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SOURCES OF ANIMAL PROTEIN IN MEALS OF THE POPULATION OF THE SEPIK-RAMU CATCHMENT

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ABSTRACT

Baseline data about freshwater fish and other sources of animal protein in the diet were collected by means of structured interviews with inhabitants of 24 villages in the Sepik-Ramu catchment area and among people fishing at a high altitude reservoir. The survey revealed that 35 - 38% of the respondents staying at high (> 1000 m above sea level) and middle altitude level (200 - 1000 m) had no animal protein in the meals eaten the day before the interviews took place. At these higher altitude levels, where in general freshwater fish is scarce, tinned fish and frozen meat were the most commonly eaten sources of animal protein. Of the respondents staying at low altitude (< 200 m above sea level) 23% reported not to have eaten any animal protein the day before the interview took place. Freshwater fish was the most commonly eaten source of animal protein for respondents who had access to water bodies with more abundant fish resources such as lakes and reservoirs.

Keyword: Sepik-Ramu, catchment area, animal protein, freshwater fish, introduced species.

INTRODUCTION

Papua New Guinea has considerable marine fisheries resources which are however not accessible for the 85% of the population who live inland (Coates, 1987). The Government of Papua New Guinea in co-operation with the Food and Agriculture Organisation of the United Nations (FAO) started in 1987 the Sepik River Fish Stock Enhancement Project. This project aimed to alleviate the problem of malnutrition and to enable the development of the fishery in the Sepik-Ramu catchment area by means of increasing the total fish biomass in the Sepik-Ramu river system. The total annual fish production of the Sepik River floodplain was estimated at 3000 to 5000 tonnes/year, which is about 10% of the production from similar sized flood plains in Africa or elsewhere in Asia (Coates, 1985). An increase in fishing effort was believed not to result automatically in an increased total catch due to the rather exceptional biological characteristics of the endemic fish population. Compared with other tropical river systems the Sepik-Ramu has a low number of indigenous fish species (Coates, 1985; 1986; 1987; 1993). Most of the bigger species (the most interesting ones from the point of view of the fisher) have a low fecundity and would not be able to stand a higher fishing pressure. The Sepik floodplain habitat developed only 6000 years ago from an inland sea (Swadling *et a.*, 1988). Only 2 indigenous fish species that are of importance to the fishery have adapted to the unstable floodplain conditions and migrate from the river channels to make use of the abundant feed sources.

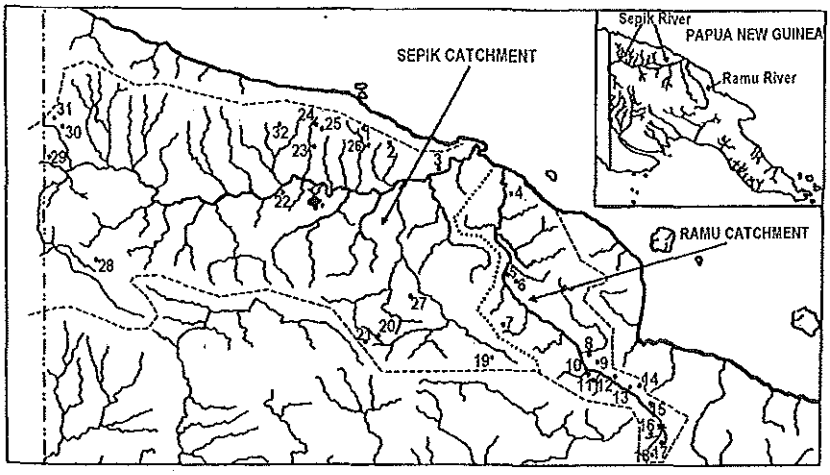

Figure 1. Map showing the sites of the Sepik-Ramu Catchment Areas where the study was conducted.

available in flooded areas (Coates, 1986). At high altitudes only a small number of native fish species are found, and these are not very productive. In addition several sources of fish feed were identified that are not fully utilised by the native fish species. Coates (1993) considered this as another significant factor contributing to the low fish productivity of the basin.

To increase the total fish biomass and fishery yield it was decided to introduce new fish species from other parts of the world. One species from Africa, 6 from mainland Asia and 2 from South America were imported and stocked at various locations and altitudes in the Sepik-Ramu catchment area between 1991 and 1997 (Coates, 1997).

Base line surveys of the Sepik-Ramu fishery were conducted to enable a future assessment of the impacts of these introduced fish species on the diet and income of the Sepik-Ramu rural population, and on the abundance of native aquatic fauna (Mys and van Zwieten, 1990; Heijden, 2002a). This article describes the results of the surveys that dealt with the occurrence of fish and other animal protein sources in the diet of the respondents. Except for the situation near Yonki Reservoir where one newly introduced fish species established itself during the year the survey took place, the results represent the situation as it was before the new species had been stocked.

THE STUDY AREA

The Sepik River channel has a length of 1100 km. In the basin below an altitude of 80 m an area of approximately 7600 km^2 is flooded during the wet season. The Ramu River has a length of 650 km. Near Yonki Township, at an altitude of 1260 m, the river was blocked in 1991 by a dam that created Yonki Reservoir. During the rainy season flooding of the Ramu flood plain occurs below an altitude of 150 m above sea level, resulting in a flood plain of 3000 km^2. The catchment areas of the Sepik and the Ramu cover a combined area of 100,000 km^2 and are connected at the floodplain level. Numerous swamps and lakes are found in the floodplains of both river systems (Figure 1).

The total population of the study area is approximately 785,000 of which 95% live in small villages. Agriculture, animal husbandry (pigs and chickens), hunting and fishing are the major economic activities of the rural people. Half of the population

live at altitudes higher than 1000 m (Coates and Mys, 1989). Malnutrition is believed to be common (Coates, 1987).

METHODS

Data were collected in 1991-92 by means of structured interviews. Fourteen villages in the Ramu catchment area and 10 villages in the Sepik were surveyed. Location and population size of these villages have been reported by Heijden (2002a). Per village between 10 and 42 people were interviewed. No selection of respondents took place except for being present and willing to be interviewed. Data were collected from 215 respondents belonging to 197 households living in 8 villages located at high altitude (> 1000 m above sea level), from 183 respondents belonging to 151 households living in 8 villages at middle altitude (200 to 1000 m above sea level) and from 211 respondents belonging to 164 households living in 8 villages below 200 m above sea level (Total: 609 respondents from 512 households). More details about the composition of the group of respondents have been reported by Heijden (2002a). The respondents were asked what kind of food from animal origin they had eaten yesterday and the day before yesterday.

The same question was asked also during a survey among 204 people who were interviewed while fishing along the shore of Yonki Reservoir.

The interviews with Yonki fishers took place at 5 different times during 1992. The respondents resided in 37 villages and hamlets of which the majority is located within 15 km from the reservoir. All these villages were at high altitude level. Details about the group of respondents interviewed along Yonki Reservoir are described in Heijden (2002b).

RESULTS

Of the respondents living at high and middle altitude levels 35 and 37% respectively reported not to have eaten any food from animal origin on the day before the interview took place. The percentages were higher for 2 days before the interview (Table 1). Of the high altitude 19.5% of the respondents reported not to have eaten any food from animal origin during both of the days before the interview took place. No food from animal origin was reported to have been eaten during the 2 days before the interview by 22.4% of the respondents fishing at Yonki Reservoir, by 25.0 % of the respondents living at middle altitude level, and by 10.0% of the respondents living at low altitude.

Respondents living at high and middle altitude levels consumed sources of animal protein purchased at the market or at the shop during 39.7 % and 46.0 % respectively of the meals eaten one day before the interview took place. Purchased food from animal origin contributed to 30.3% of the meals taken one day before the interviews by the respondents fishing at Yonki Reservoir. Eggs, chicken and pork were not included in this category because the interviews did not probe whether these items were purchased or originated from the respondent's own poultry or livestock. At low altitude level 20% of the food from animal origin that was eaten the day before the interview had been purchased.

Depending on the location animals hunted or collected in the forest or field contributed 0.5 to 6.7% of the food from animal origin eaten the day before the interview. Fish and other aquatic animals caught in nearby waters by the respondents or by other members of the respondent's household contributed 7.7% of the food from animal origin eaten one day before the interviews took place by high and middle altitude respondents. This percentage was 25.4% for the people found fishing at Yonki Reservoir, and 41.1% for the respondents living at low altitude levels.

Table 1. Percentage of the respondents that had eaten various types of animal protein one and two days before the interview took place.

	High altitude		Yonki fishers		Middel altitude		Low altitude	
Type of food from animal protein origin	One day before interview	Two days before interview	One day before interview	Two days before interview	One day before interview	Two days before inerview	One day before interview	Two day before interview
No food from animal origin	37.8	44.1	34.8	51.2	36.6	51.1	23.1	29.2
Fishery products								
Fresh fish (caught)	7.7	7.7	25.4	14.9	6.7	6.3	38.7	39.7
Claims							0.9	0
Shrimps (caught)					1.0	0	2.7	2.9
Purchased								
Fresh/smoked fish (bought)	0.5	0	0.5	0	6.7	5.8	3.6	4.8
Canned meat			3.0	2.5	5.2	7.4	0.4	0
Canned fish	19.8	15.5	12.9	10.9	28.3	14.7	16.0	13.4
Lamb flaps	18.5	15.5	12.9	13.4	1.6	1.6		
Beef	0.9	0	1.0	1.5	4.2	4.2		
Harvested or purchased								
Pork	7.7	9.5	5.5	5.5	1.6	4.2	8.4	6.2
Chicken	3.2	3.2	4.0	4.0	1.6	1.1	1.7	2.4
Eggs	0.9	0.			1.0	0	0.9	0.5
Hunted								
Casowary					0	1.1		
Other birds shot in bush	0.5	0.9			0	0.5	0	0.5
Bandicoot	0.9	0.9	0.5	0	3.7	1.1	2.2	0.5
Cuscus	1.4	1.4			1.0	0.5		
Tree kangaroo	0.5	0			1.0	0.5		
Flying fox					0.5	0		
Lizard					0.5	0		
Sago grubs							1.3	0

Of the respondents living in the 8 high altitude villages 16% reported to have sold some fish at least once in the past. The sale of fish at least once was reported by 13% of the Yonki fishers, by 5.5% of the respondents from middle altitude, and by 55% of the respondents from low altitude villages.

DISCUSSION

The percentage of the respondents that reported not to have eaten any food from animal origin "the day before yesterday" was 17 to 40% higher than the results concerning the meals eaten "yesterday" (Table 1). It seems likely that this higher percentage is due to the fact that a part of the respondents could not remember quickly what they had eaten 2 days ago, and answered negatively. The information about what was eaten one day before the interview is therefore believed to be more reliable.

The survey confirmed that animal protein is most scarce at higher and mid altitude levels. Of the 9 fish species stocked by the Sepik River Fish Stock Enhancement Project and the FISHAID Project 3 to 4 species are in their home range found in habitats similar to the high and mid altitude level rivers and streams. When the introductions are successful these species are expected to contribute to the animal protein availability. At present no data are available to confirm how many of these species have indeed established themselves.

Table 2. Percentage of the households interviewed in the 1982/83 National Nutrition Survey that reported to have eaten food from animal origin yesterday. (N = the number of households interviewed).

Province	Districts	Tinned/frozen Fish or meat	Bush meat	Fresh fish, shellfish	N
Madang	Bogia, Ramu	8.9	2.45	7.7	132
East Sepik	Ambunti, Maprik, Angoram	8.0	7.6	29.4	320
West Sepik	Amanab, Lumi Nuku, Telefomin	12.4	8.6	5.5	279
West Highlands	Hagen North, Jimi	26.9	5.8	1.5	264
East Highlands	Kainantu	24.5	0.3	0.3	80
Enga	Wabag, Wapenamanda	17.3	4.0	0.85	179

For people living at low altitudes fish and other aquatic animals caught by the respondents or by members of his or her household were the most important sources of animal protein. For the people interviewed while fishing near Yonki Reservoir fresh fish was the second most important source of animal protein. Redbreasted tilapia, the fish species introduced in 1991 by the Sepik River Fish Stock Enhancement Project, was responsible for nearly 50% of the weight of the catch of the Yonki fishers by the end of 1992 (Heijden, 2002b). Because of the rapid development of the fish stock in the newly created Yonki Reservoir it can not be established whether the contribution of this new species was additional or merely substituting part of the yield of the other 2 species in the catch (common carp and Mozambique tilapia).

The percentage of the high altitude respondents that reported to have eaten fish caught by himself or by another household member is strongly influenced by the respondents from one village that was exceptional because it is situated near a 1 km^2 big lake. Lakes are scarce at high altitude levels in PNG and over 95% of the inhabitants of villages at this altitude only have access to streams and small rivers. Of the respondents from the 7 other high altitude villages that had no access to lakes only 4.2 % had eaten fresh fish the day before the interviews took place, and 11.5% reported to have sold fish sometime in the past. These figures are believed to be more representative for the general situation of the high altitude Sepik-Ramu population.

The National Nutritional Survey of 1982/83 investigated what kinds of animal protein were eaten the day before the respondents were interviewed. The results of the districts that are (almost) completely situated in the Sepik-Ramu catchment area are summarised per province in Table 2. The percentage of the respondents that had eaten any food from animal origin the day before the interview took place is lower in the 1982-83 National Nutrition Survey than in the survey reported by us. The difference may be caused by the difference of the locations where the interviews were held, or by economic development during the period 1982 - 1991 that allowed the population to buy food from animal origin more often. East Sepik Province, which is of the 6

provinces in which the Sepik-Ramu catchment is located the province where fish is most abundant, had the lowest percentage of respondents that did not eat any food with animal protein. The higher occurrence of fresh or smoked fish in the meals of people who stay near water bodies that are more abundant with fish resources indicate that the assumption on which the Sepik River Fish Stock Enhancement Project and its successor FISHAID are based is correct: when more fish becomes available in the accessible waters, more fish will be caught, eaten and traded.

Several of the fish species introduced by the above mentioned projects were already commonly caught 4 years ago (Coates, 1997) and have now spread widely. An assessment of the nutritional and economic contribution of the newly introduced species as well as their impact on native aquatic fauna and flora seems timely and warranted.

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