

SPC/Inshore Fish. Res./BP.71
14 March 1988

ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

WORKSHOP ON PACIFIC INSHORE FISHERY RESOURCES
(Noumea, New Caledonia, 14-25 March 1988)

COUNTRY PAPER - KINGDOM OF TONGA

RESEARCH, MANAGEMENT AND LEGISLATION

by

Viliani Langi
Fisheries Officer
Fisheries Research Section
Fisheries Division
Ministry of Agriculture, Fisheries and Forests

KINGDOM OF TONGA
COUNTRY PAPER : RESEARCH, MANAGEMENT AND LEGISLATION

VILIAMI LANGI
Fisheries Officer
Fisheries Research Section
Fisheries Division
Ministry of Agriculture, Fisheries and Forest.
Tonga

1. **ABSTRACT**

Tonga Fisheries Division's present research programme is outlined. Management considerations and past and present legislations are also stated. Problems presented are those encountered by the author as the administrator of a developing Fisheries Research Programme.

2. **BACKGROUND**

The Kingdom of Tonga with its almost 300,000 sq. km. of ocean has three main island groups, Tongatapu, Ha'apai and Vava'u. There are fisheries centres in each of the three major islands, with extension centres in five other islands.

2.1 **Resources:**

The Kingdom's fishery resources are classified into:

- inshore water fisheries, comprising the shallow reefs, lagoons, reef shelf areas, reef slopes, seamounts and inshore pelagic zones to a maximum of 600 metres depth.
- deep water fisheries, comprising the offshore pelagics.

3.

PROBLEMS

Many of the problems encountered in Tonga can be regarded as universal and can be encountered by any Fisheries Scientists in any developing country. (Ref. D. Coates' letter (1987) for a humorous but all too realistic picture of "research in a developing country situation".)

Tonga's problems range from lack of funds to lack of reference materials, and can be categorized into:

3.1 Lack of Funds - the root of all problems and too common a complaint. Current Fisheries Research Section budget stands at 15000 Tongan pa'anga per year. This is expected to cover all existing research projects, including labourers' wages, plus aquaculture, and all equipment and running costs.

3.2 Lack of Trained Manpower - the highest qualification held by members of the research team is a B.Sc. in Marine Zoology. All junior staff, except one Technical Officer and two Laboratory Assistants, are locally trained.

3.3 Geographical problems - as Tonga consists of many islands scattered over a vast sea area, coupled with lack of trained manpower, trying to gather factual and consistent information becomes a major problem.

3.4 Lack of Reference Materials - lack of local expertise requires frequent referral to scientific literature which has to be requested from overseas, causing time delays.

3.5 Lack of facilities - due to the Fisheries Division's not having its own research boat some aspects of the present research programme are not fulfilled, i.e. intensive fishing experiments (on the seamount project) putting down traps in deeper shelf area (inshore reef project).

4. TONGA'S PROPOSED RESEARCH PROGRAMME 1986 - 1990

The main aim of the Research Programme is to assess and monitor those species which are important for local consumption or which form the basis for export industries. This is of paramount importance to Tonga as current fisheries developments have got to a stage where information on the resources is needed for the implementation of management measures.

<u>TIME SCALE</u>	<u>TARGET SPECIES</u>	<u>TYPE OF RESEARCH</u>
1. 1986-1990	DEMERSAL SPECIES ON SEAMOUNTS	FULL STOCK ASSESSMENT PROGRAM (Continuing)
2. 1987-1990	INSHORE REEF FISHES	STOCK ASSESSMENT
3. 1986 - 1990	PELAGIC SPECIES	DATA COLLECTION FOR SPC TUNA AND BILLFISH PROGRAMME AND THE NEWLY FORMED SOUTH PACIFIC ALBACORE RESEARCH S.P.A.
4. 1986-1988	SEAWEED (Eucheuma sp.)	AQUACULTURE
5. 1986-1988	MULLETS	BIOLOGICAL STUDY OF MULLETS.
6. 1989-1990	TROCHUS	SURVEY AND INTRODUCTION
7. 1987-1988	TRIDACNIDAE	COMPARATIVE STUDY
8. 1987-1988	DEEP WATER PRAWNS	TRAP SURVEYS
9. 1989-1990	LOBSTERS	FOLLOW UP STUDY OF DISTN. AND BIOLOGY
10. 1987-1989	LOCAL OYSTERS	IDENTIFICATION AND ASSESSMENT OF LOCAL OYSTER SPECIES FOR CULTURE PURPOSES

4.1. TITLE: STOCK ASSESSMENT FOR THE BOTTOM FISHERY OF SEAMOUNTS AROUND TONGA

AIMS: To answer (1) How big is the resource ?
(2) How to manage the resource in order to sustain the fishery ?

Need to know: (1) Stock Size
(2) Potential Yield
(3) Yield per Recruit
(4) Stock Recruitment
(5) Dynamic Response.

METHODS: (1) Depletion Estimates
(2) Annual Density Surveys
(3) Length and Weight Measurements
(4) Age information - otoliths
(5) Total catch
(6) Total Effort
(7) Mapping and Bathymetric Survey

4.2. TITLE: INSHORE REEF FISHES STOCK ASSESSMENT

AIMS: To provide information necessary for management measures to be established in order to sustain the fishery
Data is collected to estimate Yield per Recruit, Fishing and Natural Mortality and Growth Parameters.

METHODS: (Use the system described by Munro and Fakahau (1986))
- Comprehensive surveys and inventories of the Fisheries sector.
- Identification of predominant fishing methods.
- Resource sampling with standardized array of gears.

4.3. TITLE : PELAGIC SPECIES RESOURCE ASSESSMENT

AIM: To collect data in conjunction with SPC's Tuna and Billfish Programme and the newly formed South Pacific Albacore Research Programme (S.P.A.R.)

METHODS: Acquire reliable data from fish caught by longlining using LOFA catch.
a) length frequency distributions.
b) allometric measurements.
c) Collection of viscera for the analysis of parasites.

4.4 TITLE: GROWTH REQUIREMENTS AND CHARACTERISTICS OF SEAWEED (EUCHEUMA STRIATUM) IN TONGATAPU.

AIM: To determine the biological characteristics of environment necessary for seaweed growth and compare growth rates in 4 locations with different characteristics in Fanga'uta lagoon.

METHODS: (1) Establish seaweed plots in 4 locations differing in current speed and depth.
(2) measure environmental factors.

4.5. TITLE: BIOLOGICAL STUDY OF MULLET IN TONGA

AIMS: To answer some of these basic questions:

1. What is known about mullets in Tonga?
2. Which species of mullets are present in Tonga?
3. When do they spawn?
4. What are their maximum size and growth rates in the wild?
5. When do fry return from the spawning ground?
6. How best to catch the fry?

This work is to support the effort of culturing mullets in fish ponds.

4.6 TITLE: PRELIMINARY SURVEY AND INTRODUCTION OF TROCHUS

AIM: To identify local trochus species and their abundance with a view to introducing the right commercial species if not found locally.

METHOD: If possible to be done by outside agency.

4.7. TITLE: ABUNDANCE AND SIZE DISTRIBUTION OF GIANT CLAMS (TRIDACNIDAE) IN TONGA - A COMPARATIVE FOLLOW-UP STUDY

AIMS: (a) To assess the fishing pressure on the clam stocks by a direct comparison of the current abundance and size distribution with that found in 1979 by John McKoy's survey.

(b) Collect information on growth if possible.

METHODS: (a) Exactly repeat methods of assessing size and abundance used in 1979 survey.

(b) Measure any tagged specimens found to calculate growth.

4.8. TITLE: TRAP SURVEY FOR DEEP WATER PRAWNS.

- AIMS:
1. To collect basic data on deep water prawn distribution.
 2. To determine the catch rate per trap per fishing hour.
 3. To test for the effectiveness of each trap type to be employed.

- METHODS:
1. Construction of traps : 2 to 4 types.
 2. Sets of traps (a) at range of water depth
(b) during night and day time
(c) at various sites.
 3. Record of catch : (a) number of species
(b) total weight per species per trap type per fishing hour.

4.9. TITLE: FOLLOW UP STUDY OF THE DISTRIBUTION AND BIOLOGY OF LOBSTERS

AIM: To do a follow-up study to monitor the lobster resources.

METHOD: To follow sampling methods used by Dr. Leon Zann(1984) and the analysis methods used by Dr. J. Munro.(1987)

4.10. TITLE: IDENTIFICATION AND ASSESSMENT OF LOCAL OYSTERS.

AIMS: To identify and assess availability of local oyster species and determine its potential for culture.

- METHODS:
- Placement of spat collectors in different locations.
 - Measurement and identification of any settled spat.
 - Plankton collection in same localities.
 - Shellfish consumption survey to identify main species of oyster preferred and consumed in villages.
 - Life cycle study.

5. MANAGEMENT CONSIDERATIONS

Tonga has open access fisheries where fish and other marine products become a common property. This is a situation where each Tongan national has the same customary right to fish regardless of place. In other Pacific Islands, coastal communities have customary rights over sea areas. In this situation, the ultimate success of Tonga's Fisheries policy lies in the right and timely mix of a good and effective fisheries management programme backed by legislation and surveillance. The Fisheries Division recognizes that marine resources are not infinite and sooner or later investment in development schemes has to cease in order to avoid overexploitation of resources:

5.1 Inshore Reef and Seamount Fisheries

Given the sensitive nature of these fisheries to overfishing, major efforts will be made to control the intensity and efficiency of fishing efforts. Management tools which will be considered for use include registration and licensing; gear size and type limits; closed seasons; fish size limits; export quotas allocation; complete ban on some types of fishing; delineation of boundaries. The Fisheries Division should formulate management measures based on statistics and data obtained through stock assessment studies conducted within Tonga's fishery waters. Participation of artisanal and commercial fishermen in the formulation of management systems will be encouraged in order to avoid ill feelings between fishing industry and the management body i.e. Fisheries Division.

5.2 Deep Water Tuna Fisheries

Tunas being highly migratory, management measures could only become effective if jointly formulated with neighbouring nations whose waters are frequented by the same stock of tunas found in Tonga's fishery waters. At present the emphasis is on catching all tuna species which are found in Tonga's fishery zones. Major efforts will be made to maximise economic benefits from this fisheries.

6. LEGISLATION

Due to the ineffectiveness of the existing fisheries legislation (Ref. App.) the first comprehensive Fisheries Act yet designed to govern the Fisheries sector in Tonga was drafted in 1987. When this proposed Act comes into power it will take precedent over all other Acts, except for the Parks and Reserves Act (1976) and The Territorial Sea and Exclusive Economic Zone Act (1978). This Act will also repeal The Fisheries Protection Act of 1973.

7 REFERENCES AND BACKGROUND READING MATERIAL

Anon (1980) Tonga Government, Fourth Development Plan.

----- (1986) Tonga Government, Fifth Development Plan.

----- Tonga Fisheries Policy Paper (unpubl.)

Coates, D. (1987) Letter to the editor. Fishbyte, Newsletter of the Network of Tropical Fisheries Scientists. Vol.5 No.2 Aug.1987 ICLARM, Manila.

Fakahau, S.T. and M.P. Shepard. (1986) Fisheries research needs in the South Pacific: Information required for effective management and development of the fisheries of island states of the South Pacific.

Langi, V.A. and S.A. Langi. (1987) A stock assessment programme on the bottom fishes of the seamounts, Kingdom of Tonga: The first 9 months. Fishbyte Vol.5 No.3 December. ICLARM, Manila.

McKoy, J.L. (1980) Biology, exploitation and management of giant clams (Tridacnidae) in the Kingdom of Tonga. Fish. Bull. No.1 Fish. Div. Tonga.

Munro, J.L. (1986) Appraisal, Monitoring, Assessment and Management of Coastal Fishery Resources in the South Pacific Region. ICLARM, Townsville.
Part I. Report prepared for the Forum Fisheries Agency. Honiara.

Munro, J.L. and S.T. Fakahau. (1986) Monitoring and Management of Coastal Fishery Resources in the South Pacific Region. ICLARM, Townsville.
Part II. Report prepared for the Forum Fisheries Agency, Honiara.

Munro, J.L. (1987) Growth and mortality rates and state of exploitation of spiny lobsters in Tonga. ICLARM, Townsville.

Munro, J.L. Workshop synthesis and directions for future research. In "Tropical snappers and groupers: Biology and fisheries management" J.J. Polovina and S. Ralston (eds.) Westview Press / Boulder and London. pp 693-659

McKoy, J.L. (1980) Biology, exploitation and management of giant clams (Tridacnidae) in the Kingdom of Tonga. Fish. Bull. No.1 Fish. Div. Tonga.

Zann, L.P. (1984) A preliminary investigation of the biology and fisheries of the spiny lobsters (Palinuridae) in the Kingdom of Tonga. Mimeo. rept. Institute of Marine Resources; University of the South Pacific.

APPENDIX

Fisheries Regulation Act 1923.

- Fishing fences to be licensed.
- License for whale fishing.
- Control of site of fishing fence.
- Fishing nets mesh size limit.
- Fishing fence wire mesh size limit.
- Poison and dynamite prohibited.
- Prohibition of fishing in Sopa area.

With amendments on Acts Nos. 4 of 1923, 19 of 1950, 5 of 1957, 2 of 1958, 10 of 1961, 16 of 1976, 6 of 1981, 8 of 1986.

Whaling Industry Act 1935.

- An Act to Regulate the Whaling Industry.
- Amendment on Act No. 10 of 1979.

Fisheries Protection Act 1973.

- To protect the fishing resources of Tonga by restricting foreign fishing vessels from fishing in the territorial waters of the Kingdom.

Parks and Reserves Act. 1976

- To provide for the establishment of Parks and Reserves.

The Territorial Sea and Exclusive Economic Zone Act 1978.

- To make provision with respect to the Territorial Sea of Tonga ; and to establish an Exclusive Economic Zone of Tonga adjacent to the territorial sea, and in the exercise of the sovereign rights of Tonga to make provision for the Exploration, Exploitation, Conservation and Management of the resources of the zone: and for matters connected with those purposes.

FISHERIES ACT OF 1987 (NOT YET ENACTED IN PARLIAMENT)

- First comprehensive Fisheries Act yet drafted.
- (see attached paper for major headings and detail)

7 References and Background Reading Material:

Anon (1980) Tonga Government, Fourth Development Plan.

----- (1986) Tonga Government, Fifth Development Plan.

----- Tonga Fisheries Policy Paper (unpubl.)

Coates, D. (1987) Letter to the editor. Fishbyte, Newsletter of the Network of Tropical Fisheries Scientists. Vol.5 No.2 Aug.1987 ICLARM, Manila.

Fakahau, S.T. and M.P. Shepard. (1986) Fisheries research needs in the South Pacific: Information required for effective management and development of the fisheries of island states of the South Pacific.

Langi, V.A. and S.A. Langi. (1987) A stock assessment programme on the bottom fishes of the seamounts, Kingdom of Tonga: The first 9 months. Fishbyte Vol.5 No.3 December. ICLARM, Manila.

McKoy, J.L. (1980) Biology, exploitation and management of giant clams (Tridacnidae) in the Kingdom of Tonga. Fish. Bull. No.1 Fish. Div. Tonga.

Munro, J.L. (1986) Appraisal, Monitoring, Assessment and Management of Coastal Fishery Resources in the South Pacific Region. ICLARM, Townsville.
Part I. Report prepared for the Forum Fisheries Agency. Honiara.

Munro, J.L. and S.T. Fakahau. (1986) Monitoring and Management of Coastal Fishery Resources in the South Pacific Region. ICLARM, Townsville.
Part II. Report prepared for the Forum Fisheries Agency, Honiara.

Munro, J.L. (1987) Growth and mortality rates and state of exploitation of spiny lobsters in Tonga. ICLARM, Townsville.

Munro, J.L. Workshop synthesis and directions for future research. In "Tropical snappers and groupers: Biology and fisheries management" J.J. Polovina and S. Ralston (eds.) Westview Press / Boulder and London. pp 693-659

McKoy, J.L. (1980) Biology, exploitation and management of giant clams (Tridacnidae) in the Kingdom of Tonga. Fish. Bull. No.1 Fish. Div. Tonga.

Zann, L.P. (1984) A preliminary investigation of the biology and fisheries of the spiny lobsters (Palinuridae) in the Kingdom of Tonga.. Mimeo. rept. Institute of Marine Resources; University of the South Pacific.