

Summary

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The subsistence and artisanal inshore fisheries have provided the population of Savaii with sustenance for many years. The total landings of inshore species on Savaii Island were estimated to be 153 mt/yr in 1978 and 1000 mt/yr in 1991. However, there is some concern that these estimates do not reflect the actual production of the subsistence and artisanal inshore fisheries. In addition, the estimates may not truly demonstrate the current status and importance of the inshore fishery to the rural population of Savaii.

The current assessment was conducted with greater emphasis in relation with the rural population of Savaii. These emphasis include the:

- ξ Importance of the inshore fishery as sources of food and income;
- ξ Quantitative estimate of catches taken for subsistence and artisanal;
- ξ Current level of fishing efforts applied; and
- ξ Assessment of the current status of the fishery compared to five and tens years ago.

The assessment of the subsistence and artisanal inshore fisheries on Savaii Island was carried out using a combination of household questionnaire and fisher creel surveys. The surveys were conducted during the 1990-91 and 1996-97 periods. The selection of villages sampled in the surveys was randomly chosen based on the relevant demographical information obtained from the Agriculture survey (1989) and the Population census (1991). Boundaries of sampled areas were based on similarities of the coastal landform's physiographical characteristics and villages sharing the same traditional sociopolitical districts. The majority of settlement/village on Savaii located on coastal regions.

Household Questionnaire Surveys

Upon the completion of the surveys, 739 and 724 households were sampled, which represented a total number of 7,507 and 6,174 of individuals in the 1990-91 and 1996-97 periods respectively. Overall, coverage of both samplings was 16.6 and 12.3 per cent of the total population of Savaii in 1990-91 and 1996-97 respectively.

The following were the major findings from the household questionnaire surveys on Savaii Island in the periods of 1990-91 and 1996-97.

Demography

- ξ Average household size has declined from 10.2 persons in 1990-91 to 9 persons in 1996-97.
- ξ 83 and 80 per cent of families in 1990-91 and 1996-97 lived as subsistence farmers/fishers.
- ξ Only 7 and 12 per cent of families in 1990-91 and 1996-97 respectively regard themselves as primary fishers.
- ξ 19 per cent in 1990-91 and 15 per cent in 1996-97 of families had a regular income.

Fishing effort

- ξ There were 1,938 and 2,452 households generally engaged in some fishing activities either occasionally or primarily in the 1990-91 and 1996-97 periods respectively.
- ξ *Paopao* remained an important craft for fishing in shallow-waters and there were 1,912 and 2,283 canoes in 1990-91 and 1996-97.
- ξ A pair of fishers from the same or related families (averages 1.87 and 1.8 fisher/household) generally conducted fishing in the 1990-91 and 1996-97 periods.
- ξ Each household conducted fishing on an average of 3 days/week and 2.8 days/week in 1990-91 and 1996-97.

Fishing methods

- ξ Spear was the dominant fishing gear with 42 and 56 per cent in 1990-91 and 1996-97

of the households owning spear gear (steel rod with a rubber attached at the end and the Hawaiian sling).

- ξ Fish lines were the second commonly owned fishing gear with 26 and 20 per cent of families owned several types of fish lines (drag-line, hand-line, drop-line and bamboo pole with line/hook) over the survey periods.
- ξ Monofilament gillnet dominated the types of fishing net possessed with 18 and 20 per cent of families owning several fishing nets (most gillnet and cast net) in 1990-91 and 1996-97 respectively.

Consumption

- ξ Overall, seafood was consumed twice a week with an average rate of seafood consumption to be 285 g/person/day in the 1990-91 period and 209 g/person/person/day. The rate of seafood consumption has declined by 27 per cent over the past five years.
- ξ Of all the fresh seafood eaten, inshore original seafood accounted for 89 and 72 per cent in 1990-91 and 1996-97.
- ξ Seafood originating from inshore subsistence fishery accounted for 83 per cent overall. The annual total of inshore seafood consumption directly harvest from adjacent fishing areas has declined by 27 per cent over the past five years.
- ξ Overall, 17 per cent of all the fresh seafood eaten in 1990-91 and 1996-97 were purchased.
- ξ The consumption of seafood varied from area to area and it appeared relatively low in coastal communities that had restricted inshore habitats; southwest, and south central.
- ξ The most frequently consumed inshore species were surgeonfish, parrotfish, soldierfish, emperors, groupers, mullets and trevallies. Tuna dominated the offshore fish in the diet in both sampling intervals.
- ξ The consumption of tinned fish has increased significantly from 27g/person/day in the 1990-91 to 83g/person/day in the 1996-97 period.
- ξ Fresh seafood (30 and 32 per cent) dominated the major sources of protein in the diet

of many rural households over the periods of the survey.

- ξ Overall, imported proteins comprised more than half of the protein sources in the diet of the rural families. Tinned fish and frozen meats altogether accounted for 64 per cent in the 1990-91 and 58 per cent in the 1996-97 periods.

Fisheries trends

Ten years ago

- ξ The majority (80 and 60 per cent in 1990-91 and 1996-97) of those interviewed believed fish and invertebrates were now less common than ten years ago.
- ξ More than half (49 per cent in 1990-91 and 54 per cent in 1996-97) of those interviewed claimed they consume less fish now than ten years ago.

Since the TLB

- ξ After the introduction of the taro leaf blight (TLB) in 1993, 77 per cent reported that they now eat more seafood than prior to the TLB. In addition, 67 per cent claimed to be selling fewer fish than pre-TLB.

Fisheries problems and solutions

- ξ The surveys identified four major fisheries related problems. The majority (62 per cent) of those interviewed believed that the use of destructive fishing techniques and gear severely affected fishing and the fishery. The unregulated nature of the fishery (14 per cent) and impacts of natural disasters (14 per cent) were also cited and finally adverse impacts of coastal development (10 per cent) were also mentioned.
- ξ The surveys identified that the cooperative management, local regulations, technical supports, awareness, unity and education were some of the means that may help facilitate the sustainable management and utilisation of resources from inshore areas.

Fishers Creel Surveys

Creel surveys were carried out in the same villages as selected for the household

questionnaire survey for both sampling intervals. There were 133 and 166 fishing trips recorded totaling to 264 man-hours and 348 man-hours spent on fishing. A total of 692.17 kg and 960.94 kg of predominantly fish and invertebrates was weighed from the total fishing trips in the 1990-91 and 1996-97 periods.

The major findings from the creel surveys undertaken on Savaii Island were as follows;

Fishing details

Fishing areas

- ξ The lagoons and coral reefs remained important and heavily exploited for subsistence by coastal villages on Savaii as indicated by the majority of fishing activities (75 and 85 per cent in 1990-91 and 1996-97) occurred in lagoons (inner and outer) and on the coral reefs.
- ξ Fishing that took place in open sea decreased from 11 per cent to 6 per cent of all fishing over the period of the surveys.
- ξ Fishing from along the shore was of minor importance as accounted for only 9 per cent overall of all fishing in 1990-91 and 1996-97 periods respectively

Fishing techniques

- ξ Spearfishing which entailed free diving, netting and fish lines were the most commonly used fishing methods for inshore fishing.
- ξ Gleaning did not involve much fishing on Savaii and its application has declined by 18 per cent over the past five years.

Fishing frequency

- ξ On average, each individual fisher carried out an average of 1.62 trips/week in 1990-91 and 1.57 trips/week in 1996-97.
- ξ The frequency of fishing has declined by 38 per cent between 1983 and 1997.

Fishing duration

- ξ Fishing predominantly occurred during the daytime between 6am to 6pm. However,

the majority of fishing took place between 6am and 12 pm, which accounted for 66 and 58 per cent of all fishing activities.

- ξ The average duration per fishing trip has shortened by 23 per cent over the past five years (4.15 hrs/trip and 3.18 hrs/trip in the 1990-91 and 1996-97 periods respectively).

Catch rate

- ξ Catch rates from all areas ranged between 0.62 kg/fisher/hr and 3.3 kg/fisher/hr in the 1990-91 period, and 1.05 kg/fisher/hr and 3.28 kg/fisher/hr in 1996-97 period.
- ξ The rates of catch have been noted to be relatively lower on the southeast, east and north central regions. These areas have high population concentration.
- ξ The mean catch of all areas and methods combined was 1.8 kg/fisher/hr in 1990-91 and 2.1 kg/fisher/hr in 1996-97. The mean rate of catch per unit of effort applied has generally increased by 15 per cent.

Species

- ξ The lagoon and reef fish, such as surgeonfish, parrotfish, emperors, snappers, soldierfish and groupers were the most frequently landed species.
- ξ The majority of inshore fish species taken regularly for subsistence and artisanal uses were relatively small in size. Most of the harvested species were below the minimum legal size as stipulated by the Fisheries Regulations (1995).
- ξ The small size of captured food fishes was probably due to the inability of fishers to access deep fishing areas as the most frequently used method was spearing off a *paopao*.

Total landings

- ξ Of the total fisheries landings, the inshore original landings on Savaii accounted for 90 and 87 per cent in 1990-91 and 1996-97. It was estimated that the total inshore

fishery production was 2,756 mt/yr and 2,406 mt/yr in the 1990-91 and 1996-97 periods.

- ξ From the total annual landings of inshore species, subsistence landings accounted for 71 and 75 per cent. The annual total of inshore species landed for subsistence use has slightly decreased by 8 per cent between 1990 and 1997. The annual landings of inshore artisanal fishery have also declined by 25 per cent between the survey periods.
- ξ The total landings of the inshore fishery in Western Samoa were estimated as 4,800 mt/yr in 1990-91 and 4,200 mt/yr in 1996-97.

Trends in seafood consumption and production have been assessed through interviews whereby respondees recall past fisheries trends. The following summarises the outcomes and views concerning fisheries production and consumption, and fisheries related problems and solutions.

Major points emerge from the current surveys:

Nutritional aspects:

- ξ Based on the average daily minimum protein requirement suggested by the FAO (1973), local seafood provided 95 per cent of the daily required protein per capita in the 1990-91 period and 70 per cent in the 1996-97 periods.
- ξ The annual consumption of seafood (106.6 in 1990-91 and 76.3 in 1996-97) in Western Samoa is relatively lower than the yearly average of seafood consumption in other atoll nations (mean 250 kg/person/yr) but higher than those urbanised island nations like Fiji (68.2 kg/person/yr).
- ξ The rate of consumption of local seafood in Western Samoa has declined by 30 per cent over the past decade.
- ξ The frequency of consumption of a local seafood meal in rural areas in Western Samoa has declined by almost 30 percent and by 50 percent over the past decade.
- ξ The consumption of imported tinned fish in rural areas in Western Samoa has increased significantly by 71 per cent over the past ten years.

Fishing effort:

- ξ The average size of the household-fishing unit in rural areas was generally similar to those on Upolu and Tutuila. However, the average unit size in Western Samoa has declined by 35 per cent over the past decade.
- ξ The frequency of fishing remained the same on Savaii over the period of the surveys; however, the frequency of subsistence fishing in Western Samoa has decreased by 38 per cent over the past ten years.
- ξ The fishing duration for subsistence and artisanal fishing in rural areas in Western Samoa has shortened by 37.6 per cent over the past decade.
- ξ The application of a highly efficient gillnetting technique for inshore fishing in Western Samoa has increased significantly while traditional fishing methods such as gleaning has declined over the past decade.
- ξ Inshore habitats such as nearby and adjacent lagoons and coral reefs are the areas most commonly exploited by rural communities in Western Samoa.

Catch:

- ξ The catch per unit effort for all gears and areas combined for fishing on Savaii appeared higher when compared to Upolu and Tutuila.
- ξ The increase in CPUE indicated the partial recovery of the fishery, which is also reflected by the increase in market landings over the past three years, and the regeneration of coral and reefs.
- ξ Annual total landings from inshore subsistence and artisanal fisheries have declined slightly (13 per cent) on Savaii over the past five years.

Current status of the inshore fishery:

- ξ The survey results indicated that overfishing is, but one of the components in the combination of factors causing the decline in the fishery. The decline in the fishery was probably attributed to:
 1. The reduction in fishing efforts in the subsistence and artisanal sectors in rural areas;
 2. Degradation of inshore environments and habitats from the impacts of the

- crown-of-thorn outbreaks, cyclones and adverse coastal developments;
3. Use of destructive fishing techniques in particular the explosive (*fanai'a*) and the traditional poison (*ava niukini*)
 4. Use of non-selective and overly-efficient fishing methods and gear;
 5. Change in food preference and the availability of cheaper imported substituted food items; and
 6. Improvement in economic situation of rural families from remittance from overseas and by improving capacity to store foods following electrification.

Recommendations

The following are the recommendation derived and based on the outcomes of the current surveys:

- ξ The management of the inshore fisheries and marine resources is most appropriately the responsibility of each village.
- ξ Any management strategy reducing fishing pressure on inshore resources must be accompanied by alternative income or production sources.
- ξ The status of the inshore resources should routinely monitored
- ξ The introduction of small village-managed marine and fisheries reserves to act as a seeding source for the fished portion of the lagoon and reef.
- ξ Promote the integrated coastal zone management strategy
- ξ Immediate imposition of management steps to avert further overfishing in areas where overfishing warning 'signs' have appeared

1. Executive Summary

A nationwide household fisheries survey was undertaken in October and November, 2000, to collect subsistence fisheries data and to complete a profile on Samoan village fisheries. The survey covered 1092 households in 66 villages, 40 in Upolu and 26 in Savaii, i.e. a 20% coverage of villages and a 5% coverage of Samoa's households. Sampling was stratified by village location, i.e. whether the villages were located on a lagoon, adjacent to mangroves, on a cliff, or inland. As well as analysing the data for all of Samoa, comparisons were made between these four strata, as well as for Savaii and Upolu. Additional comparisons were made between villages that had developed fisheries management plans under the Fisheries Division's Community Extension Programme, and those that had not.

Results were raised to account for all Samoan households, and showed that there are 11,700 fishers, living in 8,377 fishing households. The most common fishing method is diving and spearing, followed by gill netting, hook and line fishing, and gleaning. Most fishing takes place inside the lagoon. Eighteen percent of fishers are female, mainly gleaning along the shoreline for shellfish or diving in the lagoon for seaweed, sea cucumbers, sea urchins and other invertebrates.

The total subsistence seafood catch for the year 2000 is estimated to be 7169 tons, with a value of ST45 million. The average catch rate is 2 kg per person per hour fished. Villages with management plans have the highest catch rate of 2.8 kg per person per hour, compared with coastal villages with no management plans where the catch rate is 1.8 kg per person per hour. Fishers from cliff villages report the lowest catch rate at 1.6 kg per person per hour. For the purpose of monitoring the Fisheries Division community-based fisheries management programme, it is suggested that a catch rate of 1.8kg per person per hour is used as a monitoring baseline.

Average consumption of seafood per capita is 57 kg per annum, made up of 44 kg of fish, and 13 kg of invertebrates and seaweed. Inhabitants from lagoon villages report the highest per capita consumption at 68kg per annum, and inland villagers report the lowest at 45 kg per annum. Canned fish consumption per capita is 14 kg per annum, canned meat is 5.7kg per annum, and fresh and frozen meat is 92kg per annum.

Total seafood consumption for the country is 9,971 tons, with the seafood additional to that caught in the village being mainly pelagic species bycatch from the rapidly growing commercial longline fishery. The most commonly caught and eaten seafood surgeon fish (family Acanthuridae), except for inland villages, where tuna is more commonly eaten.

The total value of the seafood consumed in Samoan households is estimated to be over ST62 million per year, ST45 million of which is caught by village fishers. Together with fishery exports, the gross value of Samoa's marine resources is around ST100 million (approximately USD27 million) per year.

During the process of conducting the survey, training in survey techniques, including data enumeration and analysis was provided for Fisheries Division staff. A database for storage of the data was developed, and can be used for subsequent surveys. Valuable links were also established with the Samoa Statistics Department, and data to update several key figures calculated in this survey will now be collected during their Agricultural Census annual update. A major dedicated household fisheries survey will then only need to be repeated every 3 to 5 years.