

9.2.3 Financial Support

There is no governmental financial support to the fish farming industry in the UAE. However, The Mohammad Bin Rashid Establishment for young business Leaders was launched in 2002 and formed with a vision to nurture the entrepreneurial spirit in Dubai. It encourages and facilitates the development of business and entrepreneurial activity among UAE nationals. They focus on the creation of new businesses by offering a platform for ideas and financial support.

<http://www.sme.ae/english/>

9.2.4 Registration and Approvals

Registration and approval of any farm in UAE comes under the direct scope of Department of Fisheries of Ministry of Environment and Water. But one thing to be noted here is that, they are not the competent authority. Competent authority is the Municipality of the respective emirates where the farm is located. For Abu Dhabi, competent authority is Environmental Agency.

Initially for a new farming license, application along with required documents (which also includes feasibility studies, and recently added EIA - Environmental Impact Assessment) has to be submitted to the department of Fisheries. They forward a copy of the feasibility study to the Aquaculture head of MRRC for their comments and side by side it will also be reviewed in fisheries department.

Once all the concerned departments of the Ministry of Environment and water gives approval, they give initial registration permit to make a farm. This registration has to be renewed every year.

Then the company/individual can get all the required approvals and licenses from the concerned departments of respective emirates, which includes municipality, chamber of commerce and ministry of economy (if required to do so). Actually there is no unified law on this, and each emirate has different requirements. However, they have one thing in common; they all need approval from Ministry of Environment and Water.

Once farm is ready, inspection is done by department of fisheries in coordination with MRRC. If everything is fine as per the documents submitted, farm is given approval for 5 years as per the federal law 23 of 1999. After production starts at a farm, regular inspection is also a must and sampling is done on regular basis, by the Aquaculture section of MRRC, for quality check.

The aquaculture sector seems frustrated by poor legislation and bureaucratic requirements for obtaining licenses and permits. Cooperation between institutions and agencies is weak. In some cases, their functions overlap or are conflicting.

Dubai Municipality

The General Secretary of Municipality is responsible for aquaculture and seafood, quality control and for the export to the EU countries.

Abu Dhabi Environmental Agency

Any fish farming company needs approval from them in order to start operations.

Abu Dhabi Municipality – Food control.

9.3 Research

The UAE, Ministry of Water and Environment have signed a memorandum of understanding with the Kinki University in Japan to cultivate Pacific blue fin tuna.

This is the first collaboration of this type between Japan and the UAE. According to the agreement, specialists from Kinki will conduct a feasibility study on the possibility of bluefish farming in the UAE. (www.intrafish.com)
<http://www.moew.gov.ae/EN/Pages/default.aspx>

9.3.1 MRRC

The Marine Resources Research Centre was established in 1984 in order to:

- Produce seeds of commercially important fishes and shrimps by artificial methods and grow them to marketable size.
- Contact biological and hydrographical surveys and research.
- Train UAE nationals and fishermen to use aquaculture techniques.
- Produce quantities of artificial seeds of commercially important fish at low cost and restore them in the sea to increase the natural resources of those species.
- Cooperate with similar regional and international organisations.

The MRRC has been promoting aquaculture by offering fingerlings and imparting technical know-how to those who are interested. The environmental conditions in the country are favourable for aquaculture projects and the authorities hope to attract more investors in the coming years. The MRRC produce about 500,000 tons of fish being released into the open waters of the UAE yearly.

The main species currently selected for aquaculture purposes at the MRRC are the white-spotted spine foot (*Siganus canaliculatus*), the Sobaity sea bream (*Sparidentex hasta*) and the large-scale mullet (*Liza macrolepis*). The finfish species commercially cultured in the Dibba cages are the endemic Sobaity sea bream and the two exotic species: the gilthead sea bream (*Sparus aurata*) and European sea bass (*Dicentrarchus labrax*). The local fish hammour is also cultured.

MRRC have 30 employees including labours and 10 specialists.

We visited the MRRC centre and met with Omran Mohammad Al Shihi, Fisheries researcher, degree in aquaculture from the University of Oman. According to Omran it is difficult to find specialists within aquaculture, the industry is still new. Another challenge is to get land or space for starting up aquaculture, you have to involve and deal with the government.

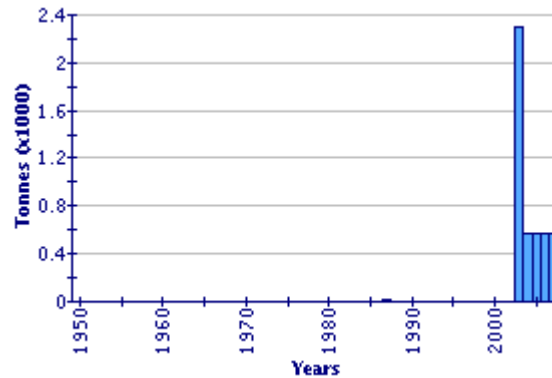
9.3.2 Plans ahead

The Ministry of Environment and Water in Abu Dhabi is planning to build a centre within aquaculture. This centre would amongst other include education within the area and commercial production. They are now seeking partners.

9.4 Production

The graph below shows total aquaculture production in the United Arab Emirates.

Reported aquaculture production in United Arab Emirates (from 1950)
(Fao Fishery Statistic)



http://www.fao.org/fishery/countrysector/naso_uae/en

9.5 Key actors and operators within aquaculture/fish farming

Private:

Asmak

This is a semi-private company with 82% owned by private shareholders (UAE nationals) and the rest is owned by the Federal government. It is the largest fish farming company in the UAE and was established in 1999. They have about 300 employees, including top management and lower level workers. About 75% of their equipment was initially supplied from Norway but currently they produce most of it locally, especially the piping's.

They had off-shore fish farming in Dubai and the East Coast but had to shut down their operations due to the red tide along the coast of the UAE. They suffered losses due to this problem.

ASMAK also farm tuna fish, mainly for export to Japan; this was also affected by the red tide but is now operational.

They plan to introduce off-shore and on-land fish farming in Abu Dhabi during 2009. On-land fish farming will focus on the production of Sea bream, Sea bass and other local species. Main focus will be on off-shore farming. Asmak have branches in Saudi Arabia and Oman.

<http://www.asmak.biz/>

Contacts:

General Manager Mohammed Yassin

yassin@asmak.ae

Business Development Manager Said Bin Ahmed

sba@asmak.ae

Mubarak Fisheries

This is a newly established fish farming company in the UAE

They will be investing in on-land and off-shore farming and are planning to expand to other GCC countries as well. They will mainly be supplying to the local market.

They are expecting their first production in the UAE from off-shore farming.

Because of their extensive experience the company wishes to become a know-how provider and consultant within aquaculture in the region.

Contact: Mr. Panagiotis
Mobile: 050 +971 50 4453577

Bin Salem Group

Bin Salem is an Emirati owned group headquartered in Abu Dhabi with an international outlook. The group has established business interests in various businesses ranging from Trading of Medical Equipment and Supplies, Military Equipment, IT Projects, Telecommunication & Security, Car Service Centres, Carwash Projects, Cosmetic & Perfumery, Interior Design, Education, Travel and hotel Services Industry, Contracting & General Maintenance, Retail, Industrial Projects, Real Estate, to diversified joint ventures with local and international entities.

Bin Salem Group and United Food Technologies, its German partner, are investing USD 80 million in the project, centred around a climate controlled facility in an industrial park on the outskirts of Abu Dhabi. 64 swimming-pool-sized basins will house thousands of sturgeon, ultimately providing up to 40 tonnes a year of caviar and 710 tonnes of smoked and sliced sturgeon meat. Work has started on the farm, the world's largest single-site plant, which should take 14 months to build.

<http://www.binsalemgroup.com/>

<http://www.uftag.de/en/>

Information Based on Interviews with the Market Players

The market survey is based on several interviews with market players from both the governmental and the private sector within the UAE. A summary of these is given below:

It is recommended to invest on land and of- shore. Fishes like European Sea bream, Arabian Sea bream, Sobaity and Cobia can be farmed off shore. Hammour and European Sea bass can be farmed on-land in tanks.

The Red Tide Algae

The Gulf's coastal areas are from time to time facing problems with the Red Tide Algae – which is as sudden overgrowth of algae. This causes the fish to die.

On-land/off-shore fish farming

Today only offshore cages are being used. The future of fish farming is on land or a combination of on land and offshore. The reason is that you have little or no control with seawater due to pollution like chemicals, sewage etc. With on land farming you can control the whole chain and up to 4-5 species can be farmed.

On-land fish farming requires a higher investment but will have a lower operation cost. It is more secure from diseases and pollution. Off-shore farming requires lower initial investment but will have a higher operation cost. It is a high risk investment. It is easier to train workers to look after fish in cages.

A local experiment was made with Hammour, a very common and popular fish in the Gulf. 80% was put in cages and farmed at sea and the rest was farmed in tanks. The fish in cages died after 6 months due to strong currents and waves, "Hammour is a lazy fish and do not like stress or waves". All the Hammour farmed in tanks survived.

"In order to do fish farming one must understand the environment, the thinking here – short term investments are no good. Long term investments and on land farming is the future and it is easy to locate areas in the desert.

People from the Gulf region traditionally prefer to buy the fish alive which makes it easier with on land farming.

Personnel

There are few experts available with fish farming experience, however, personnel from the Philippines and India can be trained. Generally it is not a problem to find workers like lower staff, supervisors as well as divers. To find good/qualified managers, however, is more difficult.

Hatcheries

Integrated hatcheries are not recommended because it requires a large production of 800–1000 tonnes. If you can't reach this production it will not be worth to invest in hatcheries. Juveniles should be supplied by another company.

Hatchery can be on land and offshore.

Government support

Currently there is generally little support from the government in the Gulf Countries for Aquaculture.

There are few restrictions regarding pollution, wastewater, etc.

Government seems weak in following up with rules and regulation for testing. Every 6 months they test for drugs etc. because of export to EU countries.

Real estate investments in the region spoilt people with quick return on their money. In aquaculture long term thinking and patience must be emphasized, profit will be there but in the long run.

Insurance

Off-shore farming is high risk business and therefore fish stock, equipment and assets should be insured. This is available in the UAE through Oman insurance and Saudi Insurance.

Investment and Finance

It is generally difficult to find investors because of lack of knowledge about fish farming. They must see and experience. Regarding finance, there are no particular industrial loans available. Loans are available only on fixed assets.

Various information

There are local manufacturers of cages, but brackets are bought from Norway.

Fibreglass, pipes, steel items that has to be constructed on site is recommended to be manufactured locally as no one would be willing to pay the price for the equivalent imported items.

Cobia is nicknamed "the chicken of the sea" and can be exported to Europe and to the local market. Farming of Cobia and Hammour has great potential.

In UAE cheap labour can be found easily therefore the fish can be fed manually, and a feeding system is therefore not necessarily required. However it can be difficult to monitor the feeding when it is done manually.

There are large feeding systems available but the temperature is too high in the UAE. Small feeding systems are better and can be done from small boats with lesser quantities.

Governmental:

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10.0 Summary

The GCC countries rely on the rest of the world for 90% of their food and feed requirements. The growing demands of an ever-increasing population, combined with the need to reduce dependency on imports, are adding to the potential for agribusiness industries in these developing markets.

However there are challenges that need to be addressed like pollution from desalination plants and construction projects. There are occasional pollution scares due to heavy traffic of oil transportation and tanker accidents. The red tide algae have also been a serious problem the last few years. The aquaculture industry is a cost-intensive industry and there are small margins. There is no support from the government, except in Saudi Arabia. There are few suitable sites offshore in the region and the Gulf, the Gulf of Oman and Arabian Sea is open and can be rough.

Bahrain

Aquaculture is a small industry in Bahrain, but according to Dr. Abdulredha J. Shams, The Director of the Directorate for Marine Resources, the government of Bahrain is interested in developing the aquaculture sector in Bahrain. Even with limited land-resources they want to develop the industry, both on land and offshore.

Oman

Aquaculture is a very small industry in Oman, but according to Ministry of Fisheries and Water they have plans for expansions and will soon be ready to welcome investors. A master plan with recommendations to sites and species will be ready. They will not allow foreign species, but both on land and offshore farming is interesting.

Qatar

Aquaculture is next to non-existence in Qatar, but may have some potential. The government are now building a research centre and need to allocate the entire corresponding infrastructure. Mr Falamarzi, Head of fisheries, development sector, tells us that the government wishes the private sector welcome, but a limitation on suitable marine or coastal sites may inhibit the significant development of this industry. Land-based is not an alternative.

The private companies starting up in Qatar will have to farm local species. New/foreign species will not be allowed.

Saudi Arabia

With the increase in demand for shrimp and fish in Saudi Arabia, and the simultaneous reduction of fish stocks in the world's oceans, the aquaculture industry will play an important future role in food production in Saudi Arabia. As noted, the nation has many advantages in this area, and the government is actively involved in the development of fish and shrimp farming.

The United Arab Emirates

The aquaculture industry in the UAE is still a small scale industry and quite newly established. The aquaculture sector in general seems frustrated by poor legislation and bureaucratic requirements for obtaining licenses and permits. Cooperation between institutions and agencies seems weak. A challenge is to educate the market and make it understand that investments in the aquaculture industry will be a long term beneficial investment.

10.1 SWOT – GCC - Middle East

An analysis of Norwegian suppliers Strength, Weaknesses, Opportunities and Threats:

<p style="text-align: center;">Strengths</p> <p>Professional</p> <p>High quality products</p> <p>Focused on R&D</p> <p>Trustworthy</p>	<p style="text-align: center;">Weaknesses</p> <p>Too expensive</p> <p>More flexibility required during negotiations</p> <p>Showing only the professional/business side and not the human side</p> <p>Absent from the market/field in this region</p>
<p style="text-align: center;">Opportunities</p> <p>Utilise local expertise and knowledge (local ecological conditions are extremely important).</p> <p>Produce certain items locally.</p> <p>Enter with a local partner and start a pilot project.</p>	<p style="text-align: center;">Threats</p> <p>Strong competition from Europe and Asia (price and quality)</p> <p>Certain technical items can be manufactured/copied locally much cheaper</p> <p>May face difficulties with market entry</p>

11.0 Recommendations and Market Entry

Norwegian companies are generally perceived in the region as being professional, having high quality products but are too highly priced.

We do believe there is a market potential for the Norwegian aquaculture industry in the Gulf region. However, there are challenges.

When a new company decides to enter the market it is important to be flexible and patient especially when dealing and negotiating with governmental institutions. It is important that the product is priced competitively as it is a very price sensitive market, particularly because of its strategic location and the strong competition it faces from the rest of Europe and the Far East. They should be willing to consider producing certain items locally as it will be cheaper than importing them from Norway.

As aquaculture is a relatively new concept in the Gulf there is still little knowledge and awareness and few market players available. Therefore it is important to educate the market on future benefits on this, particularly as it is a long term investment and not much involvement from the governments as yet.

We suggest that a pilot project is initiated together with a local partner. Based on its success it will create awareness and show the future potential of aquaculture in the Gulf.

We highly recommend that Norwegian companies spend time on securing a local partner who has extensive local expertise and knowledge within aquaculture and the ecological and climatically conditions in the Gulf.

It will be essential for Norwegian companies to obtain knowledge on local business culture and etiquette which differs widely from the West in order to succeed. Normally when Arabs do business they emphasize personal relationship building with the individual rather than the company.

