FISH AND SHELLFISH OF THE LABU ESTUARY. AN ENVIRONMENTAL SURVEY IN PROGRESS

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INTRODUCTION

The need to include environmental factors in planning for the development of Papua New Guinea is set out in the fourth national goal and directive principle of the constitution of Papua New Guinea.

The directive calls for:

1. Wise use of our national resources and environment (land, sea and air) in the interests of development and in trust for future generations.

2. The conservation and replacement of the environment in its scenic and historical qualities.

3. Steps to be taken to protect birds, animals, fish, insects, plants and trees.

The environmental planning laws, passed in 1978, were designed to put these directives into action.

The laws aim to make sure that environmental planning is included in any economic or engineering planning. There should be fair consideration of the costs and benefits to the environment in both the short and long terms.

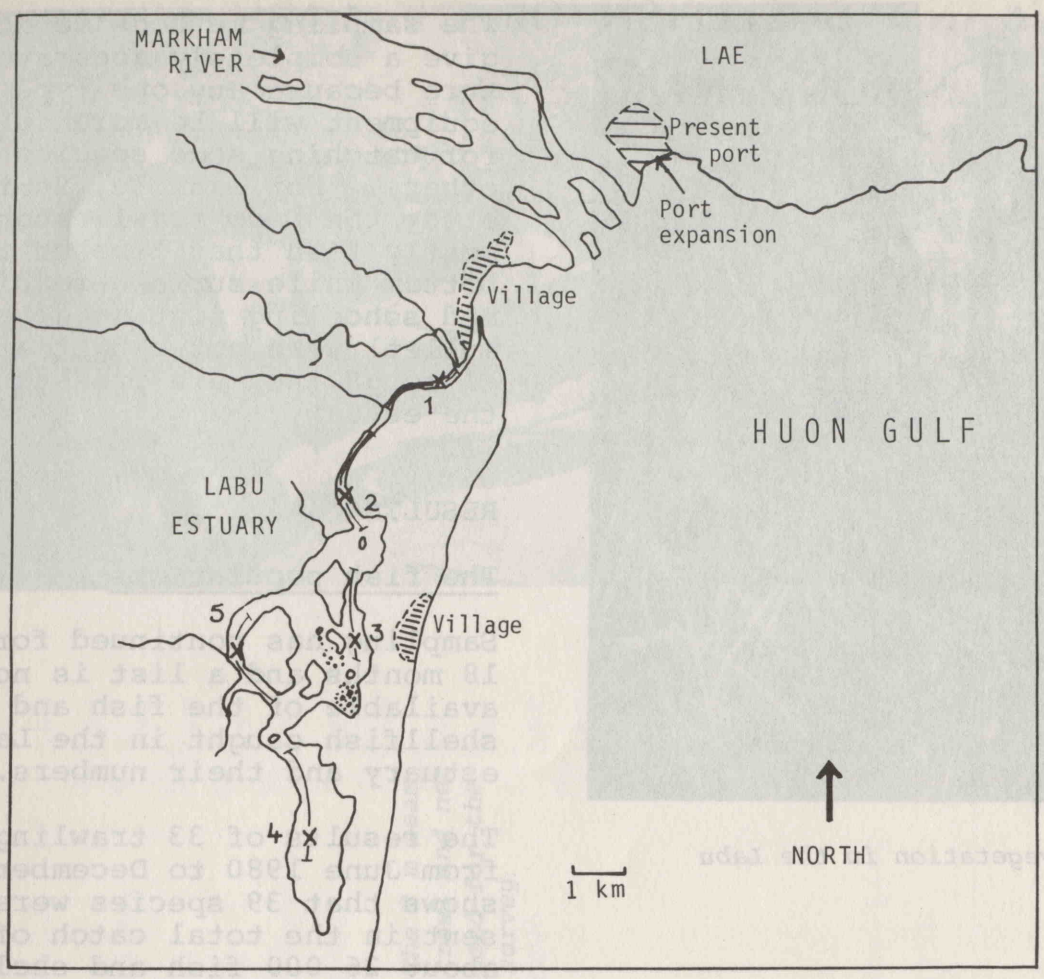
One major development which is planned is the expansion of the Lae wharf. In relation to the environmental planning laws, a study is being conducted to examine the effects of the expansion because, so far, little has been written about the local marine (sea) animals. Also, little has been written about how much the local villagers rely on the resources of the water.

This article reports on a survey in progress of the fish in the Labu estuary, an estuary close to the port expansion (see map). The survey will provide information about local fish populations in order to find out if there are changes during and after the port expansion.

THE IMPORTANCE OF LAE PORT

Lae is the largest port in Papua New Guinea handling some 36% of the country's sea freight, compared with Port Moresby's 24% and Rabaul and Kieta each with about 9%. The total volume of freight handled in Lae was 675,000 revenue tonnes in 1979.

Geographically, Lae is well situated on major Asian and Pacific freight routes. Within



The position of the Labu Estuary. Sampling sites are numbered 1 to 5 and marked with a cross (×) and a line (⊢—⊣) to show the extent of the trawl.

Papua New Guinea it is centrally located with respect to all other ports. It has the only major road system in the country, the Highlands Highway, which connects it to the densely populated and economically important Highlands region. Because of its central postion and direct road access to some 44% of the nation's population, Lae is the most important port in Papua New Guinea.

Continued agricultural and industrial expansion in the area will soon make it necessary to expand the port in order to continue its present efficiency. The planned site for future development is a swamp area to the west of the existing port (see map).

The proposed port extension will be around 500 m long and 220 m wide; it will be dredged to a depth of 11 m below mean low tide. A volume of 2.2 million m^3 of material will be removed to produce the basin and about 1 million m^3 of fine soil will be pumped into the sea. An area of over 0.4 km^2 will be directly affected by dredging and reclamation and about 1.5 km^2 will be enclosed by a retaining wall to protect the port against river floods. Much of the area which will come within the boundary of the proposed development is undisturbed, forested swamp.

Mangrove vegetation in the Labu Estuary

METHODS

On the basis of a pilot survey conducted from March to June 1980, a 3 m beam trawl with a 3.2 cm stretched mesh net was chosen to take samples of fish and shellfish in the Labu estuary. Five sites were selected and have been trawled for 15 minutes each fortnight between 1800 and 2300 h from June 1980 to the present.

Captured fish and shellfish were counted. Species which could be identified on sight were measured in length and weighed, then returned to the water. Unfamiliar specimens were preserved in formalin to be identified later. Analysis of protein and fat was carried out on 13 species and Plaza canned Mackerel by the Chemical Analysis Laboratory at P.N.G. University of Technology.

The sampling methods do not give a completely accurate picture because any one type of equipment will be more suitable for catching some species than others. For example, in this study the beam trawl caught mostly fish that live on the bottom while surface feeding and schooling fish (e.g. mullet) were not caught at all, although they are present in the estuary.

RESULTS

The fish populations

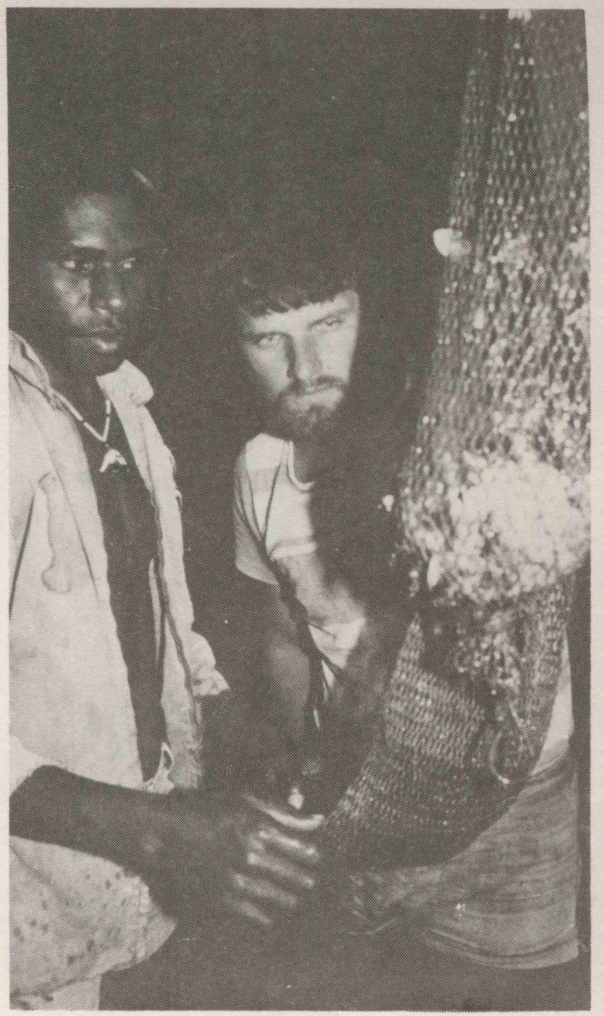
Sampling has continued for over 18 months and a list is now available of the fish and shellfish caught in the Labu estuary and their numbers.

The results of 33 trawling sets from June 1980 to December 1981 shows that 39 species were present in the total catch of about 26 000 fish and shellfish weighing almost 150 kg. These are listed in Table 1 with the scientific and English names.

Thirty species were represented by more than five individuals and over 86% of the bony fish catch belonged to four species. Twelve species of the fish and prawns accounted for over 92% of the total mass caught. These twelve species are indicated in Table 1.

Most of the fish in the estuary are small individuals belonging to a few species. Some of the less common species have only a few large individuals. Other studies of bay, inshore and estuarine fish populations in other parts of the world have found the same result. It appears that estuaries are important places for young fish to develop.

The 3 m beam trawl and net used for the survey



Examining a catch after 15 minutes of trawling

Collecting the net

TABLE 1. SPECIES PRESENT IN THE LABU ESTUARY, JUNE 1980 TO DECEMBER 1981.

Scientific name	Common name	Eaten by villagers	% of total* number/of individuals	% of total*/ weight
Apogon amboinensis	Amboina cardinalfish	Yes		
Apogon hyalosoma	Hump-backed cardinalfish	Yes		
Archamia buroensis	Buru cardinalfish	Yes		
Caranx sexfasciatus	Great trevally	Yes		
Anodontostoma chacunda	Bony bream	Yes		
Eleotris c.f. macrolepis	Gudgeon	No		
Setipinna papuensis	Hair-fin anchovy	Yes		
Stolephorus bataviensis	Batavian anchovy	Yes		
Gerres filamentosus	Spotted silver-biddy	Yes		
Glossagobius circumspectus	Goby	No		
Oxyurichthys tentacularis	Goby	No		
Lactarius lactarius	Milk trevally	Yes	< 1	1.0
Ambassis interruptus	Long-spined perchlet	Yes	1.8	2.2
Gazza achlamys	Silver toothed ponyfish	Yes	3.5	3.1
Secutor ruconius	Pug-nosed ponyfish	Yes	9.2	3.3
Leiognathus equula	Common ponyfish	Yes	71.6	53.3
Lutjanus argentimaculatus	Mangrove Jack	Yes	< 1	2.6
Lutjanus johni	John's seaperch	Yes	< 1	2.4
Lutjanus ehrenbergi	Ehrenberg's seaperch	Yes	< 1	1.0
Monodactylus argentimaculatus	Moonfish	No		
Upeneus vittatus	Yellow-banded goatfish	Yes		

Muraenesox cinereus	Arabian pike-eel	Yes		
Polydactylus microstomus	Small-mouthed threadfin	Yes	<1	2.6
Pomadasys argyreus	Silver javelinfish	Yes	<1	2.2
Tetraroge barbata	Bearded roguefish	No		
Arothron reticularis	Reticulated toadfish	No	<1	14.82
Toxotes jaculator	Archer fish	Yes		
Epinephelus tauvina	Greasy cod	Yes		
Platax sp.	Batfish	Yes		
Scatophagus argus	Spotted scat	Yes		
Pseudosciaena sp.	Jewfish	Yes		
Antennarius hispidus	Anglerfish	No		
Harpodon nehereus	Bombay duck	Yes		
Varuna litterata	Crabs	Yes		
Thalamita crenata	Crabs	Yes		
Macrobrachium sp.	Prawns	Yes	9.1	3.6
Metapenaeus sp.	Prawns	Yes		
Palemonidae	Prawns	Yes		
Catostylus sp.	Jellyfish	No		

* Percentages of total number and total weight are given for the twelve most common species only.

Food value of fish caught

From interviews with the villagers in the area it was found that of the 32 kinds of fish and 6 kinds of shellfish that we caught in the estuary, 26 types of fish and five types of prawns and crabs are eaten by them (see Table 1).

The amount of protein in selected common species ranged from 6.7% to 29.1%, with an average of 15.4%. This compares well with some common temperate fish and well-known types of processed fish.

The fat content of seven common species in this study ranged from 0.7% to 2.5%, with a mean of 0.8%. These values are very low compared with temperate and processed fish (Table 2).

TABLE 2. FOOD VALUES FOR COMMON SPECIES FOUND IN THE LABU ESTUARY, AND TEMPERATE AND PROCESSED FISH

	PROTEIN (%)	FAT (%)
Labu estuary fish		
Amboina cardinalfish	29.06	1.12
Hump-backed cardinalfish	9.28	n.m
Great trevally	15.76	n.m
Silver-toothed ponyfish	14.89	0.86
Milk trevally	17.31	n.m
Common ponyfish	13.59	2.48
John's sea-perch	17.18	1.32
Small mouthed threadfin	17.09	1.11
Silver javelinfish	6.73	1.09
Batavian anchovy	17.26	n.m
Pug-nosed ponyfish	9.16	n.m
Prawn (*Metapenaeus* sp.)	18.90	n.m
Crab (*Varuna litterata*)	13.76	n.m
Temperate fish		
Haddock*	17.4	n.m
Herring*	16.8	18.5
Processed fish		
Kipper*	19.8	11.7
Canned salmon*	20.3	n.m
Canned sardines*	23.7	13.6
Cod fried in batter*	19.6	10.3
Plaza mackerel in oil	17.0	3.8

n.m = not measured

* From: McCance and Widdowson (1978). *The Composition of Foods.*

All values are percent of wet body weight.

CONCLUSIONS

The aim of the research described in this article is to provide a list of fish and shellfish present in the Labu estuary and their numbers from June 1980, to when building of the new wharf begins. Any changes during and after the building of the port can then be compared.

Fresh fish provides food for many people in Papua New Guinea. Therefore it is a good idea to find out which fish are present in coastal waters, which fish are important in local diets and what their food values are before major developments begin in the area. A later article will give details of the importance of fish in the lives of people in the area.

Such information is important if a check is to be kept on the quality of the environment during the development of Papua New Guinea.