

FOREST CLEARING AND PEPPER FARMING BY BUGIS MIGRANTS IN EAST KALIMANTAN: ANTECEDENTS AND IMPACT*

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The migration of Bugis farmers to the forests of East Kalimantan is a well-organized continuing process. Through it forested lands offering new opportunities are cleared quickly and at least temporarily settled, without the government providing the substantial and costly assistance in land clearing and settlement building to the migrants required under the official resettlement and transmigration programs.¹ The research reported here was aimed at assessing the actual or potential impact of migrant Bugis farmers on the East Kalimantan forest, and involved examining the mobility of the Bugis in relation to their use of land and their impact on the environment. We considered not only the forest-clearing, land-opening, and land-use activities of the farmers but also the causes, magnitude, and organization of their migrations. We did this as part of a larger research program concerned with identifying the forces contributing to deforestation in East Kalimantan.

In the research on the impact of the Bugis farmers, we concentrated on the district of Loa Janan. Here, along about 25 kilometers of the main Samarinda-Balikpapan road, Bugis migrants have converted lowland dipterocarp forest

* Field work on which this article is based was conducted by Sahur in Loa Janan from May through July of 1980 and by Vayda and Sahur in South Sulawesi in March and April 1980 and in Central Sulawesi in July 1984. In 1980 the research was part of a US-Indonesian MAB (Man and the Biosphere program) project on "Interactions between People and Forests in East Kalimantan," directed by Vayda and funded by the US Forest Service through a grant awarded to the East-West Center in Honolulu by the US MAB program's "Consortium for the Study of Man's Relationship with the Global Environment." Sahur's participation in the research was made possible by supplementary funds provided by the US Agency for International Development. The project as a whole was carried out with the cooperation of Mulawarman University, the Provincial Government of East Kalimantan, the Indonesian Institute of Sciences (LIPI), and UNESCO. For preliminary reports on the project as a whole, see Kuswata Kartawinata and Andrew P. Vayda, "Forest Conversion in East Kalimantan, Indonesia: The Activities and Impact of Timber Companies, Shifting Cultivators, Migrant Pepper-farmers, and Others," in *Ecology in Practice*, pt. 1, ed. F. di Castri et al. (Dublin: Tycooly, 1984), pp. 98-125; and A. P. Vayda et al., "Interactions between People and Forests in East Kalimantan," *Impact of Science on Society* 30 (1980): 179-90. A book on the project is in preparation and will include a revised version of the present article. Research methods used in the project are discussed in Andrew P. Vayda, "Progressive Contextualization: Methods for Research in Human Ecology," *Human Ecology* 11 (1983): 265-81.

1. On the same theme, see Andrew P. Vayda, "Buginese Colonization of Sumatra's Coastal Swamplands and Its Significance for Development Planning," in *Proceedings of the Jakarta Workshop on Coastal Resources Management*, ed. E. C. F. Bird and A. Soegiarto (Tokyo: United Nations University, 1980), pp. 80-87.

to plantations of pepper (*Piper nigrum*). By 1980 the total area so converted was 1,170 hectares containing more than 3.5 million pepper vines. There were at least 770 pepper-growing households distributed among four villages.² Dwellings and plantations spread from the main road to a distance not exceeding 5 kilometers on either side.

Like earlier overseas migrations in the periods of political and economic disruption that punctuated Bugis history,³ much recent Bugis migration to East Kalimantan was an effort to escape conditions at home. Although there had been Bugis movement from South Sulawesi to East Kalimantan at least as far back as the sixteenth century, the number of Bugis present in the district of Loa Janan in the 1950s, according to our informants, could have been counted on one's fingers. In the early 1960s, other Bugis arrived, most of them from the vicinity of Muara Badak, an East Kalimantan coastal town 20 kilometers north of the mouth of the Mahakam River. (See Map 1.) They had moved to Muara Badak around 1951 at the start of Kahar Muzakar's Islamic rebellion in South Sulawesi. According to our informants, the rebels had seized and slaughtered for food the water buffalo the farmers needed to plough their rice fields; in addition the farmers had been forced to give their daughters in marriage in accordance with the rebels' dictates, and had been forbidden, on pain of death, from going to town to buy salt, sugar, margarine, and other infidel foods. Hence, the farmers migrated to escape the rebels' demands. Most of those migrating went to areas where they could grow perennial commercial crops--pepper and coconuts, for example--not suited to the long dry season and erratic rainfall of their homelands.

By the early 1960s, the initial cycles of pepper farming were drawing to a close at Muara Badak. With the types of techniques used by the Bugis, the yield of pepper plantations in areas of poor red-yellow podzolic soils (ultisols) declines after approximately ten years to the point that the plantations have to be abandoned. By this point the farmers are searching for new plantation sites. So, for the original migrants to Muara Badak, this was a propitious time for the move to Loa Janan.

In 1961 a number of men from Muara Badak went to Loa Janan to check out settlement possibilities, and they decided on the move, although at the time the sole road was a small one which motorcycles could use for only 28 kilometers from Samarinda. However, the main Samarinda-Balikpapan road was already under construction and this contributed to Loa Janan's attractions for the pioneer pepper farmers.

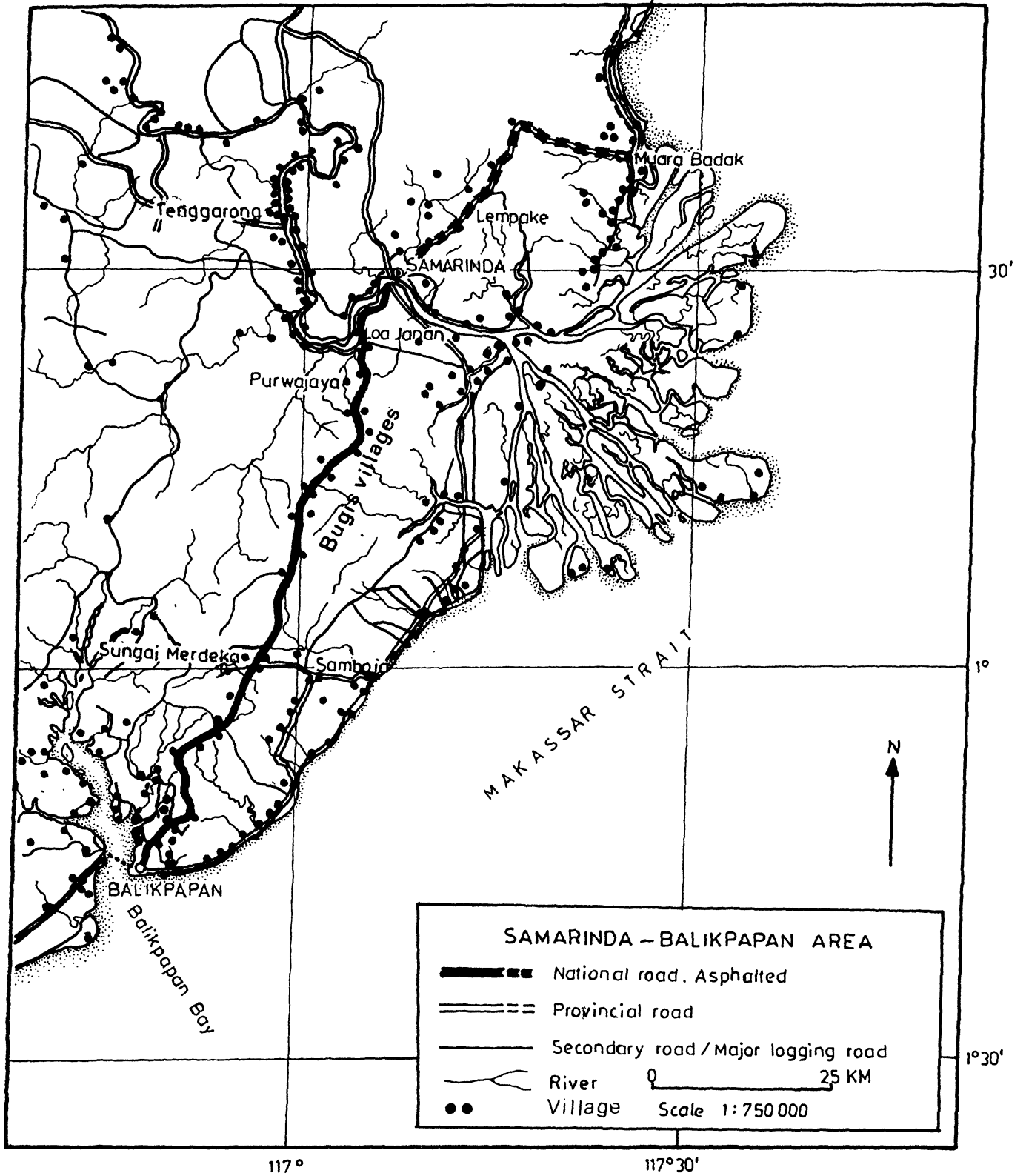
After they established their plantations, their example was followed by other migrants from Muara Badak, and the movement from there to Loa Janan went on for some years. Of the hundred Loa Janan pepper farmers in our interview sample,⁴ thirty were from Muara Badak. Although data on the point are not clear, it may be presumed that those who had come later to Muara Badak from Sulawesi tended to leave later for Loa Janan, i.e., waiting until the approximately ten-year cycles of their Muara Badak plantations were completed.

When the Kahar Muzakar rebellion in South Sulawesi ended in 1965, it became safe for Loa Janan pepper farmers to go back to their homelands to visit their

2. See note 6, below.

3. Vayda, "Buginese Colonization"; Jacqueline Lineton, "Pasompe' Ugi': Bugis Migrants and Wanderers," *Archipel* 10 (1975): 173-201.

4. See note 6, below.



relatives. Just emerging from years of privation, these relatives and other friends were attracted by the wealth the migrants displayed (gold, tape recorders, etc.), the gifts they brought, and the stories they told of opportunities at Loa Janan and, in some cases, even of pilgrimages to Mecca made possible by their success in pepper farming.⁵ Many of the Bugis who had suffered through the rebellion now lacked the capital and equipment to restore their long neglected rice fields to full production, and they decided it was worth seeking a better life in East Kalimantan. As a consequence, a new wave of migrations occurred, impelled this time by prospects of social and economic advantage or advancement rather than by the fear and insecurity that had driven earlier migrants to Muara Badak. The cost of the trip was relatively low, so starting a new life at Loa Janan not only held the promise of greater future rewards but for some could also be cheaper and easier than postrebellion reconstruction at home.

Beginning in 1966, Bugis migrants to Loa Janan increasingly came directly from South Sulawesi, rather than from elsewhere in East Kalimantan. Seventy of the hundred Loa Janan pepper farmers we interviewed had come directly from South Sulawesi--thirty-nine from Soppeng and thirty-one from Bone, the two regencies that have constituted the predominant sources of Bugis migration to Loa Janan.⁶

It is difficult to estimate from the available data just how many Bugis have arrived from South Sulawesi to become pepper farmers in Loa Janan each year since 1965. Yearly population figures are available for Loa Janan as a whole from 1971 to 1978 and these are given in Tables 1 and 2. These figures, however, do not show how much of the annual increase indicated is attributable to new Bugis arrivals to the pepper-growing areas. Since the district of Loa Janan also includes a government transmigration project for the resettlement of Javanese and in addition during the first part of the 1970s was the location of the base camp for the construction of the Samarinda-Balikpapan road, much of the in-migration indicated in Table 2 may represent laborers for the road project and Javanese settlers who, on their own ("spontaneously"), were joining relatives who had previously moved to Loa Janan with government support. The largest increase indicated in the tables is no doubt connected to the long-delayed completion of the road in 1976.⁷ This is known to have attracted settlers from many areas.

5. Success and prosperity did not of course come equally to all Loa Janan farmers; the more successful, however, were no doubt among those making the trips back to Sulawesi. Figures on wealth and income are not available from the 1960s, but the 1980 data show that, although 1.52 ha per family was the average size of Loa Janan pepper farms, a few families had as many as 10 ha (each with about 3,000 pepper plants) and had diversified into such businesses as rice milling and using their cars for taxi services. By 1980, approximately seventy of the Bugis farmers in Loa Janan had become *haji*.

6. The 100-farmer sample was drawn from the register of Loa Janan pepper farmers that was prepared in 1978 for a government program to intensify pepper production (*PMU Intensifikasi Lada*). Seven hundred and seventy pepper-farming families, consisting of a total of 2,912 persons, were included in the register, and our procedure was to divide the families into groups of seven and then to select for our sample a family head from each of a hundred groups. Unfortunately the register cannot have been complete, for it was known that some migrant families had never reported to the local government. Time did not permit us to prepare our own census and register.

7. The official opening was in 1977.

Table 1. Population of Loa Janan 1971-1978

Year	Number of Persons
1971	14,137
1972	14,570
1973	15,318
1974	15,508
1975	15,577
1976	15,915
1977	18,431
1978 (Feb.)	18,873
1978 (Jul.)	19,402

Source: Monografi Kecamatan Loa Janan 1978.

Table 2. Population Increase of Loa Janan 1971-1977

Year	Number of Persons	Increase (persons)	Migration (persons)			Total
			Transmigration	Spontaneous		
				In	Out	
1971	14,137	234	-	199	-	433
1972	14,570	241	-	505	-	746
1973	15,318	253	502	-	563	192
1974	15,508	256	-	-	187	69
1975	15,577	257	-	81	-	338
1976	15,915	263	-	2,253	-	2,516
1977	18,431	305	-	137	-	442

Source: Monografi Kecamatan Loa Janan 1978.

At the village and subvillage levels, no reliable data on Bugis in-migration were obtainable, because only in the last few years have the deputy village heads (*Wakil Kepala Desa*) and the neighborhood headmen (*Kepala RT*) attempted to maintain accurate records, as they themselves acknowledged. Even in 1980, not all new arrivals were being recorded, for some, in violation of a standing regulation, were failing to report to the local officials. Nor could the data be obtained in Pare-pare, the South Sulawesi port of departure for East Kalimantan. Bugis migrants leaving there have to obtain travel permits stating their destinations. But, on examining records in Pare-pare, we found that the destinations given were not the ultimate ones but rather the city, Balikpapan or Samarinda, of the migrants' first arrival in Kalimantan.

Notwithstanding this lack of precise numerical data, it is clear that Loa Janan became well established as a receiving area for Bugis rural migrants, especially from Soppeng and Bone. The process in effect was the familiar one of chain migration,⁸ whereby the first migrants to a place--usually young men--recruit family and friends as new migrants, and they, in turn, recruit others.⁹ For many, a key factor in their decision to migrate to Loa Janan was that someone they knew had gone there previously.

Moreover, subsequent developments served to enhance the attractiveness of Loa Janan. As the numbers of Bugis increased, more of their own schools and mosques were built, so that later migrants had the psychological comfort of finding a community life not very different from what they had left in South Sulawesi. Also, converting forest to pepper plantations became easier with the granting of concessions in Loa Janan to two timber companies--PT Hima, which began operations in 1969, and PT Cida, which began in 1970. This meant that later migrants could use logging roads to gain access to convertible forest, and that they would find the forest easier to clear because the logging companies had already selectively removed some large-diameter trees.¹⁰ Transport problems were of course also eased by completion of the Samarinda-Balikpapan road. Thereafter, at least twenty migrants were arriving each month to settle, according to the heads of the four Bugis villages of pepper farmers. (The possibility that this number may have begun to decline will be discussed later in this article.)

Institutionalized services available to help migrants before their departure from Sulawesi and after their arrival in Loa Janan contributed to making Bugis migration an expeditious process for opening up new lands and getting them at least temporarily settled. In Sulawesi *pengurus rantau* (migration organizers) arrange boat passage for travelers and obtain not only the tickets for them but usually also all necessary official papers and letters from the provincial government and police. Moreover, the organizers arrange transportation to the port, and then provide food and lodging there for the travelers prior to their ship's departure. For these services, the organizers in Pare-pare, the port of departure for East Kalimantan, received about Rp 12,500 (US\$12.00) per migrant in 1980.¹¹ Rp 9,000 of this went for boat passage, and the organizers

8. See, for example, Charles A. Price, *Southern Europeans in Australia* (Melbourne: Oxford University Press, 1963).

9. Sixty-nine of the men in our 100-farmer sample were still unmarried when they migrated to Loa Janan.

10. For a brief discussion of the "Indonesian Selective Logging System," see Kartawinata and Vayda, "Forest Conversion," pp. 118-19.

11. In 1980: US\$1.00 = approximately Rp 625.

usually had a profit of between Rp 1,000 and Rp 1,500 per migrant from the remainder. In cases when a ship's departure was unduly delayed, they would lose money because of the costs of providing room and board for the migrants during the waiting period. (A migrant making his own arrangements would have to pay several thousand rupiahs more than the fee being charged by the organizers.)

Many of the organizers started their business during the Kahar Muzakar rebellion, and for some years the South Sulawesi government, which was trying to control emigration from the province, regarded them with disfavor. However, after 1970, the government granted some of the organizers licenses to run travel bureaus. In 1980, we found there were at least seventeen licensed and unlicensed organizers in Pare-pare. The former differed from the latter in having offices, a regular office staff, an official company name (e.g., CV Watampone, CV Subur, CV Toraja, CV Orde Baru), and lists of ship arrivals and departures posted in front of their offices or office buildings. They also differed in that they generally waited for customers to come to them, while the unlicensed organizers often scoured the countryside for would-be migrants. Although similar fees were charged by the two types of organizers, the unlicensed ones had ways of arranging travel even for persons lacking identification cards (*Kartu Tanda Penduduk*) and travel permits and were therefore preferred by many migrants. Both types of organizers lodged travelers in their own houses, but conditions tended to be inferior in the houses of the unlicensed organizers. Sometimes no more than space on the ground beneath the elevated main floor of the house was provided.

In Pare-pare, we heard of two other types of operators: (1) men who find prospective migrants in the rural areas and bring them to migration organizers in Pare-pare in return for commissions; and (2) migration organizers who are, in effect, illicit moneylenders, i.e., they charge substantially higher fees but allow payments to be deferred until the migrants have earned money in East Kalimantan. We were unable either to contact these operators or otherwise verify reports of them. But it is clear that, even without them, numerous people and important services were available in South Sulawesi to help the migrants on their way.

Once arrived in Loa Janan, the migrants received more help. Some received this mainly from relatives already living in Loa Janan, while others obtained it from so-called *penerima rantau* or "migrant receivers." There were twelve of these receivers among the established Bugis residents of Loa Janan, and helping newcomers was for them more a matter of morality and prestige than the kind of commercial activity practiced by the migration organizers in South Sulawesi. It was also a matter of quasi-kinship, expressed by the Bugis adage that a single glob is formed by the water-buffalo droppings that come out one by one. Migrants who leave their homeland one by one and without relationship to one another become as one family in their new settlements. However, the receivers were less willing to help newcomers if they lacked proper travel documents and identification cards, or at least references on their behalf from relatives already settled in Loa Janan. Feelings of moral obligation and quasi-kinship did not necessarily extend to everybody.

The migrant receivers assisted the newcomers in registering with the local authorities and in getting started in pepper farming. They either found jobs for the newcomers as farm workers (sometimes as employees of the migrant receivers themselves) or allocated land to them for conversion into pepper farms. When the first Bugis migrants had arrived in Loa Janan, licenses to open forest land had been granted to individuals, and there had been little official control

over the location and extent of the land subsequently opened by the licensees. Possibly intending to rectify this, in the late 1960s the government adopted new regulations whereby licenses to open land were to be granted only for specific locations and to groups rather than individuals; each member of a group would be allowed two hectares. In applying for group licenses under the new regulations, the migrant receivers adopted the device of using fictitious names, with the express purpose of obtaining land that could be allocated to new migrants.

The migrant receivers made no charge for the land they allocated, with the exception of those two-hectare plots that they had already cleared with the usual techniques of slash-and-burn cultivation,¹² for which in 1980 they charged Rp 50,000-60,000 per hectare. This was to cover such expenditures as having trees with diameters of 50 cm or more felled with chainsaws at the rate of Rp 1,000 per tree. Those new migrants who had neither the money to pay for the clearing costs nor the capacity or desire to clear the plots themselves, could still obtain cleared plots from the migrant receivers. This was, however, with the understanding that half of the pepper vines on these plots, although planted by the new migrants, would belong to the migrant receivers. Under this arrangement, the receivers also provided pepper cuttings for planting, and the ironwood stakes, measuring 2 to 2½ meters, needed to support the pepper vines. They sometimes lent farm implements too.

Those newcomers who were allocated forest land by the migrant receivers and who were able to clear and plant it themselves could establish themselves as pepper farmers if they had brought enough money with them to meet their subsistence needs for six to eight months. After that time, the dry rice planted in the cleared plots was ready to be harvested, and some of it could be set aside for subsistence, while the proceeds from selling the remainder could be used to meet further consumption needs and to cover the costs of converting the temporary rice fields into pepper farms. Pepper cuttings might, for example, have to be bought for Rp 150 each if they could not be obtained gratis from the plantations of relatives or friends.

As a token of gratitude, the new settler would give several tins of unhulled rice from the harvest, each containing approximately 11 to 12 kg, to the migrant receiver from whom he had obtained the land. Clearly the migrant receivers were not suffering economic losses from their activities, even if their principal motivations were those of status and prestige and feelings of quasi-kinship. But, in the present context, the important point remains that these activities facilitated the conversion of forest to pepper farms by newcomers to Loa Janan.

After planting pepper on their land, some migrants also planted fruit trees, such as jackfruit, durian, rambutan, langsats, and mango. Planting these trees might be regarded as establishing a basis for claiming permanent rights to the land,¹³ but it should be noted that, contrary to popular assumptions regarding interisland migrants, the Bugis migrants to Loa Janan do not seem to have been motivated by a strong desire to own land in the migration area. Holding licenses to open land in Loa Janan or being allocated land by license-holders did not confer *de jure* ownership. For that, certificates of ownership had to be obtained

12. See below, p. 104.

13. On planting fruit trees for such purposes elsewhere in Kalimantan, see Michael R. Dove, "Theories of Swidden Agriculture, and the Political Economy of Ignorance," *Agroforestry Systems* 1 (1983): 87.

from the government. But interviews with the local government officials and the pepper farmers themselves revealed that most of the farmers had no intention of applying for the certificates. The reasons given for not applying included the following:

1. Slowness of the certification process, and costliness of the application procedures in terms of time, energy, and money. (Some farmers known to have applied long before at considerable expense had still not received certificates in 1980.)¹⁴
2. Ignorance of the application procedures.
3. Fear that being certified as landowners would mean having to pay taxes.
4. The belief that certification was unnecessary for the use that the farmers wanted to make of the land.

Since most Indonesians in 1980 reportedly did not have certificates for their land,¹⁵ these interview findings are of no great significance. They do, however, show that certification problems did not deter Bugis migrants to Loa Janan from opening land and planting pepper. Moreover, the findings as a whole and the belief that certification was unnecessary for their needs in particular are consistent with the conclusions to be presented later about the Bugis migrant strategy of using frontier land impermanently.¹⁶

Having reviewed some factors that made Bugis migration an expeditious process for opening up new lands, we may now consider more directly the land-opening and land-use processes themselves. We need pay attention only to those aspects or features that contribute to understanding the actual or potential impact of migrant Bugis farmers on the East Kalimantan forest.¹⁷

14. This is not unusual in Indonesia, where the "complexity of certificate administration" has been acknowledged to be a general problem ("MPs Endorse Land Certificate Issuance," *Indonesia Times*, September 17, 1981, p. 3).

15. *Ibid.*

16. On problems resulting from insecurity of land titles in an area of agricultural colonization in another part of the world, see Joseph R. Thome, "Title Problems in Rural Areas of Colombia: A Colonization Example," *Inter-American Economic Affairs* 19, 3 (1965): 81-97.

17. For descriptions of Borneo pepper cultivation, see two reports from Sarawak: J. Stewart Blacklock, "A Short Study of Pepper Culture with Special Reference to Sarawak," *Tropical Agriculture [Trinidad]* 31 (1954): 40-56; and P. W. F. de Waard, "Pepper Cultivation in Sarawak," *World Crops* 16, 3 (1964): 24-30. A classic description of Indonesian pepper growing, based on observations in Sumatra, is that by Marsden, who, in referring to pepper in Borneo, was unaware that ironwood stakes lasted more than a couple of years (William Marsden, *The History of Sumatra*, 3rd ed. [London: Longman, Hurst, Rees, Orme, and Brown, 1811; Kuala Lumpur: Oxford University Press, 1966], pp. 129-45). For other historical references to Southeast Asian pepper production, see I. H. Burkill, *A Dictionary of the Economic Products of the Malay Peninsula* (Kuala Lumpur: Ministry of Agriculture and Co-operatives, 1966), pp. 1746-48; and Karl J. Pelzer, "Swidden Cultivation in Southeast Asia: Historical, Ecological, and Economic Perspectives," in *Farmers in the Forest: Economic Development and Marginal Agriculture in Northern Thailand*, ed. P. Kunstadter et al. (Honolulu: University Press of Hawaii, 1978), pp. 276-77.

Selection of forest land for conversion into pepper farms was based, according to the farmers, on several considerations:

1. The forest to be converted should include a good number of Borneo ironwood or ulin trees (*Eusideroxylon zwageri*), the tough-wooded trees from which the tall support stakes needed for the pepper vines were prepared. These ironwood stakes, being resistant to attacks by termites and other insects, can be used for decades. If the farmer had no ironwood on his land, he had to buy the stakes at a cost of Rp 25 each, and if he and his family could not themselves transport the stakes from the roadside selling points, he had to pay carriers Rp 100 per kilometer per stake.

2. The land should not be far from the Samarinda-Balikpapan road. In 1980 transporting pepper to the road cost Rp 25/kg/km, but along the road itself, the usual cost by van or bus from Loa Janan to Samarinda was Rp 500 per sack, whether full or not. (A full sack could weigh as much as 90 to 100 kg.) This was the same as the fare paid by one passenger to the city.

3. The land should not be flat. According to the farmers, slope is desirable in order to prevent the soil around the pepper plants from becoming too wet after rainfall. This explanation accords with the expert view of the adverse effects of waterlogging on pepper growth.¹⁸ Loa Janan farmers believe wet soil to be conducive specifically to *Phytophthora* footrot, a fungus disease that affected many plants in Soppeng Baru, a Bugis village in Loa Janan that has land that slopes only to a slight degree. Planting on hills is, in fact, among the methods that have been recommended to the farmers to control *Phytophthora* footrot.¹⁹

4. Water, preferably from a running stream, should be available for the farmer's daily domestic use and for the production of white pepper, which differs from the black in that the skin has been removed from the pepper berries by soaking in water. With water available, farmers could wait until harvest time to decide, on the basis of such factors as price differentials, whether to make black or white peppercorns from their berries. Most Loa Janan pepper in recent years has been white. Suitable running streams, however, are rare in Loa Janan—there are two or three around a hamlet named Sungai Nangka and one near a hill named Bukit Soeharto at Km 54 from Samarinda. For many of the farmers, white pepper production necessitates using stagnant pond water, which darkens the pepper and thus lowers its market value. The stagnant water can, of course, also be a source of health problems, both because it is used for washing, cooking, and drinking and because it provides a breeding place for mosquitoes.

5. The land should be near already settled land, from where assistance can be obtained in the case of illness or other emergencies.

Obviously, not all these criteria could always be met in selecting a site.²⁰ Compromises or tradeoffs were necessary. Sloping land was desired, but flat

18. See, for example, Blacklock, "A Short Study," pp. 44-45.

19. Rachmad Hernadi, "Some Notes on Footrot on Black Pepper in East Kalimantan," Paper presented at the Southeast Asia Regional Symposium on Plant Diseases in the Tropics, Yogyakarta, September 1972.

20. Interesting questions, on which, unfortunately, we have no adequate data, concern not only how the migrant receivers selected sites in the first place but also how land-allocating decisions were made if the plots available for allocation were not equally desirable. Some migrant receivers stated that they let newcomers choose their plots from all of those which were available.

land was not shunned; land near the main road was preferred, but land as much as 5 km from the road was also used; suitable running streams were a desideratum, but most sites lacked them. Interestingly, many farmers said that the presence of ironwood on the site was the prime consideration, as this would keep down costs, especially for newcomers to Loa Janan who were just beginning their farming operations there. Ironwood is common and quite widely dispersed over the lowlands of East Kalimantan, an area also characterized by the hilly or rolling topography and the clayey, red-yellow, podzolic soils which are acceptable to the Bugis farmers for pepper growing. It can thus be seen that the settlers' requirements are not so exacting as to preclude their finding many other suitable sites for future pepper plantations along the roads that will be pushed through the forests of East Kalimantan. The implications of this for road building and forest management in the province will be considered later.

The Bugis farmers cleared forest by slashing underbrush with machetes and felling the larger trees with axes or chainsaws. Ironwood was set aside for later use, and some other timber was kept for house building and firewood, but most of the cleared vegetation was left to dry in the sun and was then burned. The burning usually occurred during the relatively dry months of August and September, and the resulting ash provided nutrients critical for farming the otherwise poor soils of Loa Janan.²¹ For planting rice, the men made holes in the ash-covered ground with long dibbling sticks, and the rice was then sown, usually by the women. A few farmers planted corn, but most, regarding rice as their staple, made that their first crop. After harvest, they used the rice both for their own subsistence and for sale in order to have funds for food and other expenses. Hulled rice could be sold for Rp 225-275 per liter at Loa Janan in 1980.

The land-use strategy of the Loa Janan pepper farmers is basically that of Bugis migrants to other frontier areas of Indonesia--clearing the forest, which is then planted with rice or other annual food crops from which the farmers subsist until the perennial commercial crop that they have also planted is ready to be harvested. After the perennial crop has begun to yield, the land is no longer used for food staples. Such a strategy among Bugis coconut growers has been noted in Sumatra's coastal swamplands,²² and the interviews that we conducted in April 1980 and July 1984 in Sulawesi indicated that it also operates among Bugis clove growers in that island's frontier areas. For farmers with very limited capital, the strategy is clearly effective for opening up new lands for commercial crop production.

In Loa Janan, most of the area planted in rice was, after a single harvest, converted to pepper plantations. A small portion might, however, be planted in rice for a second year, as farmers worked to complete the conversion of the forest on their land to rice fields. This enabled new pepper farmers to have rice available for consumption and sale while they waited for income from their pepper plants, which do not have substantial yields until the plants are three years old.

21. On the importance of ash for farming poor-soil areas elsewhere in the humid tropics, see Pedro A. Sanchez, "Soils of the Humid Tropics," *Studies in Third World Societies* 14 (1980): 367-71.

22. Jacqueline Lineton, "An Indonesian Society and Its Universe: A Study of the Bugis of South Sulawesi (Celebes) and Their Role within a Wider Social and Economic System" (PhD dissertation, School of Oriental and African Studies, University of London, 1975), ch. 6; and Vayda, "Buginese Colonization," pp. 83-84.

Various Bugis practices in pepper growing, such as clean weeding and the absence of interplanting have had an impact on the environment and land conservation. In Loa Janan, as elsewhere, pepper is planted in neat rows. The average number of plants per hectare in Loa Janan is about 3,000, and the usual space between vines is one *depa*, i.e., somewhat under two meters, or about six feet.²³ This space is clean-weeded by the farmers--or by workers they hire--in order to promote the growth of the pepper. The weeding is done continuously, so that the well-kept plantation is characterized by long bare strips of soil between the rows of pepper vines. Planting other crops in these strips is not practiced, apparently for fear that they would compete for nutrients with the pepper vines and damage their shallow root system. Such a fear is well founded so long as the width of the strips between the rows of pepper plants is kept at only one *depa*.²⁴ Although no systematic measurements of soil erosion in the Loa Janan pepper plantations have been made, research for three years in clean-weeded pepper gardens on steep, unterraced land (more than 25 degrees) in Sarawak²⁵ has shown the "very serious" and "potentially disastrous" soil erosion that can occur. The measured soil loss in this research was as follows:

Year	Rainfall	Soil Loss [tonnes/ha/yr]
1978	2,741 mm	52.3131
1979	3,455 mm	54.9579
1980	4,090 mm	139.1203

While soil loss is likely to have been somewhat less from the Loa Janan pepper plantations because they receive less rain--1,955 mm in 1976 and 2,111 mm in 1978 were recorded at the nearest station--and because some are on less steep ground, there can be no doubt that pepper planting and weeding as practiced by the Loa Janan farmers does result in substantial erosion.²⁶

There is a rationality to these practices despite the damage they cause to the land. The major aim of the pepper farmers is the profitable production of crops, which is not seen by the migrants as depending in either the short

23. The *depa* is an Indonesian measure based, like the fathom, on the distance from fingertips to fingertips of one's arms when stretched sideways. Being a subjective measure, it has no uniform equivalent in meters or feet.

24. Blacklock, "A Short Study," p. 48.

25. T. Hatch, "Soil Erosion and Shifting Cultivation in Sarawak," in *Proceedings, Workshop on Hydrological Impacts of Forestry Practices and Reafforestation*, ed. K. Awang et al. (Serdang, Selangor: Faculty of Forestry, Universiti Pertanian Malaysia, 1983), pp. 54-55; see also T. Hatch, "Preliminary Results of Soil Erosion and Conservation Trials under Pepper (*Piper nigrum*) in Sarawak, Malaysia," in *Soil Conservation: Problems and Prospects*, ed. R. P. C. Morgan (New York: Wiley, 1981), pp. 255-62.

26. Rainfall records from the Loa Janan station are incomplete for years other than 1976 and 1978; see Transmigration Area Development Project, *Rainfall Records, East Kalimantan, Vol. 16: Kabupaten Kutai and Kotamadya Samarinda Miscellaneous Short Term Records* (Samarinda: Transmigration Area Development Project, n.d.). The average annual rainfall recorded at Samarinda from 1904 to 1980 is 1,964 mm (Gerd R. Zimmerman, *Kalimantan Timur Petunjuk Statistik 1980* [Samarinda: Transmigration Area Development Project, 1982], pp. 24-25).

or long run on maintenance of particular plots of land.²⁷ It is important to keep in mind the difference between Bugis migrants and those stereotypical peasant farmers who, dependent on local resources and having no appreciable mobility, try to avoid destroying those resources and, in the process, destroying themselves.²⁸

Although pepper farmers elsewhere rely substantially on fertilizer to increase their production and profits,²⁹ farmers in Loa Janan make little use of it. A few of the Loa Janan farmers burned and buried uprooted weeds in holes dug 50-75 cm deep between the pepper rows, but the chemical fertilizer (NPK) that officers of the government's Pepper Intensification Project began promoting in 1978 was generally rejected by the farmers. In view of their uncertainty about the effects of the fertilizer on yield, most of the farmers considered its price too high. One successful farmer, the owner of 27,500 pepper vines, said, "I have been growing pepper for more than seventeen years and, without ever using fertilizer, have been getting good yields and good profits; I don't want to jeopardize that by buying fertilizer." The price of the fertilizer in 1980 was Rp 75/kg, and one kilogram was thought to be needed for every five pepper plants per year. This means that the cost of fertilizer for 1,000 pepper plants would be Rp 15,000.³⁰ A fertilizer experiment conducted by project officers on 300 pepper plants belonging to a long-established and influential Loa Janan resident resulted in the death of most of the plants. Possibly they had been overdosed. This failed experiment reinforced the farmers' decision not to use chemical fertilizers.

The use of fertilizer may make it easier for old pepper areas to be reused, as is done in Sarawak, where much pepper is planted in *alang-alang* (*Imperata cylindrica*) grassland that had been the site of plantations twenty or thirty years earlier.³¹ But for the Bugis migrants who chose to stay in East Kalimantan, including those who had been in the province since the early 1950s, land with primary or logged-over forest, which could be burned to add nutrient-rich ash to the soil, had always been available when old plantations were to be abandoned and new ones begun. Planting in *alang-alang* is an option that no Bugis pepper farmers seem yet to have considered.

27. The rationality of actions is judged here in terms of their suitability for achieving in specific situations whatever specific aims the actors have. See the discussion and references in Vayda, "Progressive Contextualization," p. 266.

28. For a discussion arguing that such peasant farmers are conservators of resources, see Vandana Shiva et al., *Social Economic and Ecological Impact of Social Forestry in Kolar* (Bangalore: Indian Institute of Management, 1981), pp. 23-24. On other frontier farmers more like the Bugis than like the stereotypical peasants, see Maxine Margolis, "Historical Perspectives on Frontier Agriculture as an Adaptive Strategy," *American Ethnologist* 4 (1977): 42-64.

29. For example, in Brazil as noted in Philip Staniford, *Pioneers in the Tropics: The Political Organization of Japanese in an Immigrant Community in Brazil* (London: Athlone Press, University of London, 1973), pp. 46-47, and in Sarawak as noted in Blacklock, "A Short Study," pp. 45-46.

30. This may be a conservative estimate, since, according to some recommendations, one kilogram of NPK fertilizer suffices for only one mature pepper plant per year; see Ismael S. Anunciado, "Growing Black Pepper," *Farm Bulletin* [Philippines] 28 (1969): 14. The amount recommended for young vines is less.

31. Blacklock, "A Short Study," p. 47.

However, the lack of suitable, forested land has sometimes been a problem for those considering starting new plantations. Indeed some of the farmers who said in 1980 that they would go to Sulawesi to plant cloves, cashews, or oil palm, after their Loa Janan plantations stopped yielding, gave as one reason the fact that forested land close enough to roads and containing enough ironwood was becoming too difficult to obtain at Loa Janan. Bugis migrants have so far regarded the availability of suitable, forested land as a prerequisite for their staying on as pepper farmers in East Kalimantan. Where new land for conversion to plantations is scarce, they would choose to move on rather than find ways to reuse old land.

Mobility clearly influences Bugis land-use decisions. Without the opportunity to move to new places where suitable forest land was available, the Bugis farmers no doubt would have been willing to work for smaller returns and would have found ways to reuse old land, just as has been done by formerly mobile people elsewhere.³² For most Bugis, however, moving on is likely to remain an option. Centuries of Bugis trade, travel, adventuring, and pioneering have produced geographically extensive networks and far-flung mutual aid institutions, so that information about new opportunities, sometimes in distant places, is quickly transmitted, and assistance for exploiting them is, as already described with respect to pepper farming in East Kalimantan, effectively provided.³³

It is unclear whether Bugis pepper farming and the number of Bugis pepper farmers were increasing or declining at the time of our East Kalimantan field research. The difficulty of estimating from the available data the number of Bugis arriving each year from South Sulawesi to become pepper farmers in Loa Janan has already been discussed. Hectarage under pepper plantations showed a dramatic increase during the 1970s, even though the official figures are underestimates to the extent that they do not include the plantations of migrant families that had not reported to the local government. Thus, according to the data collected by the Plantation Crops Office (Dinas Perkebunan) of East Kalimantan, the area under pepper in Loa Janan was only 317 ha in 1972 but it was 815 ha in 1976; this represents an increase of 157.1 percent in four years.³⁴ District records show a further increase of 43.5 percent from 1976 to 1980, i.e., to the previously noted figure of 1,170 ha. The possibility that the increase was actually much greater than this is suggested by a 1980 local government estimate that 50 percent of the hectarage planted in pepper in Loa Janan was not yet producing. Since it takes three years for pepper vines to become productive, this estimate, if valid, would mean that Loa Janan pepper hectarage doubled after 1976 and that there must be some error in the estimate of only a 43.5 percent increase. Although we have been unable to assess the validity of these conflicting estimates, the increase in hectarage after completion of the Samarinda-Balikpapan road must have been substantial.

32. For example, the Sarawak shifting cultivators described by Christine Padoch in *Migration and Its Alternatives among the Iban of Sarawak*, Verhandelingen van het Koninklijk Instituut voor Taal-, Land- en Volkenkunde, no. 98 (The Hague: Martinus Nijhoff, 1982).

33. On these networks and institutions as the outcomes of historical events and processes, see Lineton, "Pasompe' Ugi'," and Vayda, "Buginese Colonization."

34. Zimmerman, *Kalimantan Timur Petunjuk Statistik*, p. 194.

During our three months of field work in Loa Janan (May-July 1980), migrants kept coming from Sulawesi, and we recorded all arrivals in the four pepper-farming villages. The results are presented in the following table:

Village	May	June	July	Total
Tani Maju	7	4	6	17
Tani Makmur	3	5	2	10
Betuah	4	1	4	9
Soppeng Baru	0	93	17	110
Total arrivals	14	103	29	146

The large number of migrants to the village of Soppeng Baru arrived in just two groups from two Sulawesi villages. The group of 93, arriving in June, came from a village in the regency of Bone and included the village headman, the village religious leader, the village teachers, and their families. They said they left their home village because the farmlands they had established there several years ago were suddenly confiscated by the government. Similarly the group of 17 arriving in July from a village in the Polewali-Mamasa regency came because their coconut groves had been taken over by an ex-official of the government, who had obtained title to the land on which their trees were growing. Although the former official had agreed to compensate the farmers for the trees, his success in delaying payments discouraged the farmers and made them decide to migrate.

While the arrival of 146 new migrants in just a three-month period constituted a 5 percent increment to the 2,912 Bugis registered in Loa Janan in 1978, other information we obtained in 1980 suggested to us that Bugis migration to Loa Janan might soon wane. In particular, interviews conducted in South Sulawesi, as well as in Loa Janan, showed the declining attractiveness of East Kalimantan pepper farming. Several of the Loa Janan farmers even said that they would return to South Sulawesi after their pepper plants stopped yielding. Of the respondents in the Loa Janan 100-farmer sample, none expected Bugis migration to Loa Janan to increase; 24 said they did not know whether it would increase or decrease, but 76 expected it to decline.

In the interviews in Loa Janan and South Sulawesi, the reasons cited for expecting a decline included the following:

1. The drop in pepper prices beginning in early 1979. (This was, in fact, part of a worldwide decline caused by oversupply and slackened demand.)³⁵ Farmers in Loa Janan were getting only Rp 600-700 per kilogram for their pepper in 1980 (compared with a peak price of Rp 1,200 per kilogram in 1978), while their production costs were increasing. Farmers estimated each mature pepper vine would produce between 0.4 and 0.55 kg of pepper per year, depending on the age of the vine.

2. The increasing difficulty of obtaining forest land suitable for conversion to pepper plantations in Loa Janan, i.e., forest land close enough to roads and containing enough ironwood.

3. New opportunities elsewhere for planting perennial crops which fetched good prices. Thus the opening of new frontiers suitable for clove growing

35. "Farmers Switch Crops as Pepper Prices Fall," *Straits Times* [Singapore], September 17, 1981, p. 13.

in Central and Southeast Sulawesi was attracting Bugis migrants, and road building in such parts of South Sulawesi itself as the district of Siwa in the Luwu regency was providing access to hundreds of hectares of forest land suitable for conversion to clove, cashew, and oil palm plantations.

4. Improved conditions in the South Sulawesi homelands (e.g., new irrigation works and other infrastructure development), with the result that there was less incentive to migrate from there.

More than two years after these interviews, there occurred the great East Kalimantan drought and forest fire of 1982-83, in which an estimated 3.5 or 3.6 million ha of forest were damaged.³⁶ This no doubt intensified the difficulty of obtaining forest land suitable for conversion to pepper farms. The fire also destroyed hundreds of hectares of the plantations in Loa Janan. Consistent with the general Bugis migrant strategy of using frontier land impermanently and being ready to move on when things turn bad locally, some of the Loa Janan farmers affected by the fire reportedly moved back to Sulawesi.³⁷

Even if the fire, together with such factors as depressed pepper prices and better opportunities elsewhere, were to halt Bugis migration to East Kalimantan for the purpose of pepper farming, the migration pattern considered here would still have relevance to future development planning, road building, and forest management in East Kalimantan. The following are some noteworthy features of the process by which Bugis migrants open up and settle new lands:

1. Migration can happen quickly in response to new opportunities. This was illustrated by the initial movement of Bugis to Loa Janan for pepper farming when construction of the Samarinda-Balikpapan road was just beginning, and by the substantial increase in migration at the time of the road's completion.

2. The process can effect major transformations of environments without the kind of assistance in land clearing and settlement building granted to migrants under the government's resettlement and transmigration programs. This was illustrated by the conversion of more than 1,170 ha of Loa Janan forest into Bugis pepper plantations and settlements with houses, schools, mosques, and shops.

3. Settlement by the migrants is not necessarily permanent, nor intended to be so. This was illustrated by the movement of Bugis pepper farmers away from Muara Badak in the 1960s, by the statements of some in 1980 that they would leave Loa Janan after their pepper vines stopped yielding, and by the reported return of some to Sulawesi after the 1982-83 fire. The time they planned to stay in one place was not definite for any longer than the perennials planted there would yield profitably.

4. Consistent with the lack of long-term commitment to particular localities, resource use by the migrants is oriented much more towards profitability than towards sustainability. This was illustrated by their reliance on the erosion-

36. These estimates of the affected hectarage are cited in "Wound in the World" (cover story on "The Great Fire of Borneo"), *Asiaweek*, July 13, 1984, p. 35, and "Years to Prepare Report on Forest Fire, DPR Is Told," *Jakarta Post*, June 14, 1984, p. 3. More than a year after the fire, it was still unclear how much of the area was actually burned and how much suffered damage only from drought; see Nengah Wirawan, "Good Forest within the Burned Forest Area in East Kalimantan," World Wildlife Fund Report (Bogor: World Wildlife Fund, August 1984).

37. "Ratusan Hektar Tanaman Lada Musnah," *Kompas*, May 3, 1983.

producing practice of clean-weeding and their avoidance of intercropping and the use of fertilizer.

From these features, it may be inferred that Bugis migrants are likely to come again to clear and plant forested lands, if new roads provide new opportunities that offer comparative advantages for the profitable production of crops. This is a point of considerable importance, for development planners too often concentrate on the benefits of new roads for specific target populations and fail to make plans in relation to the migrants that the roads will attract. The following is an example from North Sulawesi:

One effect of improving accessibility through building of the Dumoga valley highway and the maintenance roads along irrigation canals is accelerated population influx. Such impact should have been anticipated before construction started and necessary actions planned beforehand. One of the actions should be an advance programme of forest protection before people start to encroach areas.³⁸

Forest protection programs should precede future road building through forests in East Kalimantan. Since these programs are likely to be more successful if they are directed towards controlling, rather than completely stopping, forest clearance and settlement, Bugis migrants might have a role as agents of buffer-zone development along the roads, i.e., as settlers and cultivators of strictly limited bands of land which would parallel the roads and would impede access to the forests for illicit timber cutting and other destructive activities. The rapidity with which Bugis migrants can move to new areas and their ability to transform them into plantations and settlements at no expense to the government would recommend them for such a role. On the negative side is their limited concern with land conservation, but this could be counteracted by government programs making it worthwhile for the farmers to control erosion. An example in the case of pepper plantations would be a government-subsidized program to increase the width between the rows of pepper vines and then to interplant the rows with other crops.³⁹

Regardless of which specific government programs are adopted in the future, this article will have had a desired practical effect if it leads planners and policy makers to recognize that Bugis migration and frontier land use can have significant environmental consequences and must be taken into account in program planning and development.

38. Effendy A. Sumardja et al., "Nature Conservation and Rice-Production in Dumoga Area, North Sulawesi, Indonesia," Paper presented at the World National Parks Congress, Bali, October 1982.

39. Such practices were recommended by Blacklock ("A Short Study," p. 48) for Sarawak pepper gardens thirty years ago.