Environment and Human Ecology in the Lake Murray-Middle Fly Area

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Abstract

The Lake Murray-Middle Fly area lies in the centre of the vast lowland alluvial plain which constitutes much of the Western Province of Papua New Guinea. The dominant geographical features in the area are Lake Murray – the largest lake in Papua New Guinea – and the Fly and Strickland Rivers with their broad flood plains which in places are fifteen kilometers wide. In the midst of these flood plains are numerous lakes and extensive areas of swamp and marsh. Along the rivers and around the edges of the lakes, including Lake Murray, are large tracts of grassland and savannah which are periodically inundated when the Fly and Strickland Rivers flood their low banks. These grasslands and swamps are home to an extraordinary variety of wildlife, including large numbers of fish, turtles, crocodiles, and migratory birds, many species of which have not been adequately documented .

The Lake Murray-Middle Fly area is also home to some 3,500 people who speak the closely related Boazi and Zimakani languages. These two languages are closely related to the Marind language spoken to the west and southwest in Irian Jaya, and the culture of Boazi and Zimakani speakers is similar to that of the Marind-arnim and Bian Marind described by van Baal in his book Dema. Like the Bian Marind to the west the people of the Lake Murray-Middle Fly area live in small villages and isolated homesteads along the flood plains of the rivers and have a riverine adaption, relying on naturally occurring sago as well as fish and game for their food. Virtually all travelling is by dugout canoe. Because of the riverine adaption of Boazi and Zimakani, the negative effects of mining in the headwaters of the Fly and Strickland Rivers on those two rivers would have particularly serious consequences for the people of the Lake Murray-Middle Fly area.

This paper provides an introduction to human ecology in the Lake Murray-Middle Fly area, an area in which I conducted two and a half years of anthropological research between 1982 and 1985.[1]

I want to preface this paper by noting that I am a social anthropologist and my research in the Lake Murray-Middle Fly area focused primarily on kinship and marriage (see Busse 1987), not human ecology. Nonetheless, like most anthropologists who live among people who derive their daily living directly from their natural environment, I found that during the course of my research I had to learn a great deal about the physical environment in which I was living and about the ways in which the people among whom I was living thought about and used that environment. Not surprisingly, I discovered that much of the symbolic life of the people of the Lake Murray-Middle Fly area was and is closely connected to the physical world in which they live and that their view of that world differs in important ways from the view that an urban American such as myself might have of such an environment.

During the two and a half years that my wife and I lived in the Lake Murray-Middle Fly area, we came to appreciate the stunning beauty of the area and to understand, at least to some degree, the ways in which the people of the Lake Murray-Middle Fly area make a living from their environment and the rich social, cultural and emotional meanings which that environment has for them.

In this paper, I particularly want to emphasize that both the grasslands and *Melaleuca* swamp savannahs of the Lake Murray-Middle Fly area on the one hand and the hunting, fishing, and sago-making adaptation of its inhabitants on the other hand are unusual in New Guinea. Indeed, the physical environment of the Lake Murray-Middle Fly area is, in many ways, more reminiscent of parts of northern Australia than New Guinea.

The Lake Murray and Middle Fly Census Divisions comprise some 12,500 square kilometers in the midst of the vast lowland alluvial plain which constitutes much of the Western Province of Papua New Guinea and which stretches across the international border into south-eastern Irian Jaya. The dominant geographical features of the Lake Murray-Middle Fly area are Lake Murray – the largest lake in Papua New Guinea – and the Fly and Strickland Rivers with their broad floodplains which in places are fifteen kilometers wide. Along the rivers and around the edges of the lakes, including Lake Murray, are large tracts of grassland and *Melaleuca* swamp savannah which are periodically inundated when the Fly and Strickland Rivers overflow their low banks. This area is home to a variety of water birds, including ducks, geese, herons, ibises, storks, and pelicans. Away from the rivers are somewhat higher areas consisting of low ridges covered with open forest or closed canopy rainforest. In the marginally lower areas between the ridges are the vast sago swamps from which the people of the area get an important part of their food. Despite these somewhat higher areas away from the rivers and their floodplains, the overwhelming impression that one gets travelling through the area is of extensive flatness and swamp.

The Lake Murray and Middle Fly Census Divisions are home to approximately 4,500 people or fewer than 0.5 persons per square kilometer. The reasons for this low population density appear to be malaria and the limiting effects of particularly dry years rather than an absence of natural resources.[2] The cycle of particularly dry years

warrants particular comment here in light of the activities of Ok Tedi Mining Limited upstream from the Middle Fly.

In an average year, the Lake Murray-Middle Fly area receives about 2.5 meters of rain, over half of which falls during the northwest monsoon season from late December to mid-April. Annual rainfall figures at Bosset in the Middle Fly between 1974 and 1984, however, ranged from 1.5 meters in 1979 to over 3.5 meters in 1975. The water level in the Fly River and its floodplain, however, depends primarily on rainfall in the headwaters of the Fly and Ok Tedi Rivers, and the water level in the Middle Fly appears to rise and fall independently of rainfall in the Middle Fly itself.

In the twenty five years prior to my research, particularly severe dry seasons occurred in 1958, 1965, 1972, 1979, and 1982, so severe dry seasons are not unusual events. During extreme dry seasons, such as the one that was in progress when I arrived in the Lake Murray-Middle Fly area in 1982, food and water are serious problems. During the second half of 1982, Bosset Lagoon[3] which is usually three to four meters deep, was completely dry and covered with high grass. During this time, the people of the Middle Fly abandoned their villages which are near the edge of the flood plain and moved to the banks of the Fly River because the river channel was the only source of drinking water. During October and November 1982, it was impossible to make sago – the main food in the area – because there was no water with which to wash the starch from the sago pith, even though people dug two-meter deep holes in the dry floors of their sago swamps. As a result of the lack of water with which to make sago, people were forced to rely on bananas and fish.

In addition to the difficult food and water conditions, the exposed lake beds are quickly covered with grass. When the river rises and the lakes are inundated – and Bosset Lagoon filled with water before it rained in the Middle Fly – the grass remains, at least temporarily. This grass removes the oxygen from the water which means that there are few or no fish in the lakes. Not only does this make it more difficult for people to obtain fish to eat, but it also means more mosquitoes, since the fish eat the mosquito larvae, and more mosquitoes means more malaria.[4] Thus, it appears that the cycle of extreme dry seasons may be an important limiting factor on human population in the Lake Murray-Middle Fly area.

Of the 4,500 people who live in the Lake Murray-Middle Fly area, approximately 3,500 speak the Boazi and Zimakani languages. There are approximately 2,000 Boazi speakers and about 1,500 Zimakani speakers. Zimakani is spoken by people living around Everill Junction (i.e., the confluence of the Fly and Strickland Rivers) and the southern part of Lake Murray, and Boazi is spoken by people living along the shores of the northern and central parts of Lake Murray and along the Fly River from the Binge River in the north to just above Everill Junction in the south.

Together, these two languages make up the Boazi Language Family, and Boazi and Zimakani speakers are social and culturally very similar to one another. The Boazi Language Family, in turn, is the easternmost of the three language families in the Marind Language Stock (Voorhoeve 1970, 1975:355-362). The other languages of the Marind Stock are spoken in Irian Jaya, and Boazi and Zimakani speakers are culturally similar to the Marind-anim and Bian Marind of Irian Jaya who have been described by van Baal (1966).[5]

The Boazi and Zimakani are riverine people who get most of their food by hunting, fishing and processing the pith of wild sago palms. Gardens are unimportant both culturally and in terms of day-to-day subsistence. The people of the Lake Murray-Middle Fly area live within and along the edges of the floodplain in semi-permanent villages and camps near their sago swamps and hunting grounds. Travelling is done primarily by dugout canoes which are made from a variety of trees in the forest. The forest also provides wood for paddles and drums, and the marshes and forests provide reeds, bark, and palm spathe for making baskets and water containers.

Boazi and Zimakani speakers see themselves as living in a rich environment, and, in many regards, they are right. The Lake Murray-Middle Fly area has vast tracts of naturally-occurring sago (*Metroxylon sagu*).[6] Under optimum conditions such as those found in the Lake Murray-Middle Fly area, sago palms grow to heights of fifty feet and take ten to fifteen years to mature. During its growth, the palm stores carbohydrates in its stem. At full maturation, these carbohydrates are converted to sugar to sustain seed production.[7] Therefore, the best time to harvest a sago palm is just before it flowers when its pith contains the maximum amount of starch.[8]

Sago-making is women's work, and sago is an important feminine symbol. A complicated process is used to extract the starch from the palm pith. A woman first selects a mature palm, fells it with an axe, and removes a section of bark. She then chops, or shaves, the pith with a tool made of two sticks, the ends of which are tied together at a right angle with cane rope. The sticks are then pulled to about a 60° angle and held in that position by a cord, also made of cane, tied to the other ends of the sticks (i.e., the ends that were not tied together initially). The cutting edge of the tool is a bamboo node, or sometimes a piece of metal pipe, fitted over the end of one of the sticks. The other stick then serves as the handle of the tool. When the woman has chopped the pith, she places it in a large basket made of bark or grass. She then pours water into the basket and squeezes the basket with her feet on a small platform at one end of a trough made of palm spathes tied together with grass. As she squeezes the basket full of pith, the water, with the sago starch in suspension, runs out of the basket and into the trough where the sago starch comes out of suspension and settles to the bottom of the trough. At the end of the day, the woman carefully pours off the water and loads the wet sago starch into her basket.[9]

Hunting is men's work and men's passion. The Lake Murray-Middle Fly area is rich in game. Cassowaries, wild pigs, two types of wallabies, and deer abound.[10] It should also be pointed out that the Lake Murray-Middle Fly area is home to one of the largest monitor lizards in the world, *Varanus salvadori* which can reach four meters in length (Cogger 1972). These are also hunted, and their skins are used for the heads of drums.

Almost all hunting is done with large bamboo bows and cane arrows. A variety of hunting techniques are used including the construction of blinds in the bush for hunting birds, the construction of traps for pigs, stalking (with or without the help of dogs), and drives in which game is driven toward a line of hunters waiting at the base of a peninsula. Hunting is almost always successful, and most people eat red meat at least twice a week.

The most dramatic hunts are the fire drives which take place during the dry season in the grasslands and savannahs of the river floodplains. These hunts, which may

involve as many as sixty or seventy men, are the most important contemporary public expressions of masculinity.[11] In one fire drive in which I participated, over 300 hectares of grassland were burned, and seven deer, three pigs, and eight large grass wallabies (*Wallabia agilis*) were killed.

While ideologically and symbolically less important than hunting, fishing is more important as a source of food. People often eat fish more than once a day. Hooks, traps, spears, and commercial fishing nets are used, and, when the water is low, poison squeezed from the root of a vine is used to kill the fish in small creeks and streams. Boazi speakers recognize more than thirty five different types of fish, many of which are eaten. The most important species are barramundi (*Lates calcarifer*), saratoga (*Scleropages jardini*), various types of catfish (including *Arius augustus* and *Arius leptaspis*), tandans (*Neosilurus ater*), mudfish (*Oxyeleotris fimbriata*), and black bass (*Lutjanus goldiei*). Crocodiles are also hunted, and the sale of crocodile skins is still the main source of cash in the Lake Murray-Middle Fly area.

Finally, Boazi and Zimakani speakers gather a variety of foods from the forests and marshlands including bush fowl eggs (both *Megapodius* and *Tallegalla* are found in the Lake Murray-Middle Fly area) and turtles.

In sum, the Lake Murray-Middle Fly region, with its vast areas of grassland, *Melaleuca* swamp savannah, and freshwater swamp is an unusual ecosystem for New Guinea and is, in many ways, reminiscent of northern Australia. It is a rich environment about which natural scientists know very little. The periodic severe dry seasons appear to play an important role in limiting the human population of the area by causing shortages of food and water. They are also important in light of the dumping of mining wastes by Ok Tedi Mining Limited both because during severe dry seasons the fish and human populations are concentrated in and along the main channel of the Fly River and because immediately after a severe dry season the back swamps of the floodplain are refilled by the rising waters of the Fly River.

The adaptation of Boazi and Zimakani speakers is also an unusual adaptation for New Guinea inasmuch as it is based on hunting, fishing, and sago making, while gardening plays a very minor role.

I want to close this paper with a quotation and my concern. Volume I of the 1982 Ok Tedi Environmental Study (Maunsell and Partners 1982) predicted that there was,

> *little likelihood* of mine-derived effects on the aquatic resources that are of *major dietary importance* to the peoples of the Fly River, and there will be no terrestrial impact. A possible exception, but difficult to predict, is the effect of barge wash on turtle breeding grounds on sand bars of the Middle Fly. [Maunsell and Partners 1982:1:87; emphasis added]

Recently, however, Ok Tedi Mining Limited has predicted high levels of sediment and particulate copper in the Fly River as far downstream as the Middle Fly. The long-term impact of these waste materials on the fish in the river and on the human population which lives along the river is hard to predict, but Ok Tedi has predicted high "fish catch loss" percentages in the main channel of the Fly River in the Middle Fly area during 1990.[12]

Inasmuch as "aquatic resources ... are of major dietary importance to the peoples of the Fly River," the continued dumping of mining wastes by Ok Tedi Mining Limited into the Ok Tedi River (and hence into the Fly River) and the failure of Ok Tedi Mining Limited to construct a tailings dam thus poses a potentially serious threat to the environment of the Middle Fly and to the way of life of its people. This threat comes despite Ok Tedi Mining Limited's previous assurance that there would be little or no effect on the aquatic resources of the Middle Fly.

Notes

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[2] Riley (1983) has argued that the present population distribution in New Guinea may be the result of population regulation by malaria. In support of his argument, Riley points to the efficient transmission of malaria through mosquitoes, the short incubation period of malaria, the high but selective mortality of malaria (causing death mainly in individuals between six months and five years of age), depressed fertility due to malaria (which may cause abortion or premature labor), and the reduction of the body's immune response to other infections due to malaria. In the Lake Murray-Middle Fly area, the deleterious effects of malaria appear to be made worse by the cycle of particularly dry years.

[3] Bosset Lagoon, like many of the other open bodies of water in the floodplains of the Fly and Strickland Rivers (including Lake Murray), is called a "blocked-valley lake" by geographers. In the context of the Southern Lowlands of New Guinea, this term is somewhat misleading since the terrain is so flat that the difference in elevation between a valley floor and the surrounding higher ground is often a matter of only five to ten meters. "Blocked-tributary lake" is probably a more accurate description. Such lakes are sometimes referred to as "lagoons" on maps of the Lake Murray-Middle Fly area, and in using the name "Bosset Lagoon", I am following an established usage.

[4] I am grateful to Kent Hortle, Senior Biologist with Ok Tedi Mining Limited, for these observations concerning the effects of extreme dry seasons on the aquatic environment of the Lake Murray-Middle Fly area.

[5] In addition to the cultural similarities between the people of the Lake Murray-Middle Fly area on the one hand and the Marind-anim and Bian Marind on the other, Boazi and Zimakani speakers see themselves as culturally related to the Bian Marind (van Baal 1940, 1966) and Yei-nan (van Baal 1982) to the west and the Suki (van Nieuwenhuijsen 1979) and Trans-Fly peoples (Ayres 1983; Williams 1936) to the south.

[6] Unlike most food plants in New Guinea, sago palms appear to be indigenous and sago was probably the staple food of the first inhabitants of the island (Rhoads 1982; Townsend 1982: 2). Sago palms grow best in shallow freshwater where there is a regular influx of fresh water (Paijmans 1971, 1976:43). The Lake Murray-Middle Fly area, with its large areas of frequently inundated swamp, is thus an excellent environment for sago palms.

[7] Sago palms also reproduce by sending out suckers during the later stages of their life cycle.

[8] Barrau (1959) reports that a sago palm harvested just before it flowers may yield 175 pounds of dry sago which may contain as much as 250,000 calories.

[9] According to Rhoads (1981:51), squeezing (or "trampling" as he terms it) sago pith with the feet has only been reported for the Kongara of Bougainville, the Suki, two groups in the Trans-Fly, and the Kairi and Pepike people of the Papuan Gulf. It is also used by the Foi people who live along the lower reaches of the Mubi and Digimu (or Soro) Rivers and by the Fasu people who live just to the northwest in the villages of Tamadigi and Manu.

[10] Deer were introduced at Merauke in Irian Jaya around 1920 and have thrived in the South Central Lowlands. According to Ayres (1983:8-9), an estimated 30,000 deer now live in the Trans-Fly region. The first deer was killed in the Bosset area in the early 1960s.

[11] Prior to pacification, head hunting and warfare were the exemplars of male power.

[12] This prediction is based on computer modelling of data gathered in 1989 and has a high potential level of error.

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