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| <b>FISHERY<br/>COUNTRY<br/>PROFILE</b>                               | <b>Food and Agriculture<br/>Organization of the United<br/>Nations</b>                   | <b>FID/CP/MMR</b><br> |
| <b>PROFIL DE LA<br/>PÊCHE PAR PAYS</b>                               | <b>Organisation des Nations Unies<br/>pour l'alimentation et<br/>l'agriculture</b>       | <b>May 2006</b>  |
| <b>RESUMEN<br/>INFORMATIVO<br/>SOBRE<br/>LA PESCA POR<br/>PAISES</b> | <b>Organización de las Naciones<br/>Unidas para la Agricultura y la<br/>Alimentación</b> |  |

## THE UNION OF MYANMAR GENERAL ECONOMIC DATA

|   |                           |
|---|---------------------------|
| Areas:                                      | 676 577 km <sup>2</sup>   |
| Shelf areas (to 200 m):                     | 230 000 km <sup>2</sup>   |
| Length of coastline:                        | 3 000 km                  |
| Population (est.2005):                      | 42.9 million              |
| GDP at producer's price (est.2005)          | US\$ 76.23 523<br>billion |
| PCE per head (est.2005)                     | US\$ 1 800                |
| Agricultural GDP (est.2005)                 | 54.6 % of GDP             |
| Livestock and fisheries GDP<br>(Iest.2005): | 8.94% of GDP              |

## FISHERIES DATA

### Commodity balance (2003):

|   | <b>Production</b>       | <b>Imports</b> | <b>Exports</b> | <b>Total<br/>supply</b> | <b>Per caput<br/>supply</b> |
|---|-------------------------|----------------|----------------|-------------------------|-----------------------------|
|   | <b>tons live weight</b> |                |                |                         | <b>kg/year</b>              |
| Fish for direct<br>human<br>consumption | 1 397 439               | 1 767          | 242 301        | 49 485                  | 23.4                        |
| Fish for animal                         | 252 208                 | -              | -              | -                       |                             |

|                         |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| feed and other purposes |  |  |  |  |  |
|-------------------------|--|--|--|--|--|

|                                     |  |
|-------------------------------------|--|
| <b>Estimated employment (2004):</b> |  |
| Primary Sector                      | 797 738 persons employed (including aquaculture) |
| Secondary Sector:                   | 2 562 230 persons                                |
| <b>Trade (2004):</b>                |  |
| Value of imports:                   | US\$ 1 267 000                                   |
| Value of export:                    | US\$ 318 514 000                                 |

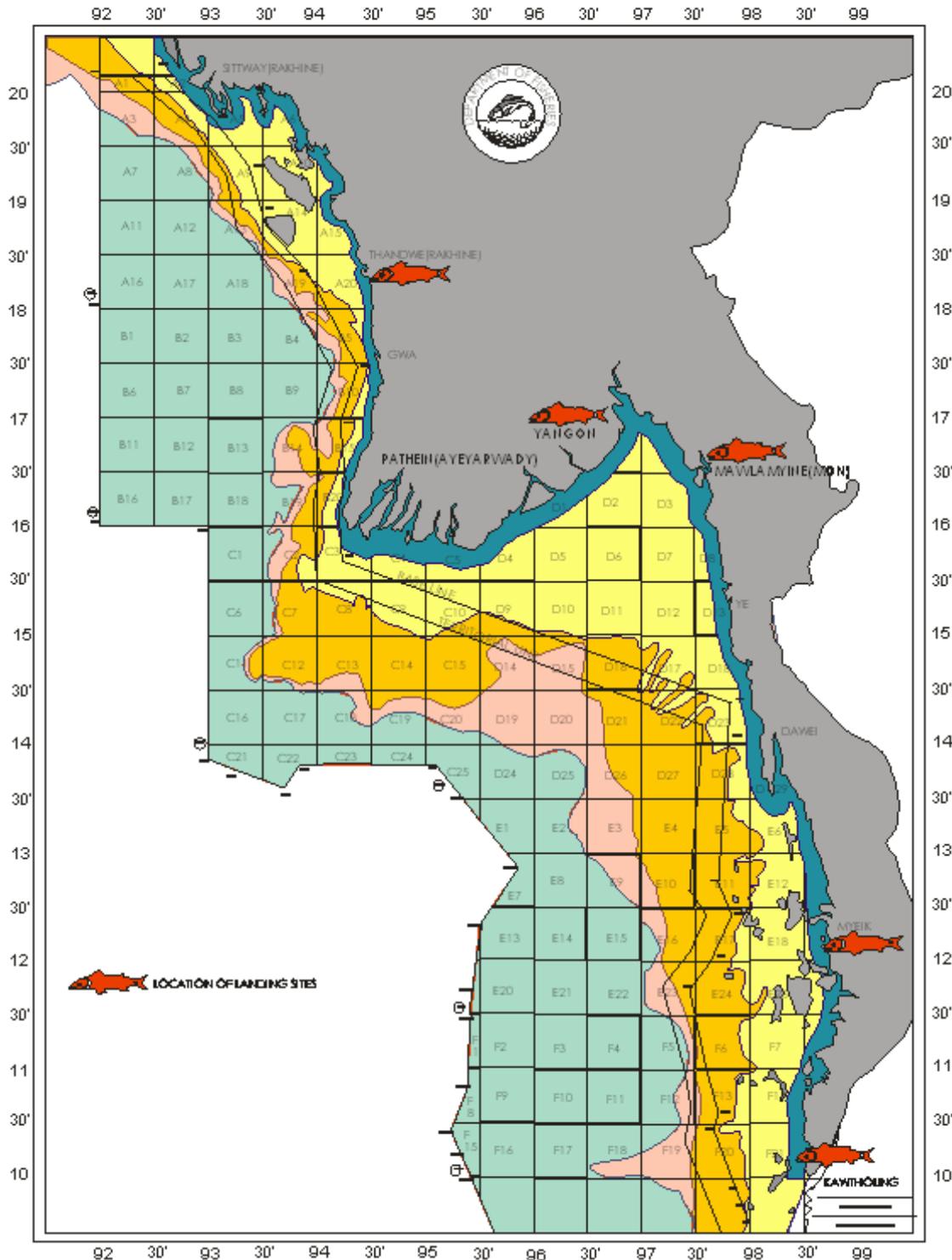
## MARINE SUBSECTOR

With a coastline of nearly 3 000 km, several large estuaries, delta systems and numerous offshore islands, Myanmar has a considerable diversity of coastal habitats, including enormous coral reefs, mangroves, sandy beaches and mudflats.

### Landing Sites

The main landing sites are around Yangon, at Pazuntaung Nyaungdan and Annawa for landings, with a fish market at San Pya in Alone township. Other major landing sites are found along the coast, at Thandwe, Mawlamyine, Myeik and Kawthoung (see map).

## Department of Fisheries Fishing Grounds of Myanmar and Landing Sites



### Capture fishery

The marine capture fishery comprises coastal or inshore fisheries, and offshore or deep-sea fisheries. Various types of fishing gear are used to exploit the large diversity of marine species found in Myanmar waters. The fishing gear is classified into commercial, such as trawl net, purse seines, driftnet and gillnet, and traditional, including hook-and-line, cast net, bag net, trammel gill net, lift net and traps. However, the bulk of landings derive from trawls, purse seines, drift nets and gill nets. There were 29 791 inshore

fishing vessels and 1 757 offshore fishing vessels licensed by DoF in 2004–2005, compared with 29 861 and 2 121, respectively, in 2003–2004.

### **Trawl fisheries**

Otter bottom trawl nets are the main gear for demersal finfish and penaeid prawns. The trawl fishery contributed more than 40% to marine landing in 2002–2003. The trawlers landed a large number of fish species. When demersal species were still the main catch, the trawl nets caught pelagic finfish, mainly the short (Indo-Pacific) mackerel (*Rastrelliger brachysoma*). This resulted in the Indo-Pacific mackerel being caught mainly by bottom trawl nets.

Penaeid shrimps are important for trawlers operating in inshore waters, particularly on the coast of Rakhine. They are the mainstay of the trawl fishery by virtue of their high commercial value and market demand. The rapid development and concentration of the trawl fishery within coastal waters has resulted in the current intensive exploitation of the coastal demersal finfish and penaeid shrimp resources. There were 21 offshore fishing vessels and 13 452 inshore fishing vessels operating in Rakhine state in 2004–2005, between 1 September 2004 and 4 May 2005.

### **Purse seine fishery**

The purse seine is a major fishing gear, used to exploit the pelagic fish resources. The two main types of purse seines nets employed in Myanmar waters are the fish purse seine, which is used to catch small pelagic species, and the anchovy purse seine, for anchovies in coastal waters, especially in the northern sector of Rakhine state.

The fish purse seine nets are operated in a traditional manner, without fish aggregating devices (FADs). Catching efficiency of this gear has not improved through the years. There are no new fishing techniques to increase fishing pressure on stocks of small pelagic species. Most purse seiners have a skipper with expertise in seeking out fish schools relative to the "fish lures", and at night, free-school scouting purse nets using lights. The purse seine fishery mainly harvests small mackerels and sardine species, such as *Rastrelliger* spp. and *Sardinella* spp.

### **Anchovy purse seines**

Anchovy purse seines nets are operated in very shallow waters and target mainly anchovies of the genus *Stolephorus*. No landing data are available. The fishery is important, particularly along the northern coast of Rakhine. Post-harvest techniques are primitive, relying on sun-drying on the shore.

### **Driftnet and gillnet fishery**

Driftnet and gillnet are also important in coastal fisheries, and used selectively. The finfish drift net and gillnets mainly target higher valued commercial pelagic fish species, although the gillnets set by coastal fishermen mainly catch demersal fish species like marine catfish and jewfish. The shrimp drift and gillnets are actually trammel gillnets, and are employed to catch the more valuable species of shrimp, like *Peneaus merguensis*.

## **INLAND SUBSECTOR**

### **Inland Fishery**

Inland fishery in Myanmar is mostly associated with riverine and estuarine systems. Inland water bodies, such as natural lakes, reservoirs, river systems and ponds, cover

about 8.1 million hectares, of which 1.3 million hectares are permanent; the remainder being seasonally inundated floodplains. Ayeyarwaddy, Chindwin, Sittatung and Thanlwin are the main rivers, and extend from the eastern part of the Bay of Bengal to the Gulf of Moattama and along the eastern edge of the Andaman Sea.

Mangroves provide invaluable ecological functions. They serve as a shelter for fish, shrimp and prawn and are a natural habitat for various plants, birds and animals. They also act as an important buffer zone against natural destructive disaster, such as winds, storms or floods. Some development of shrimp farming occurs in mangrove areas, in part, apparently, driven by government policy to prevent the conversion of agricultural land to aquaculture ponds. In coastal areas, so-called "unused" land can be used for aquaculture, in Rakhine state at least, and secondary mangroves are classified in this category, meaning shrimp farms can be developed in secondary mangroves.

For fisheries management (licensing and regulation) purposes, Myanmar divides its inland capture fisheries into two main categories:

- **Leasable fisheries.** These are important fishing grounds on floodplains, which are primarily fished through the erection of barrage fences around the lease area and collecting the catch on pens or traps. The peak season is when fish are migrating off the floodplain at the beginning of river drop down. This is referred to locally as the Inn fishery. There are currently 3 722 designated leasable fisheries in Myanmar, of which 2 084 were licensed by the Department of Fisheries (DoF) in 2004–2005. The leases have traditionally been auctioned annually, but DoF is extending the lease period up to nine years to promote improved long-term management.
- **Open fisheries.** This covers fisheries in all areas other than the leasable fisheries, with licences issued on an annual basis by DoF. All fishing gear requires the respective implement licence. For most, this is a set fee. Use of some of the larger gear, such as bag nets set in rivers, is allocated by a tender system. Fees vary between locations according to production and capacity. Licence fees for small gear are low. Although the policy is for complete licenced coverage of all gear, attention focuses on those perceived as fishing for profit.

The fishing techniques used in inland fisheries are drift net, gillnet, traps and pots, pole-and-line, stationary traps, and bamboo stake traps in the near shore of rivers. There are 2 084 licensed flood fisheries (leasable fisheries), producing about 434 320 t of fish and prawn in 2004.

## **AQUACULTURE SUBSECTOR**

### **Aquaculture**

Generally, aquaculture contributes significantly to fish production (some 400 000t in 2004), but this sector can be expected to expand to meet future demand for fish. In addition to food species, ornamental fish are also produced. The aquaculture industry comprises freshwater culture, brackish-water systems, ornamental fish production and fingerling production. The Government of Myanmar has published a special plan to increase and develop shrimp culture. As of 2004–2005 (April–March), the total shrimp ponds area was about 63 000 ha in the coastal regions. DoF fisheries is now seeking means and ways to promote this industry. A Livestock and Fisheries Development Committee has been organized and a task force set up to work on a three-year plan for extended breeding and production of fish and shrimp.

Major fish species cultured include Roho (*Labeo rohita*), Catla (*Catla catla*), Common carp (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idellus*), Mrigal carp (*Cirrhinus mrigala*), Silver carp (*Hypophthalmichthys molitrix*), Tilapia (*Tilapia* spp.), Striped catfish (*Pangasius sutchi*), Philippine catfish (*Clarias batrachus*). Recently, DoF successfully cultivated another three species of freshwater fishes, namely *Piratus branchatus*, *Notopterus chitala* and *Osphronemus gouramy*.

### **Fingerling production**

Government hatcheries in 2004–2005 produced about 5 868 million freshwater fingerlings. The main species were Roho (434 million), Common carp (58 million), Grass carp (6 million), Catla (5.5 million), Mrigal (7 million), Tilapia (12 million), Silver carp (3 million), Big head (2 million), Catfish (1 million), Striped catfish (16 million), Tapian (41 million) and Freshwater pomfret (2.5 million). In 2004–2005, DoF replenished 109 million fish seed into reservoirs and dams, 63 million fish seed into lakes and rivers, and 0.7 million fish seed for national organizations. There were 59 million fish seed supplied to governmental organizations to replenish rice fields and natural water bodies to increase inland fish production and to maintain a sound biodiversity balance. In 2002–2003, DoF replenished 236.5 million fish seed (113% of target) into dams, reservoirs and natural water bodies.

### **Ornamental fishes**

The main group of ornamental fish produced are cyprinids. The common names of exported ornamental fishes are Pearl danio, Spotted danio, Stoliczka's barb, Pink microrasbora, Emerald dwarf rasbora, Sawbwa rasbora and (Asian Rummy nose), all of which are exported by the fish trading aquarium companies under control of DoF.

## **MANAGEMENT APPLIED TO MAIN FISHERIES**

### **Fisheries Management**

Management and development of fisheries resources is undertaken by the Department of Fishery (DoF) of the Ministry of Livestock and Fisheries. DoF responsibilities include, among others, facilitating the technical needs and equipment of the marine sector; distributing freshwater and deep-sea prawns to private breeders and assisting them with breeding techniques; undertaking research and development activities; collecting taxes; issuing fishing licences; and establishing model breeding centres. DoF has also entered into several joint ventures with the private sector (both local and foreign companies) for fisheries operations.

The challenge for the country is to manage its fisheries in such a way as to ensure optimum and sustainable use of aquatic resources, as well as economic efficiency in their use and ensuring transfer of benefits in social terms. Myanmar has formulated a fishery development policy that respects national and international agreements and the conditions and nature of the resources.

One of the goals of fisheries management is to achieve sustainable coastal fisheries. To achieve this goal, various management strategies have been formulated and implemented to control fishing effort and to promote rehabilitation and conservation of marine resources and marine ecosystems.

## **Management of the Marine Fisheries Resources**

DoF has established an appropriate legal framework and formulated and implemented various strategies for the sustainable development and management of marine fisheries. Fisheries management is pursued by proper licensing, prescribing exploitable species, designating environmental friendly fishing gears and methods, imposing closed areas and seasons, etc.

### **Monitoring, Control and Surveillance programme for fisheries management**

The introduction of a Monitoring, Control and Surveillance (MCS) programme for fishery management is another measure taken up by DoF. This programme should provide effective and efficient scientific data acquisition for resources evaluation and management of fisheries in Myanmar. It also provides the basis for effective monitoring and control of fisheries enforcement activities, to ensure that only authorized or licence-holding fishing vessels operate within the designated areas in the national EEZ.

### **Policy and Objectives**

The Ministry of Livestock and Fisheries is responsible overall for the fish and meat sectors. Its sectoral policies and principle objectives are to:

- supply good quality fish seed;
- promote all-round development in the production of fish for food;
- increase meat and fish production for domestic consumption and share the surplus with other countries;
- encourage development of livestock- and fisheries-related investment;
- promote the development of the shrimp culture industry;
- husband sustainable fisheries resources and prevent their depletion;
- increase freshwater aquaculture to ensure sufficient production for domestic consumption and to promote inland resource enhancement activities in national waters; and
- improve the socio-economic status of livestock and fisheries communities under the guidance of the Head of State.

### **Rehabilitation of resources through the use of artificial reefs and coral re-plantation programmes**

There are no activities of this type in Myanmar's coastal zone. The coastal zone is still in good ecological condition, with no sign of coral depletion. There has been no need to resort to the installation of artificial reefs.

Coral reefs are abundant in the islands of the Myeik Archipelago and provide habitat for many species of fish, molluscs and other economically important living aquatic organisms. They are many times more productive than the open tropical sea, which typically is poor in nutrients. Fringing reefs also play an important role in maintaining

coastline stability by acting as efficient physical barriers that protect low-lying coastal area from erosion and other destructive sea action. In addition, their aesthetic appeal, biological richness, clear waters and relative accessibility make them popular recreational areas for local and foreign tourists, and provide good ecotourism opportunities.

DoF continues activities for the conservation of turtles and the biodiversity of marine ecosystems that originated in legislation in 1905, a "Fishery Act" that has protected all the sea turtles for conservation purposes. In the "Fishery Act" (111-1905), protection for turtle hatching areas and turtles was included and those trespassing on those areas without official consent were liable to be penalized. In 1924, the government of Burma, through Agriculture (Forest Department) Notification No. 1/2005, banned trespass within three miles of a turtle hatching area, and imposed conservation of juveniles of sea turtles, allowing them to survive, and forbade the eating of turtle eggs. Current regulations require the release of turtles caught accidentally; ban the eating of sea turtles; require use of Turtle Excluder Device (TEDs) in all fishing areas; and forbid the jettison of damaged fishing gear.

DoF personnel of Ngapudaw township released 640 000 sea turtle juveniles into the sea between 1986–1987 and 2004–2005, and 120 000 sea turtle juveniles were released into the sea from Bogalay township between 1997–1998 and 2004–2005.

In 1991, DoF formulated a new Freshwater Fisheries Law to reflect changing conditions, as the old "Fishery Act" (Burma Act 111-1905) was inadequate. In 1993, DoF issued Notification No. 11/93 for Sea Turtle Conservation. There were trials and demonstration of TEDs with shrimp trawlers in Thandwe, Rakhine state, in May 2004 – a joint collaboration with SEAFDEC and DoF, Myanmar.

The objectives for marine turtle conservation and management are to:

- preserve and restore developmental, feeding and nesting habitats;
- make nesting beaches acceptable to turtles by eliminating the impact of artificial lighting through technology, legislation and public information;
- clean beaches and control predators;
- minimize solid waste and pollution of the marine environment; and
- increase public awareness and participation in marine turtle conservation through public education.

Management measures that have been implemented through the legal and institutional framework to control fishing effort are considered below.

### **Direct limitation of fishing effort**

A moratorium has been placed on the issuance of new or additional fishing licences for vessels to harvest in coastal waters. This is to ensure that the current high fishing pressure on the limited coastal fisheries resources will not be increased, and thus to prevent overexploitation. Current licences are annual (1 September to 31 August for deep-sea fishery, and 1 April to 31 March for coastal and small-scale fishery).

## **Surveillance of fishing activities**

Enforcement of fishing activities involves the Myanmar Navy; Myanmar Coast Guard; DoF; Myanmar Customs Department; and Myanmar Police Force. Overall, the Myanmar Navy coordinates surveillance efforts.

## **Technical measures: closed season, closed area, marine parks, mesh control**

### **Closed fishing areas**

Commercial fishing vessels, such as trawlers and fish purse seiners, are prohibited from fishing less than 5 n.mi. from the shore. Waters within the 5 n.mi. mark are nursery grounds for juveniles of fish and shrimp. This will reduce the fishing pressure from trawlers and purse seiners. DoF has restricted fishing in various fishing grounds, including in A20 from latitude 18°00'N to 18°30'N and from Longitude 94°00'E to longitude 94°30'E in Rakhine, from latitude 15°30'N to 17°00'N and longitude 94°00'E to 95°00'E; in four fishing grounds (B15, B20, B10, and ten n.mi. from the shore line of C3 and C4) in Ayeyarwaddy, latitude 13°30'N to 14°30'N and longitude 97°30'E to 98°00'E; in two fishing grounds (D23, and in D28 on the east side of the centreline between North Moscos island and Middle Moscos island); in Mon, latitude 12°00'N to 13°00'N; and in two fishing grounds (E11 and E17) in Tanintharyi region. For positions of the fishing areas, see map.

Identified nursery areas have been protected and managed to ensure survival of the juveniles of commercially important fish species. This includes a fishing ground in Rakhine area, four fishing grounds in Ayeyarwaddy, two in Mon and two fishing grounds in Tanintharyi region, which have been declared as closed fishing areas for 3 months (June to August) annually.

### **Management zones**

Two fishing zones have been established through a licensing scheme whereby zones are designated for specific fishing gear, classes of fishing vessels and ownership. This is an attempt to provide equitable allocation of resources and reduce conflicts between traditional and commercial fishers. Basically, the two fishing zones are: Fishing Zone 1, for coastal fisheries, extending from the shoreline to 5 n.mi. in the northern area and to 10 n.mi. in southern coastal areas; and Fishing Zone 2, from the outer limit of the Fishing Zone 1 out to the EEZ limit.

### **Input Control**

Every fishing activity in Myanmar's fishery industry is controlled by the licensing and registration system to control both the fishing vessels and their gear, under the current Fisheries Law and Union of Myanmar Foreign Investment Law 1995.

### **Controls on size and power of fishing vessels**

Any attempt by fishermen to change the tonnage or engine power of fishing vessels or to construct fishing vessels require permission from the Director General of DoF and nautical approval from the respective authority.

## **Fisherman registration**

There is system that controls the entry of new individuals into the fishing industry. Every fisher must be registered and anybody working, living or staying on a fishing vessel must have a fisher's registration card.

## **Output control**

Currently, there are neither individual transferable quotas (IQTs) nor total allowable catch (TAC) regulations in Myanmar's fisheries industry.

## **Economic incentives: taxes on output or inputs**

Import tax on shrimp exported to China was removed at the beginning of 2004 to promote trade between Myanmar and China. Shrimp exports to Japan from Myanmar are more than 20% by value of total shrimp exports from Myanmar. There is a regulation that allows exporters to also import. Export earnings after deducting a 10% tax can be used for import purposes. Earned foreign currency is allocated 80% for importing essential goods such as medicines listed by government, while 20% is can be used for import of commodities such as refrigerators and basic needs. The exchange rate differs according to allocation. The exchange rate dominates trade, so it is one of crucial factors for competitiveness of Myanmar in ASEAN.

## **FISHERMEN COMMUNITIES**

Most of fisher communities are located along the coast, and includes significant numbers of poor and vulnerable people and a high proportion of people dependent on fisheries activities and aquatic products for income and food security. The development of coastal fisheries and coastal aquaculture is quite limited, but already the livelihoods of perhaps several thousand of people are directly and indirectly involved in the fishery sector.

## **POST-HARVEST USE**

### **Fish utilization**

About 80% of the fish landed in Myanmar are used for direct human consumption, mostly as fresh and chilled, with some frozen or cured. About 10% is processed into fish meal. At present there are 125 cold storage factories and 253 ice plants in the country, of which 146 are privately owned and 4 government owned in Yangon Division; 38 private and 4 government in Taninthayi Division; 53 private and 8 government in Rakhine state, 77 private in Ayeyarwaddy Division; 36 private and one government in Mon state; 7 private and one government in Mandalay Division; and 2 private and one government owned in Shan state. The types of fisheries products produced by fish processing plants and factories from Yangon are shrimp block, shrimp headless and head on, chilled fish, fish fillet, fish paste, fish sauce, etc.

### **Fish markets**

The main wholesale fish markets are located in Yangon, namely Sanpya Fish Market, Pazuntaung Naungdan Fish Market and Annawa Fish Market. There are others in the states and divisions.

### **Fish exports**

Total shrimp exports from Myanmar have been increasing annually. Shrimp exports to Japan (ca 2% of annual output) and the United States of America (ca 0.6–0.8% of annual output) have been on the rise. Japan has been taking about 2% of shrimp production in recent years, while the largest segment has been about 20% to Indonesia among ASEAN countries. Thailand has taken about 8% of Myanmar shrimp production. These markets could be expanded.

## **Employment**

In 2003–2004, the livestock and fisheries sector contributed 8.94% to GDP and it provides employment for more than 7.98 million persons fulltime and 2.6 million part time, including almost 30 000 fish and shrimp farmers.

## **Rural development**

Most of those living in coastal areas are probably involved directly or indirectly (e.g. collection of shrimp post-larvae; collection of crab and grouper fry; women involved in preparation of feed for mud crab fattening) in production. The coastal population relies heavily on fishing and aquatic products for income and food. Coastal households are involved in shrimp fry collection and directly involved in shrimp aquaculture, and to a limited extent in mud crab and grouper cage farming. In Taninthayi Division, aquaculture has the potential to be a significant source of income and employment. These coastal areas need local development through efforts such as sustainable coastal aquaculture, and income generating projects for fisher communities.

There is a small but increasing involvement of international NGOs in rural development in Myanmar, and some are showing an interest in fisheries and aquaculture for poverty alleviation. The Myanmar Fisheries Federation (MFF), part of the ASEAN Fisheries Federation, is also supporting aquaculture development in Myanmar, although efforts are focused more on inland areas.

## **FISHERY SECTOR DEVELOPMENT**

### **Constraints**

Major constraints and areas needing development are:

- There is a lack of awareness concerning fisheries resources.
- Coastal area fisheries infrastructure is underdeveloped.
- Fishery data reporting systems need improvement.
- Capacity building is needed to support the future fishery industry.

The fishery sector needs to develop sustainable utilization of fishery resources activities, with involvement down to fishermen-community level through collaboration with MFF and related international and regional organizations.

### **Development prospects**

National fish production is expected to develop at a medium pace for the next few years. Total landing of marine catch is also expected to increase. The increase in marine fish production can be achieved by better exploitation of the potential resources in the EEZ, and the increase in fish landing is expected primarily to derive from deep-sea fishing. It is estimate that about 1 million tonnes of fish can be additionally exploited annually from

this source. The expected increase in the landing from deep-sea fishing will be due to increased productivity per vessel through application of new technology, upgrading of fishing knowledge, and exploitation of new resources. However, landing from the inshore fisheries will be sustainable through prudent, systematic and sustainable management measures and policies imposed by DoF. Production from aquaculture will be a major source of increased fish production, following expansion of aquaculture industries, increased average production and modern technology, especially in the fields of fry production, culture systems, feed and disease control. It is estimate that annual production from brackish water and marine pond culture will increase at tremendous rates, reflecting increasing demand and the good economic returns possible from brackish-water and marine pond culture.

## **Conservation of resources**

Conservation of marine resources has always been a primary concern of DoF. Marine Parks and Marine Reserves, together with fisheries protected areas, have been established under the Fisheries Law, as one of DoF's management measures. This is essential to protect, conserve and manage in perpetuity the marine environment in order that it remains undamaged for future generation. Public awareness of the need to protect the corals and other marine flora and fauna in the waters surrounding the islands off the coast is being promoted to ensure their conservation. Recently, the Lampi islands of Tanintharyi coast have been gazetted as Marine Parks and Marine Reserves. The waters around the island area have declared protected fisheries areas, whereby collection of marine flora and fauna is prohibited. Fishing in fisheries protected area is also prohibited unless specifically licensed for research purposes.

## **RESEARCH**

The Universities of Yangon and Mawlamyaing provide teaching and research in coastal aquaculture. These Universities provide a few aquaculture-related courses in the curriculum of the Department of Zoology of Yangon University and Department of Marine Science of the University of Mawlamyaing.

The Department of Fisheries (DoF) is also responsible for research, but this function needs to be substantially strengthened if it is to address the key researchable issues relevant to coastal aquaculture development in the country.

## **FOREIGN AID**

There are several ongoing projects in collaboration with the Southeast Asia Fishery Development Center (SEAFDEC), FAO, etc., including:

- A shark fishery project in collaboration with SEAFDEC.
- Fishing gear for Myanmar (with SEAFDEC).
- Taxonomy of the inland fishes of Myanmar (with SEAFDEC).
- TED and JTED experiments in Myanmar (with SEAFDEC).
- Evaluation of inland fisheries resources (with SEAFDEC).
- SEAFDEC-AQD Mangrove shrimp culture under Japanese trust fund support to SEAFDEC.
- Care Myanmar has a rural livelihoods coordinator and is involved in agriculture, but not yet in fisheries or aquaculture.

## GENERAL LEGAL FRAMEWORK

"The Fisheries Law" 1905 was the only legislation regulating fishery management and the fishing industry of Myanmar until amended in 1954, and was finally repealed by "Law relating to the fishing rights of foreign fishing vessels" in 1989. After that, the government promulgated three other fisheries laws, namely "Aquaculture fisheries law" in 1989, "Myanmar marine fisheries law" in 1990, and "Freshwater fisheries law" in 1991.

However, in the 1980s, the introduction of trawling in coastal waters led to considerable conflict between traditional fishermen and trawlers. This led to the amending of the fisheries law of 1989 to provide a more comprehensive legal framework to manage fisheries in national waters. This law was formulated to integrate and strengthen the legal framework relating to marine and inland fisheries and to:

- get more revenue through fishery taxation;
- protect the natural living fisheries resources;
- ensure equitable allocation of fisheries resources;
- obtain accurate fishery data; and
- strengthen systematically administrative activities to reduce conflict among the fishing communities.

### Fisheries notification on prohibition of fish importing

This notification (regulation) lists fish species that may not be imported, exported, sold or kept in captivity without permission of the Director General of DoF.

#### Notification 2/92

This notification protects the spawners, breeders and fingerlings of freshwater fishes, specifying those species that it is forbidden to catch, export, kill or keep in captivity in the months of May, June, July and August without permission of the Director General of DoF.

#### Notifications 8/94 and 9/94

The notification established size limits for crabs for export (8.15 cm, length 6.15 cm), and to control trade in them under section No. 35 of the Aquaculture Law. Notification 9/94 defines measuring systems for crabs, and sets limits.

#### Notifications 2/95 and 3/95

These prohibit trade in spawners, breeders and fingerlings of the freshwater prawns *Macrobrachium resenberghii*, and *M. malcolmsonii*, which can not be caught, exported, sold, killed or kept in captivity in the months of May, June and July, unless permitted by the Director General of DoF. If accidental catch occurs, they should be released immediately. Similarly for penaeid species, namely *Penaeus monodon*, *P. indicus*, *P. merguensis*, *P. semisulcatus* and *P. japonicus*.

#### Notification 5/2001

This notification controls the import, export, culture, production, sale, propagation or possession of African cat fish (*Clarias gariepinus*) under Sections 35 and 20 of the Aquaculture Law.

### **Notification for control of endangered fish species**

This regulation lists all the species of fish and mammals that are protected, including the dugong, whale, whale shark, dolphin, giant clam and turtle, and included in the list of endangered species in the Convention on International Trade of Endangered Species (CITES). It is an offence to fish for, harass, catch, kill, possess, sell, buy, export or transport any endangered fish as specified in this regulation. Any of the listed endangered fish species caught unintentionally must be released immediately or disposed of as directed by the Fishery Officer.

### **Notification 2/2001**

It is forbidden anywhere in Myanmar waters to catch, harass, kill, possess, sell, buy, export or transport Whale shark (*Rhincodon typus*), which is in CITES list.

### **Prohibition of fishing gear**

Under "Law relating to the Fishing Rights of Foreign Fishing Vessels 1989" and "Myanmar Marine Fisheries Law" and related regulations, fishing gear that is destructive to the environment and fisheries resources are banned. Banned gear includes pair trawling, electric fishing, fishing using poisons, chemicals and explosives, and push net.

The Government of the Union of Myanmar, having been empowered by the Forest Law of 1992, has declared all mangrove forests as protected areas, and fishing within three hundred yards of such mangrove areas is strictly prohibited.

### **FISHERY SECTOR INSTITUTIONS**

DoF is part of the Ministry of Livestock and Fisheries, and its key role is management of fisheries. Administratively, has four directorates, dealing with capture fisheries; aquaculture; research and development; and administration (see chart). Some roles are cross-cutting, whilst others relate to fisheries or aquaculture administration; they can be summarized as follows:

- The issuing of licences for fishing gear, vessels, aquaculture sites and ventures.
- Evaluation of sites for aquaculture or fisheries.
- Production of fingerlings for sale to the aquaculture industry and leasable fisheries (revenue generation) and stocking of open water fisheries (reservoirs, rivers and other waterbodies, including community ponds).
- Advising the Minister of Livestock and Fisheries, and local government on fisheries and aquaculture matters.
- Acting as a regulatory body for the correct and proper conduct of fisheries and aquaculture (including inspection of fishing gear and sites).
- Acting as an inspection body for trade purposes (including inspection of legal size for export products, quality assurance and certification).
- Administrating the system for the auctioning of Leasable Freshwater Fisheries, and

collecting the fees. This is a key income generating activity for the inland fisheries sector.

- Stocking of open water fisheries. This is performed in a number of ways, ranging from the release of millions of 7-day-old fry (typically Rohu), to the release of larger (0.5–1 inch) fingerlings. A single hatchery may release up to 50 million fry to natural waters.
- Administrating water bodies for aquaculture, including so-called virgin land, degraded agricultural lands, perennially flooded areas, small dams, village ponds, borrow pits near roads and houses, spill water from irrigation, feasible cage culture sites, rice fish, environmentally friendly mangrove culture, salt pens (in the rainy season), and barge and raft culture in brackish and marine areas.
- Collecting and communicating aquaculture knowledge (under the Deputy Director of Aquaculture).
- Training and extension.

DoF Headquarters office in Yangon has a staff of about 1000, whilst the State and Divisional Fisheries administrations sizes vary with the importance of fisheries locally. Mandalay Division, which is an important fish production centre for upper Myanmar, has four fisheries stations.

The Ministry of Forestry is responsible for management of forests, including mangrove forests. It appears though that the management of "secondary" forests for aquaculture has been ceded to DoF. The Ministry of Forestry also has some responsibility for management of protected areas.

### **Organizational chart of the Department of Fisheries of Myanmar**

