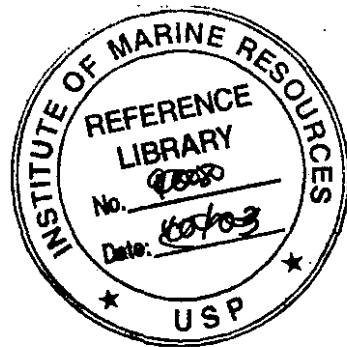
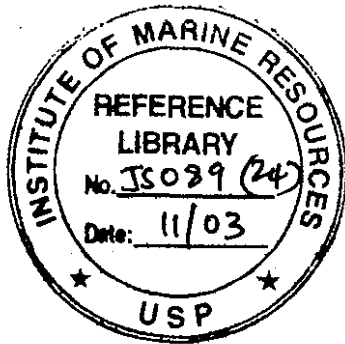


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RESEARCH IN FISHERIES BIOLOGY
IN FIJI AND THE ROLE OF THE INSTITUTE
OF MARINE RESOURCES,
THE UNIVERSITY OF THE SOUTH PACIFIC

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Delivered before Fiji Institute of Agricultural Science Annual
General Meeting, 26 March, 1983. To be published in Fiji
Journal of Agriculture.

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INTRODUCTION:

Fish are very important to Fiji's economy and are currently the second largest export. In 1981 nearly 10,000 tonnes of fish worth about \$20 million was exported as canned and frozen products (Fisheries Report, 1981).

Fish are also very important in the local diet. Approximately 2,000 tonnes of fish and shellfish worth \$2.7 million were sold in urban municipal markets in 1981. For the subsistence dweller fish is vital. It is estimated that about 12,000 tonnes, worth about \$20 million at local market prices, is caught in the subsistence fishery per annum (Fisheries Report, 1981).

With the declaration of its 200 mile Exclusive Economic Zone it is hoped that Fiji's fisheries will become an even more important revenue earner in the future.

RESEARCH AND FISHERIES DEVELOPMENT:

Marine biological research can be divided into a number of aspects e.g.

- (1) Identification and assessment of potential new fisheries.
- (2) Biological studies needed for the management of these and established fisheries.
- (3) Studies of specific related problems e.g. fish poisoning, processing.
- (4) Background research in related fields such as ecology and oceanography which may assist in the above.
- (5) Theoretical studies which have no direct relevance to the above but which contribute to the general pool of scientific knowledge.

In the third world where specialized expertise and funds are lacking marine research should be ranked in the above priorities. Areas (4) and especially (5) might be luxuries in poorer countries.

MANAGEMENT OF FISHERIES IN THE PACIFIC ISLANDS

The identification of management procedures (2 above) should be regarded as the major goal for marine research. The World fisheries have had a grim history of non-management, especially where several nations or interests have access to a single resource. Examples of over-fishing are legion, ranging from the tiny North Sea herring to the giant whales of the high latitudes.

In traditional times in Fiji management practices were widespread. Clan ownership of the sea prevented over-exploitation while many conservational practices evolved over millenia on a trial and error basis. However the advent of the cash economy, commercial fisheries, improved gear, increasing demand for fish, and new fisheries necessitate that marine research must formulate new guidelines for management.

Certain difficulties are inherent in the development and management of tropical fisheries. In temperate ecosystems there is a trend for fewer species and larger numbers of individuals of each, while in the tropics large numbers of species but smaller numbers of individuals. As well as creating technological problems in fishing, it vastly compounds the problems of management.

Temperate water fisheries models and management procedures may therefore be inappropriate for tropical fisheries. For example, in tropical Australia fisheries regulations have existed for many years prohibiting the taking of fish below certain sizes. This is sound practice in temperate species with limited fecundity as it allows immature fish to grow up and reproduce. However it was recently found that very many reef fish change sex as they grow, starting life as males and changing into females as they get larger. Thus for years Australian fishermen were keeping the reproductively valuable females and releasing the less important males. Thus a basic temperate-water fisheries practice was useless, even harmful, in the tropics.

As very little research has been conducted on tropical fisheries by the scientifically and technically advanced nations, it falls upon the Pacific Islands to attempt their own. The multi-million

dollar question is: can they really afford expensive, time-consuming and often unrewarding scientific research?

Several options face the Pacific Island nations. They can proceed with commercial fisheries development regardless of the consequences (this has occurred in most fisheries in the past). Or they can proceed with caution, monitoring catches carefully to develop management policies on a "trial and error" basis. Or alternatively, they can invest heavily in fisheries research, bearing the necessary time delay and great cost.

ROLES OF REGIONAL ORGANIZATIONS IN FISHERIES RESEARCH

The respective role of the commercial and public sectors in fisheries development should also be examined.

In the past, exploratory fishing by the established fishing nations (Japan, Russia, U.S., Scandanavia) were responsible for most discoveries of new fisheries. In more recent years government fisheries research vessels have made significant new discoveries in more remote areas (e.g. Antarctica) and in those areas difficult to fish (e.g. deepwater zones) which had not been explored by commercial fleets because of the high costs involved. In Fiji and other island countries much of the "public sector" research is provided by aid funds, while "private sector" fishing is poorly developed.

A surprisingly large number of institutions and organizations have been active in fisheries research and development in Fiji and neighbouring countries and a large amount of aid money has been invested in fisheries, often without any apparent consequences.

The Fisheries Division of the Ministry of Agriculture and Fisheries, Fiji, has been engaged in the identification and development of marine resources e.g. tunas, deepwater snappers, shrimps, beche-de-mer etc.), the promotion of small-scale commercial fisheries and village fishing schemes, investigations of aquaculture potential, and some basic research on mangroves and tuna baitfish.

The South Pacific Commission has also been engaged in a number of studies in Fiji e.g. the assessment of tuna stocks and migration, deepwater snapper exploration, shell cottage-industries.

Other bodies active in fisheries research, development and management include the Forum Fisheries Agency based in Honiara, various U.N. agencies such as ~~F.A.O. and U.N.D.P.~~, and agencies from the United State Peace Corps, Foundation for the Peoples of the South Pacific), from Britain (Fisheries Advisory), Germany (Hanns Seidel Foundation) and France (CNEXO).

In addition, the University of the South Pacific's Institute of Marine Resources has an extensive programme of research in fisheries and marine sciences.

With so many bodies engaged in fisheries studies there are often areas of overlapping interests and, on occasion, claims of duplication of effort. There have been suggestions that a single body such as the SPC might conduct all marine research in the Pacific Islands, although this is hardly realistic in such a vast and diverse area. Nevertheless it is critical that research be rationalized, and that all bodies conducting marine studies collaborate in the region's best interest.

The following is an outline of the Institute of Marine Resources' research projects and a clarification of its role in the area of fisheries and marine research:

THE INSTITUTE OF MARINE RESOURCES

The Institute was set up by the University in 1978 for "action-orientated" research, training and consultancies in the field of marine resources in the eleven island nations and territories which comprise the University region. As it is obviously impossible for small countries to support extensive research operations, the Institute consists of a small core staff of scientists with general skills, but draws upon specialized staff from overseas affiliates such as the Hawaii Institute of Marine Biology (through the Seagrants scheme) and Kagoshima University in Southern Japan. It has received project funding from a number of organizations, the major one being the European Economic Community. The Institute is equipped with basic

scientific, oceanographic and fisheries gear, and has two ocean-going vessels and a fleet of small craft.

TRAINING

Education is the primary role of a university. In the area of training, the Institute services the practical Diploma of Tropical Fisheries which has produced in excess of 100 fisheries officers for Fiji and other islands. This is now in its final year of operation, having satisfied the immediate requirements of Fiji. The Institute also teaches several courses in marine sciences in the more theoretical B.Sc. program and will be developing a specialized B.Sc. in Fisheries and Marine Sciences to satisfy the small, but important requirements for local marine scientists. It conducts a two-month program in Earth Sciences and Marine Geology each year, as well as various specialized training workshops, for example, on "Fish Poisoning" (with WHO) in January 1983. In June, 1983, it is to host a major workshop on the "Exclusive Economic Zone" for the Forum Fisheries Agency.

RESEARCH

Although a university's normal research is in theoretical fields ("pure" science) the research programs of the Institute of Marine Resources have a more practical application and relevance to the region, as befitting an institution in the Third World. Its projects generally provide a scientific background to the developmental programs of the Fisheries Division and S.P.C. For example, the latter organizations have programs on deep water snapper fisheries: Fiji Fisheries Division in the development of local fisheries and training of fishermen, and S.P.C. in general exploration. The Institute's research has provided a scientific background on the classification, distribution and general biology of the snappers. In this field there has also been a practical "spin-off" as deepwater longlines tested by the Institute has provided local fishermen with information on gear and catch rates.

Major areas of interest in research are in snappers and shrimp of the outer reef slopes of islands, the tuna baitfish and ciguatera fish poisoning. Other practical research has been conducted on seawave energy, various fishing gears, and small-scale commercial and subsistence fisheries. Studies of "background scientific value "

have been conducted on corals, mangroves, and the deepwater benthos (bottom fauna). Academic studies have been conducted on various crustacea, worms, molluscs, sea squirts and so on.

The following is a brief description of the major studies:

(1) STUDIES OF THE OUTER REEF SLOPE

Although they comprise only 10% of the seas, the shallow continental shelves provide 90% of the world's fisheries. However the Pacific islands almost entirely lack shelves and the islands drop rapidly away into the deeps.

For this reason exploratory fishing has concentrated on the outer reef slopes, from 100 m to 1000 m in depth. As the deep water offshore was not traditionally fished, fishing rights problems, a constraint to developing commercial fisheries in Fiji, should not be encountered. Exploitation of these new resources will also relieve the mounting fishing pressure on the inshore lagoons and reefs. So far there have been promising finds of shrimp and snapper on the outer reef slopes.

(A) DEEPWATER SHRIMP

Deepwater carid shrimps have been trap-fished commercially in Hawaii, Guam and Chile, and are trawled in the North Atlantic.

Studies in the Institute (King, 1980; 1981; 1982) have established the identities, depth distribution, range and basic biology of Heterocarpus spp. and Parapandalus spp. in Fiji and neighbouring islands. As a result of these surveys a small commercial fishery began in Vanuatu, and a pilot commercial fishing trials were conducted in Fiji.

(B) DEEPWATER SNAPPERS

Studies have also been conducted on the deepwater fish using traps, droplines and longlines. Reef slopes off islands and seamounts have been surveyed and a number of new species have been discovered (Raj., and Seeto, 1983 a and b).

A number of large snappers e.g. Pristipomoides; Paracaesio have been found in large enough numbers to support a commercial fishery. The large size, fine edible qualities and absence of ciguatera fish poisoning will make the deepwater snappers valuable luxury food fish for local consumption and export.

Catch rates and gear tested by the Institute has been useful to those entering this fishery.

(2) TUNA BAITFISH

Small fish (anchovies, herrings etc.) are used in the skipjack tuna pole-and-line fishery for live bait or chum. The lack of baitfish has been a major problem in this fishery in the islands.

The Institute has conducted studies on the basic biology of the bait fish, the species composition (several dozen have been identified), size and population structures from 46 sites around Fiji (Prasad, 1982).

As wild bait is often unavailable, the IKA Corporation is to establish aquaculture facilities for an emergency supplies of bait in the tuna season. The Institute has provided a consultant for this project.

(3) FISH POISONING

Ciguatera fish poisoning is a major problem in many places. In a recent epidemic (February 1983) 42 cases were admitted into the Colonial War Memorial Hospital in Suva.

The Institute has been active in fish poisoning research and has a small extraction and bioassay testing laboratory. Prof. Yasumoto, the discoverer of the causative agent of ciguatera poisoning, the dinoflagellate Gambiadiscus toxicus, has been a frequent visitor to the Institute. Investigations of other types of fish poisoning, including the "balolo season poisoning" are also underway in collaboration with Japanese scientists.

The Institute hosted a WHO fish poisoning workshop in January 1983 in which the latest discoveries of the leading scientists in the field were presented.

(4) TRADITIONAL FISHING KNOWLEDGE

The subsistence fisheries remain very important in Fiji. Studies of traditional fishing knowledge have been undertaken to document and evaluate the age-old skills of Fijian fishermen (Kunatuba, 1983).

Surveys of traditional fishing and canoes have also been undertaken by the author in other Pacific Islands (e.g. Zann, 1981).

Studies of traditional island fisheries may provide important information on the sustainable yields of coral reefs, necessary for the management of reef fisheries (Zann, 1983).

(5) THE ENERGY CRISIS AND ARTISANAL FISHERIES

Fishing, an energy-intensive industry, has been very seriously affected by the 15 fold increase in oil over the past decade.

The author has conducted surveys of small-scale fishing in Fiji and other islands, evaluating the effects of rising fuel prices on fishing trends (e.g. Zann, 1982).

(6) OTHER STUDIES

The staff and visitors of the Institute have been engaged in many other studies. These include:

The Fijian river mussel or kai Batissa (Raj)

Effects of sand mining in Laucala Bay (Penn)

The Nautilus (Zann; Muntz)

Corals and reef ecology (Raj; Morton)

The benthos of the reef slope (Zann).

(7) CONSULTANCIES

The Institute also provides consultancy services in the fields of marine sciences. Some involve substantial research projects whereas others are far easier to answer.

Examples of major consultancies in the past year include:

Baseline studies of oil prospects in Bau Waters (Gawel et al.)

Baseline study of Betio Causeway, Tarawa Atoll (Zann)

Survey of deepwater shrimp in the Gulf of Papua (King)

Rarely does a week pass without someone wanting advice on a fish, environmental impact factors, an enquiry from a hospital on fish poisoning and so on.

CONCLUSION

Marine research is one of the most important activities of a university which services the tiny, scattered island nations of the South Pacific.

The Institute of Marine Resources has demonstrated the necessity of a research facility in the islands examining problems of island life and assisting in the development of island fisheries.

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