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*One Hundred Years of Land-Use Changes:
Political, Social, and Economic
Influences on an Iban Village
in Bakong River Basin, Sarawak,
East Malaysia*

ICHIKAWA Masahiro

This paper describes land-use changes¹ in Nakat, an Iban village located in the Baram River area in northeastern Sarawak, East Malaysia (see Figure 7-1). In this village the forest has been central in the development of the local economy, providing resources for domestic and commercial uses, and land that could be cleared for agricultural production. However, land use has not remained static through time. Extra-village influences, such as local and international market fluctuations, have been critical to the process of change. Even the beginning of the village itself, instigated by settlers' search for primary forest, was ultimately due to government policies promoting cessation of warfare and economic development of the territory. In some periods of time, collection of products from swamp-land forests was done enthusiastically; at other times, that same forestland was converted into rice fields and rubber gardens. Not only has land use changed, but also the kinds of products that villagers sought to grow and to collect from forests. As extra-village conditions changed, their effects percolated through to the local economy, affecting, for example, methods and techniques of rice cultivation and site selection for farmland. Recently drastic changes in the subsistence base and land use can be linked to road and urban development. It seems that villagers in Nakat have not lived a passive self-sufficient life but have tried to deal positively with, and economically benefit from, changes in external political and social conditions that have affected the village.

The negative impacts of external influences, such as increasing degradation of natural environments and loss of local ability to deal with environmental perturbation, are often emphasized in peasant studies (Watts 1983; Grossman 1981; cf. Donovan, this volume). The resulting resistance of local people to government policies and their implementation have been described in several studies on political ecology (Peluso 1992; Watt 1983). Such resistance was not observed in Nakat. This may partly be because degradation did not occur in Nakat. An alternative explanation may be that local communities have resilience and flexibility to adapt their local natural resource management to accommodate to forces of change that elsewhere lead to degradation. In Nakat, adaptation to external conditions has been thoroughly integrated into the mechanism of survival in a severe and unstable natural tropical forest environment. This mechanism is observed not only in the study village, but also in the wider areas of Sarawak and insular parts of Southeast Asia.

The villagers of Nakat recognize several phases in the history of their village, each marked by different land-use patterns and economic activities. The shifts from one phase to another were caused by wider political and economic conditions. This paper distinguishes three historical periods: the pioneer period (1900–1950), the period of commercialization of rice and rubber (1950–1985), and the period of diversification of commodities (1985–1998).

The objective of this paper is to show the strong connection between land-use patterns and political, economic and social conditions outside the village. Section one discusses the methods used in the research leading to this paper, followed by an introduction of Nakat in section two. Sections three to five then examine the three periods, related to the major changes in land use. Finally, the paper concludes by interpreting the observed changes in village history in terms of the villagers' flexible responses to changes in political and economic conditions far away from their own homelands.

Methods

I conducted field research for this paper in Nakat during four separate periods: February–June and October–November 1996, July–August 1997, and August–December 1998. During those periods, I stayed with a family in the village and conducted interviews with villagers on land-use histories.

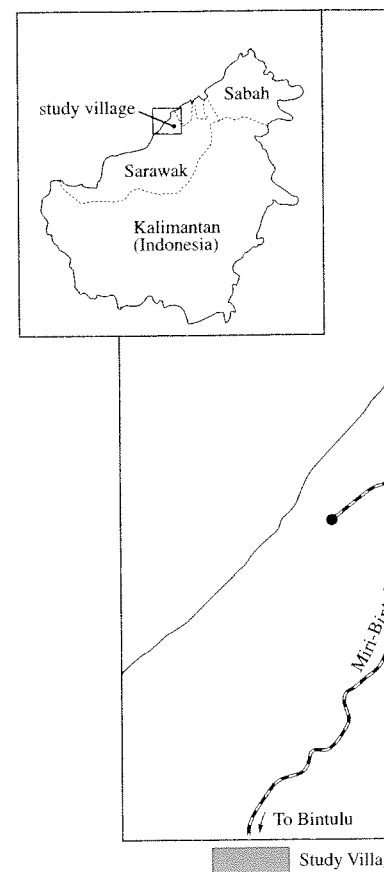


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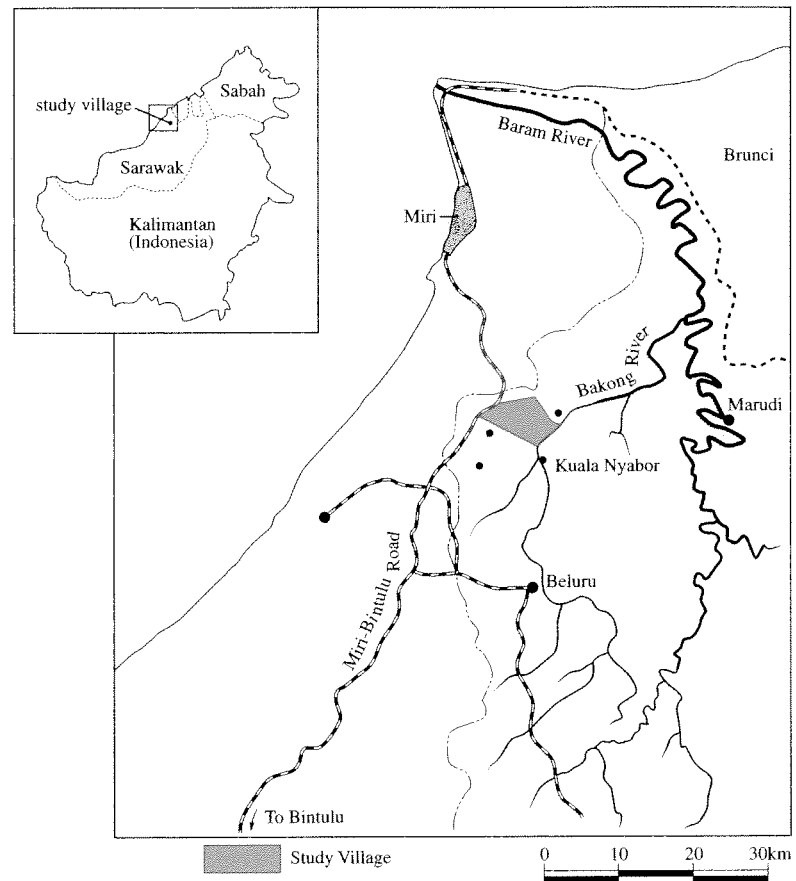


Figure 7-1. Bakong River basin, Sarawak

Observations and measurements of current land-use patterns and activities supplemented these interviews. Chinese merchants of Bakong River basin and extension officers from the Agriculture Department also provided information on changes in resource use. These merchants sometimes have had contact with the villagers coming to their shops since before the Pacific War, and the extension officers visited the village occasionally over the past 20 years. They are therefore familiar with its land use and other economic activities. Textual sources like the *Sarawak Gazette* (SG), which reported on conditions in the Baram area, permitted independent confirmation of events documented through interviews. In addition, I used

aerial photographs from 1947, 1963, 1977, and 1997 for a spatial analysis of land-use changes.

Location, History and Natural Social Conditions of Nakat

The village of Nakat lies between the Miri-Bintulu road and Bakong River, which is a tributary of the Baram River. The village's territory of 37 km² is located in the Miri Division, which extends over 27,000 km² in the northeast of Sarawak, and has a population of 233,000 (Department of Statistics, Malaysia 1997). As of May 1996, the village population² was 454, almost all of them Iban. Iban are the major ethnic group in the state, comprising one third of its population. They usually live in longhouses containing household compartments called *bilek*. Longhouse communities are egalitarian and have no distinctions in rank, as other groups in Borneo do (see Rhee, this volume). The *bilek* is a socially highly independent unit of the longhouse community (Freeman 1955).

The village of Nakat was founded at the turn of the 19th century. The Brooke³ government had started the physical and economic development of the Baram area after Brunei ceded this territory in 1882. Initial activities focused on the construction of strongholds, offices, and market towns to trade forest products. The first settlement of the Baram basin dates from 1891, when James Brooke permitted Iban for the first time to move to this region (Pringle 1970: 271–272).⁴ Previous to that time no Iban had lived permanently in this region. According to the 1907 census, the number of Iban living in the Baram already had increased to 1,960 or 12 per cent of the total population (SG 4/4/1907: 83).

There are two reasons behind the Brooke settlement program into the Baram region. First, it was expected that new settlers would secure peace and compliance with the rule of law in this frontier area with Brunei. Secondly, the program also intended to expand the collection of forest products. The Iban were considered ideal settlers because Brooke knew their warfare qualities well and felt he could count on them in case of military emergencies (Pringle 1970: 270–271). Forest products such as rattan, forest rubber, and dammar were very important economic resources for Sarawak at the time, regularly accounting for about a third of its total exports between 1876 and 1910. In most of the newly acquired districts trade in forest products was the only potential source of revenue (Pringle 1970: 267).

Iban from the Second and Third Divisions of Sarawak, for their part, were in critical shortage of land (Pringle 1970: 272). They migrated to the Baram

area seeking new lands and new forests. The village of Nakat was only one of many settlements along the Bakong River. According to oral history, Nakat was founded by a group that settled in the village of Nakat in the vicinity. The split occurred just after the village was founded. It occurred in 1896 (Sandin 1994: 228) and is estimated to be around 1900. During this time, a longhouse near the mouth of Sor River. The six families had originated from a tributary of the Rajang River in the

The middle and lower parts of the village are swampland. The swampland belongs to the village territory, is distributed along the river. It contains hilly lands, land through which the river flows, but even this hilly part of village territory is swampland. There is a difference of soil types between the swampland along the Bakong River and the

The village has strong economic links with Beluru, which developed after the discovery of oil. Beluru is the third largest city in Sarawak. In the early years of Nakat's existence, the village had other daily necessities and services. Beluru has links with other smaller towns. Beluru has about 130 Chinese shops. Beluru is on the Bakong River and also has several Chinese shops. Beluru has four Chinese shops patronized by the Iban. Beluru has since then left this location.

The Pioneer P

In the early years of Nakat's existence, the village had economic activities, the cultivation of primary forestlands, and the collection of forest products. In the 1930s, a few villagers made pepper on a small scale of cultivation was small and the Pacific War (1941–1945). According to the former part of Penan territory, the hunter-gatherers reportedly moved

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area seeking new lands and new forests in which to collect forest products.⁵ The village of Nakat was only one of the villages established along the Bakong River. According to oral history, the founders of Nakat split off from a group that settled in the village of Malang, which is located in the vicinity. The split occurred just after Malang was established, which occurred in 1896 (Sandin 1994: 228). Thus the foundation of Nakat can be estimated to be around 1900. During that time six Iban families constructed a longhouse near the mouth of Song River, which flows into the Bakong River. The six families had originally come from the Nyelong River, a tributary of the Rajang River in the Sibu district.

The middle and lower parts of the Bakong River hold abundant swampland. The swampland belonging to Nakat, about half of the village territory, is distributed along the Bakong River. The rest of the village contains hilly lands, land through which the Miri-Bintulu road now passes, but even this hilly part of village territory has valleys where swampland occurs. There is a difference of some 170 m in elevation between hills and swampland along the Bakong River; the latter is less than 15 m a.s.l.

The village has strong economic ties with the city of Miri (Figure 7-1), which developed after the discovery of petroleum in 1910 and has become the third largest city in Sarawak. In 1991, its population was about 130,000 (Department of Statistics, Malaysia 1997). Nakat villagers purchase food and other daily necessities and sell products in Miri. The villagers also have links with other smaller towns and villages, such as Marudi and Beluru. Marudi has been the main town in Baram River and nowadays has about 130 Chinese shops. Beluru serves a similar function for the Bakong River and also has several Chinese shops. Kuala Nyabor had until 1985 four Chinese shops patronized by the nearby Iban villagers but the Chinese have since then left this location.

(The Pioneer Period (1900–1950))

In the early years of Nakat's existence the villagers engaged in two main economic activities, the cultivation of rice and secondary crops⁶ in Penan primary forestlands, and the collection of commercial forest products. In 1930s, a few villagers made pepper gardens near the longhouse, but the scale of cultivation was small and they were abandoned after the start of the Pacific War (1941–1945). According to oral history, the Bakong area was formerly part of Penan territory. Following the Iban's arrival, the hunter-gatherers reportedly moved to Tinjar River, a tributary of the Baram

and more than 30 km away. The *Sarawak Gazette* (1/4/1902: 79) reports, for example, that the Iban at Laong (upstream from Nakat) had settled in Penan territory. Initially, primary forests (*kampong*) occupied most of the land area. The villagers who established a longhouse near Bakong River started to clear land for dry and wet rice fields, first around the longhouse, then gradually expanding outward. Aerial photographs from 1947 confirm oral history that the extent of the primary forest opened up at this time was from the longhouse to a spot near today's Miri-Bintulu road, which is also the village border. On the other hand, unfelled forests still remained in the vicinity of the Bakong River, where floods make agricultural production too risky, and on hilly ridges where the soil is poor and access from the longhouse is difficult (Figure 7-2a).

Clearing primary forests was also a way to claim usufruct rights to the lands. Following Iban customary law, usufruct is given to the one who first fells a primary forest, and the rights are then passed on to his descendants (Freeman 1955). Villagers therefore clear primary forestland partly also to increase landholdings. The villagers preferred to grow hill rice rather than wet rice in swamplands. For one thing, the hillside fields could also sustain the growing of secondary crops, which supplemented the diet at times when these crops could not be obtained through trade. The reason for growing rice in both dry hillside and wet swampland fields was, as also argued by Dove (1985), to minimize risks of poor harvest caused by droughts or floods.

The cultivation of hill rice follows an established sequence. Cutting a patch of hill forest opens a plot of land that is left to dry and then burned. Rice seeds and secondary crops are planted using a dibble stick to make holes in the soil in which a few rice seeds are put. After one to three years of cultivation on the same land, another patch of forest is felled and opened for cultivation. A similar method is used for wet rice cultivation. However, after the swampland forest has been slashed and burned, the rice seeds are broadcast, rather than planted with a dibbling stick. Today, many villagers have adjusted this technique and clear swampland that is under grass vegetation, into which rice is transplanted (Ichikawa 2000a). Broadcasting seeds is more effective, partly because of the many unburned and felled trees scattered around the rice fields, which makes moving around the fields difficult. Wet rice fields usually are left to fallow after a few years of cultivation, thus allowing forest to grow back on the site. Although the pioneer period was characterized by clearing of primary forests, rice fields were not always opened in primary forests, but instead in fallow forests located in easily

accessible areas from the longhouse. Rice fields opened in fallow forests (Figure 7-2a).

Forest product collection was a livelihood strategy in Nakat and in other watersheds far from the village. In Bakong River, they collected for (spp.) and rattan which they sold in Marudi in 1910. When the Nyabor took over this role, according to commercial activities in Beluru. According to shops at Kuala Nyabor around 1910. The role in the Iban's livelihoods, as the Iban and sold them everyday goods. The Pacific War (1941–1945) was a very difficult time for the Chinese of Bakong River who were forced to stop their commercial activities and clothes became unavailable due to merchants' activities.

The proportion of time distributed between forest products collection and forest products collection changed. According to *Gazette* records, forest products collection was poor harvests caused by drought, fire, and animals (SG 17/1/1910: 26; 1/4/1910: 26). It was abandoned when prices of forest products were low. That rice growing demanded the more labor during the harvesting period (SG 1/4/1931: 203). Fields was significantly reduced. Villagers started to work in the peat fields (SG 1930: 203). In general, activities were affected by economic conditions, although rice growing continued to be an important economic activities.

To summarize this period, the pioneering land use of its early inhabitants was to maintain peace in this region through forest product collection. On the other hand,

Sarawak Gazette (1/4/1902: 79) reports, [villagers] (upstream from Nakat) had settled in [forests (*kampong*)] occupied most of the [land]. [They] established a longhouse near Bakong River [and] [cleared] rice fields, first around the longhouse, [and then] [further]. Aerial photographs from 1947 confirm [that] [the] primary forest opened up at this time was [the] [same] as today's Miri-Bintulu road, which is also [the] [same]. And, unfelled forests still remained in the [area] [where] [floods] [make] [agricultural] [production] [impossible] [because] [the] [soil] [is] [poor] [and] [access] [from] [the] [longhouse] [is] [difficult].

[Villagers] [used] [a] [way] [to] [claim] [usufruct] [rights] [to] [the] [land]. [When] [usufruct] [is] [given] [to] [the] [one] [who] [first] [clears] [the] [land], [the] [rights] [are] [then] [passed] [on] [to] [his] [descendants]. [The] [clear] [primary] [forestland] [partly] [also] [to] [the] [descendants]. They preferred to grow hill rice rather than [wet] rice. [In] [the] [hillside] [fields] [could] [also] [sustain] [the] [village]. [This] [rice] [supplemented] [the] [diet] [at] [times] [when] [the] [land] [was] [flooded]. [The] [reason] [for] [growing] [hill] [rice] [in] [swamp] [land] [fields] [was], [as] [also] [argued] [by] [the] [villagers], [that] [the] [land] [was] [of] [poor] [harvest] [caused] [by] [droughts] [or] [floods].

[This] [shows] [an] [established] [sequence]. [Cutting] [the] [land] [that] [is] [left] [to] [dry] [and] [then] [planting] [crops] [are] [planted] [using] [a] [dibble] [stick]. [A] [few] [rice] [seeds] [are] [put]. [After] [one] [to] [three] [years] [in] [the] [same] [land], [another] [patch] [of] [forest] [is] [cleared]. A similar method is used for wet rice [fields]. [In] [swamp] [land] [forest] [has] [been] [slashed] [and] [burned], [rather] [than] [planted] [with] [a] [dibbling] [stick]. [The] [villagers] [have] [adjusted] [this] [technique] [and] [clear] [the] [vegetation], [into] [which] [rice] [is] [trans-] [planted]. [This] [method] [of] [planting] [seeds] [is] [more] [effective], [partly] [because] [the] [felled] [trees] [scattered] [around] [the] [rice] [fields] [make] [the] [fields] [difficult]. [Wet] [rice] [fields] [after] [a] [few] [years] [of] [cultivation], [thus] [allowing] [the] [villagers] [to] [live] [in] [the] [area]. [Although] [the] [pioneer] [period] [was] [short], [the] [rice] [fields] [were] [not] [always] [established] [in] [fallow] [forests] [located] [in] [easily]

accessible areas from the longhouse. For example, distribution of wet rice fields opened in fallow forests are shown as *Scleria* grasslands in Figure 7-2a.

Forest product collection was also an important component of livelihood strategies in Nakat and in the entire Baram area. Villagers from Nakat collected forest products mainly along the Bakong River, and also in other watersheds far from the village. In the swamp forests along the Bakong River, they collected forest products such as jelutong (*Dyera* spp.) and rattan which they sold to Chinese merchants. Chinese merchants had settled in Marudi in 1883 (Chew 1990: 74) and periodically visited the village to buy forest products. Later, the merchants from Kuala Nyabor took over this role, according to the Nakat villagers and the merchants of Beluru. According to them, Chinese settled and started commercial activities in Beluru around 1920, and merchants opened shops at Kuala Nyabor around 1930. The merchants played an important role in the Iban's livelihoods, as they bought forest products from the Iban and sold them everyday goods. The villagers also recall that the Pacific War (1941–1945) was a very difficult time for them, because all the Chinese of Bakong River were forced by the Japanese occupation forces to stop their commercial activities. Products such as sugar, salt, and clothes became unavailable with the suspension of the Chinese merchants' activities.

The proportion of time distributed between dry and wet rice cultivation and forest products collection changed periodically. As shown in *Sarawak Gazette* records, forest products collection was actively done in periods of poor harvests caused by drought, flood, and infestation of insects and wild animals (SG 17/1/1910: 26; 1/4/1915: 79). Conversely, collection was abandoned when prices of forest products were low, or during the season that rice growing demanded the most intensive use of labor, mainly the harvesting period (SG 1/4/1931: 87, 2/12/1935: 234). The area of rice fields was significantly reduced in the villages near Miri when many villagers started to work in the petroleum industry (SG 2/1/1930: 25, 1/8/1930: 203). In general, activities would shift depending on environmental and economic conditions, although forest product collection and rice growing continued to be an integrated part of a mixed portfolio of economic activities.

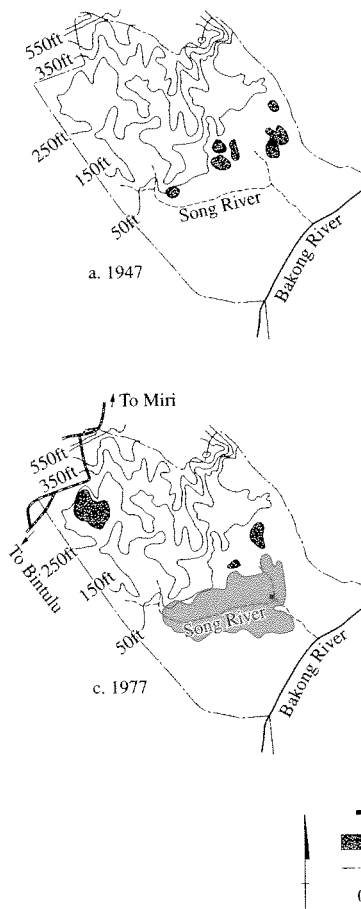
To summarize this period, the founding of Nakat village and the pioneering land use of its early inhabitants, was a results of Brooke's desire to maintain peace in this region close to Brunei and to encourage forest product collection. On the other hand, the Iban who moved to this region

were driven by land and natural resource shortages they faced in the Third Division where they came from. Once they arrived in their new territory, the new settlers aggressively exploited the primary forests to produce a decent livelihood and to increase landholdings. The villagers adopted mixed resource-use strategies. They created a complex landscape, converting both hill and swampland forests to grow different kinds of crops. They also incorporated forest product collection in order to supplement their income when agricultural activities yielded low returns. Therefore, though the early settlers had responded to the government's land settlement schemes, they also created their own version of resource use, and were not just "obeying" what authorities had told them to do.

The Period of Commercialization of Rice and Rubber (1950–1985)

The years from 1950–1985 are characterized by greater commercialization of rice and rubber and with it villagers' changes of economic emphasis from dry rice production and forest products collection to wet rice production and rubber tapping. This period was influenced by three major historical events: the end of the Pacific War in 1945, Great Britain retaking control of the region in 1946, and Sarawak's entry into the Malaysian federation in 1963. Land use and economic activities in Nakat were directly and indirectly affected by those events. The end of this period is marked by a significant turning point of the impact of the Miri economy on the villagers' economic activities.

The years between 1950 and 1985 are marked by the growth of the commercial logging industry, which by the 1970s and 1980s had become thoroughly established in the whole of Sarawak. Although before the Pacific War (1941–1945), logging activities had already begun, their scale was small and the timber was mainly for the domestic market.⁷ By contrast, after the war, timber was mainly exported abroad. The scale of logging grew following increased demand and developments in logging technology (Kaur 1998). In the Baram watershed *ramin* (*Gonystylus bancanus*) found in swamp forests became targeted for logging from the 1950s to early 1960s. The government recognized favorable conditions for commercial logging in hill forests in the early 1960s (SG 30/9/1963: 230). Since the late 1960s logging in dipterocarp forests in lowlands and hills became widespread (SG 31/7/1969: 180), while logging concessions were held mainly by Chinese entrepreneurs.



Source: a.–c. were made based on the a (Land & Survey Department). using the topographical map and

Figure 7-2. Changing land

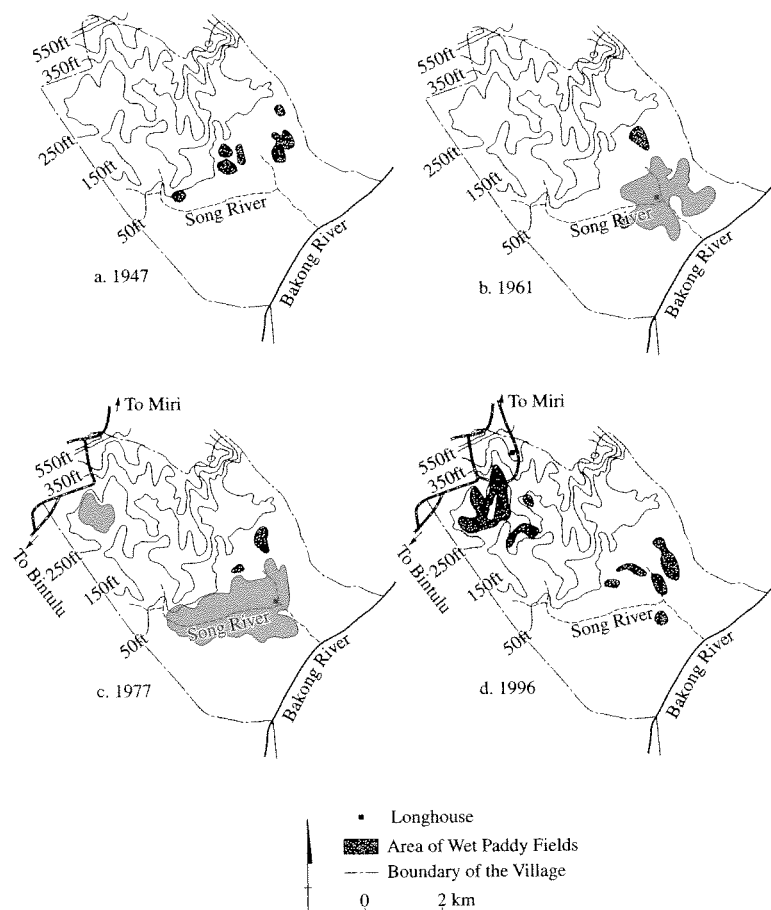
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source shortages they faced in the Third. Once they arrived in their new territory, they exploited the primary forests to produce a new landholdings. The villagers adopted. They created a complex landscape, forests to grow different kinds of crops. duct collection in order to supplement activities yielded low returns. Therefore, ded to the government's land settlement n version of resource use, and were not d told them to do.

Commercialization of Rice and Rubber (1947–1985)

Characterized by greater commercialization, villagers' changes of economic emphasis from forest products collection to wet rice production period was influenced by three major events: the Pacific War in 1945, Great Britain retaking Sarawak's entry into the Malaysian Federation, and economic activities in Nakat were affected by those events. The end of this period is marked by the impact of the Miri economy.

1985 are marked by the growth of the economy by the 1970s and 1980s had become a major role of Sarawak. Although before the 1960s, economic activities had already begun, their scale was small for the domestic market.⁷ By contrast, logging started abroad. The scale of logging grew rapidly with developments in logging technology and the demand for ramin (*Gonystylus bancanus*) found in Sarawak for logging from the 1950s to early 1960s (SG 30/9/1963: 230). Since the 1960s, the forests in lowlands and hills became more valuable while logging concessions were held



Source: a.–c. were made based on the aerial photographs taken in the corresponding year (Land & Survey Department). d. was made from the result of field survey using the topographical map and GPS.

Figure 7-2. Changing land use of Nakat village, 1947–1997

According to the merchants of Marudi, before the 1960s a demand for rice grew in towns such as Miri and Marudi, which were recovering from the Pacific War. This rice was supplied by the villages along the Baram River. After the 1960s, a lot of logging camps started to appear, which needed a large quantity of rice. Furthermore, following the international food crisis, in the 1970s prices for rice increased across the board.⁸ These

three reasons boosted rice production from the study area. As a result, the 1960s and 1970s were marked by a dramatic commercialization of the rice production in the Baram area. According to the merchants of Marudi, the Bakong watershed in the Baram area was the most productive for rice production because of the availability of large swamps that could be converted for wet rice-growing. In addition, the local Iban had adequate experience with market-oriented production. According to the merchants interviewed, relative to other ethnic groups in Baram, the Iban have a stronger tendency to produce goods that have market value.

According to the villagers of Nakat, the number of those who worked in logging camps and sawmills in 1960s and 1970s grew. Road and house construction work also became major wage earning opportunities in the 1970s. It has often been argued that logging affected local people's lives negatively by, for example, degrading the natural environment. Furthermore, work in timber camps entails physical danger (see Hong 1987). Villagers from Nakat, however, did not see themselves only as victims of the logging industry as they took advantage of the opportunities that it brought and benefited economically. In a way, the people living in the regions where logging took place became essential to the logging operations, as they supplied labor to the timber operators and food to everybody in the camps. Because of this change in economic activities, the number of villagers who engaged in forest products collection declined after 1960.

Wet Rice Cultivation in Nakat

The growing of rice in swamplands produces higher yields per land unit than rice grown on dryland. Thus, after the pioneer period, the villagers rarely opened rice fields in the primary forests that remained on the periphery of the village, but turned to secondary forests and grasslands on swampland near the longhouse. Figure 7-2, derived from aerial photographs,⁹ shows the distribution of lands converted to wet rice fields. Towards the end of the pioneering period, the distribution area was small (Figure 7-2a). In 1963, when rice became a highly sought after commodity, the area under wet rice cultivation grew (see Figure 7-2b). By the mid-1970s, when the production of rice was at its peak in Nakat, the distribution of rice fields had increased again and reached its maximum extent as shown in Figure 7-2c. Table 7-1 provides the areas of wet rice fields and numbers of households during two periods, and percentage increase of each of these variables.

The villagers claim that there were no drastic changes in the number of household members which suggests that household increase and village

Table 7-1. Wet rice production

YEAR	AREA OF WET RICE FIELDS ¹ (HA)	NUMBER HOUSEHOLDS
1947	75	29
1961	297	46
1977	534	55

Source: 1. Measured from Figure 7-2.
2. Ichikawa, field notes.

population growth were in proportion. Under cultivation far exceeded the. The reason for this accelerated growth in the market value of rice and for expanding their rice area. Since 19 increased the size of their rice field.¹⁰

The rice fields became concentrated rather far from the longhouse had the advantage of facilitating. According to the villagers, carrying a strenuous part of rice farming, especially in the longhouse. In the village area, the Song River is the only river that is navigable by longhouse. rice usually are transported by longhouse or to Kuala Nyabor to longhouse. reason for choosing the Song River is its banks.

In the first year of planting, far from forests, while in subsequent years. Single fields could be cultivated year, when weed infestation became forests would be cleared. This was that period. Also, the villagers opened new fields not in forest but rather were used for one or two years by secondary forests and dense *Scrub* weeds because the shade of the scrub suppressed these weeds. During the

ion from the study area. As a result, the a dramatic commercialization of the rice according to the merchants of Marudi, the area was the most productive for rice ability of large swamps that could be n addition, the local Iban had adequate production. According to the merchants nic groups in Baram, the Iban have a ls that have market value.

kat, the number of those who worked in 960s and 1970s grew. Road and house ajor wage earning opportunities in the at logging affected local people's lives ding the natural environment. Further- its physical danger (see Hong 1987). l not see themselves only as victims of advantage of the opportunities that it lly. In a way, the people living in the ce became essential to the logging r to the timber operators and food to of this change in economic activities, d in forest products collection declined

s produces higher yields per land unit after the pioneer period, the villagers ry forests that remained on the periphery ry forests and grasslands on swampland rived from aerial photographs,⁹ shows o wet rice fields. Towards the end of the area was small (Figure 7-2a). In 1963, fter commodity, the area under wet rice 3y the mid-1970s, when the production distribution of rice fields had increased ent as shown in Figure 7-2c. Table 7-1 and numbers of households during two each of these variables.

re no drastic changes in the number of s that household increase and village

Table 7-1. Wet rice production and village expansion in Nakat

YEAR	AREA OF WET RICE FIELDS ¹ (HA)	NUMBER OF HOUSEHOLDS ²	PERCENTAGE INCREASE OVER 14/16 YEAR PERIOD	
			WET RICE FIELD	HOUSEHOLDS
1947	75	29	-	-
1961	297	46	296.0	58.6
1977	534	55	79.8	19.6

Source: 1. Measured from Figure 7-2.
2. Ichikawa, field notes.

population growth were in proportion. This means that the growth in lands under cultivation far exceeded the rate of population increase (Table 7-1). The reason for this accelerated growth in rice production was the increase in the market value of rice and families responding to this change by expanding their rice area. Since 1960, some households were said to have increased the size of their rice fields to an estimated four to five ha per field.¹⁰

The rice fields became concentrated along the Song River, which is located rather far from the longhouse. Producing rice along the Song River had the advantage of facilitating the transportation of rice in boats. According to the villagers, carrying home harvested rice is a very strenuous part of rice farming, especially when fields are far from the longhouse. In the village area, the Song, which is three to four meters wide, is the only river that is navigable by longboat. Large amounts of harvested rice usually are transported by longboat from the rice fields to the longhouse or to Kuala Nyabor to be sold to Chinese merchants. The other reason for choosing the Song River is the existence of a large swamp along its banks.

In the first year of planting, farmers cleared fields in areas of secondary forests, while in subsequent years fields were opened in *Scirelia* grassland. Single fields could be cultivated for three successive years. In the fourth year, when weed infestation became excessive, new patches of secondary forests would be cleared. This was the typical way of wet rice growing in that period. Also, the villagers explained that some farmers would open new fields not in forest but rather in dense *Scirelia* grassland. Those fields were used for one or two years before shifting again. In fields opened in secondary forests and dense *Scirelia* grassland, there are few obnoxious weeds because the shade of the secondary forest and the dense *Scirelia* had suppressed these weeds. During this period, rice planting was always done

by broadcasting seed, even though the transplanting method would have been better to reduce weed infestation. According to the villagers, the lack of labor, most of which was used to expand the rice production area, made it impossible to use transplanting technology. Weeding also consumed too much time and capital. The villagers controlled for weed problems by selecting lands shaded by fallow forests or dense grasses. By applying the broadcasting planting technique and a short rotation fallow system, they could expand and manage extensive wet rice field areas.

Increase of Para Rubber Plantation

Besides wet rice growing, rubber tapping was another important activity in the village from around 1950 to 1980. In the Second and Third Divisions of Sarawak, Para rubber trees had been actively planted since the early 1900s (Cramb 1988: 112). In the Bakong area, however, there were few planted rubber gardens, because the price of wild rubber was so good that local people were less motivated to plant Para rubber (SG 16/3/1917: 73). Rubber cultivation was also constrained by international regulations controlling market prices.¹¹ In Nakat village, rubber growing began during the war and was actively continued during the 1950s and early 1960s when the price of rubber had increased (Figure 7-3).

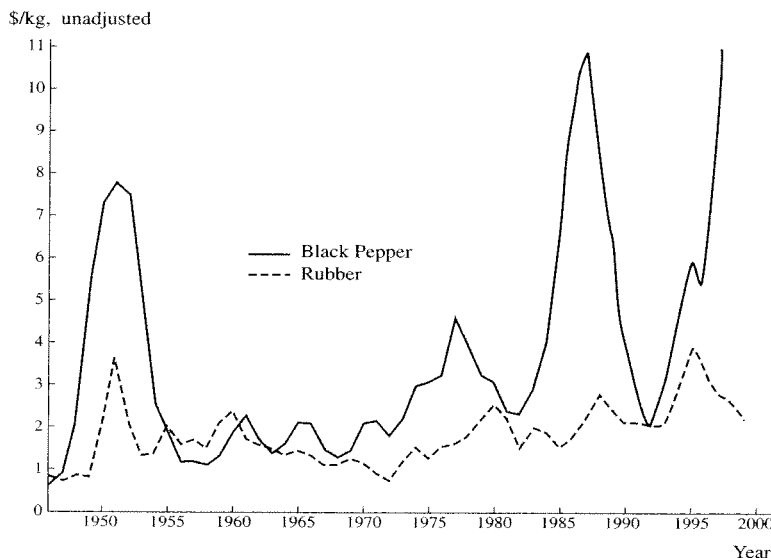


Figure 7-3. Change in value of black pepper and rubber

Rubber gardens were located on the hillside, so that the size of the area harvested had been around one ha. Since the hillside was in various places around the village, the rubber trees spread out, although they were not in a longhouse (Figure 7-2c). Rubber tapping was located near the wet rice field that was used in a four-year cycle. The proportion of rubber tapping varied annually depending on rubber prices were high, rice growing was reduced to rubber tapping activities even to the detriment of rice growing. Conversely, the value of rubber was low in the latter 1960s and early 1970s (Figure 7-3).

Another element encouraging the shift to rubber was the availability of labor. As already mentioned, men would migrate to find work outside the village in sawmills, logging camps, and other activities. Men who worked outside, however, would return to the village when they got married. They were dedicating themselves to rice cultivation as a more profitable activities at the time. In the late 1960s, the felling of forests to make rice fields was still going on in the village in the 1960s and 1970s. Under these conditions, forests in the village were converted to rice fields and rubber gardens.

The Period of Conversion

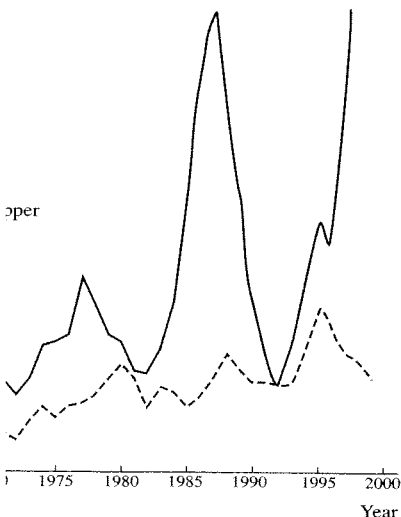
Until the 1980s and first part of the 1990s, the palm industries around Miri were still in the same time, a number of products were still being harvested, edible forest products, river fish, and other marketable items. The reasons for the shift from what used to be household corner to commercial production were:

The Miri-Bintulu road, constructed in the northern part of the village in 1964, and the road in 1974. Road construction was one of the factors that Sarawak joined the Malaysian Federation.

h the transplanting method would have ion. According to the villagers, the lack o expand the rice production area, made echnology. Weeding also consumed too gers controlled for weed problems by rests or dense grasses. By applying the nd a short rotation fallow system, they e wet rice field areas.

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tapping was another important activity 1980. In the Second and Third Divisions l been actively planted since the early Bakong area, however, there were few e price of wild rubber was so good that o plant Para rubber (SG 16/3/1917: 73). strained by international regulations at village, rubber growing began during during the 1950s and early 1960s when Figure 7-3).



ie of black pepper and rubber

Rubber gardens were located on abandoned fields after hill rice had been harvested, so that the size of the each rubber plantation that time may have been around one ha. Since the hill rice fields were opened every year in various places around the village, the rubber gardens were also widely spread out, although they were more intensively located near the longhouse (Figure 7-2c). Rubber tapping was practiced in those gardens located near the wet rice field that was being cultivated during a particular four-year cycle. The proportion of time spent in rice growing and rubber tapping varied annually depending on the price of each commodity. When rubber prices were high, rice growing was cut back. Villagers dedicated time to rubber tapping activities even to the extent of refraining entirely from rice growing. Conversely, the value of rice as a marketable commodity rose in the latter 1960s and early 1970s when the price of rubber stagnated (Figure 7-3).

Another element encouraging the increase of these activities was simply the availability of labor. As already mentioned, unmarried young men would migrate to find work outside the village. This included wage work in sawmills, logging camps, and public construction. Most of the young men who worked outside, however, in this period usually returned to the village when they got married. They would then remain in the village, dedicating themselves to rice cultivation and rubber tapping, the most profitable activities at the time. In Iban communities mainly males do the felling of forests to make rice fields. As many male laborers remained in the village in the 1960s and 1970s, the task was smoothly accomplished. Under these conditions, forests in the village were aggressively converted to rice fields and rubber gardens.

The Period of Commodity Diversification

Until the 1980s and first part of the 1990s, the logging, petroleum, and oil palm industries around Miri were prospering progressively. In Nakat at the same time, a number of products from the village, such as rattan baskets, edible forest products, river fish, pepper, fruits, fowl, and pigs, became marketable items. The reasons for this diversification and commodification of what used to be household consumption items are explained below.

The Miri-Bintulu road, constructed from Miri, passed through the northern part of the village in 1965 and connected it to the Bintulu road in 1974. Road construction was one of the development projects started when Sarawak joined the Malaysian Federation in 1963. Before the advent of

the road, it would take a day's walk on forest paths to reach Miri from Nakat. By road, the same destination was just an hour's drive by car, although the road was at that time still unpaved and not in the condition it is in today. After the road was built, however, most of the villagers continued to live in the longhouse along the river,¹² as it was a convenient place for rubber and wet rice production, and close to the Chinese merchants of Kuala Nyabor. To get to Miri, Nakat villagers would first go to the Miri-Bintulu road on foot (a walking distance of about two hours) and then take a bus. However, during the 1970s and early 1980s, signs of impact from the road construction and Miri economy could be observed on the land use patterns of Nakat. In the early 1970s some 25 households opened pepper gardens with subsidies from the Agricultural Department, on the way from the riverside longhouse to the road (Figure 7-2c). The harvest from these gardens was sold to merchants in Miri, who paid better prices than in Kuala Nyabor. Figure 7-2d also shows a wide area of bush fallows with only a few years of abandonment. Unfelled forests distributed next to the road was cleared by many villagers to claim usufruct rights. Villagers now also gained profits from selling vegetables grown in their swiddens, which they sold in huts built along the roadside.

Recovering from the disasters of war, Miri grew rapidly after 1960s as it prospered from the logging and petroleum industries. Commercial logging in the Baram River area continued until the early 1990s and petroleum production was also increasing.¹³ In the area between Miri and Bintulu, the oil palm industry rapidly developed after the construction of the Miri-Bintulu road.¹⁴ As these economic changes took place in the region around Miri, its urban area expanded rapidly, especially in the 1980s and early 1990s. The population of Miri increased more than twofold from 52,000 in 1980 to 130,000 in 1991 (Department of Statistics, Malaysia 1997). After the mid-1980s, access from the village to Miri improved as a result of the improvement and widening of roads, and the public transportation system.¹⁵ Under these conditions, longhouse communities in the Bakong area who had easy access to the road began to choose Miri as the place to buy daily necessities and sell new products. As a result, the amount of trade with Kuala Nyabor merchants declined. By 1985, all the four Chinese shops there had abandoned their operations and moved to bigger cities or towns such as Miri and Marudi.¹⁶

The withdrawal of the Kuala Nyabor merchants, who had been the primary buyers of rice and rubber, made the value of these commodities drop drastically in Nakat. If the villagers wanted to sell them, they had to go up to Beluru, which was a one-hour journey by motored longboat; it

was costly in terms of fuel as well as a place for buying daily necessities and foods.¹⁷ However, the villagers switched to products other than vegetables along the Miri-Bintulu road, such as rubber shoots, and fruits. Villagers also traded in the streets of Miri. Pepper and fowl were

After the Kuala Nyabor Chinese became totally dependent on Miri commodities. The small huts built for products, also served as temporary longhouse increasingly only became a place for cultural work. Finally, in 1995, villagers moved along the Miri-Bintulu road. Their houses were along the riverside to the roadside.

The villagers themselves say that they only rice and rubber. Subsequently, they sold other commodities and thus diversified their income, although a few villagers sold other products. Villagers obtained income from other sources than rice and rubber production as hard work. The same efforts in other income sources were made in primary forests and mature secondary forests sold to small Chinese entrepreneurs. Wage work in and around the region was important in sustaining households. Villagers work for wages even after marriage. Unmarried women (who formerly worked outside the village).

A slight reversal of this trend, however, was increasingly sold again since 1995. Villagers moved to the streets of Miri to city dwellers. They sold better quality than the imported products. In the 1970s, however, both the number and quality of products (just six families in 1995) and quality declined. Following the shift of longhouse communities again near the new longhouse. Since the river declined. The wet rice was replaced by which were opened in grassland. Although planting was partly car-

on forest paths to reach Miri from Nakat. just an hour's drive by car, although the road was not in the condition it is in today. most of the villagers continued to live in Miri as it was a convenient place for rubber and other products. Chinese merchants of Kuala Lumpur would first go to the Miri-Bintulu road (about two hours) and then take a bus. By the 1980s, signs of impact from the road could be observed on the land use patterns. 25 households opened pepper gardens in the area. The Forest Department, on the way from the road (Figure 7-2c). The harvest from these gardens was better than in Kuala Lumpur, who paid better prices than in Kuala Lumpur. The area of bush fallows with only a few trees distributed next to the road was reduced. Villagers now also sell products grown in their swiddens, which they had previously sold in the village.

After the war, Miri grew rapidly after 1960s as it became a center for petroleum industries. Commercial logging continued until the early 1990s and petroleum exploration began. In the area between Miri and Bintulu, changes took place in the region around the road, especially in the 1980s and early 1990s. The population increased more than twofold from 52,000 in 1970 to 104,000 in 1995 (Department of Statistics, Malaysia 1997). After the road was built, the public transportation improved and the public transportation improved. Longhouse communities in the Bakong area began to choose Miri as the place to sell their products. As a result, the amount of trade increased. By 1985, all the four Chinese shops had moved to bigger cities or towns.

Nyabor merchants, who had been the main buyers of these commodities, wanted to sell them, they had to make a long journey by motored longboat; it

was costly in terms of fuel as well as time. The villagers also lost their usual place for buying daily necessities such as sugar, salt, coffee, and canned foods.¹⁷ However, the villagers swiftly adjusted. After 1985, various kinds of products other than vegetables grown in swidden fields were also sold along the Miri-Bintulu road, such as rattan baskets,¹⁸ rattan and fern shoots, and fruits. Villagers also turned to selling these products on the streets of Miri. Pepper and fowl were sold to Chinese merchants in Miri.

After the Kuala Nyabor Chinese had moved out in 1985, the villagers became totally dependent on Miri as the place to buy goods and sell commodities. The small huts built along the Miri-Bintulu road to sell products, also served as temporary homes en route to Miri. The original longhouse increasingly only became occupied when busy with agricultural work. Finally, in 1995, villagers started to build a new longhouse along the Miri-Bintulu road. Their living base had completely shifted from the riverside to the roadside.

The villagers themselves say that before the road existed, they sold only rice and rubber. Subsequently, they became aware of other potential commodities and thus diversified their economic strategies.¹⁹ After 1985, although a few villagers sold only rice and rubber,²⁰ almost all the villagers obtained income from other activities. The villagers considered rice and rubber production as hard work, while giving lower returns than other income generating activities. Timber from primary forests and mature secondary-forests in Nakat was logged and sold to small Chinese entrepreneurs from the mid 1970s until the 1990s. Wage work in and around the rapidly growing city became especially important in sustaining household incomes. Today, young and senior villagers work for wages even after they are married, and almost all the unmarried women (who formerly always remained in the longhouse) work outside the village.

A slight reversal of this trend, however, occurred when rice became increasingly sold again since 1995. Nakat villagers started selling rice on the streets of Miri to city dwellers who reckoned that local rice was of better quality than the imported varieties. Compared to rice sales in the 1970s, however, both the number of households engaged in selling rice (just six families in 1995) and the quantity sold were much smaller. Following the shift of longhouse in 1995, many rice fields were opened again near the new longhouse. Since then the number of rice fields next to the river declined. The wet rice was in most cases grown in small fields, which were opened in grasslands using herbicide and/or bush knives. Although planting was partly carried out by broadcasting, transplanting

to the
Miri

✓ to the
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became the main planting method, which the villagers felt was a more reliable and productive method. Table 7-2 shows the changes in location of rice fields between 1995 and 1997.

The number and type of economic activities the villagers engaged in varied per household. For example, in young households, the main income came from the husband's cash-earning work. The wife was responsible for childcare and sometimes worked small rice fields herself. In households that had more than two generations of workers (such as a senior and a young couple), the younger man would work outside the village, while his wife and the senior couple would engage in a number of activities, including wet and dry rice growing, collection of rattan, making of rattan baskets, pepper cultivation, fishing, and livestock raising. The critical constraint in any household's selection of economic strategies was the number of working persons.

Government policies also affected people's economic activities. According to the villagers, government services such as agricultural subsidies became available since increased communication with Miri. After the late 1980s, when the price of pepper was high (Figure 7-3), almost all the families prepared pepper gardens, and all of them had received subsidies from the Agriculture Department to do so.²¹ The subsidies that villagers have received recently could be used for planting high yielding rubber and fruit trees, raising fowl and fish, and buying fertilizers to grow rice. The villagers said that after they moved to the roadside, communication with the extension officers became easier and it was easier to apply for subsidies at government offices in Miri.

Given these spatial and economic changes, there have also been effects on the landscape. Natural vegetation has grown back in the lands around the former longhouse by the river, formerly cultivated with rice and rubber. The regeneration process, in other words, has begun. On the other hand, along the road, after the relocation of the longhouse and agricultural fields,

Table 7-2. Number of rice fields by location, Nakat, 1995 and 1997

YEAR	NUMBER OF RIVER SIDE RICE FIELDS	NUMBER OF ROAD SIDE RICE FIELDS	RATIO OF ROAD-SIDE RICE FIELDS TO TRADITIONAL RIVER SIDE
1995	30	20	0.67 : 1
1996	13	32	2.46 : 1
1997	9	41	4.56 : 1

Source: Ichikawa (2000b)

the landscape has been transformed home gardens, and many rice field

Con

As outlined here, land uses in the three different periods, over a total to a set of political, social and ec

The beginning of the village itself political and economic factors: the and the encouragement to the Iban interest in forest products collection of Sarawak, official actions proved were beginning to face problems of area was still abundant in land and aggressively converted primary forest products. When rubber prices in the Pacific War, there was an expansion period, following the growth of deer arrivals appeared in sizable numbers. In the 1960s and 1970s, the villagers increase of rice fields was formed along the for extensive new tracts of rice fields of harvested rice. Secondary forests had formed after initial rounds of shifting every four years or so.

In the 1960s and 1970s, a large area to rubber gardens and wet rice fields products from the village started development of the region, specifically urban centers, and favorable government period, various kinds of forest products and started to be sold along the Miri villagers started to live along the roadside gardens, home gardens and rice fields.

In the three periods land use changes the same time there were important emphases could change depending any point in time. In the pioneer

1, which the villagers felt was a more able 7-2 shows the changes in location 197.

mic activities the villagers engaged in, in young households, the main income ing work. The wife was responsible for small rice fields herself. In households of workers (such as a senior and a young work outside the village, while his wife ge in a number of activities, including on of rattan, making of rattan baskets, vestock raising. The critical constraint economic strategies was the number of

ected people's economic activities. rnment services such as agricultural increased communication with Miri. ice of pepper was high (Figure 7-3), pepper gardens, and all of them had iculture Department to do so.²¹ The ed recently could be used for planting es, raising fowl and fish, and buying gers said that after they moved to the extension officers became easier and at government offices in Miri.

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by location, Nakat, 1995 and 1997

NUMBER OF RICE FIELDS	RATIO OF ROAD-SIDE RICE FIELDS TO TRADITIONAL RIVER SIDE
20	0.67 : 1
32	2.46 : 1
41	4.56 : 1

the landscape has been transformed from forests to pepper and fruit gardens, home gardens, and many rice fields.

Conclusions

As outlined here, land uses in the village of Nakat can be distinguished in three different periods, over a total 100 years. Each of these periods relates to a set of political, social and economic conditions outside the village.

The beginning of the village itself in the Baram area was a result of wider political and economic factors: the acquisition of new territory by Brooke and the encouragement to the Iban to move to this region, as well as official interest in forest products collecting. For the Iban on the southwestern part of Sarawak, official actions proved to be a stimulus, as they themselves were beginning to face problems of land and resource shortage. The Baram area was still abundant in land and forest. After the settlement, the villagers aggressively converted primary forests to rice fields and collected forest products. When rubber prices in the international market went up after the Pacific War, there was an expansion in rubber gardens. Also in the same period, following the growth of demand for rice as logging camps and new arrivals appeared in sizable numbers in the Baram River at the end of the 1960s and 1970s, the villagers increased their rice production. A large area of rice fields was formed along the Song River, which was not only suitable for extensive new tracts of rice fields but for transporting the larger amounts of harvested rice. Secondary forests were used for rice growing, once they had formed after initial rounds of rice production. The wet rice fields were shifted every four years or so.

In the 1960s and 1970s, a large area of forest in the village was converted to rubber gardens and wet rice fields. From around 1985, various kinds of products from the village started to be traded as a result of the overall development of the region, specifically road construction, expanding urban centers, and favorable government policies for agriculture. In that period, various kinds of forest products became marketable commodities and started to be sold along the Miri-Bintulu road and in Miri. Since the villagers started to live along the road, the forests were converted to pepper gardens, home gardens and rice fields.

In the three periods land use changed profoundly in Nakat. However, at the same time there were important fluctuations within a period. Economic emphases could change depending on what the wider conditions were at any point in time. In the pioneer period, for example, villagers would

choose either rice growing or forest products collection as their main activity. In the period of commercialization of rice and rubber, they would shift emphasis between rice growing and rubber tapping. Presently, they select among a range of activities including pepper cultivation and weaving rattan baskets.

Dynamics could go as far as modifications within one single economic activity. For example, when the price of rice was high in the 1960s and 1970s, large rice fields were made on forest fallows, using broadcasting as the dominant planting method. Now that the relative importance of rice has declined, small fields are made in grass fallows while the dominant planting method has become transplanting. The villagers have adapted to the changing economic conditions by adopting different agricultural methods in their land use.

While these changes took place in the village, no serious land degradation did occur, such as *Imperata* grassland formation. The Song area of the former large wet rice fields has evolved into bush and forests. Pepper production in vicinity to the Miri-Bintulu road started roughly 15 years ago in the village. Since the productivity of these gardens is now dropping, the pepper gardens are being abandoned. During the fieldwork, such abandoned pepper gardens observed along the Miri-Bintulu road reverted to bush that seems to be able to recover into forest in the future.

Adaptations to outside conditions seemed to be part of the villagers' strategies for surviving in a severe and unstable natural environment. As already mentioned, the villagers have experienced crop losses due to natural disasters, including drought, flood, and pest infestation. In order to counter-balance such risks, it may be necessary for them to interact increasingly with the outside economy. The villagers seem to have chosen the more beneficial activities and appropriate methods of land use through careful consideration of conditions outside the village. Nakat inhabitants depend not only on their village economy, but adjust their livelihood strategies to respond positively to political, social and economic situations developing outside of the village. The degree to which they depend on one versus the other has changed throughout village history.

This paper is focused on a single village. Similar changes of land use and economic activities, however, may be observed in other areas of Sarawak as well as in other parts of Southeast Asia, where population density is low and tropical rain forests are dominant. Cramb (1988) noted that drastic changes in the Iban's activities and land use have occurred as

a result of wider economic conditions. The change of longhouse location observed along the Miri-Bintulu road in Sarawak and Sumatra (Takaya 1979; Furukawa 1988). The livelihood strategies recognized

On the streets of Miri, the number of people coming from local villages selling various goods is increasing recently. Their land-use patterns and such changes in their economic strategies. The road network is rapidly expanding, and commercial logging. Before, in the village, the only way of communication but to the village. An important role in improving communication between ever larger number of places. They can go to Miri faster and cheaper. The exploitation of upriver and resource exploitation of upriver areas, others, may follow similar patterns.

Acknowledgements

Research was supported by grants from The Daiwa Foundation (1996) and The Daiwa Foundation (1998).

- 1 The land use types observed were bush, rice field, rubber garden, paddy field, and information on wet paddy field.
- 2 In this study, the person recognized by the chief of household (*tua*) was always observed. The number of villagers stayed outside the village for 6 months from June 1995 until June 1996. The number of villagers stayed outside the village for years.
- 3 Sarawak was ruled by James Brooke and his descendents, Charles Brooke and James Brooke.

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a result of wider economic conditions in Sarawak. Padoch (1982) reported the change of longhouse locations and today many such cases can be observed along the Miri-Bintulu road. There are similar reports for South Sumatra (Takaya 1979; Furukawa 1994) and colonial Malaya (Kato 1991). The livelihood strategies recognized in Nakat are by no means unique.

On the streets of Miri, the number of Iban and other ethnic groups from local villages selling various local products are said to be increasing recently. Their land-use practices are likely to change with such changes in their economic strategy. Today in the Baram area, the road network is rapidly expanding further upstream as a result of commercial logging. Before, in the interior, river transportation was the only way of communication but today the former logging roads play an important role in improving communication and exchange between an ever larger number of places. The people from upstream villages now can go to Miri faster and cheaper. Following such changes, land uses and resource exploitation of upriver people, of the Kayan, Kenyah and others, may follow similar patterns of change presented in this paper.

Acknowledgments

Research was supported by grants from The Osaka International House Foundation (1996) and The Daiwa Bank Foundation for Asia and Oceania (1998).

Notes

- 1 The land use types observed were primary forest, secondary forest, bush, rice field, rubber garden, pepper garden, and so on. Among these, information on wet paddy field is based on Ichikawa (2000b).
- 2 In this study, the person recognized as the member of family (*se-bilek*) by the chief of household (*tuai bilek*) was counted as a "villager." Out- and in-flow of villagers for wage work outside the village was always observed. The number of villagers who stayed for more than 6 months from June 1995 until May 1996 was 262. The rest of the villagers stayed outside the village for more than 6 months or even for years.
- 3 Sarawak was ruled by James Brooke, an English adventurer, and his descendents, Charles Brooke and Vyner Brooke, from 1841 to 1941.

- 4 Sandin (1994: 227–228) describes in detail the Iban's move to the Baram River.
- 5 Even before the settlement started, many Iban, who were famous for *bejalai* or traveling, went to Baram to seek forest products (SG 1/3/1883: 26, 1/5/1884: 44). These travels might have led them to discover the abundance of forest products in the area.
- 6 'Secondary crops' here refers to those crops grown in the space or interval between the rice plants, such as a variety of vegetables and root crops.
- 7 For example, in Baram River a sawmill was established around 1920 to produce lumber for construction purposes in Miri (SG 2/8/1920: 176).
- 8 The price of rice in Sarawak, which was controlled to some extent by the government, had increased 1.4 times from 24.46 ringgit per 100 kg in 1971 to 33.90 ringgit per 100 kg in 1974 (Department of Agriculture, Sarawak 1981).
- 9 The wet rice fields, especially those that are cultivated successively for a few years can be seen even from a distance as grassland. Figure 7.2 was made by tracing the grasslands and bush on the aerial photographs in each year. According to the villagers, if a rice field is abandoned, the vegetation in the area will grow from grass to bush within three to seven years. Therefore, though the figure does not necessarily show the exact rice fields cultivated in the year when the photograph was taken, it shows the approximate area of rice fields in that period.
- 10 The area is estimated from recall interviews about the amount of rice produced at that time. According to the villagers, families who had larger rice fields opened around ten acres (about four ha) and in favorable years around 6,000 kg of rice was harvested. Assuming productivity to be 1,200 kg/ha (cf. Ichikawa 2000a), the average size of a family's rice field was roughly five ha.
- In the study year in 1995–1996, 38 households (45 per cent of the total number of household) cultivated wet rice, for which the largest field was 1.48 ha and the average was 0.54 ha.
- 11 In order to control the market price of rubber, the International Rubber Regulation and the International Rubber Agreement were concluded in 1925 and 1934 respectively among the rubber producing countries (Barlow 1978:62). In Sarawak, the planting of rubber trees and the amount of latex sold were controlled (Cramb 1988:115–116).

- 12 According to the villagers, a roadside in 1964 when the r families remained in the origi
- 13 The amount of exported logs the early 1990s, and exported million tons in 1996 (Departm
- 14 The plantation areas of Sarawa in the 1990s and were 160,000 Malaysia 1997). The center of area between Miri and Bintulu
- 15 For example, bus services start the buses from Miri to the vill from 6 in the morning until 4
- 16 According to interviews with t Burulu.
- 17 Although foodstuffs could be foot for two hours between the
- 18 Rattan baskets are not a tradit selling by the villagers since made them by imitating existi
- 19 The villagers said that there directions to encourage them selling their commodities in M local Iban who had previously
- 20 In 1995, rice growing engage and the rice was sold by six l practiced by almost none of t
- 21 Subsidies took the form of pep some cash for preparation of j

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- 12 According to the villagers, although eight families moved to the roadside in 1964 when the road was still under construction, 47 families remained in the original longhouse.
- 13 The amount of exported logs had increased up to 15 million m³ by the early 1990s, and exported petroleum also increased to nearly 10 million tons in 1996 (Department of Statistics, Malaysia 1997).
- 14 The plantation areas of Sarawak have drastically increased especially in the 1990s and were 160,000 ha in 1996 (Department of Statistics, Malaysia 1997). The center of plantation development has been the area between Miri and Bintulu (King 1993: 277).
- 15 For example, bus services started in the early 1970s and in the 1990s the buses from Miri to the village departed almost every 30 minutes from 6 in the morning until 4 in the afternoon.
- 16 According to interviews with the villagers and Chinese merchants of Burulu.
- 17 Although foodstuffs could be bought in Miri, they had to travel on foot for two hours between the Miri-Bintulu road and the longhouse.
- 18 Rattan baskets are not a traditional product, but they were made for selling by the villagers since around 1985. Initially, some villagers made them by imitating existing articles made and sold by Chinese.
- 19 The villagers said that there were no government programs and directions to encourage them to produce commodities. They started selling their commodities in Miri after the mid-1980s, following the local Iban who had previously sold goods in Miri.
- 20 In 1995, rice growing engaged less than half of all the households and the rice was sold by six households, while rubber tapping was practiced by almost none of the households.
- 21 Subsidies took the form of pepper buds, fertilizers, weed killers, and some cash for preparation of posts for pepper planting.

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