

FISHERY COUNTRY PROFILEFood and Agriculture
Organization of the United
Nations

FID/CP/ROK

**PROFIL DE LA PÊCHE PAR PAYS**Organisation des Nations Unies
pour l'alimentation et
l'agriculture

November 2003

**RESUMEN INFORMATIVO
SOBRE
LA PESCA POR PAISES**Organización de las Naciones
Unidas para la Agricultura y la
Alimentación**THE REPUBLIC OF KOREA****1. GENERAL ECONOMIC DATA**

Area (including areas of the offshore islands):	99,274 km ²
Length of Continental Coastline: Exclusive economic zone (EEZ):	11 542 km 200 NMs.
Population (2001):	47,142,000
GDP at purchaser's value (2002):	\$US 931 billion
PCE per head (2002):	\$US 19,400
Agricultural GDP (2002):	\$US 37,24 billion

2. FISHERIES DATA**Commodity Balance (2001):**

	Production	Imports	Exports	Total Supply	Per Caput Supply
	'000 tonnes liveweight				kg/year
Fish for direct human consumption	2,101,823	1,199,401	518,425	2,782,799	59.0
Fish for animal feed and other purposes	180,663				

Estimated Employment (1998):	
(i) Primary sector (including aquaculture):	259,465
Gross Value of Fisheries Output (2001):	4,511 billion Korean won
Trade Value of Fisheries Imports (2002):	\$US 1,861,205,000
Value of Fisheries Exports (2002):	\$US 1,045,672,000

3. FISHERY SECTOR STRUCTURE

3.1 Overall Fishery Sector

The Republic of Korea produced 2,282,486 metric tons (MTs) of fish with a value of 4,511 billion Korean won (KRW) in 2001, showing an increase of around 8%. The increase was due to increased catches of mackerel and anchovy from the coastal and offshore waters and of Alaska Pollack from distant waters (OECD, 2002) as well as attributed to the implementation of production-oriented fishery policies (Lee, 2000). In 2001, about 47% of the total fishery production came from offshore and coastal waters; only 0.2% came from inland waters. Landings from distant water fishing operations have also steadily expanded, and accounted to more than one-quarter (27.7%) of the total fishery production in 2001. The main species of fish caught in Korean waters are anchovy, mackerel, hair-tail, yellow corvina, squid, and blue crab. Most fishery products are used for human consumption.

With the development of new technologies, aquaculture production has increased to account for one quarter of the total fishery production in 2001 of which the marine aquaculture dominates 98% of the total aquaculture production (667,997 MTs) with the rest 2% contributed by the inland aquaculture. In 1995, some 107,000 hectares were used to produce about 996,000 tonnes of fish. Approximately 50 fish species, 15 shellfish species, 10 species of seaweed as well as other aquatic animals and plants were produced (Lee, 2000).

The Republic of Korea recorded for the first time a trade deficit o in fishery products due to declining export to Japan following Japan's economic depression and increasing import from China. In 2002, the total export value of fishery products was US\$ 1,045,672,000. The imports of fishery products rose to US\$ 1,861,205,000 in 2002 (FAO).

Since 1994 the chronic overexploitation of marine fishery resources by over-capacity in coastal and offshore waters has been addressed by imposing a fleet reduction program, the "General Buy-back Program". About 113 fishing vessels were scrapped under this program in 2001. Moreover, another buy-back scheme, the "Buyback Program by the International Agreements," has also been implemented after the "Special Act for Supporting Fishermen Affected by the International Fishery Agreements" entered into force on 7 December 1999; this Special Act of agreements aimed at compensating fishermen for losses resulting from the international fishery agreements, including fishing cooperation agreements with Japan and China. The Korean government had scrapped 551 vessels in accordance with this Special Act in 2001. Financial transfers by the Korean Government for implementing these buy-back

programs totaled to KRW 550 billion in 2001, showing an increase of KRW 192.7 billion (54%) from KRW 367.3 billion in 2000.

In addition to the buy-back programs, the Korean Government also worked towards implementing the best optimal management system for sustainable fisheries namely the "Total Allowable Catch" (TAC) system. This TAC system is an alternative to the current fishing license system and it has been implemented for seven commercial species such as the common mackerel, Pacific sardine, Jack mackerel, red snow crab, purple Washington clam, pen shell and spiny top shell in 2001 after the system has been successfully tested in 1999-2000 (OECD, 2002).

3.2 Marine sub-sector

3.2.1 Catch profile

The law which aimed at improving the livelihood of the rural sector has been legislated in 1990 and implemented recently. This law is the major legal instrument that has brought about the structural adjustments of the fishing industry. Thus, since 1994, the government already developed the policy to reduce the fishing capacity. The total number of fishing vessels removed in 1997 was 135 including 48 for fishing in coastal and 87 in offshore waters. The program was aimed at reducing the fishing capacity of those non-profitable fishing methods, e.g., the large purse seines, offshore stow net, offshore angling and trawls, due to the loss of fishing grounds resulting from the declaration of the exclusive economic zone (EEZ) by other coastal states such as China and Japan (Asianinfo, 2003).

The capacity reduction program appeared to yield results in stabilizing the CPUE (catch per unit effort) values (2.99-3.70) over the past six years (1995-2000). The total catches from these coastal and offshore fishing methods were also relatively stable at 715,378 to 897,227 MTs in 1995-1999. The tuna purse seine, squid-jiggering, North Pacific trawl and general trawl which catch predominantly the pelagic fish species still dominate the fishing methods operating in the coastal and offshore waters.

However, the ratio of juvenile fish in the catches has been increasing suggesting a clear indication of depleting coastal and offshore fisheries resources. Pelagic species such as anchovies, mackerels, and squids still dominate the catches from the coastal and offshore waters. The major species caught by the distant water fisheries are the Alaska Pollack and tunas (skipjack, yellow-fin and big-eye. Total catches by the distant water fisheries decreased from 1,023,926 MTs in 1992 to 791,409 MTs in 1999.

3.2.2 Landing sites

The major fish landing sites in the Republic of Korea are located in the coastal cities or towns known as Pusan, Incheon, Ulsan, Kyonggi, Kangwon, Chungnam, Chonbuk, Chonnam, Kyongbuk, Kyongnam and Cheju.

3.2.3 Fishing units

There was a slight decrease in the total number of fishing vessels in 2001 (94,935 with 884,853 gross tones and 14,765,745 horse powers) compared to 2000 (95,890 with 923,099 gross tones and 13,597,179); except for the vessels at the category of around 25 gross tones (GTs), which showed a slight increase in number, vessels of other tonnage categories had decreased slightly. Powered vessels represented 93.1% of the total number of fishing vessels in 2000 and it was 94.1% in 2001; also, large fishing vessels of sizes more than 50 GTs accounted for around 70% of the total vessel tonnage in 2000 but it was 71% in 2001. Aquaculture, gill netting, long lining and angling employed most of the fishing vessels in their operations being around 21,742; 21,042; 17,666; and 10,563 boats, respectively .

It has been found that the coastal fishing vessels are commonly made of wood (79.1 per cent). However, the ratio of wooden vessels is only 22.8% by GTs (OECD, 2002). In the Republic of Korea, the number of fishing vessels began to increase since mid-1970s when the resource-destructive fishing methods began to develop and increase in number. In 1982, Korean government introduced regulation to limit the fishing permits for controlling the ever-increasing fishing capacity resulting from the increase of fishing vessels in number, tonnage and horse power. In view of these, the Korean government began to adopt measures to control the total tonnage of each fishing method in 1987 (OECD, 2002). One of the measures which have proven to be effective is the buy-back program for the adjustment of fishing fleet. The buyback program has two objectives, namely, the conservation of fisheries resources, and the enhancement of economic efficiency of fishery industry.

In 1994, Korean government started the fishing fleet reduction scheme through implementing the buyback program. During 1994 - 1998, the Korean government has spent 93,644 million won to scrap 614 fishing vessels which were considered to be resource-destructive. The Korean government has planned to spend 348,549 million won to remove 2,421 vessels engaged in coastal and offshore fisheries (FAO, 2000).

3.2.4 Fisheries resources

The mixing of the warm Tsushima and cold Liman ocean currents has created several fishing grounds rich in fishery resources in the coastal and offshore waters around Korean coasts.

A total of 850 species of fish are found in Korean waters. The species of fish caught in the East Sea are mainly the Alaska Pollack, saury, plaice, squid, etc., most of which are cold current species. Fishing season for squid is usually in the summer when salmon species migrate to the East Sea. The main fishing methods are trawling, jigging, long-lining and gill-netting. The West Sea (Yellow Sea) has a jagged coast-line and well-developed continental shelf providing good conditions for spawning and growth of fish. The major species that could be caught from the Yellow Sea include the yellow corvenia, hair-tail, pomfret, blue crab, shrimp and laver; the main fishing methods used are the trawling, stow net, long-line and set-net. The oceanographic conditions of the Korea Strait (South Sea) are much influenced by the warm Tsushima current causing the water in the Korea Strait to be generally warmer than any parts of the Korean coastal seas. Thus, the Korea Strait not only provides suitable sites for aquaculture but also has rich fishing grounds for capture fisheries. The main species caught in the Korea Strait are jack mackerel, anchovy, hair-tail, sardine and Spanish mackerel which are caught by trawlers, gill-nets and traps; the species that have been cultured include the oysters, ark shell, laver and sea mustards (OECD, 1997).

Fishery resources in the coastal and offshore waters have generally been overexploited, particularly for the commercially important species such as red-lip croaker and Alaska Pollack. Despite the government's efforts in enforcing management programs such as the "buy-back program" to reduce the fishing capacity since 1994 which did maintain the CPUE (catch per unit effort) almost constant over the past six years (1995-2000),

Some species of fish such as common mackerel, Jack mackerel and spiny top-shell have been over-exploited to over 90% of their TAC (total allowable catch) in the coastal and offshore waters of Korea. Introduction of the "buy-back program" by the government since 1994 did, however, stabilize the CPUE (catch per unit effort) and the catches by the coastal and offshore fisheries over the past 6-7 years. It appears that the pelagic species such as mackerels, anchovies, squids, etc are still abundant while the demersal species such as Alaska Pollack have declined due to increased water temperatures in recent years (OECD, 2002).

3.2.5 Fishery areas

The mixing of the warm Tsushima Current and the cold Liman Current along the east and west coasts has created several rich fishing grounds along the East Sea, Korea Strait and Yellow Sea, where abundant supplies of fish of different varieties could be caught. Thus, different fishing methods are employed for fishing different species of fish in the coastal and offshore waters mainly along the Korean coasts as follows:

Fishing activities	Description of fishery areas
1. Offshore stow netting	Along the deep waters of Yellow Sea and East China Sea.
2. Coastal stow netting	Along the near-shores of Yellow Sea.
3. Offshore squid jigging	In areas about 400 nautical miles (n mi) from the Korean harbors in the East Sea (Sea of Japan), partially the Yellow Sea.
4. Large purse-seining	In the coastal waters about 300 n mi from all Korean coasts, including those in the East China Sea of the similar distance from the Chinese coast.
5. Anchovy mid-water trawling	In the coastal waters up to 100 n mi from the Korean shores.
6. Large bottom/mid-water trawling	Coastal and offshore areas within 200 n mi from the shores around Cheju Island (South Sea) and in Korea Strait and East China Sea.
7. Large bottom/mid-water pair trawling	Offshore areas up to 400 n mi from the shores around Cheju Island, Korea Strait, East China Sea and Yellow Sea.
8. Danish seining	Large fishing vessels operate around Cheju Island, middle and south of East China Sea in areas less than 250 n mi from the harbors; medium-sized fishing vessels operate in the southern part of Yellow Sea and western part of South Sea in areas less than 100 n mi from the harbors as well as in the coastal waters of East Sea (Sea of Japan).
9. East Sea bottom trawling	In coastal waters of East Sea in areas less than 50 n mi from the harbors.

(Source: Lery, et al., 1999)

Korea's distant-water fishing fleets are operating far from their national waters in the Pacific, Atlantic and Indian Oceans; the species fished by these fishing fleets include mainly the Alaska Pollack, tunas (skip-jack, yellow-fin and big-eye), brown croaker and saury.

3.2.6 Fishermen communities

Fishermen communities are concentrated in eleven coastal cities/towns and the numbers of full- and part-time fishermen in these cities/towns in 1999 are as follows (NSO, 2003):

City/Town	Number of Fishermen		
	Full-time	Part-time	Total
Pusan	5,082	2,547	7,629
Inchon	4,309	1,195	5,504
Ulsan	1,518	436	1,954

Kyonggi	2,438	404	2,842
Kangwon	5,723	2,976	8,699
Chungnam	11,972	2,405	14,377
Chonbuk	4,665	1,606	6,271
Chonnam	32,629	5,580	38,209
Kyongbuk	6,375	2,340	8,715
Kyongnam	16,197	3,384	19,581
Cheju	6,844	695	7,539
Total	97,752	23,568	121,320

Higher populations of fishermen of over ten thousands are found in Chonnam (38,209), Kyongnam (19,581) and Chungnam (14,377). Full-time fishermen still dominates the population, constituting about 80.6% of the total fishermen population.

Despite the contributions of the fishing industry to the food supply and employment of Koreans, it is suffering from an outflow of fishing population, and a depletion of the fish resources. The average income of fishing families in comparison to other industries is not attractive too, for example, in 1993 it was approximately \$18,000 far below that of any agricultural families. Furthermore, the depletion of fish resources and increase in the fish imports has aggravated the economic status of fishing families, resulting in an increase in their debts. The average debt of fishing families in 1993 reached about \$9,600, an increase of 18.1 per cent from 1992. In addition, 32.5 per cent of family fisheries household income is derived from other family owned businesses (OECD, 1997).

3.3 Inland fisheries sub-sector

The production of inland fisheries is relatively low. In 2000, it reached only 7,142 MTs valued at 33,765 million KRW, decreasing to 5,971 MTs at 29,469 million KRW in 2001. The Inland fisheries captures 15 different species of fish, such as eel, trout and Israeli carp. The species taken are mainly carp, eel, loach and trout.

3.4 Recreational fisheries sub-sector

Recreational fisheries sub-sector is managed through the enactment of the Fisheries Act of 1908 (replaced by the Chosun Fishery Act of 1929) and the Recreational Fishing Boats Operation Act (RFBOA). The Chosun Fishery Act regulates the seasonal and area enclosures, minimum size limits, etc of the fishery while the RFBOA controls the operational aspects of the recreational fishing boats such as regulating the recreational fishers' safety, prevention of discarding of wastes by anglers, inspection of recreational boats for safety and waste-treating equipment on boats, etc (OECD, 2002).

3.5 Aquaculture

In 1998, the Republic of Korea has been ranked tenth in terms of aquaculture production. The main production comes from three species of seaweeds, four species of mollusks and one

species of halibut. For the seaweed production, the Republic of Korea led the world in the production of the brown seaweed known as "Wakame" (*Undaria pinnatifida*), sharing 60-80% of the world "Wakame" production during the past decade; the Republic of Korea produced about 239,700 metric tons of "Wakame" in 1998 (Silpachai, 2001). The country also shares about 20% of the world production of another higher-value seaweed, the Laver.

Four species of molluscs have been widely cultured on large-scale in South Korea: the Pacific cupped oyster (*Crassostrea gigas*), the inflated ark (*Scapharca broughtonii*), the Korean mussel (*Mytilus coruscus*) and the Japanese carpet shell (*Ruditapes philippinarum*). Blood cockle has also been cultivated but on a smaller scale.

The Republic of Korea has been next only to China and Japan in oyster production, particularly with the Pacific cupped oyster. The cultivation of the inflated ark (*Scapharca broughtonii*), a relatively expensive commodity, is confined only to the Republic. The Korean mussel (*Mytilus coruscus*) is exclusive to the Republic, and it has been cultivated relatively successful in the past five years or so.

The area of mariculture in 2001 was 122,218 ha, an increase of 238 ha (0.2%) from 121 980 ha in 2000. Production in 2001 was 655 827 MTs (717,163 million KRW), about a 0.3% increase from 653,373 MTs (683,856 million KRW) in 2000 and the number of households in 2001 involved in aquaculture was 25,344, representing a 2% increase from 24,810 in 2000, due to the implementation of aquaculture promotion policy by the government. The major species in mariculture are bastard halibut, Pacific cupped oyster, inflated ark, Korean mussel, Japanese carpet shell and seaweeds (OECD, 2002).

In spite of the increase in production volume, a marked decline in the quality of the products has been noted due to the deteriorating environmental conditions of aquaculture farms. Initiatives have been taken by the government to address this issue of deteriorating product quality through the introduction of new coastal mariculture maintenance programs consisting of three components: general mariculture ground maintenance, special mariculture ground maintenance and demonstration mariculture ground maintenance.

Total funds invested for general farm maintenance (total of 23,000 ha), demonstration farm management (800 ha) and special farm maintenance (2 zones) were US\$14.9 million in 1997. The benefits of the coastal mariculture maintenance programs were clearly demonstrated by the regeneration of aquatic micro-organisms and increased production per unit area as well as improved quality of products (Asianinfo, 2003).

On 29 January 2000, the Farming Ground Management Act was enacted to build a sustainable fishery and to improve the productivity of farm sites. The Act introduces a system of sabbatical years for the mariculture sites to increase their productivity efficiency as well as the inspection and standardization of environment of farm sites, etc.

The Fishery Promotion Act which was enacted on 14 January 2002 enables the government to establish a framework to promote aquaculture every 5 years. One of the function of the Act is to control and management a fish health program that could help the aquaculture farms to solve the disease problems. Any person wanting to be a fish doctor should pass a qualification test and be licensed by the government (OECD, 2002).

4. Fish Utilization

4.1 Post-harvest use

Most of the fish landed were used for human consumption. In 1997, about 3.19 million MTs of

fish and fish products were consumed domestically, decreasing to around 2.69 million MTs in 2000. The liberalization of fishery imports (in 1992) has resulted in annual increases in the imports of fishery products from countries such as Russia, USA, China, Japan and Argentina (OECD, 2002).

A relatively large portion of the fish landed was processed either for domestic consumption and export. The total number of fishery processing facilities in 2000 was 749 and among them, there were 651 freezing and refrigerating facilities, 80 processing and handling facilities on ships and 18 the others. The number and capacity of freezing and refrigerating facilities is increasing due to the increasing trends of market demand (OECD, 2002).

4.2 Fish markets

Fishery products are marketed through a complex distribution system in Korea, which can be largely divided into two categories: one that takes place at landing ports and another in areas of consumption. Marketing and distribution of the products at landing ports takes place through fishery co-operative auction markets and the Pusan common fish markets, which are always located at water fronts, but distribution to consumption areas is made through whole sale markets, inland joint sale and direct-sale markets and retailers.

With the exception of the traditional ('jaere' in Korean) market, there are 330 official fish markets in Korea: wholesale corporations (20), joint markets (6), co-operative auction markets (232), common fishery market (1), and direct sale markets (71). The coastal city that has the highest number of markets is Cheonam (66), followed by Kyungnam (58) and Kangwon (38).

In Korea, fish are marketed essentially in three distribution channels as shown in Figures 1-3 below.

Figure 1. Regular fish marketing system (Source: OECD, 2000)

Figure 2. Fishery products marketed through the Fisheries Co-Operatives Distribution System (Source: OECD, 2000)

Figure 3. Marketing channel for fishery products from the distant-water fisheries

(Source: OECD, 2000)

Several measures were or are being taken by the Korean Government to ensure stable market prices for fishery and agricultural products through the establishment of the "Price Stabilization Fund". The fund is intended to cover 10 items of the fishery products, including the dry seaweed, frozen squid and frozen hair-tail fish.

Fishery marketing systems have been improved through the expansion of market facilities and the up-grading of the consignment system on landing sites and of the distribution capacity at areas with large consumer population. Since October 1997, the government has liberalized the consignment system at landing sites. This policy has been a part of a two-stage free market system first introduced in 1996. Five direct-sale market facilities have been established at large urban areas to strengthen the distribution and handling capacity in areas where large populations of consumers are found. The improvement includes the reduction of distribution and handling steps and marketing margins, and the promotion of direct shipping to consumers by fishermen's cooperatives (Asianinfo, 2003).

5. Fishery Sector Performance

In common with other industries in the Republic of Korea, the fishery sector has made impressive progress over the years, but has been going through a major transition, from a centralized system to a decentralized one. Additionally, the fishery sector has encountered a variety of difficulties, including the impact of the introduction of 200-mile Exclusive Economic Zones (EEZs) by many other coastal nations that has significantly reduced fishing areas, intensified fishing regulations for resource management, increased financial burden from high-sea fishing permit fees, the decline in abundance of fisheries resources, and the escalating labor costs (OECD, 2002). Other difficulties are the impact of trade liberalization and

increasing incidents of marine pollution from all sources, including industrialization and reclamation of coastal areas that negatively affect fish habitats and reduce fishing grounds.

The judicious use of the inland, coastal and marine resources is an important challenge as the country is poorly endowed with land resources. The critical task facing the sector is effective and efficient implementation of policies and management interventions that are environmentally sound, socially equitable and consistent with new global trade and ocean management policies (OECD, 2002).

The population in fisheries has continuously dropped since 1982. The number of fisheries households also dropped 4.7% from 97,754 in 1999 to 93,533 in 2002. The number of fisheries households in 2002 constituted around 60.2% with powered fishing boats and 39.6% with non-powered fishing boats; the household for aquaculture also decreased slightly from 32,360 in 1999 to 31,910 in 2002.

The number of fishing vessels decreased by 955, from 95,890 vessels (923,099 G/T) in 2000 to 94,935 vessels (884,853 GT) in 2001. The decrease in number and gross tonnage was the result of the government's fleet reduction program, e.g., the "buy-back program" (OECD, 2002).

The area of mariculture in 2001 was 122,218 ha, an increase of 238 ha (0.2%) from 121,980 ha in 2000. Production in 2001 was 655,827 M/T (717,163 million KRW), showing about a 0.3% increase from 653,373 MTs (683,856 million KRW) in 2000 and the number of households in 2001 was 25,344, a 2% increase from 24,810 in 2000, due to the government's aquaculture promotion policy. The major species in mariculture are bastard, jaco pever, oyster, short neck clam, sea mussel, laver, and sea mustard.

5.1 Economic role of fisheries in the national economy

Although the output of the fishery industry accounts for less than 1% of the country's GDP in 2000, it has a positive effect on the economic growth. It stimulates the development of services and infrastructure facilities in vessel construction and repair, fishing gear and marine electronics manufacturing, as well as in marketing. Foreign sales of fishing nets alone earned more than US\$ 1.7 billion in 1995 (Tietze, *et al.*, 2001).

The Republic of Korea is presently implementing a fisheries structural adjustment program with a view to reducing the fishing fleet capacity. This program also includes a fishing vessel "buy back" component under which the Government makes direct payments to fishing vessel owners for decommissioning of fishing vessels. With the view to ensure the economic viability of the presently operating fleet, Korea has a number of revenue enhancing and cost reducing Government financial transfers in place. These include price support payments, crew insurance support, tax exemptions on fuel and income tax exemptions for distant-water vessels, favorable interest rates for loans and other cost reducing transfers.

It has been found that the Korean fishing fleets are depending heavily on the subsidies for operating profitably. A study has indicated that without government subsidies, three out of the eight types of vessels covered by the study i.e. offshore stow netters, offshore jigging vessels and Eastern Sea trawlers would have a negative gross cash flow while the other five types of vessels i.e. large purse seiners, anchovy mid-water trawlers, large otter board trawlers, large pair trawlers, large Danish seiners and Eastern Sea trawlers would still have a positive though much reduced gross cash flow (Tietze, *et al.*, 2001). The findings suggest that, during the year in which the cost and earnings data were collected, subsidies in the form of revenue enhancing and cost reducing Government financial transfers were necessary for only half of the eight types of Korean vessels studied to ensure that the vessels recovered their cost of operation and also generated enough income for reinvestment. The other half of

the types of Korean vessels studied would have also been economically viable without subsidies and the subsidies actually played the role of increasing their profitability. The three types of vessels which depended on subsidies even for a positive gross cash flow were interestingly enough two off-shore vessels i.e. the stow netters and the jigging vessels as well as trawlers fishing in the over-fished East Sea (Tietze, *et al.*, 2001).

5.2 Food security

Being a peninsular country with high population density and limited arable land, the fishery production is therefore critical to food security in the Republic of Korea. Concerted action by both the public and private sectors is essential to ensure a continued supply of quality fish food for current and future generations. It is also critical to make extra efforts to:

- formulate and implement holistic policies and management measures, covering every aspect from production, processing, distribution, and marketing to consumption;
- devise coordinated and coherent strategies among the related organizations and sectors that are concerned with management and utilization of aquatic resources and environment; and
- ensure balanced and consistent actions within the fisheries sector.

Priority consideration must be given to: (i) effective and efficient dissemination and utilization of information that facilitates coordinated policy planning and implementation, participatory and community-based management, and informed actions and decisions at all levels, and (ii) targeted, problem-solving and policy-relevant research in support of sustainable availability of affordable fish food (FAO, 2000b).

To secure food safety and harmonize with international standards of food quality, the Korean Government has enacted the "Fishery Products Quality Control Act", which integrated the acts on control of fishery products quality, on 29 January 2001 and effectuated on 1 September 2001. The act introduced the HACCP (Hazard Analysis Critical Control Point) system for sea food handling and processing. Subsequently, the government has also issued a Ministerial decree in accordance to the Act, which sets the HACCPs for fishery products and commodities intended for export on 14 March 2002 and the HACCP system will soon cover other producing and processing facilities (OECD, 2002).

5.3 Employment

The total number of person employed in the capture fisheries in 1998 was 192,833 showing a little increase over that in 1996 (191,365). A large proportion of the fishermen were employed in the coastal and offshore marine capture fisheries which constituted around 89.8% of the total for the capture fisheries in 1996, 90.2% in 1997 and 89.6% in 1998. During 1996-1998, similar proportions for the inland fisheries were 5.5-5.6% and the deep-sea marine capture fisheries, 4.3-4.9%. No women were employed in the deep-sea marine capture fisheries while many women were employed in the coastal and offshore fisheries, around 48.4-49.2% and the proportions of women employed in the inland capture fisheries were 34.7%.

Age distribution also shows that the portion of those older than 50 years has increased from 55.6% in 1996 to 55.8 % in 1997 (Asianinfo, 2003). Limitations on fishing efforts such as the imposition of the "buy-back program" by the Korean government has resulted a significant drop of employment (e.g., a decrease of more than 30% in 1997 compared to 1985), and forced many fishermen to leave their fishing industry or work part-time, combining fishing with other economic activities especially agriculture and commerce (Asianinfo, 2003).

The number of person employed in the aquaculture sub-sector increases from 63,106 in 1996 to 66,632 in 1998. They constitute around 24.8-25.7% of the total number of fishermen employed in the fishery sector.

6. Fishery Sector Development

Although the prospects for further aquaculture development are promising, catches from the marine capture fisheries seem to be approaching their limits. The fishing areas within national jurisdiction, and those adjacent, are already heavily exploited by Korean vessels, as well as by fleets from nearby countries. As a result of the introduction of EEZs, opportunities for further development of distant-water fishing operations are also limited. Pollution problems are expected to put much more constraints on the sustainable development of the Korean coastal and off-shore fisheries. The Government has been pursuing a long-term aquaculture development program through the expansion of cultivating areas and the intensified development of both profitable and unexploited species. Already certain tidal areas in the southern provinces have been designated for shellfish culture. In line with this development, particular emphasis is being made to protect and enhance the surrounding coastal environment. There is a growing concern that pollution might affect fishing and aquaculture areas due to the reclamation works and construction of industrial complexes in southern and western coastal districts of Korea (FAO, 1998).

The investment policy was planned within the basic targets of training, sustained productive bases, environmental friendly fishery and development of fishing communities. The government has established 10 major investment policies such as the fishing ground conservation, fishery resources formation, fisheries guidance & regulation, fishing port construction, fisheries facilities, distribution facilities, distant water fisheries development, fishermen's debt subsidy, fishing village's development, and fisheries technical development. The total budget in investment in 1995 was US\$ 815 million (rate of exchange US\$ 1 = KRW 771.2). The amount of investment for each policy was follows (FAO, 1998):

Fisheries Policy	Investment (Million US\$)
1. Fishing ground conservation and management	21.8
2. Fishery resources enhancement	99.5
3. Fisheries guidance and regulation	19.0
4. Fishing port construction	170.8
5. Fisheries facilities	51.0
6. Marketing and distribution facilities	76.7
7. Deep-sea fisheries development	46.7
8. Fishermen welfare subsidy	176.4
9. Fishing community development	41.8
10. Fisheries technical development	39.0
Total	742.7

6.1 Constraints

Even though current fishery policies in the Republic of Korea are based on efficient management techniques, efforts to regulate the catch of individual fishers have not been entirely successful. Current fishing harvests and the number of fishing vessels, both exceed the Maximum Sustainable Yield (MSY) limits established in 1982.

Failure to effectively control the fish harvests has also resulted not only in the depletion of fish stock, but also in cut-throat competition between fishers and their companies. Despite quantitative and qualitative regulations, frequent violations indicate the need for a more vigilant monitoring system from the government authorities.

The resource enhancement fostering project was established in the 1970s, and although it is still undergoing developmental changes, this programme has expanded quite rapidly considering its relatively short period of existence. One problem area identified by the resource enhancement project is that released fingerlings are often caught by coastal fishing vessels, and the government has taken no specific actions to prevent the coastal stow net fishing in the future (OECD, 1997).

6.2 Development Strategy and Fisheries Policy

Development Strategy and Legislation

Two levels of the government, namely the central authority (Ministry of Maritime Affairs and Fisheries) and the local governments in the province, city and district, are involved in the fisheries development and management. Laws relating to fisheries and fishery resource protection, and legislation relating to the Exclusive Economic Zone (EEZ) provide the legal frameworks for the management of the fishery sector and protection of fishery resources. During the past 50 years, fishery resources have been protected mainly through regulations governing mesh size, fishing ground, fishing seasons, and so on. Despite the management efforts to control production methods and inputs, the steady decline of fishery resources in the coastal waters, and in particular, economically important species such as the yellow croaker and the hair-tail, demands much stronger management control of fisheries resources than ever before. As the implementation of Article 61 of the U.N. Convention on the Law of the Sea (UNCLOS) is inevitable, the Korean government has prepared an amendment to the rules and regulations in order to facilitate the practice of the TAC (total allowable catch) system in 1997.

To this end, the Government has declared sovereign rights in the Korean EEZ (announced in August 1996), the enforcement of Korean sovereign rights (announced in August 1997) and rules for the enforcement of Korean sovereign rights (announced in January 1998). This law covers all regulations relating to the monitoring and controlling of foreign fishing vessels, special rules relating to keeping fishing orders, and supervision/surveillance of foreign fishing vessels. The enforcement of legislation and regulation deal with: the establishment of special zones where fishing by foreign vessels is prohibited; assessment of collateral and methods of payment; fishing permit and approval of experimental research, including application procedures and punishment of fishing vessels that violate fishing rules and regulations (Asianinfo, 2003).

Fisheries Policy

The production-oriented fishery policy resulted in the overexploitation of coastal and off-shore fishery resources. Furthermore, the environmental degradation of coastal waters due to pollution and tide-land reclamation has added to the deterioration of the situation. Taking into account the need for conservation and proper management of coastal and off-shore living marine resources and in order to cope with overexploitation and international fishery environments, Korea has declared the 200-mile EEZ in 1996 and redefined its fisheries policy putting more stress on:

- conservation and cultivation of coastal fishery resources;
- adjustment of fishery structure to reduce fishing efforts in the adjacent water in order

to recover overexploited fishery resources and develop effective resource management system;

- development of fishing communities and expansion of basic fishery facilities to improve fishermen's welfare;
- improvement and strengthening of fishery technology, marketing and processing in order to improve the value-added fish and fish products, as well as the income of fishermen, specially in small-scale fishery.

The main legal documents regulating Korean fisheries are the Fishery Act (amended in December, 1995) and on the Resources Protection Decree. The major fishery management measures are the input control and technical measures. Input control includes Limited Licenses (which restrict the number of fishing units), and Gear and Vessels Restrictions (which restrict the size and other dimensions of each fishing unit). Technical measures include Size and Sex Selectivity measures and Time and Area Closures.

Although the prospects for further aquaculture development are promising, catches from the marine capture fisheries seem to be approaching their limits. The fishing areas within the national jurisdiction, and those adjacent, are already heavily exploited by Korean vessels, as well as by fleets from nearby countries. As a result of the introduction of EEZs, opportunities for further development of distant-water fishing operations are also limited. Pollution problems are also expected to put much more constraint on the sustainable development of the Korean coastal and off-shore fisheries. The Government has been pursuing a long-term aquaculture development program through the expansion of cultivating areas and the intensified development of both profitable and unexploited species. Already certain tidal areas in the southern provinces have been designated for shellfish culture. In line with this development, particular emphasis is being made to protect and enhance the surrounding coastal environment. There is a growing concern that pollution might affect fishing and aquaculture areas due to the reclamation works and construction of industrial complexes in southern and western coastal districts of Korea.

6.3 Development Projects

Several development projects or programs which aimed at enhancing the management and protection of the fisheries resources were developed and some of these were already implemented:

6.3.1 Fisheries resource fostering program

Salmon hatchery and the fingerling release program

The release of salmon and hake fingerlings was the initiation of the fisheries resource fostering project in Korea. A record of the number of artificially hatched salmon fingerlings released has been kept since 1910, and since the 1930s for hake.

The Government operated a salmon fingerling release project from 1957-61, and Jinhae Inland Fisheries Laboratory initiated the first phase of the five year inland waters development project in 1966. Three provincial hatcheries were established in 1969 and in 1984. The National Salmon Hatchery was established to promote the production of the salmon fingerlings.

Fingerlings release

The establishment of the National Hatchery in 1973 propelled the fingerlings release project for the marine species and 11 national hatcheries have since been constructed.

6.3.2 Construction of artificial reefs

The construction of artificial reefs began in 1971 and has been regarded as a major project for the promotion of coastal fishing fishery. The government has put artificial reefs in approximately 80 000 ha of the fishing ground (OECD, 1997).

6.3.3 Structural adjustment

The government has provided a Special Act for the development of rural and fishing communities in April 1990. Following the legislation, the government made a survey on coastal and offshore fisheries management schemes. The results showed that 23-52% of coastal and offshore fishing vessels had to be reduced. The government planned a reduction of 130,000 tons of coastal and offshore fishing vessels during 1994-2004. By this plan, 324 vessels of 5,406 tons were removed from coastal and offshore fishery during the period of 1994-1996.

6.3.4 Establishment of figures for the Total Allowable Catch (TAC)

Taking into accounts the need for the proper conservation and management of coastal and offshore living marine resources, Fishery Act was amended in December 1995 to introduce the fishery management system through TAC. In 1996, the Korean government established the 200-mile EEZ. Recently in December 1995, a legal basis for the introduction of a Total Allowable Catch (TAC) system was introduced by an amendment to the Fishery Act, in order to ensure the effective conservation and management of fishery resources. Under this TAC system, means for output control measures will be implemented.

6.3.5 Integrated management of coastal areas in relation to fisheries

Since the basic concept of the integrated coastal management (ICM) appeared in the agenda 21 of 1992 UNCED as an important tool for sustainable development and multi-sector use of coastal zones, Korea initiated some efforts to apply this concept and identify feasible process and implementation methods. To experiment the applicability of ICM principles to Korea, a pilot study was conducted in a severely polluted estuary in the south coast of Korea.

Integration of fisheries into coastal area management in Korea is not a concrete concept yet but the integrated coastal resource management policy for fishery conflicts is under development. This policy focuses on the fishery conflicts problems between fishery and aquaculture and also between fishery and industries that are developed on the coastal zone. Those fishery conflicts become rapidly a significant political and social force, coping with both the growth of industry and the effects of urban development in Korea.

In considering the integration of fisheries into broader coastal area management, government is preparing to establish policy, legal and institutional frameworks for the integrated management of coastal areas. Regarding the utilization of ocean space and coastal zone, MOMAF promotes policies related to fishing ground conservation, integrated coastal zone management, and responsible utilization of ocean space and coastal zone, with respect to the unique characteristics of each area.

6.3.6 Establishment of an Exclusive Economic Zone (EEZ) of 200 nautical miles

According to the provisions of the UNCLOS, Korean government has established the 200 miles EEZ. This will influence the overall fishery policy.

6.3.7 Development of environmental friendly fishery policy

The environment surrounding in large-scale coastal reclamation and land filling, discharge of sewage and industrial wastewater or oil spills, have seriously damaged coastal areas of Korea. The conservation of spawning and nursery grounds and cultivation areas has been the most urgent issue in coastal fisheries. Recently Environmental friendly fishery management strategies are under study; they focus on ecosystem conservation and potentially adverse

ecological effects on coastal fisheries and aquaculture.

6.3.8 Integrated coastal resource management policy

For fishery conflicts, the integrated coastal resource management policy is developed. It focuses on fishery conflicts between fishery and aquaculture and also between fishery and industries developed in the coastal zone.

6.3.9 Development of the fishing community and welfare of fishermen

In order to achieve balanced development between rural and urban communities, the government divided fishing communities into 160 areas and gave supports to their production facilities, income-building facilities and welfare facilities.

6.4 Research

The National Fisheries Research and Development Institute (NFRDI), along with universities and marine institutes, play a major role in the research of fisheries resources and technology development. NFRDI, located in Pusan, has several branch stations throughout the country. It is composed of twelve departments such as Oceanography, Food Technology, Administrative, Research Planning and Management, Extension Service, Marine Environment, Coastal and Offshore Fisheries Resources, Deep Sea Fisheries Resources, Shellfish and Algae, Fish Culture and Seedling, Fishing Gear and Boat, Food and Sanitation.

The NFRDI is well equipped and has a staff of well qualified personnel. Most of the personnel are graduates of the National Fisheries University in Pusan. Nine vessels are used by the NFRDI for research and development programs (FAO, 1998).

6.5 Education and Training

The fishery education and training system has in fact been restructured in 1965, with objectives directed more to meet manpower needs of the fishing industries. Within the Ministry of Maritime Affairs and Fisheries (MOMAF), fishery education and training are basically done by the Maritime and Fisheries Officials Training Institute (MFOTI). Besides the MFOTI, fishery education and training are also supervised by the Ministry of Education which carries out other fishery education and training through universities and high schools. There are four universities, 1 junior college and 8 high schools having facilities for fishery education and training. The Korea Fishing Training Center (KETC), which started as an UNDP/FAO project, provides technical training in distant water fishing, coastal and offshore fishing for crews of fishing fleets. The distant water fishing training program was developed in 1965 and the coastal and offshore fishing training program in 1969. Since then, 4,022 trainees have been trained as public servants and industrial workers related to government fishermen fostering policies and services in an attempt to raise business efficiency during the period of 1965-1995 (FAO, 1998).

The KETC offers a foreign training program under international technical cooperation programs sponsored by the government and a domestic training program on distant water, coastal and offshore fishing as well as a crew course for nationals. Under this program 463 trainees were invited from 88 countries during the period of 1968-1995.

6.6 Foreign Aid and Bilateral Agreements

The East Sea, Yellow Sea and East China Sea, all traditional fishing grounds of Korea, China and Japan, are known to be very productive areas. However, management of resources in these areas has been complicated due to territorial claims made by all three countries. In 1997, China and Japan signed a new fishing agreement, revising the fishing agreements signed in August 1975.

The Republic of Korea and Japan had signed the existing fishery treaty in June 1965. In view

of changing fishing conditions in the Northeast Asian seas that resulted from the implementation of the UNCLOS in November 1994, the two countries began negotiations to revise the existing treaty. Fishery negotiations between Korea and Japan have been difficult and complicated due to territorial claims to the island of Tokdo. During the course of these negotiations in 1997, Japan unilaterally declared establishment of the straight base lines in the East Sea, disregarding the provisional clause of Article 1 of the Korea-Japan Fishery Treaty (which states that the establishment of a fishing zone using the straight base line shall be determined in consultation with all participating signatories of the treaty). As a result, negotiations between the two countries are underway.

Presently, Korea is engaged in fishery negotiations with Japan and China. However, fundamental disagreements about fishing boundaries (and/or potential ocean areas) still remain. In addition, Korea is in the process of negotiating or bilateral fishery agreements with Peru, Guinea and the Seychelles (Asianinfo, 2003).

Korea became a member of CCSBT (Convention for the Conservation of Southern Blue-fin Tuna) as of 17 October 2001. Also, Korea is planning to be a party of the following conventions or agreement in 2002: Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean; Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean; and Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. 25. Korea hosted the first APEC Ocean-related Ministerial Meeting from 22 to 26 April 2002 in Seoul and the meeting adopted the "Seoul Ocean Declaration" which signifies a major milestone in cooperation among APEC member economies to work towards sustainable management of marine and coastal resources (OECD, 2002). Access to Korean waters by foreign-flagged vessels was allowed only for Japan and China on a reciprocal basis, according to the bilateral fishery agreements (OECD, 2002).

* This quota was allocated for the period from July 2001 to December 2002.

7. REFERENCES

- Asianinfo. 2003. Fisheries in Korea. <http://www.asianinfo.org/asianinfo/korea/fisheries.htm>; accessed: 2/06/2003.
- CIA. 2003. The world factbook 2002 – Korea, South. Central Intelligence Agency, USA. <http://www.odci.gov/cia/publications/factbook/geos/ks.html> ; accessed: 18/07/2003.
- FAO. 1998. Fishery country profile – Republic of Korea. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, Report No. FID/CP/ROK.
- FAO. 2000a. Report of the KMI/APRACA/FAO Regional Workshop on the Effects of Globalization and Deregulation on Marine Capture Fisheries in Asia and the Pacific, Pusan, Republic of Korea, 11-15 October 1999. FAO Fisheries Report No. 624 FIIT/R624.
- FAO. 2000b. Sustainable contribution to food security. Asia-Pacific Fishery Commission, Regional Office for Asia and the Pacific, Food and Agriculture Organization of the United Nations, Bangkok, Thailand.
- Japan Access. 1999. Geography – A Pacific island country. <http://www.jin-japan.org/access/geo/pacific.html> ; accessed: 26/09/2001.
- KODEFA. 2003. Fisheries statistics – Republic of Korea. Korea Deep Sea Fisheries Association (KODEFA). http://www.kodefa.or.kr/english/index_k.htm; accessed: 07/07/2003.
- NSO. 2003. Summary of census population of Korea. National Statistics Office of Korea (NSOK). http://www.nso.go.kr/cgi-bin/sws_888.cgi?ID=DT_1IN0001&IDTYPE=3&A_LANG=2&FPUB=4&SELITEM=; accessed: 06/06/2003.

PRFP. 2003. Republic of Korea – fisheries statistics 2000. Pacific Rim Fisheries Program (PRFP), Anchorage, USA.
http://prfisheries.alaskapacific.edu/PRF_Statistics/index.php?page=Korea ; accessed: 14/06/2003.

Lee, Sang-go. 2000. Transition to responsible fisheries. Fisheries labour and adjustment to responsible fisheries, case studies – Korea. OECD Report No. AGR/FI(2000)/Final, Organization for Economic Co-operation and Development (OECD), Paris, France, p. 41-52.

Lery, J.-M., J. Prado and U. Tietze. 1999. Economic viability of marine capture fisheries. Findings of a global study and an interregional workshop. FAO Fisheries Technical Paper. No. 377, Rome, FAO, 130p.

NOAA. 2003. Korea – Integrated coastal management (ICM) country profile. National Oceanic and Atmospheric Administration (NOAA), USA.
<http://icm.noaa.gov/country/Korea.html> ; accessed: 07/07/2003.

NSO. 2003. Fisheries statistics of Korea. National Statistical Office (NSO), Republic of Korea.
http://www.momaf.go.kr/eng/fish/statistics_view.asp?tablename=ENG_STATISTICS2&page=1&l=10&k=1&search=&searchstring=&idx=3 ; accessed: 26/07/2003

OECD. 1997. Towards sustainable fisheries: country reports – Korea. OECD Report No. OCDE/GD(97)199, Organization for Economic Co-operation and Development (OECD), Paris, France, p. 381-391.

OECD. 1998. OECD health data. <http://healthguide.kihasa.re.kr/statistics/sts100030.html>; accessed: 23/07/2003.

OECD. 2000. Transition to responsible fisheries. Post-harvesting practices and responsible fisheries, case studies – Korea. OECD Report No. AGR/FI(2000)9/Final, Organization for Economic Co-operation and Development (OECD), Paris, France, p. 39-51.

OECD. 2001. Fisheries data of the Republic of Korea.
http://www.oecd.org/document/7/0,2340,en_2649_37401_1837127_1_1_1_37401_00.html ; accessed: 29/07/2003.

OECD. 2002. Draft review of fisheries, Part 8: Korea. OECD Report No. AGR/FI(2002)11/Part8, 13 p.

Silpachai, D. 2001. The Bangkok declaration and the strategy for aquaculture development beyond 2000: the aftermath. RAP Publication 2001/120, The Food and Agriculture Organization of the United Nations, Rome, Italy.

Tietze, U., J. Prado, J.-M. Le Ry and R. Lasch (Eds.). 2001. Techno-economic performance of marine capture fisheries and the role of economic incentives, value addition and changes of fleet structure. Findings of a global study and an interregional workshop. FAO Fisheries Technical Paper No. 421, Rome, FAO, 80 p.

World Bank. 2003. Korea – economic data. The World Bank Group, New York, USA.
<http://devdata.worldbank.org/external/CPProfile.asp?SelectedCountry=KOR&CCODE=KOR&CNAME=Korea%2C+Rep.&PTYPE=CP> ; accessed: 23/07/2003