

FISHERY AND AQUACULTURE COUNTRY PROFILE	Food and Agriculture Organization of the United Nations	FID/CP/PNG  January 2010
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NATIONAL FISHERY SECTOR OVERVIEW

PAPUA NEW GUINEA (PNG)

1. GENERAL GEOGRAPHIC AND ECONOMIC DATA

Area:	462 243 sq km
Water area:	3 120 000 sq km
Shelf area:	[not determined]
Length of continental coastline:	17 000 km
Population (2007)*:	6 423 000
GDP at purchaser's value (2005/06 financial year)	5 521 million USD ¹
GDP per head (2006):	891 USD
Agricultural GDP (2006):	1 740 million USD ²
Fisheries GDP (2006):	185 million USD ³

*UN Population Division

2. FISHERIES DATA

2007	Production	Imports	Exports	Total Supply	Per Caput Supply
	tonnes liveweight				kg/year
Fish for direct human consumption ⁴	228 458	28 355	143 207	113 606	17.7
Fish for animal feed and other purposes	35 502	---	---	---	

Estimated Employment:	
(i) Primary sector (including aquaculture):	unavailable ⁵
(ii) Secondary sector:	Unavailable
Gross value of fisheries output (2007):	812 millions USD ⁶

¹ Staff of the PNG National Statistics Office provided information on GDP (K.Geberi, personal comm., September 2008). The average PNG Kina to USD exchange rate in 2006 was 3.06.

² Includes agriculture, forestry, and fishing

³ This is the official fishing contribution to GDP. A recalculation shows it to be about 15% greater. Source: Gillett, R. (2009). The Contribution of Fisheries to the Economies of Pacific Island Countries and Territories. Pacific Studies Series, Asian Development Bank, Manila

⁴ Data from FAO food balance sheet of fish and fishery products.

⁵ One reference states that 120,000 people are involved with fishing at least once per week and there are 2,000 to 4,000 part-time artisanal fishers. Source: Diffey, S. (2005). Market and Market Linkages Study. Rural Coastal Fisheries Development Project, National Fisheries Authority, Government of Papua New Guinea, and the European Union. A survey funded by the Australian Centre for International Agriculture Research (ACIAR) concluded that there were 8,000 freshwater fish farmers in the country in 2006.

⁶ From Gillett (2009); includes the six fishery production categories: (1) coastal commercial fishing, (2) coastal subsistence fishing, (3) locally-based offshore fishing, (4) foreign-based offshore fishing, (5) freshwater fishing, and (6) aquaculture.

Trade (2007):	
Value of fisheries imports:	21.6 millions USD
Value of fisheries exports:	138.7 million USD

3. FISHERY SECTOR STRUCTURE

3.1 Overall fishery sector

The small-scale fisheries of Papua New Guinea (PNG) reflect the diversity of the country's coastal environments. Along the mainland and high island coasts and in the smaller island communities fishing activities include the harvesting of the reef flats, spear fishing, shallow-water hand-lining from dugout canoes, netting, and trapping in the freshwater reaches of large rivers. In the swampy lowland areas net fisheries for barramundi, catfish, and sharks occur, while in the Gulf of Papua and parts of the Northern Islands Region there are also village-based lobster fisheries. Collection of invertebrates, both commercially (beche-de-mer, trochus and other shells) and for subsistence purposes is extensive, and may exceed finfish harvesting. Commercial shrimp-trawling operations take place in the Papuan Gulf and other parts of southern PNG. A small number of vessels use longline gear to catch sashimi-grade tuna for export to overseas markets by air. By far the largest fishery in the country is the purse seine tuna fishery, in which both locally-based and foreign-based vessels participate.

With respect to the current situation, fisheries in the waters of PNG can be placed into six categories. These categories and the associated production in 2007 are estimated as:

	Coastal Commercial	Coastal Subsistence	Offshore Locally-Based	Offshore Foreign-Based⁷	Freshwater	Aquaculture
Volume of Production (metric tonnes)	5 700	30 000	256 397	327 471	17 500	200
Value of production (USD)	27 027 027	35 472 973	345 976 228	386 361 944	16 554 054	675 676

Source: Gillett (2009)

The main trends and important issues in the fisheries sector

The main trends in the sector include:

- A large increase in the amount of the tuna caught in PNG, and an increasing proportion of the tuna catch being processed in PNG
- An increasing number of tuna processing plants operating in the country and a large increase in the number of people being employed in tuna processing.
- Decreasing number of locally-based longline vessels and associated employment in the present decade.
- Greater use of fisheries management plans to manage the major fisheries in the country.
- The country becoming increasingly assertive in Pacific Islands regional fishery affairs.

Some of the major issues in the fisheries sector are:

- Keeping management plans for specific fisheries current and functional is a great challenge.
- Although the national-level fisheries agency represents a very positive model that is being emulated by other Pacific Island countries, the capacity of the fisheries staff at the provincial level is quite low.
- There is considerable difficulty in developing coastal commercial fisheries and the past is littered with expensive attempts.

⁷ This is the catch in the EEZ zone of the PNG by vessels based outside the country. Normally, in FAO reporting on production in world capture fisheries, this catch will be reported as the catch of the nation(s) in which the vessel(s) is (are) registered.

- Reconciling the great need to create employment in the country with the reality that most of the newly created employment in the tuna industry are low-wage cannery jobs.
- The regional/global move to ecosystem-approach to fisheries management, however desirable, is clashing with the realities of fisheries management in PNG.
- The National Fisheries Authority Corporate Plan 2008-2012⁸ lists the following challenges and issues: regional purse seine tuna vessel over-capacity, effective surveillance and tuna resource concerns, lack of market access, inadequate onshore support facilities (particularly for coastal fisheries), lack of availability of trained staff and crew, conducive business climate for investment good governance, unavailability of credit facilities, fuel excise, and lack of linkage with other agencies or services.

3.2 Marine sub-sector

The marine fisheries have two very distinct components, offshore and coastal:

- Offshore fisheries are undertaken on an industrial scale by local and foreign purse seiners and longliners. There is also an industrial-scale shrimp fishery. In 2009 PNG reported to FAO a fishery fleet composed of 583 vessels, all larger than 12 m LOA, composed of 17 trawlers, 214 purse seiners, 83 trap setters, 30 long liners, 10 other type of liners, 153 multipurpose vessels and 76 other fishing vessels. Foreign flagged purse seiners also operate within the PNG EEZ.
- Coastal fishing is primarily carried out for subsistence purposes and for sales in local markets. In addition, there are some coastal fisheries that are export oriented: beche-de-mer, lobster, and trochus.

3.2.1 Marine Catch profile

Marine catches are dominated by the tuna fisheries, primarily longline and purse seine. Catch of tuna and tuna-like species by PNG reported to the Western and Central Pacific Fisheries Commission are:

Catch of tuna and tuna-like species by the PNG Tuna Fleet

	Gear	2003	2004	2005	2006	2007	2008	2009
Catch volume (tonnes)	Purse seine	156 727	221 164	231 805	229 124	226 895	202 829	209 333
	Longline	3 120	4 622	4 021	4 329	3 489	3 124	3 983
	Total	159 847	225 786	235 826	233 521	230 384	205 953	213 316
Number of vessels	Purse seine	28	44	51	42	47	49	41
	Longline	40	41	46	35	21	17	29
	Total	68	85	97	77	68	66	70

Source: WCPFC Yearbook

Includes foreign flagged vessels chartered to PNG.

Marine catches are dominated by the tuna fisheries, primarily longline and purse seine. Estimates of the volume and value of the catches from the PNG EEZ including those taken by foreign vessels are given in the table below.

Tuna Catches by the PNG Based Tuna Fleet

	Gear	2001	2002	2003	2004	2005	2006	2007
Catch volume	Purse seine	95 202	128 600	164 168	207 809	230 681	218 664	251 638
	Longline	2 830	2 857	3 895	5 939	4 354	4 135	4 759

⁸ NFA (2008). The National Fisheries Authority Corporate Plan 2008-2012. National Fisheries Authority, Port Moresby.

	Total	98 032	131 457	168 063	213 748	235 035	222 799	256 397
Catch value (USD)	Purse seine	75 291 905	100 222 963	122 810 818	180 287 514	212 089 155	213 083 697	332 266 645
	Longline	10 436 125	10 198 339	12, 668 605	18 256 525	11 514 005	13 257 921	13 363 607
	Total	85 728 031	110 421 302	135 479 423	198 544 039	223 603 159	226 341 619	345 630 252

Source: estimated from FFA (2008)⁹

In recent years the tuna catch in PNG waters by foreign fishing vessels consisted entirely of fish caught by purse seine gear. Gillett (2009) estimated that this purse seine catch in 2006 was 278 459 tonnes (worth USD 226 million) and in 2007 was 327 471 tonnes (worth USD 386 million).

Estimates of catches from the coastal fisheries vary widely. In 2008 the Asian Development Bank examined a large number of studies on coastal fishing in PNG and concluded (a) the coastal subsistence production of PNG in the mid-2000s was about 30 000 tonnes, worth¹⁰ USD\$35 million; and (b) the coastal commercial production in the mid-2000s was 5 700 tonnes, worth USD\$27 million to the producer.

PNG is unique in the Pacific Islands region in that the underwater topography of the country is appropriate for shrimp trawling. In recent decades four shrimp trawl fisheries have developed in PNG:¹¹

- The Gulf of Papua fishery has operated commercially since the late 1960s. In 1976, three companies operated with three licences each. In 1978, two old vessels were commissioned by a joint venture company to fish inside the 3-mile limit and in the same year an old trawler returned to Japan and was not replaced. In 1981, four national companies chartered vessels to operate inside the 3-mile zone while one foreign-owned vessel operated outside the 3-mile zone. This brought the total for that year to 19 vessels. Except for 1981, however, the average number of vessels operating in the Gulf of Papua fishery has been 13-14. During 1986, the number of licensed operators increased to 21, with the introduction of Australian chartered vessels.
- The Orangerie Bay fishery is known to be seasonal and geographically restricted to an area of 15.5 sq km. It has been fished intermittently by small class vessels (9-16 m length) since 1981.
- The Torres Strait fishery was entirely Australian until 1987 when two PNG vessels entered and by August of that year there were four PNG vessels (Australian boats chartered to PNG companies).
- The Western Province artisanal fishery commenced after a 1982 survey to determine the potential for low technology fishing using small boats or canoes. Beam trawls, beach seines and light weight otter trawls were employed and fishing was conducted in 1 to 6 metres of water, from Sui on the mouth of the Fly River to Sigabaduru west of Daru. Almost all areas to within 10 nautical miles of the shore were trawlable, depending on the state of the tide.

⁹ FFA (2008). The Value of WCPFC Tuna Fisheries. Unpublished report, Forum Fisheries Agency, Honiara.

¹⁰ Using the farm-gate method of valuing subsistence production.

¹¹ Source: (a) Kailola, P. 1995. Fisheries Resources Profiles: Papua New Guinea. Report no. 95/45, Forum Fisheries Agency, Honiara, Solomon Islands; and (b) Gillett (2009).

3.2.2 Marine landing sites

In the offshore fisheries, the catch is offloaded at a variety of locations. Longliners (all locally-based) mostly offload their catch at Port Moresby - due to the relatively simple logistics of air-freighting to overseas destinations. About half of the locally-based purse seiners offload directly to a domestic processing facility, with the other locally-based seiners either transshipping the catch or offloading at a foreign port. The foreign-based purse seiners either transship to a foreign port (mainly those vessels from China, Korea, Taiwan and the Philippines) or deliver directly to their home port (mainly those vessels from Japan and USA).

Most of the shrimp trawlers vessels are based in the capital, Port Moresby, and offload their catch at that location.

The small-scale commercial catch is mainly offloaded in or near coastal urban and semi-urban areas throughout the country. The non-perishable fishery products (e.g. beche-de-mer, trochus) are offloaded in virtually any coastal area, but mainly at the base of operations of the fishers. Subsistence fishery landings occur at coastal villages throughout the country, roughly in proportion to the distribution of the population.

3.2.3. Marine fishing production means

Most of the marine fishery production in PNG is from the offshore fisheries. In 2007 about 98% of the production of the locally-based offshore fleet came from purse seining, with the remainder from longlining. The box below gives information on the offshore production means.

Box: Offshore Fishery Production Means

Domestic longline: Papua New Guinea's longline fishery is fully domesticated, restricting the participation to only nationals or citizen companies with limited allowance for dry charter of additional foreign vessels. The longline fishery in PNG includes a distinct shark fishery which is managed under a separate Management Plan from the tuna longline. Effort for this fishery is limited to 9 vessels setting 1 200 hooks per day and a TAC of 2 000 tonnes dressed weight per year including shark catches by tuna longline vessels. The Tuna longline sector is managed under the Tuna Fishery Management Plan, which limits effort (100 vessels and 1 200 hooks per set per day) and catch limit (10 000 tonnes per year based on the combined catch of yellowfin and bigeye) for the tuna longline fishery sector. The total number of longline vessels has, however, never reached the 100 licences allowed for but has been stable at about 50 vessels (41 tuna and 9 shark vessels) in the last four years. The actual number of active vessels was 27 in 2006, 22 in 2007.

Locally-based foreign purse seine: A total of 32 vessels fish under this category. Fourteen of these are associated with the tuna cannery, and land all their catch there. Most are smaller medium sized vessels that fish in association with fish aggregation devices. They transfer catch to carrier mother ships at sea, and again take most of their catch within archipelagic waters. These vessels are Philippine flagged but are permanently based in PNG and fish only in PNG, especially in the archipelagic waters. The other eighteen are larger vessels, mostly flagged in Vanuatu, operating widely throughout the region. These vessels are associated with present or planned onshore processing developments.

Foreign access purse seine: PNG currently has bilateral purse seine access agreements with China, Korea, Japan, Taiwan and Philippine companies, as well as being a signatory to a treaty with the United States. Several Vanuatu flag vessels are also under bilateral agreement with PNG. A total of 200 purse seine vessels are currently licensed.

Source: Kumoru (2008)¹²

Most of the boats in the PNG prawn trawl industry are old. None presently in the fleet are less than 15 years old and some are more than 30. Gear restrictions have been introduced limiting the boats to less than 30 m in length, with main engines not exceeding 550 hp, and towing no more than 4 nets. Fishing takes place primarily in the Gulf of Papua, as well as in smaller

¹² Kumoru, L. (2008). Papua New Guinea. Working paper 23, Scientific Committee, Fourth Regular Session, 11-22 August 2008, Port Moresby, Papua New Guinea.

fishing grounds elsewhere. Most vessels are based in Port Moresby and carry out prolonged voyages (around a month) with on board processing, freezing, and packing of catch. Those vessels operating in the Gulf of Papua typically fish close to shore, up to depths of about 45m. A regulation introduced in the 1980s, which prohibits vessels from fishing within 3 miles of the coast, is said to have resulted in lower catches.

The coastal commercial fisheries use a wide variety of production means. These range from relatively sophisticated live reef food fish operations (using large vessels capable of transporting the catch to Asia) to small-scale operators that collect invertebrates by hand for export. Although there has never been a national survey to catalogue production means, the typical means of harvesting fish for sale are lines, spears, and nets from an unpowered canoe or outboard powered skiff. Kailola (1995) states that in PNG handlining takes large and small reef-associated carnivores, underwater spearing takes large reef fish, surface spearing takes the pelagic carnivores, and netting exploits nearly all sections of the reef community, from large carnivores to small herbivores.

The production means coastal subsistence fisheries are extremely diverse and reflect the variety **of the country's coastal environments**. Different fishing gear is used along the mainland and high island coasts, in the swampy lowland areas, and in the Gulf of Papua. In general, subsistence fishing techniques are knowledge-intensive but the gear is relatively unsophisticated.

3.2.4 Main resources

WCPFC Yearbook indicated that albacore and yellowfin are two major catch of the PNG longliners and consist around 90 % of total catch, though the ratio between albacore and yellowfin varied according to the year. In the case of purse seiners, majority (around 80 %) of catch is skipjack, followed by yellowfin.

Kumoru (2008) states the available logsheet data of offshore fisheries indicate:

- The 2007 longline catch was comprised of 1 319 tonnes yellowfin (42%), 104 tonnes bigeye (3%), and 1 564 tonnes albacore (50%) and 142 tonnes of other fish (5%).
- The 2007 purse seine catch contained about 76% skipjack with yellowfin making up most of the remainder.

The shrimp trawl fishery produces mainly banana prawn (*Penaeus merguensis*) and smaller quantities of giant tiger prawn (*Penaeus monodon*).

The small-scale coastal marine fisheries (both commercial and subsistence) take a very large number of finfish and invertebrate species. Kailola (1995) states that PNG contains some of the highest diversity of reef-associated fishes in the Indo-Pacific. The food fishes characteristically found on **PNG's** coral reefs include wrasse (Labridae), groupers (Serranidae), emperors (Lethrinidae), bream (Sparidae), sea perch and fusiliers (Lutjanidae), parrotfish (Scaridae), sweetlips (Haemulidae), butterflybream and monocle bream (Nemipteridae), squirrelfish (Holocentridae), drummers (Kyphosidae), eels (Muraenidae), triggerfish (Balistidae), rabbitfish (Siganidae), surgeonfish and unicornfish (Acanthuridae) and goatfish (Mullidae). Trevallies (Carangidae), mullet (Mugilidae) and barracuda (Sphyraenidae) are frequent pelagic reef inhabitants.

In addition to the above reef-associated finfish species, the small-scale coastal marine fisheries of PNG also harvest those species associated with estuaries, mangroves, deep reef slope and pelagic environments.

The common invertebrates taken in coastal fisheries include beche de mer, lobsters, trochus, giant clams, crabs, octopus, and green snail. Seaweeds are also gathered as a contribution to subsistence food supplies.

3.2.5 Management applied to main marine fisheries

Many of the important commercial fisheries of the country are managed using formal fishery management plans. These are subsidiary legislative instruments with the same status and authority as fishery regulations. The process of management by plan began about a decade ago and flows from the Fisheries Management Act 1998 which stipulates that a fisheries management plan shall:

- Identify the fishery and its characteristics, including its current state of exploitation; and
- Specify the objectives to be achieved in the management of the fishery; and
- Identify any possible adverse environmental effects of the operation of fishing activities in the fishery; and
- Identify where appropriate any relevant customary fishing rights or practices.

To date, about ten fishery management plans have been formulated and implemented by the National Fisheries Authority. These include:

1. Tuna
2. Beche de mer
3. Lobster
4. Gulf of Papua prawn
5. Sharks
6. Aquaculture
7. Longline tuna
8. Fish aggregating device management policy
9. Barramundi
10. Torres Strait lobster

Management Objectives

The general objectives of all fisheries management in PNG are specified in the Fisheries Management Act 1998. These are: **(a)** promote the objective of optimum utilisation and long term sustainable development of living resources and the need to utilise living resources to achieve economic growth, human resource development and employment creation and a sound ecological balance; **(b)** conserve the living resources for both present and future generations; **(c)** ensure management measures are based on the best scientific evidence available, and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors including fishing patterns, the interdependence of stocks and generally recommended international minimum standards; **(d)** apply a precautionary approach to the management and development of aquatic living resources; **(e)** protect the ecosystem as a whole, including species which are not targeted for exploitation, and the general marine and aquatic environment; **(f)** preserve biodiversity; **(g)** minimise pollution; and **(h)** implement any relevant obligations of Papua New Guinea under applicable rules of international law and international agreements.

The Fisheries Management Act 1998 also stipulates that each management plan is to include certain elements, including the objectives to be achieved in the management of the concerned fishery. The management objectives are a prominent feature of all current PNG management plans. As an example, the National Shark Longline Management Plan gives the following management objectives:

- To apply a precautionary approach to the management of the shark fishery, ensuring the harvest of shark resources is sustainable and that shark fishing has minimal impact on the marine ecosystem.
- To ensure that there are benefits to Papua New Guinea from the sustainable use of its shark resource.
- To ensure that the utilization of the shark resource does not have negative impacts on coastal communities.

PNG is a member of the Western and Central Pacific Fisheries Commission that was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. The Convention entered into force in June 2004.

Management measures and institutional arrangements

An important aspect of all the PNG fishery management plans is the specifying of management measures to be used to attain the objectives of the plan. As an example of actual measures, the box below gives those from the National Lobster Fishery Management Plan.

Box: Management Measures Specified in the National Lobster Fishery Management Plan

License restrictions:

- Licences shall not be issued to non-citizen companies or foreign individuals.
- There shall be a maximum number of exporters and buyers licences set for each province
- All licences shall be endorsed by the respective provincial authorities before submission to the Board for consideration and approval.
- All licence holders however, shall have their licence automatically terminated if they breach licence conditions or breach Fisheries Regulations or breach the provisions of this Management Plan.
- All lobster collected in a particular province shall be exported from that province. No product shall be moved to another province for sale without clearance from the respective Provincial Fisheries Authorities.

Size limits:

- All species of spiny rock lobster with a minimum tail length of 100mm to total length (midsection between the eyes to tail) of 175mm shall not be harvested and exported.
- Slipper lobster with minimum carapace length (midsection between the eyes to the base of the carapace cover) of 52mm shall not be harvested and exported.
- All species of spiny rock lobster with a minimum of 169gram tail weight and 409 gram total weight shall not be harvested and exported.

Restriction on egg-bearing females:

- Berried (egg-bearing) female lobster shall not be taken at any time, to protect and increase the number of recruitment of lobster.

Gear restriction:

- Specific gear restriction may apply to specific provinces and fishery in accordance with specific fishery plans for the province or fishery and in accordance with restrictions already in existence under the fisheries Regulation.

Special restrictions:

- There shall be restriction on the species of lobster caught in accordance with specific licence conditions.

Total allowable catch:

- A total allowable catch (TAC) shall be set for each province or fishery based on the estimated maximum sustainable yield as qualified by relevant economic or environmental factors, fishing patterns and related factor. A notice notifying of the TAC for each fishery will be published in the *National Gazette* by the Minister upon the recommendation of the Authority.

Closed seasons and closed areas:

- Whenever required, closed season and closed areas shall be set by the Minister upon the recommendation by the Authority.

Market standards:

- Marketing standards shall be based on the standards established by the relevant authorities and marketing requirement.

Institutions

The main institutions involved with fisheries management are the National Fisheries Authority (NFA) and its governing council, the National Fisheries Board. Under the Fisheries Management Act 1998 the NFA is given the authority to manage the fisheries within the fisheries waters of PNG. The National Fisheries Board provides general control and guidance over the exercise of the functions and powers of NFA.

NFA's management authority is conditioned to some degree by the "Organic Law", which devolved many powers (including some fisheries functions) to the provinces and local governments. The relationship between the management authority of NFA and that of lower levels of government is not always clear.

Additional information on the NFA and its powers is given in Section 7 below.

Another institution that is of considerable importance in the management of PNG's fisheries is the Fishing Industry Association. Because the Association is represented on the National Fisheries Board, it has substantial input into the fisheries management policies of the country.

3.2.6 Fishermen Communities

The concept of "fishermen communities" has limited applicability to Papua New Guinea. Nearly all households in coastal villages are involved in fishing activities. It could therefore be stated that all coastal villages in PNG are "fishing communities". To some extent this concept also applies to villages adjacent to significant rivers and other bodies of freshwater.

3.3 Inland sub-sector

Coates (1996)¹³ describes the major features of the inland fisheries in PNG:

- Over 87% of the population live inland and have no direct access to marine, only freshwater, aquatic resources.
- Even in highland areas of Papua New Guinea, where fish stocks are very poor, over 50% of the population engage in fishing activities in many areas, traditionally for eels but more recently catches include a number of exotic species.
- Commercial exploitation of freshwaters in Papua New Guinea is limited: southern flowing rivers support a small barramundi (*Lates calcarifer*) fishery, although this has recently declined; modest amounts of freshwater prawns are landed seasonally, estimated at no more than 10 tonnes per year.

Two major river systems, the Sepki/Ramu and the Fly/Purari, are quite extensive and provide most of the freshwater fish harvest. Except for the barramundi fishery and some commercial sales of tilapia, there has been little commercial development of freshwater fishery resources.

The production means are almost exclusively very small-scale fishing gear, with the most significant methods being trapping, netting and hand-lining from shore and dugout canoes, and spearing.

Most of the present landings from the Sepik/Ramu consist of two introduced species. Because of the very limited fish bio-diversity, a project aimed at increasing fishery productivity by introducing exotic species operated for several years up to 1997. As a result of the project many freshwater bodies have been enhanced through stocking with imported species. These include tilapia, Java carp, rainbow trout, and at least seven other types.

The Asian Development Bank made a crude estimate of freshwater production for 2007 by expanding a mid-1990s freshwater catch estimates (by FAO) of 13 500 tonnes by 30 percent for population increase and for the effects of stocking. Accordingly, a PNG freshwater fisheries production for 2007 was estimated to be 17 500 tonnes, worth USD 16.5 million.

With respect to management of inland fisheries, because most of the fishing is on a very small-scale subsistence basis, most management interventions are undertaken by local communities. The exception would be such fisheries as the Fly River barramundi fishery – for which an NFA fishery management plan has been formulated and implemented. The management objectives and measures for the other inland fisheries are not formalized. They mainly consist of local community interventions in support of protecting the flow of fishery foods to villages.

An important management concept concerns the relationship of freshwater to inland fisheries. The issues, problems and solutions of freshwater in general tend to run in parallel with

¹³ Coates, D. (1996). Review of the Present Status of, and Constraints to, Inland Fisheries Development: the Pacific Island countries. IPFC Working Party of Experts on Inland Fisheries, RAPA, Bangkok.

freshwater fisheries, so interventions to improve water quality are likely to improve freshwater fisheries.

3.4 Recreational sub-sector

Although subsistence fishing may have a large social component and be enjoyed by the participants, there is little recreational fishing as a leisure activity for villagers.

Regular sport fishing activity (mainly targeting tunas and other oceanic fish) are found in the larger population centers, including Lae, Port Moresby and Madang. Most participants are resident expatriates. Less regular, tourism-associated sport fishing occurs in some resort centers, such as Kavieng and Rabaul, most often associated with resorts offering diving and other water sports. Sport fishing competitions are held regularly in some areas, including an international competition organized by the Port Moresby Game Fishing Club. Fish aggregating devices have been deployed by some recreational sport fishing associations (off Port Moresby and Lae to increase productivity).

There is little formal management of recreational fishing activities. The Fisheries Management Act states: "Unless otherwise specified by or under this Act, the provisions of this Act do not **apply to or in relation to the taking of fishfor sport or pleasure**".

3.5 Aquaculture sub-sector

Freshwater aquaculture has been promoted in PNG since 1954. Attempts which have been made include culture of carp, eels, catfish, gourami, perch, tilapia, and trout. Until the mid-1990s freshwater aquaculture was the focus of a major national government programme which included the operation of common carp and rainbow trout hatcheries in highland and inland areas, restocking of natural water bodies with introduced species, and promotion of small-scale commercial aquaculture. The programme was considerably scaled down and handed over to provincial governments in late 1996. The Highlands Aquaculture Development Centre in Ayura, Eastern Highland Province became a nationally important centre for producing common carp seeds for distribution to farmers throughout the country, while rainbow trout seeds were produced and supplied to farmers by the private sector. The number of small-holder fish farmers with active ponds was estimated, through a Australian government funded survey project, to reach 8 000 in 2006, while there were possibly 2 000 or more farmers with ponds without seed for stocking.

The hatchery capacity of the Highlands Aquaculture Development Centre was improved through several externally funded projects and a number of training courses were offered to farmers by the centre. The centre also served as quarantine facility and trial farm for several exotic fish species introduced through some of the projects, attempting to boost inland fish farming and for stock enhancement in open water bodies. The introduced GIFT tilapia, following its first distribution of fingerlings to farmers in 2002 by the Centre, helped significantly to overcome the chronic bottleneck, the seed shortage, in developing fish farming in **Papua New Guinea, thanks to the fish's fast growth and the ability to produce fingerlings in farmers' own ponds**. Starting from 2005, the farming of tilapia boomed in the country, resulting in drastic increase in aquaculture production.

Owing to the scattered distribution of fish farmers and the terrain of Papua New Guinea difficult for easy access to many areas, the aquaculture statistics have not been well collected and reported. The existing estimates made by FAO on aquaculture production for Papua New Guinea (92 tonnes valued at USD 443 000) based on limited information appear to have very much underestimated the actual level of aquaculture production in the country, especially for recent years. According to the National Aquaculture Development Manager, the level of annual production was close to 2000 tonnes in 2009. The statistic details of this new level of production need to be reviewed and recorded.

Marine aquaculture has included farming of seaweed, giant clams, crocodile, milkfish, mullet, mussels, oysters, and prawns.

Recent initiatives in PNG aquaculture development include:

- Coral Sea Mariculture on Samurai Island – cultivation of silver-lip pearl oyster (*Pinctada maxima*)
- Coconut Product Limited in Rabaul – prawn culture in earthen ponds
- Western Province Sustainable Aquaculture in Daru – This company will focus on setting up a barramundi hatchery to produce barramundi fingerlings for restocking and conservation especially in the areas affected by the Ok Tedi mine.
- The Nago Island Mariculture and Research Station (see box in Section 6.3 below)

The National Fisheries Authority Corporate Plan 2008-2012 lists priority actions with respect to aquaculture:

- Ongoing consultation with stakeholders to promote sustainable fisheries and identify opportunities for potential new fishery and aquaculture development.
- Undertake a consultative review of the NFA aquaculture policy so as to better reflect domestic and global trends in aquaculture.
- Facilitate and undertake research and projects in collaboration with international and national stakeholders to overcome challenges in aquaculture development.
- Work with stakeholders to develop and facilitate training and skill development opportunities to increase human resource capacity in relation to aquaculture development demands

As can be seen from the above list, the priorities for NFA's involvement with aquaculture lie in developing an aquaculture industry, rather than in managing the existing aquaculture activities. Currently, NFA's aquaculture involvement is coordinated by an officer in the Fisheries Management Group.

4. POST-HARVEST USE

4.1 Fish utilization

For the offshore fisheries, the prime tuna catch from the longline fleet is exported to Japan, with lesser grades and catch of non-tuna species sold domestically. For the purse seine fleet, part of the catch is transshipped to canneries (mainly in Asia) or delivered directly by the seiners to a cannery in the Philippines or American Samoa. A growing amount of purse seine tuna is processed in PNG.

Three tuna processing plants are currently in operation and four are under progress. Each of the three operating facilities is supported by a cold storage. One of the facilities is currently processing mackerel, but is now being fitted with additional production lines to process tuna (Kumoru 2009).

Most of the coastal commercial catch destined for domestic consumption is utilized in urban or peri-urban areas, close to the base of operations of the fishers. Much commercial seafood demand in PNG is from commercial or institutional buyers such as fast-food outlets, restaurants and hotels. However, small-scale fishermen and fish merchants have difficulty responding to the needs of these buyers due to problems of quality, product volume, product form and consistency of supply. Most institutional and commercial buyers prefer to purchase from larger fishing companies who can assure regular supplies of the desired product quality and form.

The major export commodities from coastal commercial fisheries are: (source: Diffey 2005)¹⁴

- Frozen lobster tails and barramundi fillets to Australia (air-freighted on chartered aircraft from Daru via the Torres Islands)
- Canned fish (using imported mackerel) to the Solomon Islands
- Fresh (chilled) fish to the USA

¹⁴ Source: Diffey, S. (2005). Market and Market Linkages Study. Rural Coastal Fisheries Development Project, National Fisheries Authority, Government of Papua New Guinea, and the European Union.

- Frozen snapper fillets, mud-crabs, lobster tails and Spanish mackerel by sea-freight to Australia
- Live food fish, crabs and lobsters to Australia and SE Asia
- Processed and un-processed shells and shell-meat, primarily to SE Asia and Australia
- Fish meal to SE Asia

The subsistence fisheries (both coastal and inland), as the name implies, are focused on production of food for home use. Significant amounts of fish are, however, given away to friends and relatives. In some communities, production in excess of immediate needs is salted or dried for future use.

4.2 Fish Markets

The major markets for PNG's important offshore fisheries are located overseas. The main market for the fresh longline tuna is Japan. Purse seine tuna is exported mainly to markets in Europe.

Domestic fish markets are found in the urban areas of the country. PNG has about 20 coastal cities and towns that have more than 5 000 people and most of these places have fish markets, although some are quite rudimentary.

PNG, like many other Pacific Island countries, has had major involvement with rural fish collection and marketing schemes. The box below reviews some of the lessons learned from PNG's large collection/marketing attempt.

Box: PNG's Fish Collection and Marketing Centers

During the early 1970s a number of fish collection and marketing centers were established. This led to the Coastal Fisheries Development Program, the biggest publicly funded fisheries development activity ever undertaken in PNG. The program, planned in the late 1970s, envisaged the construction or rehabilitation of 20 coastal fisheries stations separated by distances of about 200 km and each equipped to freeze and store about 1 tonne of fish per day. Fish collection vessels would deliver ice to outlying villages and collect their catches, while a vessel with freezer storage would collect the product and transport it to the major towns for local sale or export. Funding was provided mainly by the National Government, but in some cases Provincial Governments and donors also provided inputs.

Twenty-two coastal fisheries stations were actually established and became operational at one time or another. Up to a dozen collection vessels over 10 m length and numerous smaller collection boats were deployed, but results were disappointing. A review of four stations undertaken in 1984 concluded that they were all over-capitalized, under-utilized and economically non-viable. Three of the most productive stations were refurbished with loan funding from the International Fund for Agricultural Development, and although the best of these (Samarai in Milne Bay Province) produced up to 300 tonnes of fish a year, all of them still operated at a loss. Problems included delays in installing and maintaining equipment (a Government Department's responsibility), poor fish quality and marketing problems, difficulty in recruiting and retaining competent managers, and a confusion between commercial and service activities.

With the benefit of hindsight, the weaknesses of the project can easily be identified:

- **Insufficient attention was paid to site selection. The project was intended to cover the whole country, rather than focusing on areas of opportunity in terms of production and marketing. Even the most productive station was located on an island with an inadequate water supply;**
- **The use of freezing as a means of preservation was inappropriate. It involved high operating costs to produce a product that is not valued on the local market;**
- **Estimates of fish production were over-optimistic, and failed to take account of the part-time nature of most artisanal fishing in rural PNG;**

- **No specific measures were taken to integrate increased fish production into the project design. It was assumed that providing a Government-run fish buying centre would be enough;**
- **As with many Government-run facilities in PNG, there was a lack of commercial focus and accountability. Indeed, making a profit was seldom stated as an objective of any of the stations.**

Today of the 22 original fisheries stations, 13 are now lying idle, 4 are barely operating, and the remainder have been converted to other uses.

Source: Preston (2001)¹⁵

5. FISHERY SECTOR PERFORMANCE

5.1 Economic role of fisheries in the national economy

A recent study by the Asian Development Bank attempted to quantify the fishery-related benefits received by Papua New Guinea. The study gave the available information on the contribution of fishing/fisheries to GDP, exports, government revenue, and employment. The results can be summarized as:

- Official estimates show that fishing in 2006 was responsible for 2.7 % of the GDP of PNG. A recalculation using a different methodology shows it was about 15% greater in 2006.
- Exports of fishery products are about 10 % of all export in 2007.
- Access fees paid by foreign fishing vessels represent 0.62 % of all government revenue.
- Formal jobs directly related to the tuna fisheries represent about 1.2 % of the total number of formal jobs in the country. The tuna industry employs about 3.3% of all formally employed women.

From the above it can be seen that fisheries make a relatively important contribution to GDP, exports, and employment.

5.2 Demand

The per capita consumption of fish in PNG, based on the 2007 FAO Food Balance Sheet, is 17.7 kg. Various other studies have made estimates ranging between 18.2 and 24.9 kg. Considering PNG's population, 21.5 kg of fish consumption per capita translates into a 2010 demand for 145 375 tonnes of fish.

Factors influencing the future demand for fish are migration from inland to coastal areas, increase in the price of fish, relative cost of fish substitutes, the amount the success of government-sponsored marketing schemes, and changes in dietary preferences.

5.3 Supply

The government has several strategies to increase the national fish supply. These involve supporting the marketing of fishery products in urban areas from rural parts of the country, deploying offshore fish aggregation devices, promoting aquaculture, and introducing non-native species into rivers.

Major factors affecting the local supply of fish are the costs of small-scale commercial fishing, transport links to the outer islands, and the offloading of fish by the offshore fleet.

5.4 Trade

FAO estimated the total export of fish and fishery products in 2007 as USD 138.7 millions including USD 97 millions of tuna products. A study by the Asian Development Bank (Gillett 2009) indicated that a crude estimate of the value of the fishery exports in 2007 could be obtained by adding the value of tuna products (US\$88 million), to the value of other fish, lobster, shell, and shrimp (about US\$13 million, for a total export value of US\$101 million which is about 10 % of all exports from the country).

¹⁵ Preston, G. (2001). A Review of the PNG Fisheries Sector. Gillett, Preston and Associates for the Asian Development Bank.

5.5 Food security

Fish is an important element of food security in PNG. The FAO Food Balance Sheets show that in 2007 fish contributed an average of 7.5% of all protein to the diet and 13.9% of animal protein.

Animal protein substitutes for fish consist mainly of various types of meat, much of which are extremely fatty and have negative health implications.

5.6 Employment

The number of people employed in small-scale commercial fishing in PNG has never been adequately surveyed – and many of the current estimates are at least partially based on a UNDP fisheries sector study in the late 1980s. Diffey (2005)¹⁶ using several sources **summarizes the current state of knowledge: “In 1989 UNDP estimated that PNG had about 2 000 coastal village communities with a population of about 500 000 people. Of these it was estimated that 120 000 were involved in regular fishing activity at least once a week and that there were between 2 000 and 4 000 part-time artisanal fishermen. These data are confirmed by the 1990 population census where NSO estimated that, of 131 000 coastal rural households, 23% (30 000) were engaged in catching fish with 60% fishing purely for subsistence consumption and 40% for both food and for sale”.**

Quantifying the number of people engaged in aquaculture in PNG remains elusive. There is general consensus that many people in the country are involved in the small-scale culture of fish, but the various studies give different results. SPC (2008)¹⁷ **mentions an “estimated 10 to 15 000 fish farmers in Papua New Guinea”.** An Australian-sponsored study on the status of freshwater fish farming in PNG during 2001-2006 (Smith 2007)¹⁸ estimated the number of farms in 2001 in each of the 19 provinces of PNG to be 5 418. On the degree of involvement of people in the these farms, the report also quotes Mufuape (2000)¹⁹ who states that there **were “approximately 5 000 families in the highlands who each had one or two fish ponds that grew 50 fish to 500 g.”**

The tuna industry provides many of the formal fishing jobs in the country. Gillett (2009) tracked the number employed in that industry over a seven-year period:

	2002	2006	2008
Local Jobs on Vessels	460	110	440
Local Jobs in Shore Facilities	2 707	4 000	8 550
Total	3 167	4 110	8 990

Considering the “monetary employment” of 774 000 in PNG in 2008, these 8 990 jobs represent about 1.2% of the salaried jobs in the country.

5.7 Rural development

Rural fisheries development projects have included trials and promotion of various designs of fishing boats and fishing gear and methods. Various initiatives have been taken to introduce or adapt exotic fishing techniques or technology to the PNG situation, and to expose local fishermen to these innovations with the aim of improving the productivity, economic efficiency, safety or comfort of fishing operations. Success of these efforts has been mixed. Constraints include high investment costs and general high opportunity costs. In addition, Preston (2001) states that despite their initial curiosity about innovative ideas, fishermen are by nature conservative and prefer to stay with tried and familiar methods wherever possible and within a **society as traditional as PNG’s, this conservatism might be expected to be even stronger than in some other countries.**

¹⁶ Diffey, S. (2005). Market and Market Linkages Study. Rural Coastal Fisheries Development Project, National Fisheries Authority, Government of Papua New Guinea, and the European Union.

¹⁷ SPC (2008). Status Report: Nearshore and Reef Fisheries and Aquaculture. Officials Forum Fisheries Committee, Sixty-Seventh Meeting, 12 – 16 May 2008, Secretariat of the Pacific Community, Noumea.

¹⁸ Smith, P. (2007). Aquaculture in Papua New Guinea: status of freshwater fish farming. ACIAR Monograph No. 125, 124p.

¹⁹ Mufuape K., Simon M. and Chiaka K. (2000). Inland fish farming in PNG. Papua New Guinea Food and Nutrition 2000 Conference, 26–30 June 2000. University of Technology.

The constraints to coastal fishery development mainly relate to the absence of a fish handling, distribution and marketing infrastructure. Costly and protracted experience has shown that the value and volume of production from coastal fisheries is insufficient to cover the high cost of establishing and running such an infrastructure. Future commercialization of coastal fisheries will depend largely on the development of facilities such as longline bases or fish canneries to service the needs of the industrial tuna fishery, whose production levels can justify the high cost of such plants. If such infrastructure is put in place it should also be able to absorb production from commercial coastal fisheries.

6. FISHERY SECTOR DEVELOPMENT

6.1 Constraints and opportunities

Some of the major constraints in the fisheries sector are:

- **To some degree, the tuna processing in PNG is leveraged by PNG's preferential access to European markets – but that preferential access is being eroded.**
- The low wages paid in tuna processing plants (which operate in a highly competitive international environment) may be insufficient to meet the expectations/needs of the workforce.
- Small-scale fishers have great difficulty in economically accessing the relatively abundant offshore fishery resources.
- There are considerable difficulties associated with marketing fishery products from the remote areas where abundance is greatest to the urban areas where the marketing opportunities are greatest; Costly and protracted experience has shown that the value and volume of production from coastal fisheries is insufficient to cover the high cost of establishing and running fish handling, distribution and marketing infrastructure.

The opportunities in the fisheries sector include:

- Development of the Pacific Maritime Industrial Zone in Madang. This involves tuna canneries, tuna loining plants and in vessel servicing in a scheme that requires foreign vessels operating in PNG and some other Pacific Island countries to deliver tuna to a marine industrial park located near Madang.
- Encouraging more offloading of offshore fisheries catches for domestic consumption in PNG.
- Development of the relatively under-exploited coastal resources of the country by **"piggy-backing" on the industrial offshore fisheries infrastructure.**
- Development of aquaculture in the highlands in such a way that it does not require subsidies in perpetuity.

6.2 Government and private sector policies and development strategies

The most up-to-date source of government policies and development strategies in the fisheries sector are to be found in the National Fisheries Authority Corporate Plan 2008-2012. Some of the important points are:

- The 1995 Domestication Policy encourages the full participation of PNG citizens and PNG-based companies in the development of commercial fisheries. The policy aspires to have citizens actively participate in all aspects of fishing, from harvesting to post harvesting, to downstream processing to value-adding.
- The government has a "development framework" in fisheries which promotes:
 - Preferential – but not necessarily protected - access for national operators dependent on increasing participation by nationals;
 - Actively consulting with industry to consider their interests when developing policy;
 - An awareness programme promoting industry activities and potential;
 - Working with other regulators to remove impediments to efficient operation;
 - Provision of marketing and resource information;
 - Training for operators to plan and manage their businesses well;
 - Provision of a range of practical training programmes to provide skilled labour for the industry through the National Fisheries College; and

- o Increasing restrictions on direct foreign employment where skilled nationals are available.

The Fishing Industry Association of PNG is involved in fisheries policies and development strategies. Although these policies/strategies are rarely formalized, the Association is an important force in these areas through its representation on the Board of the National Fisheries Authority.

6.3 Research

The Fisheries Act mandates the National Fisheries Authority as follows: “to operate research facilities aimed at the assessment of fish stocks and their commercial potential for marketing”. At NFA, the Fisheries Management Business Group (one of seven business groups in the NFA) is charged with (a) accessing research expertise, (b) approving, arranging or facilitating research required for the effective development and management of marine resources and fisheries, and (c) undertake collaborative projects and research with national and international stakeholders to address regional management requirements.

The results of many of the previous research programmes in the country are given in the Aquatic Resources Bibliography of Papua New Guinea²⁰ and the Papua New Guinea Fishery Profiles.²¹ Past research has mostly been carried out by NFA, its processor agency (the Department of Fisheries and Marine Resources), the University of PNG, the Secretariat of the Pacific Community, the Forum Fisheries Agency, FAO, and agencies based in Australia, Japan, New Zealand, and the USA.

In the past few years the strategy for fisheries research has been re-oriented to focus primarily on obtaining information needed to refine fishery management plans. This approach involves making greater use of partnerships with local and overseas research agencies, NGOs, private institutions and funding donors.

One of the latest developments in PNG fisheries research is the Nago Island Mariculture and Research Station (box).

Box: NFA’s Nago Island Mariculture and Research Station

Nago Island is a small uninhabited islet located just off the town of Kavieng in New Ireland Province. It is the site of the new National Fisheries Authority (NFA) Nago Island Mariculture and Research Station, which is currently under construction. NFA has secured 11 hectares of land connected by a jetty. The station has a hatchery, algal laboratory and “wet” laboratory and indoor and outdoor larval tanks and raceways, with replicates and free spacing set aside for experiments. There is a separate area for quarantine. There are also offices and two resident houses onsite for staff. Because the island is uninhabited, the facility will be fully self-sufficient in providing its energy and water needs. Nago Island also has tourism potential and NFA intends to sub-lease part of its land to Nusa Resort to build some tourist accommodation. Current project ideas include trochus community restocking trials, cage farming rabbitfish, introducing Kappaphycus seaweed, mariculturing marine ornamentals and mabe pearl culture trials.

Source: Ponia (2009)²²

6.4 Education

The most important institution in PNG for education related to fisheries is the National Fisheries College. The College provides training in:

- Commercial fisheries, including course for skippers and deckhands

²⁰ Kailola, P. (2003). Aquatic Resources Bibliography of Papua New Guinea. National Fisheries Authority and the Secretariat of the Pacific Community.

²¹ Kailola, P. (1995). Papua New Guinea Fishery Profiles. Forum Fisheries Agency, Honiara.

²² Ponia, B. (2009). Aquaculture updates from Papua New Guinea (March 2009). Aquaculture Portal, Secretariat of the Pacific Community, Noumea. Available at: www.spc.int/aquaculture/index

- Post-harvest aspects of fisheries
- Fishery observation
- Business aspects of fisheries

The National Fisheries College is a branch of NFA. It is located in Kavieng in the north of the country, but some of the courses are given in other areas of PNG. The National Fisheries College is incorporated into a new NFA entity, the Institute of Sustainable Marine Resources.

In 2006 a PNG fisheries training needs assessment was carried out. The results²³ were used to modify the various courses offered by the National Fisheries College. A major conclusion of that assessment was that in order to better address training needs across the sector, (a) it will be necessary for training providers and industry to make better use of partnership type arrangements and develop the capacity of provincial-level institutions; and (b) there needs to be greater commitment in industry to staff professional development and to localization programs.

There are a number of other institutions in PNG which offer training relevant to the fisheries sector:

- the PNG Marine School, in Madang, provides more advanced and officer-level vocational training for the merchant shipping;
- the University of Papua New Guinea offers degree courses in marine biology and other relevant scientific disciplines through its main campus as well as via its Marine Research Station at Motupore Island;
- the University of Technology at Lae offers a food technology degree;
- the PNG Institute of Public Administration offers accountancy, management and other training programmes relevant to the fisheries sector.

Training courses, workshops and attachments are frequently organized by the regional organizations: the Secretariat of the Pacific Community in New Caledonia and by the Forum Fisheries Agency in the Solomon Islands. The subject matter has included such diverse topics as fish quality grading, stock assessment, seaweed culture, fisheries surveillance, and on-vessel observing. Courses and workshops are also given by NGOs and by bilateral donors.

6.5 Foreign aid

According to the National Fisheries Authority Corporate Plan 2008-2012, the Government of PNG is a party to numerous development and investment related international arrangements, agreements and treaties, both bilateral and multilateral. For NFA, key development partners in recent years have included:

- Asian Development Bank
- European Union
- Australia
- Japanese International Corporation Agency
- German Technical Assistance
- Chinese Government

Important aid-funded projects have provided: fisheries infrastructure, training in fish sanitary procedures, aquaculture development, and fish marketing.

7. FISHERY SECTOR INSTITUTIONS

The Fisheries Act provides for the establishment of the National Fisheries Authority (NFA) to replace the former Department of Fisheries and Marine Resources. The NFA, which has a more commercial orientation than its predecessor, began operating in 1995. It was mandated in 2001 to manage PNG's fisheries resources under the Fisheries Management Act (1998) and was completely reorganized and re-staffed and strengthened. Staff numbers dropped by two thirds.

²³ Blanc, M. G. Carnie, and H. Walton (2006). Training Needs Assessment. Secretariat of the Pacific Community for the National Fisheries Authority.

NFA is governed by a board of 10 people, consisting of representatives of government, the fishing industry, resource owners and NGOs. The National Executive Council appoints the chair of the board. It is supposed to meet at least once every three months.

Access fees from foreign fleets currently form the bulk of the revenues received and managed by the National Fisheries Authority. Other income sources include licence fees from other operators, assistance from donors and penalties arising from prosecutions under the Fisheries Management Act.

The functions of the National Fisheries Authority as given in the National Fisheries Authority Corporate Plan 2008-2012 are to:

- Manage the fisheries within the fisheries waters in accordance with this Act and taking into account the international obligations of Papua New Guinea in relation to tuna and other highly migratory fish stocks;
- Make recommendations to the Board on the granting of licences and implement any licensing scheme in accordance with this Act;
- Liaise with other agencies and persons, including regional and international organisations and consultants, whether local or foreign, on matters concerning fisheries;
- Operate research facilities aimed at the assessment of fish stocks and their commercial potential for marketing;
- Subject to the Pure Foods Act, the Commerce (Trade Descriptions) Act, the Customs Act, the Customs Tariff Act, and the Exports (Control and Valuation) Act, control and regulate the storing, processing and export of fish and fish products;
- Appraise, develop, implement and manage projects, including trial fishing projects; and
- Prepare and implement appropriate public investment programmes;
- Collect data relevant to aquatic resources;
- Act on behalf of the government in relation to any domestic or international agreement relating to fishing or related activities or other related matters to which the independent State of Papua New Guinea is or may become a party;
- Make recommendations on policy regarding fishing and related activities; and,
- establish any procedures necessary for the implementation of this Act, including tender procedures; and
- Implement any monitoring, control, and surveillance scheme, including cooperation, agreements with other States or relevant international, regional or sub-regional organisations in accordance with this Act.

NFA has been structured into several business groups, each under the leadership of an Executive Manager reporting directly to the NFA Managing Director. These groups are:

1. Directorate
2. Corporate Services
3. Finance and Accounts
4. Fisheries Management
5. Licensing and Data Management
6. Monitoring, Control and Surveillance
7. Provincial Support and Industry Development
8. Project Management
9. Institute of Sustainable Marine Resources (including the National Fisheries College)

The other main body involved in PNG fisheries is the Fishing Industry Association (FIA), which was formed in January 1991 to provide a formal channel through which fishing-related businesses could voice their ideas, opinions and concerns relating to the development of the sector. FIA membership is drawn from across the fisheries sector, representing a diversity of commercial operations covering sedentary resources, lobsters, prawns, finfish and pelagic species. FIA has been quite outspoken since its formation and has become both respected and influential in the development of fisheries policy in PNG. The Association has successfully lobbied Government for the removal of a range of taxes and levies and the granting of other concessions to the industry. A representative of the FIA sits on the National Fisheries Board, as well as on the Governing Council of the National Fisheries College.

8. GENERAL LEGAL FRAMEWORK

The Fisheries Management Act 1998 defines the role and responsibilities of the National Fisheries Authority. The Act essentially empowers NFA to manage, control and regulate all of **PNG's fishery resources, whether these be inland, coastal or offshore. Although the Act** recognises and allows for customary uses, rights and traditional resource ownership, it does not in itself empower provincial or lower level governments to manage fisheries in what they may consider to be their areas of jurisdiction. Such powers may be delegated by the Minister for Fisheries through regulation or promulgation, but this is entirely discretionary.

The Act is 56 pages in length and consists of nine parts:

- Part i Preliminaries
- Part ii Institutional arrangements
- Part iii Fisheries management, conservation and development
- Part iv Licences
- Part v Enforcement and observer programme
- Part vi Jurisdiction, procedure, offences, penalties and liability
- Part vii Administrative proceedings
- Part viii Evidence
- Part ix Miscellaneous

With respect to the details of the Act:

- The provisions of the Act on the functions of the NFA are given in Section 7 above
- The provisions of the Act on the content of fisheries management plans and on the objectives of fisheries management in PNG are given in Section 3.2.5 above

Apart from the Fisheries Act, there are at least 28 other legislative instruments currently in force and relevant to the fisheries sector. Most important of these is the Organic Law on Provincial and Local-level Governments of July 1995, which gives provincial governments the responsibility for fisheries and other development activities and the provision of basic services. The Organic Law requires that national bodies devolve as many of their functions as possible to the Provincial authorities, or carry them out at Provincial level. Other relevant legislation includes the environment, maritime zones, shipping and maritime safety acts and regulations, and laws governing business and company management.

REFERENCES

- Blanc, M. G. Carnie, and H. Walton. 2006.** Training Needs Assessment. Secretariat of the Pacific Community for the National Fisheries Authority.
- Coates, D. 1996.** Review of the Present Status of, and Constraints to, Inland Fisheries Development: the Pacific Island countries. IPFC Working Party of Experts on Island Fisheries, RAPA, Bangkok
- Diffey, S. 2005.** Market and Market Linkages Study. Rural Coastal Fisheries Development Project, National Fisheries Authority, Government of Papua New Guinea, and the European Union
- FAO. 2009.** Fishery and Aquaculture Statistics: Food balance sheets. In: FAO Yearbook of Fishery and Aquaculture Statistics 2007. Rome, FAO. pp 55-68
- FFA. 2008.** The Value of WCPFC Tuna Fisheries. Unpublished report, Forum Fisheries Agency, Honiara.
- Kailola, P. 2003.** Aquatic Resources Bibliography of Papua New Guinea. National Fisheries Authority and the Secretariat of the Pacific Community
- Kailola, P. 1995.** Fisheries Resources Profiles: Papua New Guinea. Report no. 95/45, Forum Fisheries Agency, Honiara, Solomon Islands;
- Kumoru, L. 2008.** Papua New Guinea. Working paper 23, Scientific Committee, Fourth Regular Session, 11-22 August 2008, Port Moresby, Papua New Guinea.
- Mufuape K., Simon M. and Chiaka K. 2000.** Inland fish farming in PNG. Papua New Guinea Food and Nutrition 2000 Conference, 26–30 June 2000. University of Technology.
- NFA. 2008.** The National Fisheries Authority Corporate Plan 2008-2012. National Fisheries Authority, Port Moresby.
- Ponia, B. 2009.** Aquaculture updates from Papua New Guinea (March 2009). Aquaculture Portal, Secretariat of the Pacific Community, Noumea. Available at: www.spc.int/aquaculture/index
- Preston, G. 2001.** A Review of the PNG Fisheries Sector. Gillett, Preston and Associates for the Asian Development Bank.
- Smith, P. 2007.** Aquaculture in Papua New Guinea: status of freshwater fish farming. ACIAR Monograph No. 125, 124p.
- SPC. 2008.** Status Report: Nearshore and Reef Fisheries and Aquaculture. Officials Forum Fisheries Committee, Sixty-Seventh Meeting, 12 – 16 May 2008, Secretariat of the Pacific Community, Noumea