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NATIONAL FISHERIES SECTOR OVERVIEW

PERU

3. FISHERIES SECTOR STRUCTURE

3.1 Overall fisheries sector

The fisheries sector is a key component of Peru's economy, mainly as a significant source of foreign currency, after mining. Particularly important is the marine fisheries sector, followed to a lesser degree by inland fisheries and aquaculture. In 2008, landings of marine and inland aquatic living resources amounted to 7 353 000 tonnes, with an export value of 2.335 billion US dollars. This represented a 19 percent increase over the value of exports in 2007.

Peru's fisheries activity is traditionally based on its marine pelagic resources, mainly anchovy (*Engraulis ringens*) and other species such as jack mackerel (*Trachurus murphyi*) and chub mackerel (*Scomber japonicus*). Recent years have seen a larger share of other resources including giant squid/pota (*Dosidicus gigas*) and dolphinfish (dorado/perico) (*Coryphaena hippurus*).

Next in importance are demersal or coastal trawl fisheries, mainly involving hake (*Merluccius gayi*). The vulnerable state of hake stocks early this decade prompted a new Regulation on Fisheries Management to help medium-term recovery and the sustainable harvesting of hake and associated species. A Technical Commission was set up to propose fishery management measures, based on fishery life cycle studies and socio-economic factors. The Commission includes representatives from the commercial fisheries sector.

Also important is the artisanal or small-scale fisheries sector made up of small vessels with a hold capacity of up to 32.6 m³. These mostly harvest resources along the coast, which include an estimated 220 species, of which some 80 percent are finfish, 17 percent invertebrates, 2 percent algae and the remaining 1 percent other resources. There are some 200 fishing settlements involved in this fishery along the Peruvian coast, whose catches are mainly for direct human consumption (DHC). About 721 000 tonnes were taken by artisanal fisheries in 2008.

In recent years part of the small-scale fleet has diversified towards giant squid (pota), taking as many as 485 000 tonnes (2008).

Other marine fisheries could be developed by diversifying traditional capture and processing techniques, although this would require specialized vessels, especially for tuna and deep-water cod. Other potential resources, such as deep-water red prawn (langostino) and king or giant crab, have been identified as a basis for future fisheries.

Inland fisheries occur mainly in the rivers and swamplands of the Amazon, in small lakes of the sierra and highland forest areas and in Lake Titicaca. In 2007, the inland fisheries catch amounted to 43 000 tonnes of fish.

In 2008, inland and marine aquaculture produced some 43 000 tonnes. The value of aquaculture exports for the same year was USD 94 million. Marine aquaculture accounted for 65.24% and inland aquaculture 34.76%. The main cultured species were rainbow trout (*Oncorhynchus mykiss*) with 12 400 tonnes; Peruvian scallop (*Argopecten purpuratus*) (14 800 tonnes); whiteleg shrimp (*Litopenaeus vannamei*) (13 300 tonnes) and Nile tilapia (*Oreochromis sp.*) (1 700 tonnes). Other cultured species included algae (*Gracilaria spp.*);

boquichico (*Prochilodus nigricans*); giant Malaysian prawn (*Macrobrachium rosenbergii*); gamitana or black pacu (*Colossoma macropomum*); Pacific oysters (*Crassostrea gigas*); red pacu (*Piaractus brachipomus*); silverside (*Odontesthes bonariensis*) and carp (*Cyprinus carpio*). Other species cultured in recent years include sailfin catfish (*Pterygoplichthys multiradiatus*); red-tailed brycon (*Brycon cephalus*); and netted prochilod (*Prochilodus reticulatus*).

Shrimp culture (*Penaeus vannamei*) has intensified in Peru, mainly because of higher world demand, lower captured volumes, the profitability of the culture and its importance as a source of foreign currency. The culture of this species could help raise overall production, depending on international demand and market prices.

3.2 Marine fisheries subsector

Pelagic industrial fisheries are the most developed, with the highest rate of growth since fisheries activity began in the 1950s. In the 1960s, harvesting of anchovy, the single target species at the time, increased fourfold from 3.5 million to 12 million tonnes. However, this fishery collapsed in the early 1970s because of excessive fishing and processing capacity and the 1972/73 El Niño event. After a long interval, there were signs of anchovy recovery in the 1990s, with catches reaching similar levels to the 1960s. However, a further El Niño event in 1997/98 again undermined the anchovy fishery, cutting the harvest to 1.2 million tonnes in 1998. But this time and in contrast to 1972/73, the fishery was able to quickly recover because appropriate fishery administrative measures had been taken. As a result, 6.6 million tonnes were landed in 1999. This was followed by a substantial increase in catch, reaching 9.6 million tonnes of anchovy in 2000, higher than the 8.0 million tonnes subsequently caught in 2002, 2004 and 2005. The global quota system that was applied is considered to have disrupted fisheries by creating an urgency to maximize catch levels. This produced overcapacity and pressure on fish stocks and the environment, resulting in shorter fishing seasons. This led to Legislative Decree 1084 establishing the "Law on Maximum Catch Levels per Vessel", a regulatory instrument assigning individual rights to fishery resources and intended to rationalize fishing effort. The idea is that catch limits per vessel will impact positively on the industry, with better programming of fishing activity, longer fishing seasons and a consequent reduction in environmental impact.

Demersal fisheries in the form of bottom trawling relatively close to the coast began in the mid 1960s. Landings have risen significantly since then because of factory trawlers. In 1978 catches amounted to just over 300 000 tonnes, with 150 000 tonnes caught by purse seiners. Such quantities undermined hake stocks in subsequent years with only 79 000 tonnes landed in 1988. The level did then rise to 235 000 tonnes in 1996, before again declining to 32 000 tonnes in 1999 and 125 000 tonnes in 2001. In recent years, hake landings have stood at around 30 000 tonnes.

Artisanal fisheries is defined as that carried out by artisanal natural or legal persons that have no vessel or a vessel with a hold capacity of up to 32.6 cubic metres and a length of up to 15 metres, and where most of the work is done manually. Small-scale fisheries is that with vessels also with a maximum hold capacity of 32.6 cubic metres, but using modern fishing gear and methods. Artisanal fisheries in Peru plays a twin social role: first, as a key source of employment significantly helping to mitigate poverty; and, second, as an important provider of protein food for the poorer population groups.

One characteristic of this fishery has been the increase in fishing effort in the last ten years, both in terms of number of fishers and fishing vessels and of time spent fishing. Artisanal fishing grounds are currently not limited to an area within 5 miles of the coast but often extend beyond 10 nautical miles, making it the national fleet operating in the largest ocean area.

Artisanal fishing gear and methods include: driftnet, hook-and-line, compressor diving, purse seine and surface longline. About 9 percent of vessels have two or more types of gear. Land-based fishers (i.e. without vessel) use artisanal trawl nets or gather algae ('algueros') or molluscs. Other fishers catch freshwater shrimp (*Cryphiops caementarius*) in coastal rivers.

Most artisanal fishery landings are destined for sale on local or domestic markets for direct human consumption in fresh state.

3.2.1 Capture profile

Catches are reported according to main fishery and marine fishing area, grouped into pelagic, demersal and coastal fisheries.

The pelagic species accounting for the bulk of landings are anchovy (*Engraulis ringens*), jack mackerel (*Trachurus murphyi*), chub mackerel (*Scomber japonicus*) and dolphinfish (dorado/perico) (*Coryphaena hippurus*). Aggregate catches in the last ten years had a low of 3.6 million tonnes in 1998 and a high of 10.2 million in 2000. Landings of these species in 2008 amounted to 7.4 million tonnes.

The harvesting of demersal species is mainly by coastal trawl fishery. The principal species is Peruvian hake (*Merluccius gayi*); other species are lumptail searobin (vocador or falso volador) (*Prionotus stephanophrys*), humpback smooth-hound (tollo) (*Mustelus whitneyi*), weakfish (ayanque) (*Cynoscion analis*) and rock seabass (cabrilla) (*Paralabrax humeralis*). Overall catches in the last ten years fluctuated between a low of 35 500 tonnes in 2006 and a high of 142 000 in 1998. Demersal landings have stabilized at around 40 000 tonnes in the last five years.

Coastal species, mainly caught by artisanal and small-scale fisheries, have reached a total of between 27 000 tonnes and 77 500 tonnes annually in the last ten years. Principal species are silverside (*Odontesthes regia*), flathead grey mullet (liza) (*Mugil cephalus*) and lorna drum (*Sciaena deliciosa*).

Other stocks in this fishery include: crustaceans (prawns) with about 15 000 tonnes and molluscs (Peruvian scallop - *Argopecten purpuratus*) with 25 000 tonnes, and squid (*Loligo gahi*) with 15 000 tonnes each year. Landings of giant squid (*Dosidicus gigas*) amounted to 428 000 tonnes in 2007 and 485 000 tonnes in 2008.

Landings for indirect human consumption (IHC) amounted to 6.1 million tonnes in 2008. Fifty-five percent of total catches for this market were sent to processing plants in the central coastal area. As regards the distribution of these catches by landing point, 85.9 percent were landed in the northern-central area and 14.1 percent in the southern area.

Harvesting of aquatic living resources for direct human consumption amounted to 1 227 000 tonnes in 2008, a comparative increase of 82 000 tonnes (7.2 percent) from 2007 due to higher deliveries to the fish canning and freezing industries.

Peru: Total landings of aquatic living resources by use ('000 MT)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total	4348	8431	10661	7995	8775	6098	9 619	9400	7028	7231	7353
Direct H.C.	651	643	748	787	618	751	808	772	1132	1145	1227
Canned	218	205	223	175	60	168	83	89	233	183	197
Frozen	129	114	141	199	185	185	308	322	482	538	607
Cured	41	51	51	55	49	49	50	48	43	42	47
Fresh	263	273	333	358	324	348	367	312	375	382	376
Indirect H.C.	3696	7788	9913	7208	8157	5347	8811	8629	5986	6086	6126
Anchovy	1206	6732	9556	6348	8083	5336	8797	8628	5892	6085	6117
Other species	2491	1056	357	860	74	12	14	0	4	1	10

Source: PRODUCE

Compiled by PROMPERU

3.2.2 Landing points

PERU: TOTAL LANDINGS OF MARINE RESOURCES BY PORT, 1998 – 2007
(MT)

Port	1988	1989	2000	2001	2002	2003	2004	2005	2006	2007
Total	4 310 271	8 382 378	10 826 323	7 855 980	8 741 386	8 080 836	8 674 269	8 353 308	6 883 483	7 178 689
Zorritos	1 732	6 336	4 372	5 377	5 463	2 439	3 624	3 929	1 128	1 825
Mancora	3 840	4 415	7 277	11 049	8 838	1 486	1 900	7 410	2 297	2 899
Palta	878 509	909 516	967 207	860 874	549 293	724 147	574 353	407 020	513 873	659 106
Sechura/Parachique	249 038	261 027	323 400	158 836	182 380	309 552	273 849	205 382	113 380	163 390
Baydvar	145 822	292 339	250 628	255 188	213 596	359 484	460 454	302 063	153 551	196 008
San José	3 512	4 457	8 217	8 201	12 002	3 862	2 562	7 057	5 127	3 146
Pimentel/Santa Rosa	18 700	22 750	18 557	24 285	21 752	15 383	11 125	8585	10 004	8 379
Chicama	257 439	467 361	1 014 268	717 171	655 044	1 161 457	1 226 885	575 440	697 587	821 412
Salaverry	7 917	1 681	11 152	624	149	-	1 186	3 425	5 083	2 264
Chimbote	404 717	1 499 443	1 678 666	1 600 227	1 204 714	860 538	1 632 309	1 326 799	988 673	1 072 047
Colshco	202 899	555 930	580 037	593 858	452 183	404 391	579 976	449 618	424 297	419 314
Casma	42 284	228 910	212 649	211 145	168 328	114 200	247 605	157 839	80 453	28 937
Samanco	42 973	107 461	129 110	121 567	48 858	63 330	185 655	179 287	153 155	131 775
Huarmey	113 101	190 095	199 073	235 896	213 431	157 032	309 797	255 961	173 012	155 712
Culebras	3 126	854	428	853	2 110	607	923	78 245	41 907	39 154
Super/Vidal	103 971	360 494	437 078	352 199	405 176	154 393	506 586	632 956	355 334	337 642
Vegueta	102 329	313 842	428 977	332 558	325 492	122 955	411 509	441 318	220 164	217 457
Huacho/Carquin	79 441	202 737	271 659	190 539	223 287	97 509	185 525	236 233	152 421	154 906
Chancay	324 530	829 459	1 093 827	583 121	714 683	253 468	752 896	788 198	496 253	432 570
Callao	213 986	396 951	698 112	366 959	462 702	282 767	645 421	629 268	469 953	476 124
Pucusana	24 830	13 313	6 104	27 209	25 546	8 422	8 371	9 024	13 072	8 231
Tambo de Mora	219 043	276 016	510 015	186 167	339 587	106 706	181 503	314 876	176 233	188 910
Pisco/San Andres	405 562	761 230	1 120 357	511 154	877 515	341 247	272 709	967 611	500 299	371 439
Lomas	964	19	4 651	5 334	4 095	2 617	2 722	5 041	3 663	3 540
Atico	15 874	65 258	55 703	39 475	152 549	10 029	62 920	234 570	127 120	146 053
La Planchada	61 396	50 065	20 358	55 748	94 332	21 916	42 811	201 443	149 133	134 307
Mollendo	19 129	38 788	43 169	54 551	74 241	18 895	53 313	83 342	101 059	117 588
Matarani	37 249	86 441	64 286	69 156	171 183	41 443	54 222	127 789	100 440	131 234
Ilo	210 503	317 133	275 402	229 792	922 665	208 853	598 651	485 343	519553	528 617
Others	115 855	128 057	191 584	145 707	200 202	211 857	282 887	228 224	234 239	224 713

N.B. Does not include output from inland fisheries

Source: Fishery Companies, Regional Offices of Production (DREPRO)

PORTS ALONG THE PERUVIAN COAST



3.2.3. Fishery production means

Fishing vessels

The Peruvian fishing fleet is classified as large-scale when with a hold capacity of more than 32.4 m³ (about 30 metric tonnes), and as small-scale or artisanal when below that limit.

N°	VESSEL/PERMIT	N°	HOLD CAPACITY m ³	GEAR			
				PURSE SEINE	TRAWL	PS/T	OTHERS
A	AN/SAR	343	100 634.74	343			
B	AN/SAR/JACK/CHUB	42	19 072.39	42			
C	AN/SAR/JACK	1	868.27	1			
D	JACK/CHUB	6	2 083.51	5	1		
E	PRAWN	2	103.71		2		
F	HAKE	40	4 273.11		40		
G	HAKE/JACK/CHUB	11	2 894.14	1	5	5	
H	SAR/JACK/CHUB	3	272.40	3			
I	SAR	2	370.00	2			
J	AN	183	46 022.75	183			
K	JACK/CHUB/PRAWN/MISC.SP	22	2 208.78	1	4	1	16
L	AN/JACK/CHUB	4	780.93	4			
N	AN/SAR/JACK/CHUB/MISC.SP	1	118.63			1	
P	AN/JACK/CHUB/MISC.SP	1	111.36	1			
TOTAL		661	179 814.72	586	52	7	16

Legend:

AN = anchovy
 CHUB = chub mackerel
 JACK = jack mackerel
 SAR = sardine

The licensed large-scale fleet is made up of industrial pelagic purse seiners, coastal trawlers and mixed or other gear. The total hold capacity of this fleet is 179 800 m³.

The purse seine fleet has 586 vessels with hold capacities of between 34 and 868 m³, licensed to fish anchovy and sardine, jack mackerel and chub mackerel. The total hold capacity of this fleet is approximately 142 500 m³. A further 502 wooden purse seiners, known as "Vikings" and with hold capacities of between 32.6 and 110 m³, are licensed to fish anchovy and sardine. These have a total hold capacity of about 31 500 m³.

The trawl fleet has 52 vessels with an aggregate hold capacity of 6 400 m³. Forty-five of these are licensed to fish hake. There are also 23 multipurpose vessels (with a variety of gear including surface longline, bottom longline, purse seine, trawl and trap) that are licensed to harvest different aquatic species including dolphinfish and shark. This segment of the fleet has an overall hold capacity of about 3 600 m³.

The small-scale or artisanal fleet comprises an estimated 9 667 vessels using gear that includes: driftnet (33 percent), hook-and-line (19.6 percent), compressor diving (13.7 percent), purse seine (12.3 percent), surface longline (9.8 percent) and trawl net (1.5 percent). Some 9 percent of vessels have two or more gear.

Peru's fishery legislation allows foreign vessels to operate in its territorial waters, subject to application for fishing and navigation permits, payment of fishing fees and compliance with the provisions of the corresponding Regulations on Fisheries Management.

3.2.4 Main resources

The waters facing Peru are part of the anti-cyclonic movement of the eastern part of the Southern Pacific Ocean and are characterized by slow-moving surface currents. This creates a complex system of water flows and masses with seasonal variations associated with the south-eastern trade winds, which are light in summer and strong in winter. In addition, there

are abnormal irregular variations, principally the unusually hot periods referred to as 'El Niño', which bring sweeping scale change to the Southern Pacific's oceanic and atmospheric system.

These conditions produce an upwelling ecosystem that is conducive to abundant and diverse aquatic living resources off the Peruvian coast.

Peru only exploits a portion of the broad diversity of species that exist in its extensive marine zone. The marine fish fauna comprises some 736 species, which vary more in the north and proportionately less so towards the south. Only 80 of these species (11 percent) contribute significantly to industrial fisheries and human consumption.

In addition, some 40 species of mollusc are caught, representing 5 percent of the 870 known species of mollusc, and 23 species of crustacean, accounting for 7 percent of the 320 or so known crustacean species.

Marine fisheries centres mainly on species living in the pelagic/neritic zone, generally to depths of no more than 100 fathoms. The most commercially important fish families are: Engraulidae ("anchovy", *Engraulis ringens*), Carangidae ("jack mackerel", *Trachurus murphyi*), Scrombidae ("chub mackerel", *Scomber japonicus*), Merlucciidae ("hake", *Merluccius gayi*), Sciaenidae ("lorna drum", *Sciaena spp.*) and Serranidae ("rock seabass", *Paralabrax spp.*).

The main species of mollusc are mussel (*Aulacomya ater*), sea snail (*Thais chocolata*), clam (*Semele solida*), Peruvian scallop (*Argopecten purpuratus*), "chanque" (*Concholepas concholepas*), surf clam (macha) (*Mesodesma donacium*) and squid (*Loligo gahi*).

Crustacean landings include prawns, shrimps, lobsters and various crabs and swimcrabs.

Distribution of main resources and fishing areas

Anchovy (*Engraulis ringens*) is distributed geographically between 03°30' S and 37°00' S, mainly within 100 nautical miles of the coast, with its major concentrations between 04°00' S and 16°00' S. Jack mackerel (*Trachurus murphyi*) is found from Ecuador (01°38' N) to southern Chile (55° S), while chub mackerel (*Scomber japonicus*) is distributed between Manta and the Galapagos Islands (Ecuador) and south of Darwin Bay in Chile (45° S). In Peru both species are found latitudinally off the whole coastline, both in territorial waters and in the high seas.

Hake (*Merluccius gayi*) is found in shallow waters and at depths of more than 500m in an area that extends from the extreme north of Peru 00°30' S to 13° 56' S (Chirichigno, 1974). Giant squid (pota) (*Doscidicus gigas*) is widely distributed in the Eastern Pacific, from the Gulf of California (36°N) down to 47° S.

The purse seine fleet operates mainly in the area from Paita (6°30' S) southwards. The main ports are Paita, Chimbote, Supe, Callao, Pisco and Ilo. The trawl fleet prefers to operate north of 6° S, where the continental shelf is widest.

The large-scale fleet of wooden vessels with hold capacities of between 32.6 and 110 m³ operate along the northern-central coastline close to their ports of origin, such as Sechura-Parachique, Santa Rosa, San José and Chimbote.

3.2.5 Management applied to main fishery activities

The purpose of Peru's fisheries management is to regulate fishery and aquaculture activity in order to foster their sustainable development and ensure the responsible use of aquatic living resources. Part of management is to establish instruments to generate legal and economic stability and thus encourage private investment in the sector.

As national capital assets, Peru's aquatic living resources are administered by the State. Their institutional management is entrusted to the Ministry of Production (formerly Ministry of Fisheries) through the Office of the Deputy Minister of Fisheries, whose main function is to balance the sustainable use of aquatic living resources, conservation of the environment and socio-economic development. The Office of the Deputy Minister of Fisheries oversees compliance with regulations on the health and quality of fishery products, the safety and hygiene of the fisheries industry and conservation of the environment.

The administration of fisheries and aquaculture embraces all operations that are directly or indirectly associated with the use of living resources of the sea and inland waters. Fisheries management is conducted through regulations (formerly Fisheries Management Plans) devised to set out the principles, rules and measures applied to aquatic living resources that are to be administered as separate entities.

Content of regulations

Regulations on fisheries management apply to each main fishery (hake, jack mackerel, chub mackerel, giant squid, etc.). Each regulation sets out the objective of management and, as appropriate, the fishery entry regime, total fleet and processing capacity, fishing seasons, total allowable catch, fishing gear, tackle and methods, minimum sizes, prohibited zones, research needs and control and surveillance actions.

The entry regime for fishery activity is in the form of authorization to increase fleet size and fishing permits, issued in accordance with the provisions of the regulation and the state of exploitation of the resource in question. The entry regime for aquaculture is in the form of authorizations and concessions. Entry to fishery processing is regulated through installation permits and operating licences.

Classification of resources by level of exploitation

Entry to individual fisheries is regulated by classification of the state of the resource in question, based on scientific evidence and level of exploitation. Classification categories include: a) Unexploited resource when there is no activity; b) Underexploited resource when activity could be increased; and, c) Fully exploited resource when activity is at maximum sustainable yield.

With regard to unexploited aquatic living resources, research projects with exploratory and trial cruises are encouraged. A research project must be approved by the IMARPE.

In the case of underexploited aquatic living resources, entry is regulated by authorization to increase fleet size and fishing permits, taking care to match fishery growth with stock potential.

Where a resource is fully exploited, no authorization to increase fleet size (entry of new vessels to the fishery) is granted and no fishing permits are given to enter that fishery. Exceptionally, authorizations or permits may be granted to replace comparable hold capacity of existing fleet in that fishery.

Provisional restrictions apply where fishery activity could jeopardize stock sustainability, as in the case of hake which is subject to a recovery regime.

Fisheries or aquatic living resources not specifically covered in the fishery management regulations are for the most part governed by the rules in the General Law on Fisheries and its Regulations.

3.2.6 Fishing communities

The Second Structural Survey of Artisanal Fisheries on the Peruvian Coast (II ENEPA), conducted from September 2004 to May 2005, indicates that the number of artisanal fishers increased by 34 percent (from 28 082 to 37 727) in the ten years from 1995 to 2005. This was natural given the country's demographic growth and the geographic distribution of poverty, with migration to the coast and its free access to artisanal fisheries as a livelihood strategy. These figures include fishers with boats, fishers without boats (land-based), beach trawl netters, algae collectors and fishers of freshwater shrimp (*Cryphiops caementarius*).

The II ENEPA survey also showed that the average level of education of artisanal fishers had risen significantly; those with secondary education increased from 44 to 54 percent. This indicates the migration of a better educated population to fishing, confirming national statistics on higher underemployment. It is also interesting to note the 7.1 percent of fishers with higher education.

All fishers, especially artisanal fishers, belong to some form of group, whether trade association, trade union, marine association, collective or other organization.

An analytical study of the social status of work in the fisheries sector reveals that women working in production are generally employed in processing plants for direct human consumption, where they are recruited seasonally and are paid per shift according to productivity. In the fish canning plants, the women work on different production lines, sorting, cleaning and filleting fish, filling cans, adding coating medium, labelling, and in the cleaning areas, doing quality control and other activities best suited to women because of their application and their deft hands and because the work is lighter than that of the men.

In the case of artisanal fisheries, the fishers' wives sell the fish privately and daily during the day or when the fish are landed.

A final noteworthy feature has been the professional integration of women in fishing, processing, marketing, research and development, even to the point of holding positions of supervisors and managers in the public and private sectors.

3.3 Inland fisheries subsector

In the Amazon

The Peruvian Amazon is characterized by its geographical and biological heterogeneity. The region covers 778 449 Km² and thus accounts for 61 percent of the whole country. The diversity of species in the Peruvian Amazon is considered to be greater than that of other catchment areas and is estimated at 726 species. Only 70 of these are commercially fished for human consumption, while 420 species are caught for ornamental purposes.

Fishing is one of the oldest activities in the region, serving as the basis for providing food and generating employment. In 2005, fishery activity harvested 36 600 tonnes, including 19 500 tonnes (53.3 percent) for curing (salted, dried and salted, smoked) and 17 100 tonnes for consumption fresh (46.7 percent).

In the Sierra

Most fishing activity in the Peruvian Sierra is on Lake Titicaca, focused on the native species Ispi (*Orestias* genus), a species with pelagic habits but also caught in shoreline waters when breeding; Carachi (*Orestias agassi*), caught with driftnets and other local gear; Boga (*Orestias pentlandii*), highly prized commercially for its quality and size, and caught in areas of medium depth with a type of trawl net called "bolsa"; Suche and Mauri, types of catfish found throughout the lake and currently in decline, because of overfishing and low fecundity

levels. An indefinite close season has in fact been placed on Suche, Boga and Mauri throughout Puno Department.

Ipsi is protected each year by close season during its breeding period of January to March. However, greater protection is needed because this species is increasingly used as trout feed.

Other important resources in the Sierra and Lake Titicaca are introduced species: trout and Argentine silverside (*Odontheistes bonariensis*). Silverside is a pelagic found at depths of between 10 and 50 m. It is caught in two fishing areas: the open lake where fishing takes place all year and the shoreline area where larger specimens are caught. Fishing is with driftnet.

Silverside are also managed in lakes of Apurímac, Cusco and Puno, where minimum sizes and fishing seasons have been established according to the breeding season.

Trout is the species best adapted to the conditions of Lake Titicaca where it lives in deep open waters alongside its prey, the Ipsi. Trout is caught by driftnet, mainly near the river mouths.

On the coast, freshwater shrimp fishing (*Cryphiops caementarius*) occurs principally in the rivers of the south and centre of the country. The species is protected by fishing ban at the peak of its breeding season which usually coincides with the summer months. Harvesting is only allowed with selected gear and fishing methods and minimum sizes are imposed.

Sierra fisheries produced 6 585 tonnes in 2005, mainly trout (5 474 tonnes). Eighty-eight percent of the total catch was consumed fresh and 22 percent was cured.

Fishing vessels

Fishing vessels in the Amazon region can be classified into four groups according to their characteristics: large-scale vessels for commercial fishing or regional use; small-scale vessels for local use; craft for subsistence fishing; and boats for sports fishing. Other vessels are also used to catch ornamental fish.

The larger vessels have an average length of 21 metres and are fitted with isothermal boxes of between 10 and 30 m³. These account for 15 percent of the Amazon catch. The vessels for small-scale fishing are shorter and equipped with isothermal boxes of 3 to 10 m³.

The craft for subsistence fishing are dugout canoes and small boats. It is estimated that there are some 42 000 such craft harvesting about 75 percent of the annual Amazon catch. Ornamental fish are caught using small motorized or rowing boats.

The main stocks caught in the Peruvian Amazon are: 'boquichico' (*Prochilodus nigricans*), 'llambina', 'palometa', 'maparate', 'ractacara', 'yahuarachi' and 'yulilla', while species with highest commercial value are: 'paiche' (*Arapaima gigas*), 'gamitana' or black pacu (*Colossoma macropomum*), 'tucunare', 'acarahuazu', dolphinfish, 'doncella' (*Pseudoplatystoma fasciatum*), 'cunchimama' and red pacu (*Piaractus brachypomus*).

Fishing on Lake Titicaca is mainly in the shoreline area for native species and in the pelagic and shoreline area for silverside. Fishing is with small craft usually equipped with gillnets.

Freshwater shrimp (*Cryphiops caementarius*) is fished in some rivers of the Sierra and the coast, producing an estimated harvest of 743 tonnes in 2005.

3.4 Recreational fisheries subsector

Sports fishing is for leisure or tourism and, if private, does not require a fishing permit.

3.5 Aquaculture subsector

Aquaculture started in Peru in the mid 1920s, when fertilized rainbow trout eggs were imported from the United States. Shrimp farming began in the late 1980s when IMARPE and the then Ministry of Fisheries conducted the first culture trials in the Tumbes area. Shrimp farming was subsequently taken over by private enterprise. Scallop farming began in Pisco in the early 1980s triggered by abundant natural production of seed in those years. Scallop culture was later successfully pursued in several coastal areas.

Peru's aquaculture still involves few species. In 2008, of the total aquaculture area, 77.8 percent (18 300 ha) was for marine aquaculture and 22.2 percent (5 240 ha) for inland aquaculture. The most advanced cultures are scallop and prawn, which are mainly for export. Trout farming is progressing in the high Andes for the local market and export. Other species cultivated in tropical zones are native species: 'gamitana' or black pacu (*Colossoma macropomum*), red pacu (*Piaractus brachypomus*) and 'boquichico' (*Prochilodus nigricans*), mainly for the local market. Tilapia is farmed in the highland forest areas of San Martín for local consumption, and on the northern coast of the country for the domestic market and export, but this form of aquaculture is still in its infancy, producing little.

Aquaculture has grown in recent years in Peru. By the end of 2000, a total of 1 115 authorizations had been granted covering a water surface area of 10 810 hectares. By late 2008, there were 3 497 authorized aquaculture establishments covering a water area of 23 600 hectares – clear evidence that aquaculture is rapidly becoming a viable option for economic development of the country.

Peru's aquaculture sector is regulated by the Law on the Promotion and Development of Aquaculture (Law N° 27460) and its Regulations (Supreme Decree N° 030-2001-PE). These supplement the General Law on Fisheries as far as aquaculture is concerned. Aquaculture activity is subject to a 'Concession' or an 'Authorization'. Concessions are granted for water and land in the public domain, while authorizations are required for aquaculture on private land and for research and restocking activities. Both licences are granted for periods of between 10 and 30 years.

Aquaculture licences are granted for subsistence level (annual production below 2 tonnes), small-scale level (annual production between 2 and 50 tonnes) and large-scale level (annual production above 50 tonnes). Fish seed and fingerling centres are classified as small-scale.

The Law on the Promotion and Development of Aquaculture also establishes an incentives scheme, with 15 percent income tax, suspended payment of aquaculture fees until 31 December 2010 and the option to subscribe to the legal stability agreements under Legislative Decrees N° 662 and 757. With regard to labour law and social security, aquaculture workers are included under the Health Insurance of agricultural workers established by Law N° 27360, replacing the health benefits scheme, with monthly contributions paid by the employer.

In the middle of 2008, investment in aquaculture and its streamlined administration were declared in the national interest in order to ensure the transparency and rapidity of administrative processes relating to the granting and management of licences, for which the Aquaculture Single-Window Facility (Ventanilla Unica: 'one-stop service' was created.

4. POST-HARVEST USE

4.1 Fish utilization

In 2008, 6.1 million tonnes of landings were used for indirect human consumption (IHC) in the manufacture of fishmeal and fish oil, with anchovy accounting for 99.8 percent of this and other species the remaining 0.2 percent. A total of 1.2 million tonnes were used for direct human consumption (DHC) (canned, frozen, cured and fresh) as follows: 197 400 t for canning, 606 800 t for freezing, 46 900 t for curing and 375 800 t for consumption fresh.

Total production for IHC amounted to 1.7 million tonnes, including 1.6 million tonnes of fishmeal and 234 800 tonnes of fish oil.

While the IHC industry accounted for 81 percent of fishery production, last year's increase was driven by the development of DHC products, which rose 10.6 percent to 412 700 tonnes. Canned products increased 20 percent and thus reversed the decline of 2007, and frozen products rose 8 percent and thus consolidated their recent upward trend.

There are 179 industrial fishery processing plants for DHC (2006 statistics): 73 canneries with a production capacity of 175 682 cans/shift; 93 fish freezing plants with a capacity of 3 913 tonnes/day; and 13 plants for cured fish products with a capacity of 1 243 tonnes/month.

4.2 Fishery markets

Domestic market

In 2008, a total of 562 000 GMT of fishery products were sold on the domestic market, down 5.1 percent from 2007 due to lower sales of raw fish oil (41.4 percent), fishmeal (25.1 percent), frozen products (5.3 percent) and products to be consumed fresh (1.5 percent).

Exports

The year 2008 saw record Peruvian fishery exports, with an FOB value of 2.335 billion USD for 2.208 billion tonnes (product weight), a volume up 19 percent from 2007 while the value also increased in virtually all items, except fresh products. With regard to volumes, all items increased except fresh products and fish oil, whose value however increased by almost 52 percent because of high fish oil prices during much of the year.

Products for IHC, such as fishmeal and fish oil, again accounted for the bulk of export earnings with 77 percent and 1.807 billion USD, while other uses contributed 1 percent of the total, with 19 million USD.

The principal market for IHC products is China, which receives 41 percent, followed by Germany with 9 percent and Japan with 8 percent. With respect to the export of fishery products for direct consumption, Spain topped the market in 2008 with 17 percent, a rise of 9.2 percent. Next came China with 15 percent and a growth of 74 percent, driven mainly by shipments of giant squid (pota). Third was the United States with 15 percent and a 12.2 percent hike. There then followed France and the Republic of Korea, each with a 6 percent share.

In 2008 frozen product exports were worth 463 million USD, accounting for 79 percent of DHC items and 19 percent of total fishery exports. In terms of volume, 328 543 tonnes (product weight) were shipped, representing 15 percent of fishery exports. The main export markets for these products were China, United States and Spain, with respective shares of 19 percent, 17.2 percent and 16.1 percent. These were followed by France with 7.9 percent, Republic of Korea with 7.1 percent, Italy with 4 percent and Japan with 3.5 percent.

Exports of canned products grew 16 percent from the previous year, with a remarkable 51 percent increase for canned chub mackerel, 34 percent for fish pieces, 73 percent for canned 'sardine type' anchoveta and 99 percent for canned anchovy. Overall exports in this category amounted to 89 million USD representing 4 percent of the fisheries total. In terms of volume, 39 100 tonnes were exported (product weight), equivalent to approximately 3 million cans.

The 2008 FOB value of chilled fresh fish amounted to 5 million USD for 630 tonnes or 0.2 percent of the sector total. The main items in this subsector are razor clams and whole deep-water cod, followed by filleted and whole dolphinfish, sea urchin and whole trout, with an aggregate export value of more than 200 000 USD.

Ornamental fish

Ornamental fish exports rose 11 percent in the last year. The main market was Hong Kong Special Administrative Region of China, accounting for 45 percent of shipments and a 30 percent growth from the previous year. Next was the United States with a 13 percent share but a 12 percent drop in imports, then Japan with 10 percent and Taiwan province of China with 9 percent. Other markets with increased demand were Thailand with 52 percent growth, the Czech Republic with 52 percent and Canada with 26 percent.

5. FISHERIES SECTOR PERFORMANCE

5.1 Economic role of fisheries in the national economy

Although fishing activity only contributed between 0.5 and 0.6 percent of GDP in the last ten years and, coupled with processing activity, between 0.8 and 1.4 percent of GDP, the sector's greatest contribution has been the foreign currency it earns from exports and the employment it creates. Including fish processing, the fisheries sector's contribution to GDP rose from 1.314 billion New Soles in 2003 to 1.748 billion in 2006, at constant 1994 prices.

5.2 Demand

Total utilization of fishery products amounted to 611 000 tonnes in 2007, with apparent per capita consumption of 21.4 kilos in 2007 and 22.1 kilos in 2008, which is higher than in previous years.

Apparent consumption per type of product in 2007 was: canned (4.2 kg); frozen (2.4 kg); cured (1.0 kg); and fresh (13.8 kg). In 2008, consumption changed slightly as follows: canned (5.5 kg); frozen (2.4 kg); cured (1.1 kg); and fresh (13.1 kg).

5.3 Trade

Foreign currency earnings from fishery exports amounted to 2.335 billion USD in 2008, including 1.807 billion USD from traditional products (fishmeal and fish oil) and 529 million USD from non traditional products (canned, frozen, cured and other).

According to PROMPERU, fishery product imports amounted to 60.6 million USD in 2008, which was 77 percent up from 2007. This was mainly because of higher imports of frozen, canned and cured products, at 65 percent, 135 percent and 1 438 percent, respectively.

5.4 Food security

Food security exists when all persons at all times have physical and economic access to sufficient safe and nutritious food to satisfy their food needs and preferences in order to lead a healthy and active life. In Peru, the proportion of animal protein provided by fish is approximately 23 percent (2007). Per capita consumption of fish is 21.4 kg. (2007). One proposal to boost fish consumption is to increase the supply of popular low-cost products. One way of resolving the problem of malnutrition in the region could be to include small pelagics in the diet. In contrast to other countries whose fisheries have reached maximum sustainable limits and cannot increase their contribution to global food supply, Peru can still

raise its food supply by diverting some of the catch (especially anchovy) currently used for fishmeal. With this in mind and as a short-term strategy, there are plans to establish a food security system that is based on a higher intake of fish, especially anchovy.

A significant increase in supply of anchovy-based fishery products is required to bridge the population's food deficit, and several higher added-value products are being developed to this end. The Institute of Fisheries Technology of Peru (ITP), a State agency responsible for fisheries research, development, training and technology transfer, has been working on the development and adaptation of technologies to manufacture anchovy-based processed products. Technology studies are also being conducted to fit small-scale fishing vessels with systems of effective onboard preservation of catches earmarked for processing plants.

5.5 Employment

Employment is mainly in industrial fishing and processing. Trends in the fisheries labour market, by type of activity, show that the number of workers rose from 121 629 in 1999 to 145 232 in 2007, a 19.4 percent increase in working population.

In 2007, the economically active population (EAP) in all sectoral activities amounted to 145 232 workers. Capture fisheries accounted for 58 percent, processing 19.3 percent, aquaculture 6.2 percent, while 16.6 percent of the fisheries sector EAP were engaged in related activities.

6. DEVELOPMENT OF THE FISHERIES SECTOR

6.1 Constraints

One characteristic of Peru's industrial fisheries is the variability of aquatic living resources because of climatic changes from natural cycles of influence, in other words changes of conditions from cold coastal upwellings or warm El Niño events. Likewise, market conditions for main products (fishmeal and fish oil) also vary.

Fisheries activity increased over a period of 10 years because of the recovery of stocks, notably anchovy, and because of the availability of external capital. Between 1996 and 2006, the number of vessels increased by 22 percent and total hold capacity by 32.9 percent and annual anchovy catches stabilized at about 6.5 million tonnes, except in 1998 because of El Niño. In late 1997 and throughout 1998, the Peruvian economy had to contend with the impact of El Niño and the prevailing international financial crisis.

The greater size of fleet relative to fish stocks resulted in overcapacity of the purse seine fleet. In the last three years, the national fleet engaged in fishing for IHC has only operated at 50 to 60 percent hold capacity, resulting in a systematic and rapid decline in number of days at sea since 2001. This gradual reduction in fishing days has heightened pressure on fish stocks because of much higher daily catch levels and has also destabilized the employment situation.

The introduction of maximum catch limits for anchovy should benefit the fishing industry by allowing appropriate management and more efficient operations. It should also generate incentives for a reduction of fleet.

Because of the possible negative impact on employment, alternatives have been studied to protect workers, especially those working with the fleet, in the form of compensation and redeployment following the introduction of the new system of maximum catch levels in anchovy fisheries for indirect human consumption.

6.2 Development prospects and strategies

The development of Peru's fisheries sector is conditional upon the availability of fishery resources and the levels of capture, production and export. The variability of fish stocks is in turn conditional upon the nature of Peru's waters, which include extensive areas of upwelling and high productivity that can generate large fish populations, especially in the neritic/pelagic environment favoured by anchovy. Scientific research on marine fishery resources carried out by the Marine Institute of Peru has generated sufficient insight to be able to rationally manage the country's main harvested resources.

New regulations for its main fishery suggest that anchovy catches in the coming seasons will match their historic average. Hake, the next most important fishery, is fully in the process of stock recovery, following a reduction of catch per unit effort and fishing area, and is successfully emerging from its condition of overfishing. Other aspects to be tackled by the fisheries sector are market access for bivalve molluscs and the revival of prawn culture after the temporary disruption caused by the global financial crisis. A better supply of raw material for frozen and canned products, more cannery operators and the inclusion of anchovy in the canning industry also augur well for recovery of this subsector.

With regard to tuna, supplies to local processing plants are expected to increase, both for the lucrative and competitive local market and for export. Other items such as ornamental fish exports could increase. With regard to aquaculture, new projects and investments should help boost exports.

The environment for Peru's fisheries for direct human consumption is expected to be favourable, thus stimulating greater development. This activity has grown rapidly in recent years on the strength of sustained global demand for DHC fishery products and new investments, especially in frozen and chilled products. The development of this industry, which is expected to continue in the next years, is raising exports and new investments.

As for aquaculture, this has grown steadily in the last 15 years, with a spurt between 2002 and 2007. There are a number of reasons for this development, which is helped by the stability of the country for investment and domestic economic growth: access of aquaculture products to foreign and sometimes local markets; the existence and application of aquaculture production technologies; and the availability of areas for expansion and of necessary inputs.

A measured projection of increased activity in 2013 suggests a doubling of current production figures. In the longer-term perspective of 2018, a projection of sustained growth would put Peru's aquaculture sector in the range of 100 000 to 120 000 tonnes each year. However, a more optimistic projection would put Peru's aquaculture production at 150 000 tonnes in 2018.

6.3 Research

The Marine Institute of Peru and the Institute of Fisheries Technology of Peru are responsible for scientific and technology research, respectively. The former undertakes scientific research into marine and inland water living resources, ecological factors, oceanography and limnology, and quality of aquatic environment. Its key function is to provide the scientific groundwork for fisheries resource management. The Institute of Fisheries Technology conducts research into processing and conservation of aquatic living resources.

The Research Institute for the Peruvian Amazon (IIAP) located in the city of Iquitos also conducts fisheries scientific research aimed at developing this important region.

6.4 Education

Formulating training and skills development programmes for artisanal fishers is the responsibility of the National Fisheries Development Fund (FONDEPES), at its base in the port of Paita. The Centre for Fisheries Training of Paita is responsible for promoting,

supporting and executing actions to help develop artisanal fisheries and its basic infrastructure. It also develops and conducts key actions to promote aquaculture.

7. FISHERIES SECTOR INSTITUTIONS

The Ministry of Production was created by Law N° 27779, which also sets out its functions to formulate, approve and supervise national policies for extraction and production activities relating to industry and fisheries, promoting their competitiveness and higher output, as well as the rational use of resources and protection of the environment. To that end, the Ministry of Production issues national rules and oversees their enforcement as the body governing the fisheries and industry subsectors.

The organizational structure of the production sector includes the Ministry of Production, the decentralized public bodies and the projects and commissions under its control. Its authority extends to natural and legal persons engaged in activities related to fisheries and industry. As regards fisheries, the production sector has competence over all aquatic living resources in marine waters under national jurisdiction and in rivers, lakes and other water bodies in the national territory. It includes scientific and technological research of the subsector, the ecological conditions of its habitat, the means for its conservation and harvesting, the quality, hygiene and safety of aquatic products, fisheries infrastructure, and the ancillary and support services needed to carry out capture, aquaculture and general fishery activities. It formulates policies to promote Peru as an ocean-related country and the use of aquatic living resources for human consumption.

The Deputy Minister of Fisheries is the Ministry of Production official directly responsible for the fisheries subsector, charged with making policy, guiding its implementation and ensuring compliance with the rules that cover the capture, processing and culture of marine and inland water aquatic resources. The technical bodies are the Departments of Aquaculture, Fish Harvesting and Processing, Artisanal Fisheries, Fisheries Environment and Monitoring, Control and Surveillance.

The Office of the Deputy Minister of Fisheries also guides and oversees the activities of the decentralized public bodies: the National Fisheries Development Fund (FONDEPES), the Marine Institute of Peru (IMARPE) and Institute of Fisheries Technology of Peru (ITP).

The Marine Institute of Peru is the fisheries public body charged with studying the marine environment and biodiversity, assessing fishery resources and providing information and advice for decision-making relating to fisheries, aquaculture and protection of the marine environment.

The National Fisheries Development Fund (FONDEPES) is a decentralized public body charged with creating and promoting skills and know-how to foster the sustainable and integrated development of artisanal fisheries, and to develop aquaculture.

The Institute of Fisheries Technology of Peru (ITP) is a public body responsible for making best possible use of the country's fishery resources, developing products with higher added value and facilitating better conditions of health and hygiene in fisheries and aquaculture.

The ITP is the executive arm of the National Fisheries Health Service (SANIPES) working to promote and certify the quality of fisheries and aquaculture resources and/or products in order to protect consumer health.

The Ministry of Production liaises with Regional Governments in determining policies, setting national rules and overseeing their enforcement for harvesting, extraction, production and processing activities in fisheries and industry, within the framework of the legislation governing the Decentralization Process.

Internet links for fisheries public bodies:

Ministry of Production: www.produce.gob.pe

Marine Institute of Peru: www.imarpe.gob.pe

National Fisheries Development Fund: www.fondepes.gob.pe

Institute of Fisheries Technology of Peru: www.itp.org.pe

8. GENERAL LEGAL FRAMEWORK

General Law on Fisheries – Decree Law N° 25977, framework legislation to regulate fisheries activity and promote its sustainable development as a source of food, employment and income, and to ensure the responsible use of aquatic living resources, optimizing economic benefits while safeguarding the environment and conserving biodiversity.

Regulation of the General Law on Fisheries – Supreme Decree N° 012-2001-PE, regulates the provisions set out in the General Law on Fisheries. It also sets out to simplify all rules and amendments and to include instruments to generate legal and economic stability and thus encourage private investment in the fisheries sector, reconciling those rules with the criteria of responsible management and sustainable utilization of aquatic living resources. The Regulation provides for legislation determining principles, rules and regulatory measures to be applied to aquatic living resources that are to be treated as separate entities, such as those outlined below:

Regulation on Fisheries Management of Giant Squid or Pota. Supreme Decree N° 013-2001-PE has as its objectives: the rational and sustainable harvesting of giant squid or pota, taking into consideration its biological and population characteristics, and optimization of the benefits resulting from its harvesting.

Regulation on Fisheries Management of Deep-water Cod – Ministerial Resolution N° 236-2001- PE, which seeks to promote the integrated development of deep-water cod fishing and to ensure the rational and sustainable use of this resource and related species, taking into account the biological and population characteristics and the principles of responsible fisheries, the conservation of the environment and biodiversity. It also seeks to strengthen the objectives of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) by adopting measures and rules to conserve and protect Antarctic marine living resources.

Regulation on Fisheries Management of Hake – Supreme Decree N° 016-2003- PRODUCE – The principal objectives of hake management are to achieve its medium-term recovery for the subsequent sustainable harvesting of hake and related species, taking into account the biological and population characteristics and the principles of responsible fisheries, conservation of the environment and biodiversity. Its also seeks to reconcile the participation of the different stakeholders in the harvesting and processing of hake.

Regulation on Fisheries Management of Tuna – Supreme Decree N° 032-2003-PRODUCE (04.11.03) – The management objectives are the rational and sustainable harvesting of tuna and related species both in Peruvian territorial waters and on the high seas, through the application of measures for the management and conservation of this fishery. It also provides for the development of tuna fishing by establishing a specialized national tuna fleet and having Peru participate actively in instruments of subregional, regional and global cooperation for research on highly migratory species, their protection and their integrated management.

Regulation on Fisheries Management of Jack Mackerel and Chub Mackerel – Supreme Decree N° 011-2007-PRODUCE – This aims to promote the rational harvesting of jack mackerel and chub mackerel stocks, to protect the marine ecosystem and to safeguard biodiversity in accordance with the principles and rules of the General Law on Fisheries and accompanying provisions, and to contribute towards the diversification and development of fisheries as a source of food, employment and foreign currency.

Regulation on Fisheries and Aquaculture Management for the Lake Titicaca Catchment Area – Supreme Decree N° 023-2008- PRODUCE - The purpose of this regulation is to lay the foundations for the rational and sustainable use of aquatic living resources and to develop fisheries and aquaculture activities in the Lake Titicaca basin, in accordance with the

principles of the Code of Conduct for Responsible Fisheries, and to conserve the ecosystems and biodiversity. The Regulation also seeks to establish a regulatory framework, adapted to the reality of the Lake Titicaca basin, that will serve to achieve dynamic equilibrium between economic growth, encouragement of investment and conservation of resources, including protection of the environment and biodiversity.

Regulation on Fisheries Management in the Peruvian Amazon – Supreme Decree N° 015-2009 - PRODUCE – Its objective is to lay the foundations for the rational and sustainable use of aquatic living resources and the development of Amazon fisheries, in accordance with the principles of the Code of Conduct for Responsible Fisheries, and the safeguarding of ecosystems and biodiversity, and to ensure dynamic equilibrium between economic growth, encouragement of investment and conservation of resources, including protection of the environment and biodiversity.