

Summary of Information on Employment, Exports and Imports, Access Fees, and Fish Consumption

Fisheries-related Employment

Information on employment in the fisheries sector is given for each Pacific Island country in Appendix 2.

It is difficult to summarize the available information on the contribution of fisheries to employment in Pacific Island countries for several reasons:

- (i) The various sources of information on fisheries employment range from informal estimates to structured surveys.
- (ii) The data originate from studies ranging from initiatives confined to the fisheries sector to much broader exercises that covered all economic sectors or the entire population.
- (iii) The various terms used to categorize employment (e.g., subsistence, employment, total employment, paid work, workforce, fisher) differ between studies and between countries.
- (iv) The studies deal, in different ways, with the various mixes of paid, unpaid work, and work for the family.
- (v) There is inconsistency across countries in the categorization of fish processing. In some countries, it is placed in the same sector as fishing; while in others, it is in manufacturing.
- (vi) Some of the studies have produced obviously erroneous results; for others, it is difficult to establish credibility.

Bearing the above in mind, an attempt has been made to extract from Appendix 2 nominal information for each country on the relative importance of fisheries employment. This is given in Table 8 below.

As presented in Table 8, the available information on fisheries employment in Pacific Island countries is a heterogeneous assemblage of facts. This reality and the differences in the usage of terms,

especially “employed” and “fisher,” make it difficult to compare data between countries, or even between surveys in the same country. For example:

- In one survey in Samoa, a “fisher” is defined as a person who participated in fishing during the 1-week period prior to the survey. In another survey, a “fisher” is defined as a person who participated in fishing during the 2-week period prior to the survey. But, in the Solomon Islands, a “fisher” refers to a person whose main activity is fishing.
- In FSM, “employed” includes “formal workforce” and both market-oriented and subsistence agriculture/fishing. However, in Palau, “employed” is defined as “at work at all times during the reference week as a paid employee.”

Despite its shortcomings, some observations can be made on the existing information on the importance of fisheries employment:

- (i) The importance of fisheries in subsistence seems to have a strong relationship to the type of island. The level of significance is highest in atolls, followed by small islands, and least in large high islands. This pattern is somewhat altered by PNG with its important freshwater subsistence fisheries.
- (ii) The importance of fisheries in formal employment seems to be related more to business conditions than to island type. These conditions include, among others, proximity to processing facilities, schedule of airline connections, and fuel taxation. Most formal employment in fisheries appears to be tuna-related.
- (iii) The accurate portrayal of the importance of women in fisheries employment appears to be negatively affected by (i) the concept of using “main unpaid activity” for defining the subsistence fisheries sector, as it downplays the importance of secondary activities (e.g., even for women who do considerable fishing, childcare is often the main unpaid activity); and (ii) placing commercial fish processing (where many women are employed) in the manufacturing sector.
- (iv) Where commercial fish processing occurs (e.g., canning, loining) and where this is attributed to the fisheries sector, the increase in size of fisheries employment is remarkable.
- (v) Overseas employment in industrial fishing vessels does not appear to be captured in many of the employment surveys.

Table 8: The Relative Importance of Fisheries in Paid Employment and in Subsistence

Country	Basic Information on Fisheries-related Employment
Cook Islands	About 22.0% of the population, or approximately 4,435 people, were involved in subsistence fishing. The 160 jobs in fisheries represent about 3.0% of all formal employment.
Fiji Islands	The 6,246 jobs in fishing represent about 2.2% of the 280,505 people formally and informally employed in the country, as reported in the 1996 census.
FSM	A total of 10,285 private sector employees were enrolled in the Social Security System in 1997. Of these, 767 individuals (7.4%) were from the fishing sector.
Kiribati	Of the 7,848 people who had "cash work," 349 people (4.4%) had fisheries-related jobs—e.g., seaweed grower, coastal fisherman, deepsea fisherman, or other fisheries workers. About 12.0% of the households in Kiribati do not fish. Of those that do fish, 17.0% fish commercially full time, 22.0% fish commercially part-time, and 61.0% fish only for subsistence.
Marshall Islands	An estimated 2.8% of all employment is in fishing.
Nauru	There are 100 half-time commercial fishermen, which would be equivalent to 50 full-time fishermen. The census indicated 1,917 formally-employed people.
Niue	Around 61.0% of the households performed some form of fishing activity.
Palau	There are 200 commercial fishers and 1,100 noncommercial fishers in a population of 19,000. These fishers represent about 6.8% of the total population.
PNG	Out of 130,963 citizen rural households, about 23.0% are engaged in catching fish. Of this, about 60.0% caught fish for own consumption only, and the rest caught fish for both own consumption and for selling.
Samoa	A total of 500–600 people therefore appear to be formally employed in the fishing sector in Samoa. One third of the total number of households in Samoa is engaged in some form of fishing.
Solomon Islands	About 6.0% of employment in "paid work" are in "fishing and related activities." About 5.0% of the people involved in unpaid work had fishing as their "main unpaid activity."
Tonga	Approximately 8.0% of paid employment are in the fisheries sector; and 3.2% of economically-active people are in the fisheries sector.
Tuvalu	Formal cash employment in fisheries represents around 5.3% of all cash employment. Traditional fisheries activity for subsistence represents 19.6% of all traditional activity.
Vanuatu	An estimated 35.0% of the 22,000 rural households in Vanuatu were engaged in fishing during the seven-day period prior to the census. Of these fishing households, 40.0% reported selling fish for some form of income.

FSM = Federated States of Micronesia; PNG = Papua New Guinea.

Source: As per country employment sections in Appendix 2.

Where there have been attempts to estimate a “regional total” of fisheries employment (e.g., 81,000 Pacific Islanders are engaged in small-scale commercial fishing [Hamnett 1990]), the methodology used is unknown.

It is not rational to make any regional estimate by combining dissimilar country-specific employment information (such as that appearing in Appendix 2 of this report). However, some conjecture on the subject could be made and may even prove useful, if only to encourage refinement of the employment estimates.

McCoy (1991) estimated that, in the Pacific Islands, there were 17,080 motorized fishing vessels and 24,612 nonmotorized fishing vessels. If it is assumed that (i) 75% of the motorized vessels and 10% of the nonmotorized vessels are used in some form of commercial fishing, and (ii) an average of three crew are carried on a motorized commercial vessel and 1.5 crew are carried on a nonmotorized commercial vessel, then the number of employed in commercial fishing is about 42,000. This figure must, however, be adjusted by (i) the commercial fishers who do not use a vessel, and (ii) the 1,200 men that McCoy and Gillett (1997) estimated to be working on the 10 major foreign fleets operating in the region. Using this reasoning, about 45,000 Pacific Islanders appear to be presently involved in commercial fishing in the region.

Of relevance to the present study on the economic importance of fisheries, few of the surveys which produced information on fisheries-related employment were (i) specifically designed with the objective of determining the relative importance of employment in the various sectors, and (ii) formulated with sampling strategies appropriate for the fisheries sector.

The Fiji Islands’ 1998 Employment Survey provides an example of a survey using a sampling strategy suitable to the fisheries sector. Intuitively, the amount of fishing employment suggested by the survey seems low—340 people with paid employment. In another study, it has been estimated (Gillett et al. 2001) that the Fiji domestic longliners alone employ 340 people as crew. Discussions with the Fiji Bureau of Statistics officials revealed that the following may have contributed to their low estimate:

- (i) The survey used the postal enquiry system in which questionnaires were mailed out. Large firms (e.g., gold mining, garment manufacturing) are more likely than small fishing enterprises

to return the forms, or subsequently respond to government pressure to return the forms.

- (ii) The framework of the survey is based on the business register, and the smaller the firm, the less likely it is to be on the register.
- (iii) The survey and the follow-up for nonresponse were focused on the islands of Viti Levu and Vanua Levu, whereas there are many fishing enterprises located outside of the Fiji Islands' two main islands.

Other information on fisheries employment in the Fiji Islands suggests that the 1998 survey underestimated fisheries employment by more than an order of magnitude. One lesson learned from this example and from other employment surveys encountered during the present study is that, due to the complexity of the fisheries sector, it is relatively difficult to examine. Simple sampling strategies, which may be suitable for other sectors, may not be appropriate for estimating employment in the fisheries sector.

To accurately gauge the relative importance of fisheries in national paid employment, it is necessary to have a survey that covers all sectors of the economy, rather than just have a fisheries-specific study. The sampling strategy for such a national level study (e.g., national census, HIES, labor survey) must not be biased against particular sectors, which in the case of fisheries would require at least some dialogue between the designers of the survey and those with technical expertise in fisheries.

To accurately gauge the relative importance of fisheries in subsistence activity, the concept of enumerating subsistence fishers appears inappropriate. It would be more realistic to partition subsistence activity into its various sector components. This activity analysis, as with the paid employment survey above, would need to be done at a level higher than the fisheries sector to accurately portray the relative importance of the various subsistence activities, including fishing.

Exports and Imports of Fishery Products

Summary of Nominal Information

Table 9 lists the nominal values of fishery product exports. Data are for 1999, unless otherwise indicated. For several countries, there

Table 9: Estimated Annual Value of Fisheries Exports of Pacific Island Countries

Country	Nominal Value (US\$)	Fisheries Exports as a % of All Exports	Comment
Cook Islands	2,919,136	81.9	
Fiji Islands	29,193,745	6.0	
FSM	4,878,387	94.7	1997 data for exports
Kiribati	1,483,871	16.9	
Marshall Islands	473,000	6.2	
Nauru	0	0.0	
Niue	0	0.0	
Palau	2,213,419	73.0	1996 data
PNG	48,106,666	1.8	
Samoa	10,785,287	61.5	
Solomon Islands	35,472,033	20.0	1997 data for exports
Tonga	2,573,670	23.8	
Tuvalu	4,233	1.2	Fisheries export ratio for 1998 (latest year for which total export information is available)
Vanuatu	394,954	< 1.0	2000 data for exports; 1999 data for export percentage
Total	138,498,401	—	

FSM = Federated States of Micronesia; PNG = Papua New Guinea.
Source: As per country export sections in Appendix 2.

are multiple estimates of exports, in which case the official export figure, or the nearest resemblance to such a figure, is used.

The available data on fisheries imports for each of the Pacific Island countries are given in Appendix 2. For many countries, the official information on imports available to the present study did not disaggregate the import data to the level where fisheries imports could be identified. The case of the official import data of the Cook Islands is typical:

Statistics Office (2000a) gives the total imports of the Cook Islands as NZ\$77,196,000, of which “food and live animals” make up NZ\$18,739,000. The publication does not give specific information for seafood imports.

At least, some summary information on fisheries imports is available from each country; but in many cases, it is from nonofficial sources and/or dated. The varied nature of the data prevents any regional comparisons. The information from the export and import sections of Appendix 2, which are deemed to be the most representative, is given in Table 10.

Table 10: Imports of Fishery Products of Pacific Island Countries

Country	Basic Information on Imports
Cook Islands	In 1991, there was about NZ\$300,000 of imported seafood products, excluding canned fish.
Fiji Islands	F\$28,174,630 worth of fishery products was imported in 1999.
FSM	Imports of canned fish were US\$1,041,000; US\$977,000; and US\$1,730,000 in the years 1975, 1996 and 1957, respectively.
Kiribati	About 380 mt of seafood products, worth A\$572,840, was imported in 1995.
Marshall Islands	US\$500,190 worth of fishery products was imported in 1999.
Nauru	There is a substantial amount of canned fish in the stores. Most of the non-canned fishery product imports come from Taipei, China (milkfish) and Australia (salmon, prawns, sardines).
Niue	About 20 mt of fishery products are imported per year.
Palau	An annual average of 610 mt of seafood products was imported over the period 1994–1997.
PNG	Approximately 35,539 mt of fishery products, worth US\$43.6 million, were imported in 1996.
Samoa	There is an annual import of 2,450 mt of canned fish.
Solomon Islands	About 81 mt of fishery products were imported in 1999.
Tonga	An estimated 712 mt of fishery products, worth T\$1,356,980, was imported in 1999.
Tuvalu	Canned fish imports in 2000 were estimated at A\$7,366.
Vanuatu	Total value of all fishery products imported was US\$735,000 in 1993.

FSM = Federated States of Micronesia; mt = metric ton; PNG = Papua New Guinea.
Source: As per country import sections in Appendix 2.

Some Observations on the Fisheries Export and Import Data

Some of the interesting features of the export and import data are:

- (i) In general terms, the region exports tuna and other high-value species such as trochus and beche-de-mer, while importing canned and inexpensive frozen fish.
- (ii) Tuna products dominate the fisheries exports of the region. For the five main exporting countries, tuna (fresh, frozen, and processed) overshadows all other fisheries exports.
- (iii) Canned mackerel dominates the fisheries imports.
- (iv) The relatively new aquarium fish industry is responsible for a significant portion of fisheries exports. The nominal FOB value of exports of aquarium fish for the year 1999 are Cook Islands US\$73,500; Fiji Islands US\$178,000; Kiribati US\$1,160,000; Marshall Islands US\$473,000; and Vanuatu US\$16,500. Aquarium fish exports from Kiribati and the Marshall Islands now account for 78% and 95%, respectively, of all fisheries exports from those countries.
- (v) There is considerable inter-annual variation in fisheries exports.
- (vi) The amount of fishery products exported as passenger baggage in many countries is quite large, especially from FSM, Marshall Islands, Palau, and Samoa.

Comments on the Accuracy of the Fisheries Export and Import Data

The most notable feature of fishery trade data in the Pacific Island countries is the underestimation of the value of fisheries exports. This underestimation appears large and relatively worse than in other trade sectors. In most cases, when the official export values are compared to other sources of similar information (e.g., importing country information, Convention on the International Trade of Endangered Species [CITES] records, audited exporting company accounts), the differences are remarkable. There are several possible reasons for the differences:

- (i) Most government customs departments are oriented to taxing imports and may give low priority to documenting exports.

- (ii) Keeping track of fisheries exports, as compared to other major commodities exported by Pacific Island countries, is more complex due to:
 - (a) presence of many exporters;
 - (b) a multitude of different products each with different values;
 - (c) large numbers of small shipments; and
 - (d) many different export points.
- (iii) Often there is no examination by customs departments of the exported commodities.
- (iv) Because much of the exported fish is sold through auctions, exporters typically do not know the price of the products at the time of export.
- (v) There are numerous incentives for exporters to place a low value on exports—e.g., taxation, foreign exchange controls, hiding income from partners.

Another problem in accurately quantifying fisheries exports is that, in many countries, products that would normally be considered fishery products are not being captured in the official export statistics:

- (i) For some countries, fisheries exports are confined to finfish.
- (ii) Coral exports are not considered to be a fishery product in at least two countries.
- (iii) Some countries specifically list a few important fisheries exports, and lump other fishery products together with miscellaneous nonfishery commodities. Consequently, the total value of fisheries exports cannot be determined from official publications.

For imports, when the data identify fishery products, the quality for measuring volumes/values appears better than that for exports. For some countries, however, it is not possible to determine the product form (fresh/frozen vs. canned), which creates difficulties for estimating per capita consumption.

Access Fees

Access fees are a charge for the right to harvest a resource. For the purpose of national accounting, they are considered to be a charge paid by nonresidents for the use of a tangible nonproduced asset. Thus, the fee is not part of the value of production from a fishing activity, and it is therefore not included in the calculation of the fishing contribution to GDP.

Summary of Information

All Pacific Island countries received fees for foreign fishing activity in their waters. For many countries, information on the amounts of these fees is available in published documents; while in other cases, it must be estimated from fishing activity patterns. Table 11 presents the access fees received in 1999 and compares these fees to the national GDP.

Comments on Access Fees

It may be tempting to compare the 1999 access fees above to the value of the 1999 catches under the category "Offshore foreign-based vessels" to determine the ratio of the fee to the value of the catch. This, however, would be inappropriate as, in some countries (e.g., FSM and Palau), there are fee-paying foreign vessels under the category "Offshore locally-based."

In some countries, the access fees form a very large portion of government revenue. In the FSM, for example, the 1999 access fees represented an estimated 39% of non-tax revenue and 22% of total domestic revenue for the national government. In Kiribati, 34% of government income in 1999 was derived from license fees.

Some interesting features from the information presented in Table 11 above are:

- (i) Access fees are only significant for 7 of the 14 Pacific Island countries.
- (ii) There is one case (Niue) in which an apparently small access fee is actually quite significant in terms of the national economy.
- (iii) There is another case (PNG) in which an apparently large access

Table 11: Estimated Value of Access Fees Received from Foreign Fishing Vessels and GDP, 1999

Country	Access Fees (US\$)	GDP (US\$)	Access Fees as % of GDP
Kiribati	20,600,000	48,123,871	42.81
Tuvalu	5,900,000	13,848,788	42.60
FSM	15,400,000	229,869,864	6.70
Nauru	3,400,000	51,612,903	6.59
Marshall Islands	4,982,699	97,311,800	5.12
Niue	151,793	7,514,077	2.02
Palau	800,000	113,484,869	0.70
Cook Islands	169,072	82,371,930	0.21
PNG	5,840,000	3,415,590,478	0.17
Tonga	152,041	157,018,257	0.10
Solomon Islands	273,458	279,593,229	0.10
Vanuatu	218,448	226,280,313	0.10
Samoa	188,616	233,506,665	0.08
Fiji Islands	212,000	1,821,334,281	0.01

FSM = Federated States of Micronesia; GDP = gross domestic product; PNG = Papua New Guinea.
Source: As per country access fees section in Appendix 2.

fee is actually quite insignificant in terms of the national economy.

- (iv) For nearly half of the Pacific Island countries, the US multilateral treaty provides most of the access fees, despite the fact that there is little or no US fishing in those countries.

Fish Consumption

Summary of Information

Appendix 2 contains information on the annual per capita consumption of fishery products in each of the Pacific Island countries. For most of the countries, several estimates have been made. In

Table 12, the ranges of these estimates are given. The listed estimates are confined to the 1990s decade, cover the entire country (i.e., the estimate for the Honiara area is not included in the Solomon Islands range), and exclude estimates which are obviously erroneous. Although it is intended that the given amounts be for whole fish weights, this cannot be verified in some cases.

Table 12: Estimated Annual Per Capita Fishery Product Consumption in the 1990s

Country	Range of Estimates in Per Capita Fishery Product Consumption from Various Studies (kg/year)
Cook Islands	47.0 – 71.0
Fiji Islands	44.0 – 62.0
FSM	72.0 – 114.0
Kiribati	72.0 – 207.0
Marshall Islands	38.9 – 59.0
Nauru	46.7
Niue	49.0 – 118.9
Palau	84.0 – 135.0
PNG	18.2 – 24.9
Samoa	46.3 – 71.0
Solomon Islands	32.2 – 32.7
Tonga	25.2 – 30.0
Tuvalu	85.0 – 146.0
Vanuatu	15.9 – 25.7

FSM = Federated States of Micronesia; kg = kilogram; PNG = Papua New Guinea.
Source: As per country consumption sections in Appendix 2.

Comments on Fish Consumption

A number of observations can be made on the information presented in Table 12:

- (i) In general, countries comprised of small islands have high fish consumption rates, while large island countries have low consumption rates. The exceptions to this are Tonga, where the studies suggest surprisingly low fish consumption rates, and Palau, where fish consumption rate is remarkably high.

- (ii) Most of the Pacific Island countries exceed by a large margin the world average per capita fishery product consumption rate of 13.0 kg (Westlund 1995).
- (iii) Most of the estimates for Kiribati indicate that it has the highest rate of fish consumption compared to any country in the world.

The studies which provided the above estimates used a variety of techniques:

- (i) nutrition studies in which the amount of fish and shellfish consumed was measured;
- (ii) nutrition studies based on dietary recall;
- (iii) HIES which estimated the volume of fishery products consumed;
- (iv) exercises in which the fishery production is divided by the population; and
- (v) exercises that take the fishery production less exports plus imports to arrive at a gross consumption figure that is divided by the population.

Although, in theory, the various techniques should give equivalent results, the situation in Niue is an example where different estimates of per capita consumption were calculated:

- Dalzell et al. (1993) estimated per capita fish consumption using a 1987 SPC nutrition study. It indicated an annual per capita consumption of 40.8 kg food weight, or about 49.0 kg whole fish weight.
- Considering (i) the Niue population of 1,900 people in 2000 (Ryan and Stepanoff 2000), (ii) the subsistence fisheries production of 194 mt, (iii) the commercial production of 12 mt, and (iv) imports of 20 mt, the annual per capita consumption of fishery products in Niue appears to be about 118.9 kg.

This variation suggests the need for some “ground truthing” to gauge the validity of the estimation. This is especially important considering that many of the total national fishery production estimates are derived from nutrition studies.

Quantifying consumption by using import, export and production data is complicated by several factors:

- (i) The low quality of data on the export of fishery products;
- (ii) Uncertainty in some countries over whether the imports of fishery products are whole fish or canned fish;
- (iii) Where there is a large tourist industry, not knowing the full-time-resident equivalent of the tourists. Apparently, only the Palau consumption figures take this into consideration, where the tourist population has been estimated to be equivalent to 500 full-time residents, or 2.6% of the population.

Another important issue in the calculation of per capita fish consumption concerns the estimate of the uppermost limit possible. Some of the very high estimates obtained in the surveys cited in Appendix 2 (e.g., 207.0 kg per capita per year in Kiribati) are criticized solely on the intuitive basis that it is not physically possible to ingest such a large quantity of fish. However, careful examination of specific cases suggests that this concept may not be correct. For example:

- Nube (1989) reported that the Kiribati canned fish imports from 1974 to 1986 ranged from 112 mt to 312 mt per year. Using information from the 1985 census, Nube calculated the daily per capita fish consumption for 18 islands in the Gilbert and Line groups. The results ranged from 0.45 kg in South Tarawa to 2.86 kg in Arorae. Of the 18 islands listed, 11 of the islands (or 61%) have a per capita fish consumption rate greater than one kg per day.
- Passfield (1997) calculated the annual per capita consumption of fish in Tongareva Island as 219.0 kg.