

The Significance of Ecosystem Services for the Livelihood of Local People in Sarawak

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Introduction

Ecosystem services provide many benefits for human beings. In this paper, I focus on the provisioning services, and try to show how it is significant in local people's livelihood. Especially I focus on the food services and its utility for income.

Over the past half-century, the ethnic groups living in inland areas of Borneo, Malaysia, have experienced great environmental changes resulting from large-scale logging. These people, who had previously led a nomadic life in the forest, were forced to settle and turn to hill paddy cultivation (Rousseau 1990).

The common assumption for the displaced hunter-gatherers is that as hunting-gathering activities have declined, poverty has risen due to maladjustment to farming (Hong 1990). But in these previous studies, the significance of the forest resources such as wild plants and animals for their livelihood was not mentioned empirically. So, I try to make clear these points.

Study site

The study area is the one of the former hunter-gatherer community, located in inland area in Sarawak. The village sea level is about 85m and surrounded by mountains. The forest around the village is dipterocarp forest.

They are originally nomads, dependent on the wild sago palm, they began to settle in villages and undertake hill paddy cultivation in the 1960s, acting on a government policy.

Methods

This participant-observation study was conducted for about 11 months from January 2004 to May 2007 in the village. I investigated subsistence activity, mainly by recording activity times and identifying and measuring animals and plants they got. The dietary survey was conducted in one household and included a questionnaire and record of daily food consumption, number of meals, and meal contents. For cash income, I recorded the forest product for sale in the market, the number of sales, and their income from these sales.

Subsistence activity

Their subsistence activities now, contain four kinds of activities, hunting of wild animals, fishing, gathering of wild plants and farming. The farming was introduced according to government projects, such as hill paddy cultivation project in 1960s or vegetable gardening project in 1990s.

Nowadays, they use guns mainly for hunting but the elder generation like to use blowpipe, hunting spear also, and younger generation like to use hunting trap. These are the common technique in other hunter-gatherers in Borneo (Puri 1997). They mainly use casting net or gill net for fishing, and sometimes use 2 types plated rattan fish traps or angling. However men did the hunting and fishing, gathering and farming

were done by both of men and women. Gathering wild plants or fruits from the forest was also important for their subsistence. They cultivate not only hill paddy but also some vegetables, like maize, tapioca or long beans in the garden near the village.

Historically, various environmental changes have altered their subsistence methods. In the midst of such environmental change, they have learned to use devices such as catch nets, hunting guns and gill nets, as well as developing more varied hunting and gathering of forest resources.

To obtain food resources, they spent most of their time hunting and fishing, which were regarded as the most important for food. Compared to hunting and fishing, they spared little labor on cultivation. Hunting was more important than fishing, but if they did not get any animals, they often turned to fishing. The same relation held between fishing and gathering. If they did not catch enough fish, they gathered wild plants. Cultivated plants were used only when hunting, fishing, and gathering yielded no food. Thus, their food values place hunted prey at the top and cultivated plants at the bottom.

This can be expressed in other word. Food obtained from hunting and fishing is called *bao* or *lelu ayok* (“big side dish”), whereas food from gathering and cultivation is called *lelu* or *lelu ici* (“small side dish”), which demonstrates the importance attached to these food items.

Significance of forest resources as foods

During June–August 2004, the villagers used 149 types of animals and plants as food. Wild plants comprised the largest percentage, with 67 species. Other foods included 28 fish, 17 mammals, 16 cultivated plants, 9 reptiles, 2 amphibians and 1 insect species (see table 1).

Table1. Food resources appeared in 139meals in 47 days in June to August 2004 at the A village

Category	Times of Use
Wild plants	67
Fish	28
Mammals	17
Cultivated plants	16
Birds	9
Reptiles	9
Amphibians	2
Insect	1
Total	149

I observed 139 meals, comprising 471 dishes, from June to August 2004. Rice totaled 60% of staple foods, whereas sago palm, the former staple, had a low 23% use rate (see Table 2). However, sago palm use was more varied, appearing in ten dishes, whereas rice was used in only three recipes. In particular, sago palm was preferred in a culturally important dish with wild boar meat. The self-support rate of sago palm was 40%, compared to 30% for rice.

For side dishes, the self-support rate was 100%. The use rates were wild plants, 37%; fishes, 34%; cultivated plants, 15%; and animals, 14% (see Table 3).

Table 2. Variety of staple food (In 139 meals consisting of 471 dishes)

Category	Times of eat
Rice	83
Sago	33
Bananas	13
Cassava	6
Taro	2
Yam	2
Noodles	2
Total	141

Table 3. Variety of non- staple food (In 139 meals consisting of 471 dishes)

Category	Times of eat
Wild plants	102
Fishes	95
Cultivated plants	41
Animals	38

Although few mammals were eaten, red meat was regarded as important. The use of animal and vegetable foods was almost equal. Wild plants exceeded cultivated plants, both in number and in kinds of use.

In the total diet, 63% of foods came from hunting-gathering, 21% from farming and 16% from purchases. The cash for purchasing food was earned from selling forest resources obtained by hunting-gathering. Thus, on the whole, nearly 80% of foods were supplied by hunting-gathering.

Significance of forest resources as income

For them, fishing and gathering wild plants remain central for subsistence, food, and cash income. Then I'd like to try to make clear how these resources are important in relation with market economy. The nearest local market was located about 4 km from the village, or 1.5 hours on foot.

According to their income survey, they earned most of their income by selling forest products such as fishes or wild plants. They earned much of their cash income by fishes, wild plants, and baskets or mats made of rattan (see table 4).

Although they have been settled down and hill paddy farming for 40 years, they still rely on hunting and gathering of forest products provide most of their cash income.

Conclusion

Among them, hunting-gathering is important both for food and cash income. Even after 40 years of farming experience, the main subsistence activities remain hunting and fishing. In all, 70% of their diet was supplied by hunting-gathering and 20% by farming. Wild plants were more widely used than cultivated plants, both in number and in kinds of use.

Table4. Sources of cash income (three months from June-August 2004)

Category	Income (RM)
Fishes	643
Petai bean	170
Baskets or Mats of Rattans	165
Durians	136
Fishing trap of Bamboo	90
Flog	32
rattan shoots	26
Huts made of palm	20
Palm leaf	16
Total	1298

* 1RM=33YEN

Although they have settled into village life and are influenced by the market economy, they have adapted their hunting-gathering activities to the market economy. By selling forest products, such as fishes or wild plants, they achieve a steady income. Thus, hunting-gathering has not declined but is, in fact, more focused. This differs from the usual hypothesis, that hunting-gathering by former nomads has declined in favor of farming.

They began the practice of shifting cultivation more than 40 years ago and also engage in periodic wage labor. However, the use of wild plants and fishes predominates over market-economy activities. Because of their proximity to a market, they earn most of their cash income by selling fishes and wild plants and fruits, which are also important to them as food. Thus, they continue hunting-gathering through their engagement with the market economy.

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