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NOTES FROM THE EDITOR

The scope and magnitude of change in Borneo defies description. You have to see it to believe it.

Cynthia Mackie's analysis of the natural and technological forces which produced the greatest forest fire in recent history symbolizes processes which threaten the island and its inhabitants at every level.

Long known as "the evergreen island" Borneo's primary forests may be finished by the end of this decade. North of the site of the great fire, the imminence of the forests' irreversible destruction and the extent of its impact are apparent. The Malaysian Government's estimate that all hardwoods will have been removed by 1990 coincides with the report of a senior forester who calculates that northern Borneo forests will be logged out in four to eight years.

World Wildlife staff are undertaking a variety of projects, among them a strategy of conservation for Sarawak and a study of the rapidly diminishing habitat of the proboscis monkey. It is obvious that conservation--the preservation of the island biome--rather than development--the imposition of human schemes upon it--is needed.

Yet the mesmerizing effects of "development" seem irresistible, and the second of Sarawak's hydroelectric dams is scheduled for construction just above the Bakun Rapids on the Batang Baluy. Development requires energy, and hydroelectric energy is relatively cheap, though immeasurably dear to those people whose ways of life have been and will be disrupted. Among the Kajang people around the Bakun site there already are familiar signs of stress which almost certainly will be exacerbated by this enormous project.

Although in theory development provides benefits for many, in fact disparities in wealth and well-being are increasing. The timber concessions, cited as a source of revenue for economic development, have helped several dozen persons amass huge fortunes while permanently impoverishing the environment and masses of rural residents. While the nouveaux riches disport themselves with Mercedes and mansions, the poor struggle to survive and to understand where their resources have gone.

Although Bornean populations have been migratory for a variety of reasons, as Antonio Guerreiro and B. J. L. Sellato describe in the relocation by Kenyah, one of the largest demographic changes is occurring currently. Between June and September 1984 I did research on the movements of 10,000 to 15,000 Iban into Sibiu. Inquiries revealed a lack of awareness of the number of people involved--"There are 300 or 400 Iban in Sibiu"--denial of urban migration--"They are orang ulu, they won't move to Sibiu"--and expressions of resistance--"They mustn't come to Sibiu. How can we keep them where they belong?" The population of Sibiu now is about 140,000, ten percent of whom are Iban. The population of Kuching
(Cont'd. on pg. 117)

RESEARCH NOTES

THE LESSONS BEHIND EAST KALIMANTAN'S FOREST FIRES

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Introduction

During late 1982 and early 1983, wild fires swept through more than 3.5 million hectares of land in the lowlands of East Kalimantan, the largest of Indonesia's provinces on Borneo. This is an area of almost 14,000 square miles, or roughly the size of the island of Taiwan. Fire outbreaks in Sarawak and Sabah, both Malaysian states on Borneo, were also reported and may involve as much as several million more hectares of area (Leighton 1984).

Among the vegetation types burned was the most ecologically complex and species-rich ecosystem remaining in Southeast Asia, the dipterocarp rainforest of lowland Borneo. This evergreen rainforest, the product of 60 million years of evolution, contains habitats for many rare and endangered wildlife, including the orangutan, banteng (also called "forest cattle"), and hornbill species, as well as magnificent mahogonies, orchids, palms, and fruit trees. Some wildlife, such as most of the primates, were able to flee before the flames, but innumerable others could not (Leighton 1984). Quite possibly the forest fires resulted in the extinction of rare plant and animal species not yet identified by biologists.

What the damage assessments by experts and news accounts fail to mention are the costs of these fires in human terms (Lennertz and Panzer 1983; Ross 1983; Webster 1984). Not only was a huge tract of land degraded, but also billions of dollars were lost and the livelihood of thousands of local people were, and perhaps continue to be, threatened. Furthermore, rather than a unique natural disaster, the East Kalimantan fires may be a dismaying harbinger for tropical rainforests in many areas where extensive logging and agricultural expansion have taken place. They are a poignant lesson in the many hidden uses tropical rainforests

serve local people and in the importance of recognizing these uses when devising policies to commercially develop rainforest resources. For these reasons, I suggest that the East Kalimantan fires deserve immediate, interdisciplinary research to understand their causes and consequences. Of particular importance are local people's responses to the new resource problems and opportunities resulting from the conflagration. In this paper, I review briefly what is known about the causes of and biological damage by the wild fires. I then suggest some of the likely effects upon different segments of the local population and propose questions that need to be addressed in the near future.

Where the fires occurred

There were fires of every magnitude with the most extensive ones occurring during March and April, 1983. Often fire spread unseen underground in the meters-thick organic accumulation of peat swamp forests. Because of their high concentrations of flammable resins, some tree species were reported by eye witnesses to burn like spectacular 60-meter tall torches. Aerial surveys by West German forestry experts indicate that about 800,000 hectares of the burned vegetation were unlogged, dipterocarp rainforest (about the size of the state of Delaware, U.S.A.), 550,000 hectares were swamp and peat swamp forest, 750,000 hectares were secondary forest and agricultural land, and 1,400,000 were logged-over forest (Fig. 1; Lennertz and Panzer 1983). Among the worst burned were areas near the tributaries of the middle and lower Mahakam river, including the Telen, Kelinjau and Belayan rivers, as well as areas along the coast from Balikpapan to Sangkulirang. Also burned was part of the Kutai nature reserve and several small research forests near Samarinda which were used by Universitas Mulawarman, the provincial university, and by the Indonesian National Biology Institute (L.B.N.).

Causes of the conflagration

The forest fires in East Kalimantan demonstrate how natural conditions and human activities can combine to create a situation where it is possible for an equatorial rainforest to burn. The rainforest was sufficiently dry to burn because of a ten-month drought, beginning in June 1982, which was the worst to affect eastern Borneo in a century. February, March and April are usually wet months, often with more than 200 mm monthly precipitation, but in 1983, less than 50 mm fell each of those months in much of the lowlands. This was after 7 months of drier than normal weather (Lennertz and Panzer 1983; TAD 1983). Because the upland interior receives much higher precipitation in general, it was less affected by the drought and wild fires did not break out there. An analysis of East Kalimantan's annual rainfall patterns shows that they are correlated to occasional ocean warming events off the coasts of Peru and Ecuador (popularly called "el Nino"), (Leighton 1984; TAD 1983). Based on the existing record for rainfall, which is far from complete, we may expect a drought in eastern Borneo as severe as last year's perhaps every 100 years, although insufficient historical data are available to confirm this (Leighton 1984).

The 1982/83 drought was a natural catastrophe for East Kalimantan. Preliminary surveys suggest a wide variation in tree fatality from the drought (Lennertz and Panzer 1983). In general the large canopy emergents were the most affected, in some places 70% of all trees larger than 60 cm in diameter died from drought conditions (Wirawan 1983). Many trees shed their leaves in response to drought stress, building a dry layer of litter on the forest floor that later served as tinder for wild fires (Lennertz and Panzer 1983). The drought was also devastating for the farmers of East Kalimantan as, 80% of their rainfed fields and 30% of their wet rice paddies yielded no crops and emergency food shipments had to be made to some villages (Anon. 1983a). Many tributaries the Mahakam river were impassible and choked with log rafts. In the middle Mahakam basin, the swamps dried out enough for the peat layer to become dangerously combustible (Lennertz and Panzer 1983).

While periodic drought may be a familiar natural disturbance in eastern Borneo, there is no evidence that large-scale fire in the evergreen rainforest is also a natural event and historical accounts of a severe drought in the 1880's make no mention of forest fires (Bock 1882, as cited by Lennertz and Panzer 1983). (The peat swamp forests do, however, have a history of burning in drier years after the spread of agricultural fires, see Iwatuski et al. 1980). A reasonable hypothesis is that logging made this tropical forest vulnerable to fire for the first time.

In theory, the Indonesian selective logging system is a renewable one with a 35-year cycle. Only trees larger than 50 cm in diameter may be cut and existing tree seedlings are expected to thrive from the higher light levels of a broken canopy, resulting in a new generation of harvestable timber. However, there is good evidence that the Indonesian logging system does not allow full regeneration of primary forest tree species (Kartawinata 1979; Meijer 1973). Certainly this system is far less destructive than clear-cutting, and there is a fair probability that some primary rainforest species will eventually reestablish, although the original genetic diversity may never return (Kartawinata et al. 1981; Meijer 1973). Unfortunately, enforcement of the selective logging system is inadequate and many forest tracts in East Kalimantan are logged for smaller trees or relogged before the legal schedule (Daroesman 1979; Kartawinata 1979).

Even when the law is complied with, Indonesian biologists found that 40% of the remaining trees are damaged and 30% of the area is left in skid tracks, roads and logyards. The exposure and compaction of the soil along these extraction pathways prevents any but the hardiest species from growing (Kartawinata 1979). Because these pathways are more exposed and have only weedy vegetation cover, they can act as highways for wild fires to travel. In addition, dead wood logging residues and the understory vegetation that flourishes beneath the broken canopy of a logged forest serve as ideal kindling for wild fires (Lennertz and Panzer 1983; see also UNESCO 1978:218 for mention of general tendency of degraded tropical forests to be susceptible to fire). In fact, these forests

can ignite under less severe drought conditions than those experienced in early 1983, as evidenced by the wild fires that erupted in 1982, months before the drought reached its greatest extreme.

Forest surveys show that fires burned hotter and more extensively in East Kalimantan's logged-over areas than in unlogged ones, and that the unlogged stands that did burn were almost invariably adjacent to logged ones (Leighton 1984; Lennertz and Panzer 1983). Small wild fires were able to grow to enormous proportions because the logged-over rainforest had an abundance of dry fuel and provided pathways for fire to invade the drought-stressed primary forest. In a logged section of the Kutai nature reserve, where all the largest trees and half of those in the middle size class (30-60 cm) were already extracted, almost no tree survived the fire (Wirawan 1983). In contrast, in a nearby unlogged forest, fire burned relatively "coldly", consuming foliage and vines while leaving the trees standing, although most of the smaller trees, with only thin bark to protect them, died from exposure to fire (Leighton 1984; Wirawan 1983). In summary, while drought was fatal to some of the largest canopy trees, fire selectively killed smaller trees and lianas, the fire's devastation increasingly complete the more intensively a forest had been logged.

All of the lowland rainforests in East Kalimantan within reach of waterways have been the site of frantic, frontier-style, logging since the late 1960's (Daroesman 1979; Manning 1971). The peak in raw timber exports to Japanese and western markets was in 1979, after which the world recession and Indonesia's policy to require more raw timber processing to occur in-country led to a permanent decline (Awanohara and Habir 1983). In contrast, plywood and sawnwood exports have greatly increased, so that logging remains lucrative enough for timber concessionaires who lost unlogged tracts to the fires to consider logging other, unburned, rainforests in East Kalimantan (Lennertz and Panzer 1983).

The presence of highly flammable understory layers in the logged-over forests created the risk of wild fires, but how did the fires get started? The probability of uncontrolled burning in East Kalimantan has dramatically risen in the past 15 years due to increasing use of agricultural fires. With the emergence of internationally financed timber and oil industries in the late 1960's, East Kalimantan's population doubled from 1970 to 1980 as migrants poured in from other islands and from other Kalimantan provinces to take advantage of the economic boom. 60,000 of these people are part of the government-sponsored transmigration program to relocate landless farmers from densely populated Java and Bali to land-rich provinces such as East Kalimantan (figures calculated from Zimmermann 1982:6). Dayak groups living in the isolated interior uplands have also been migrating to the lower Mahakam and Kayan river areas. As shown in Figure 2, those districts within the province which have experienced the greatest increases in population correspond for the most part with the boundaries of of forest fires.

The origin of the wild fires are believed to be small agricultural fires that escaped their bounds into nearby drought-stricken secondary and logged-over forests (Lennertz and Panzer 1983). Many agricultural activities in East Kalimantan rely upon cutting and burning vegetation in site preparation. These include cash crop farming, shifting hill rice cultivation, and livestock grazing. Subsistence farmers include not only Kutai and Dayak peoples, but also government-sponsored Javanese migrants. The latter are supposed to establish permanent wet rice fields but they actually rely upon slash and burn techniques, at least initially (Kartawinata et al. 1981). While subsistence farmers account for some of the forest clearing and burning occurring in East Kalimantan's lowlands, an undetermined proportion also result from entrepreneurs such as peppercorn growers and middle-class land speculators (Vayda et al. 1980). Many spontaneous migrants, such as Buginese from Sulawesi and Banjarese from South Kalimantan, came to take advantage of booming cash crop markets (Kartawinata et al. 1981; Vayda et al. 1980). Because human settlements are concentrated in and around timber concessions and, in fact, logging roads facilitate agricultural expansion, logged-over forests are continually exposed to fire. The risk of fire spreading from agricultural fields is particularly great because farmers, by necessity, wait to burn until the driest time of the year so that the forest slash is sufficiently combustible.

It is clear that the unprecedented forest fires in eastern Borneo were the result of human activities as well as the vagaries of the world climate. The logging system was originally devised to conserve the productivity of East Kalimantan's rainforests at the same time as providing badly-needed export earnings to finance economic development programs. The transmigration program was conceived as a means to reduce population pressure, and thus environmental deterioration, on Java as well as to promote higher national food production. Despite these good intentions, opening East Kalimantan's rainforests to economic ventures without considering how rural people might respond to this opportunity inadvertently started a chain of events that resulted in East Kalimantan becoming a "wild west" frontier. In such a setting, controlling land use became an insurmountable problem. When the 1982/83 drought struck, itself a terrible natural disaster, the stage was already set for extensive forest fires. This pattern may easily be repeated in other Southeast Asian rainforests where nations rely upon timber exports as major sources of foreign exchange.

Costs of the conflagration

If the conflagration in eastern Borneo is not a unique event, then it is particularly urgent to determine just what losses were suffered and what measures can be taken to prevent future forest fires. Devastation from the forest fires has touched every segment of East Kalimantan's economy, although damage estimates dwell on the most easily quantifiable loss, that of commercial timber. According to West German experts, in the burned, unlogged forest about 50% of the marketable trees were killed

by fires and drought, at a loss of U.S. \$2 billion. They also estimate that 60% of the anticipated harvest in logged-over forests was destroyed and that much of the remaining timber may be too sparse for profitable salvage (Lennertz and Panzer 1983). This is because many of the trees that survived exposure to fire are now infested with wood-boring insects and parasitic fungi and will soon die. Others will be knocked down when their dying neighbors fall over (Leighton 1984). This represents a loss of another \$3.6 to 6 billion in potential timber resources (Lennertz and Panzer 1983). In contrast, the total amount of export earnings from East Kalimantan timber from 1970 to 1981 was about \$3.7 billion (calculated from Zimmermann 1982:277).

The timber industry in East Kalimantan is in a state of disarray and it remains uncertain whether concessionaires will respond by diversifying their investments or by moving elsewhere. Local plywood and sawmill factories, most of them owned by the logging companies, are facing first a sudden glut of raw timber from salvage operations with the long-term prospect of acute log shortages. To avoid factory shut-downs, logs may have to be imported from Sabah and a shift in production to more finished products may be required (Lennertz and Panzer 1983).

Less easily quantifiable are the environmental and agricultural losses caused by the forest fires. There are many unanswered questions about the recovery of the burned areas. Luxuriant vegetation covers much of the area now, but it consists of tenacious weedy species and fast-growing and soft wood trees (Leighton 1984). Some estimate that this weedy vegetation will dominate for the next 40-60 years (Lennertz and Panzer 1983). But the areas most severely burned by wild fires may never return to their former ecological complexity. From the viewpoint of some wildlife species, especially specialized fruit and nectar feeders, the regrowth vegetation represents a desert, offering them neither food nor habitat (see Leighton 1984 for discussion of effects upon primates and hornbill species). Some animals depend upon one or only a few plant species for their food sources. This dependence is not one-way, for if these "specialist" animals go locally (or permanently) extinct, their plant partners lose their means of pollination and fruit dispersal. Trees in the dipterocarp family, which contains most of the commercial timber species in Borneo, may experience difficulties because each has a symbiotic relationship with a specific soil fungus with which the tree's roots form a mycorrhizal association. This association facilitates nutrient uptake from the highly leached soil and without this association seedlings cannot grow vigorously. The soil fungi are vulnerable to even slight temperature changes, including canopy openings from logging, not to mention forest fires (Smiths 1983). How rapidly the soils in burned areas will be naturally reinoculated by fresh fungal spores is unknown.

A plethora of environmental problems arising from the forest fires will be especially trying for the rural population in East Kalimantan. Soil quality in the burned sites is expected to deteriorate from the death of soil organisms and increased nutrient leaching (Lennertz and Panzer 1983).

When the rains returned in 1983, soil erosion from exposed areas increased the sediment load of the Mahakam river and the important inland fisheries were threatened. Along the Mahakam there has already been extensive flooding of villages. The almost complete obliteration of the peat swamp forests, which acted as gigantic sponges to absorb rainfall and to regulate water flow, will result in more extreme fluctuations in river levels for years to come (Lennertz and Panzer 1983). This will not only affect rural communities but also timber operations which depend upon the regular flow of the Mahakam river and its tributaries to transport log rafts down to the coast. According to foresters, there is also a very real possibility that more fires will erupt in the partially-burned and drought-stressed forests. The immense quantities of standing dead wood and the dense understory growth will be easily ignited if another dry spell occurs (Lennertz and Panzer 1983).

Wild fires near human settlements have probably exacerbated the famine conditions created by the 1982/83 drought. Because of the forest fires, wild plants and game animals were at least temporarily unavailable to augment farmers' meager harvests. Many of East Kalimantan's rural people, including Javanese transmigrants, rely upon collecting and trading of forest products such as timber and rattan to overcome rice shortages and to provide needed cash (Kartawinata et al. 1981; Vayda et al. 1980; Weinstock 1983). The rainforest also provides fuelwood and building materials, as well as medicinal plants. While it has not yet been investigated, it is likely that fire destroyed many of these resources and thus hampered people's ability to cope with food shortages in the very areas hardest hit by the preceding drought. Paradoxically, the opening of large forest areas by the wild fires may benefit local people by eliminating the most arduous of agricultural tasks, that of clearing the rainforest.

Similar to the problems faced by the subsistence farmer, cash crop growers have also suffered. An example is the peppercorn industry concentrated along the corridor between the cities of Balikpapan and Samarinda, where the fires were particularly intense. The peppercorn loss was estimated at almost \$2 million (Anon. 1983b). Trade in minor forest products such as rattan, which brought almost \$3 million in export earnings in 1981 (Zimmermann 1982), has probably also been severely depressed and will continue to be as new rattan vines take about nine years to reach a harvestable size (Weinstock 1983). Furthermore, for Dayak communities along the Mahakam river, trading in forest products is a regular source of cash enabling them to buy basic goods such as clothing and kerosene, as well as consumer items such as radios, watches, and the like. For that reason, resource problems caused by the forest fires probably brought hardship not only to local farmers directly dependent upon the rainforest, but also indirectly to non-forest related industries such as that of boat operators who ply consumer wares to villagers up and down the Mahakam river. The important lesson here is that most sectors of East Kalimantan's economy are somehow linked to the use of tropical forest resources and/or depend upon the forests' environmental functions such as watershed protection.

The provincial government of East Kalimantan faces expensive undertakings as a direct outcome of the forest fires. A forest resources survey will be needed to fully assess the damage. One estimate of the cost of a thorough survey is \$3 million (Lennertz and Panzer 1983). Critical watershed areas will need costly replanting. The existing land use plan for East Kalimantan will have to be drastically revised and alternatives found for timber concessionaires who lost their stock. Because many of the slated transmigration areas (as opposed to existing ones) were not in the burned zone, the Indonesian government is considering locating the new settlers in burned-over areas to avoid unnecessary forest cutting (Ross 1983). Land use assessments of such areas will be necessary to evaluate the feasibility of this plan given the high probability of soil fertility difficulties. In addition, transmigrants may respond in unanticipated ways to the conditions they encounter in burned-over areas, including the adoption of destructive land use practices or illegal forest cutting.

Conclusions and research recommendations

The forest fires that swept through eastern Borneo last year represent an economic as well as a biological catastrophe. Their aftermath serves as a poignant lesson on the multiple functions tropical rainforests provide. Because of the many economic resources these forests represent, a policy to open the forests to one form of commercial exploitation, such as timber extraction, may stimulate spontaneous immigration, illegal forest cutting and agricultural expansion along logging roads. This "wild west" situation increases the risk of environmental damages that are more costly than the benefits gained by the original development policy.

Careful studies by ecologists and social scientists are needed if future large-scale fires are to be prevented, including investigations how local people are coping with the new resource problems opportunities created by drought and fire. Some responses are likely to exert additional pressures upon remaining unburned forests. Effective measures to mitigate the environmental and economic damage caused by the catastrophe cannot be implemented until these people-forest interactions are understood and form the basis of devising government policies. Such research would not only have immediate relevancy for policy-makers in East Kalimantan, but also contribute to our general knowledge of how tropical rainforests serve to maintain the economic and agricultural well-being of local people and of the processes that lead to the destruction of these forests.

The following questions are among those I believe are particularly urgent:

1. Where did the major fires originate and what were their specific causes?

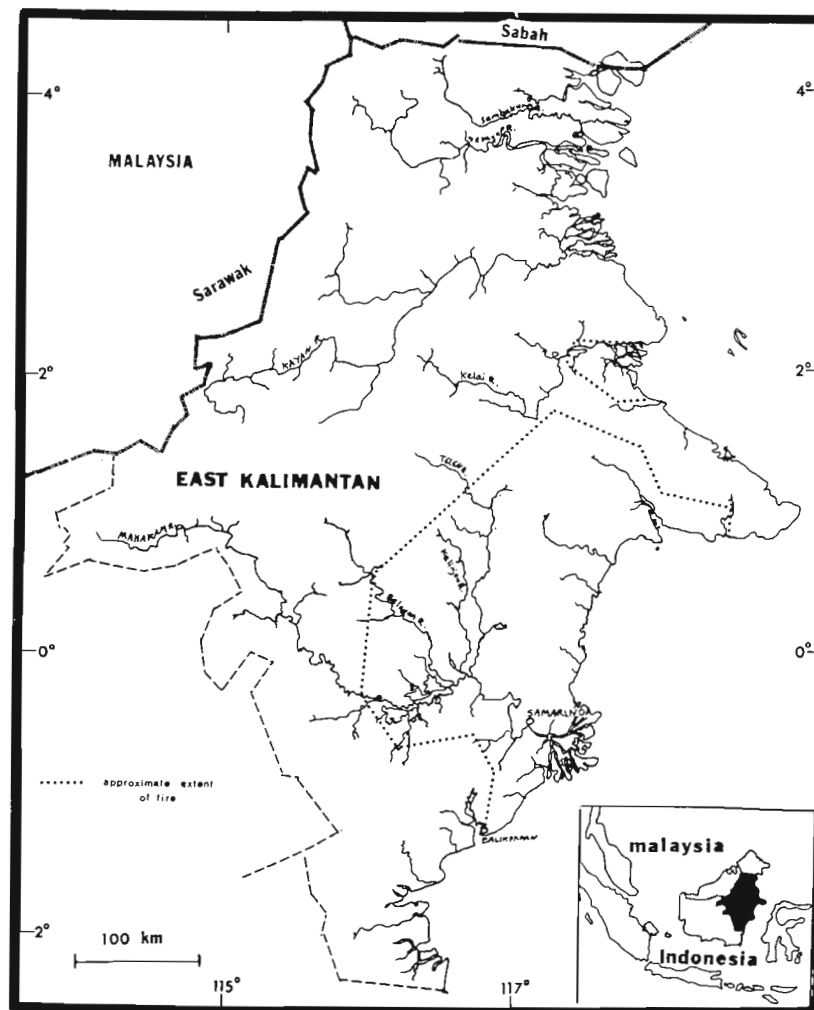


Figure 1. Map of general area affected by forest fires in East Kalimantan. (Based on aerial surveys by Lennertz and Panzer for the German Agency for Technical Cooperation (GTZ), and by Mark Leighton for the World Wildlife Fund.)

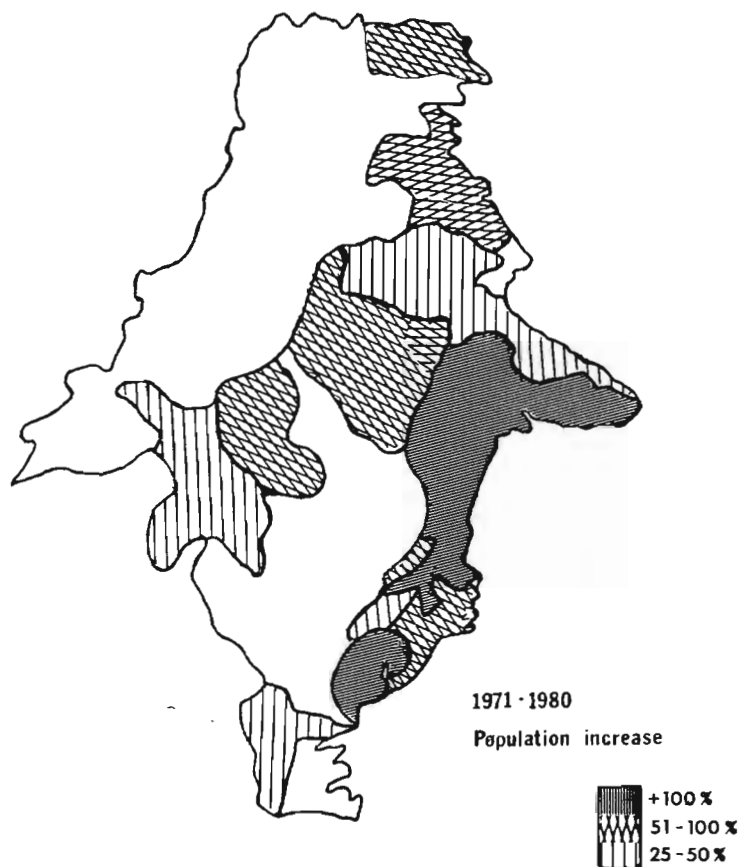


Figure 2. Map of districts that experienced the greatest population increases from 1971 to 1980 in East Kalimantan, Indonesia. (Adapted from Zimmermann 1982, Map 2.1c.)

2. How did human activities cause and/or exacerbate the fires and what were the motivations behind these activities?
3. What are the long-term resource losses and how reversible are they (e.g., forest regeneration, return of soil fertility, etc.)?
4. Who suffers and who benefits from the present situation?
5. How are local people responding to the direct or indirect resource problems created by drought and forest fires?
6. What effects do government programs and policies have upon all of the above?
7. What are realistic policies that will identify and mitigate problems arising from the fires and that will prevent more large-scale fires from reoccurring?

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CHILDREN'S USE OF DECISION RULES IN SARAWAK, EAST MALAYSIA¹

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Background

During February to May, 1983, we carried out a study examining the use of decision rules by 11-year-old children in Third Division, Sarawak. This study, which is one in a series of studies examining the effect that culture has upon children's decision-making, follows work by Moessinger (1979) and Mann, Tan, Morgan and Dixon (1984). The research problem deals with the situation in which a large sub-group of children is repeatedly opposed in its preferences by a small sub-group of children.

The major aim of the study was to see whether in decision conflicts involving a majority and a minority, children tended to use the "majority" rule (i.e., the sub-group with the most people should always decide) or the "alternating" or "turn-taking" rule (i.e., the majority and the minority should share the right to decide). We were also interested to see whether the ratio of children in the majority and minority (i.e., 6:4, 8:2, 9:1) affected the child's use of decision rules. The study also varied the nature of the questions, so that some children had a closed choice (they could only select majority or minority) while others had an open choice (the child was allowed to suggest alternative or creative solutions).

Procedure

Over 500 11-year old Chinese, Iban, Malay and Melanau children from the Third Division of Sarawak were studied. The procedure used to study children's use of decision rules was in the form of an "excursion game." In this game children were given six opportunities to indicate which of the two groups (majority or minority) should determine what the whole group should do.

Results

Four basic findings were noted:

1. In general, the children adopted a "turn-taking" strategy (i.e., they thought that the decisions should be made equally often by the majority and the minority).
2. Among the four ethnic groups of children, no significant differences were found in their tendency to adopt a "turn-taking" or democratic strategy.
3. Although children tended to give the majority in the 8:2 situation a greater number of choices, the differences between the three ratios (i.e., 6:4, 8:2, 9:1) were not significant.
4. In the closed question condition, children adopted a "turn-taking" strategy. In the open question condition, they often suggested a mixture of strategies including giving majority and minority the chance to simultaneously decide what they want and then granting each choice.

Discussion

Our findings suggest that East Malaysian children are essentially group or socially oriented in their use of decision rules to resolve conflicts of interest between a majority and a minority. That is, the children tend to treat the majority and the minority as equal members of the same group and set aside the fact that the majority is numerically larger than the minority. Thus the minority is given equal-say with the majority in choosing what should happen across six choices.

From our findings it appears that sub-cultural differences have little, if any, effect upon the way East Malaysian children make hypothetical decisions involving majority and minority interests. The direction of future research will be oriented towards seeing how children behave on other tasks. In particular, it is important to test how children respond in a real-life setting, when faced with real tasks from which they can gain or lose rewards. Patterns of behaviour in a hypothetical or "ideal" setting may not reflect what is actually done, i.e., "real" behaviour (Beals & Hoijer, 1965). It is possible that important cultural factors such

as the role of traditional leaders, traditional law, or adat, and customs would also influence decision-making in the "real" setting.

Note

1. We gratefully acknowledge the help and cooperation of Mr. Ignatius Angking, Resident of Third Division, Sarawak, and his office, Regional Director of Education of Third Division, Sarawak, and Madam Wong Chung Kee of the Education Department of Third Division, Sarawak. We would also like to thank Lydia and Jamal for their help in the translation of the test materials.

Bibliography: Beals, R. L. and H. Hoijer. 1965. An Introduction to Anthropology (3rd ed.). N.Y. Macmillan. Mann, L., C. Tan, C. Morgan and A. Dixon. 1984 (in press). Developmental changes in application of the majority rule in group decisions. British Journal of Developmental Psychology. Moessinger, P. 1981. The development of the concept of majority decision: A pilot study. Canadian Journal of Behavioral Science, 13:355-362.

MORE ON KENYAH MIGRATIONS

A. J. Guerreiro and B. J. L. Sellato

The pages below are meant to constitute a follow-up to our article "Traditional Migration in Borneo: The Kenyah Case," which appeared recently in the Borneo Research Bulletin. Actually, as some have noted, a better title would have been simply "Migration in Borneo: The Kenyah Case in Kutai, East Kalimantan."

We received late comments by Jan Zwirs, the author of the original article that we have translated into English, and we now feel the need to bring some further information about the subject of Kenyah migrations in East Kalimantan, in the forms of 1) some errata, 2) relevant comments translated from Jan Zwirs' recent letter and 3) some additional data that we found may throw light on several obscure points, particularly as concerns locations and dates of settlement. May the reader not take offence at the shortcomings of our previous paper. It is obvious, however, that the present paper is still incomplete and does not pretend to be the last word on this question.

ERRATA

1. (in 4th ainea of paragraph 1 of DOCUMENT, BRB 16.1:15)
Instead of: "by the beginning of 1973," the sentence should read: "by the beginning of 1972." (Erratum to Jan Zwirs' original text).
2. (idem)
Instead of: "This year the total population is. . .", the sentence should read: "At the end of the year 1972, the total population is. . .". (Erratum to Jan Zwirs' original text).
3. (in 1st ainea of paragraph 2 of DOCUMENT, BRB 16.1:15)
Instead of : "Amai Pajak (Father of Pajak). . .", one should read: "Amai Pajak (Master Pajak). . .". (Erratum to Jan Zwirs' original text). See Comment 2 below.
4. (in Note 8, BRB 16.1:19)
Instead of: "At the confluence of the Tepele' river. . .", one should read: "At Muara Keba, a Punan village on the upper reaches of the Len river,. . .". (Erratum by Jan Zwirs to our footnote 8). Therefore the last leg of the journey as drawn on Map 1 should be modified: after crossing the Belinau river, the route continues straight to the south until it reaches the upper course of the Len river. We assume that Muara Keba' is the place where the canoes from Ritan met the newcomers.
5. (in Table 1, BRB 16.1:26)
Instead of: "Batu Majang Ke U. Timai Lg Huroh",
one should read:
"Batu Majang Ke U. Timai Lg Huroh ??".
Long Huroh (or Uro', Uro, Uru) was a Kenyah Uma'Tau village in the 1970s but it may have been the site of a Uma'Timai village in the 1920s.

COMMENTS BY JAN ZWIRS

1. Concerning migration routes and number of people involved (paragraph 1 of DOCUMENT).
In 1972, more than 400 persons went over from Long Sungai Barang (LSB) to the Belayan river on the route that Amai Pajak was to follow in 1977-78, while 278 others went down the Boh and Mahakam rivers and up the Belayan by boat. During the years 1971-72, prior to the final departure, many families managed to have their swiddens at Long Buang, on the upper Lebusan river. While working there, they managed to go back every now and then to LSB to bring their belongings little by little back to Long Buang. Therefore, at the time of departing, the men had only to go back to LSB to fetch their family and the last items of luggage. They all left at the beginning of August 1972. Those who went overland arrived first, while those who used the boats arrived at the end of November 1972.

There had been almost no rain from September through November that year.

2. Concerning the name Amai Pajak (BRB 16.1:15)
The personal name of the leader is Kedung, his father's name is Bilung, therefore he was known as Kedung Bilung. After he begot his first child, he was called Taman Uwen, i.e. Father of Uwen. When he became a grand-father, his teknonym should have been PeKedung, i.e. Grand-Father Kedung, but he was never called Pe Kedung. Instead, at this period, because he was a prince and was chosen as adat chief, he was given the title of Ajak. Kenyah ajak is equivalent to Indonesian penuntun or pembimbing, i.e. leader or guide. As he was already a grand-father (pui), he was called Pui Ajak, or shorter Pe Ajak or Pajak. Amai Pajak would then be translated by Master Grand-Father Leader.
3. On peaceful economic expansion downstream the Balayan (BRB 16.1:23).
Dozens of Kenyah families from Ritan Baru have entered Kecamatan Kembang Janggut several years ago and have been since cultivating swiddens there every year (at Long Tahap). Furthermore, as the government will soon start a wet rice-field project there, the Kenyah will probably obtain official land-rights after a de facto occupation of land.
4. On places of origin of Kenyah sub-groups (Table 1).
In order to fill some blanks left in our Table 1, Jan Zwirs provided the following data:
 - The Kenyah Lepo Teppu village located upstream Miau Baru originated from the Iwan river in Apo Kayan.
 - The Kenyah Uma' Tukung of Kampung Uma' Tukung have come from Long Sungai Barang.
 - The Kenyah Uma' Tau of Tanjung Manis have come from Long Huroh.
 Besides, Jan Zwirs writes that the village of Beluk Sen consists of two parts: the old settlement, located upstream, and the new one (the people having come from Batu Majang), located downstream. The statistics in Table 2 reflect this influx of population, although with a delay of several years.

ADDENDA

1. On the causes for migration (BRB 16.1:20-21):
Concerning the factors that induced the 'exodus' from the Apo Kayan in the late 1950s and the 1960s, Rudes (1965:22) stresses: "First, governmental breakdown (of control over the village headmen); second, economic collapse and the depletion of salt supply; third, religious liberty in the fact that Dayaks could travel long distances and into new areas without the hindrance of superstitions (bad omens) of the past years." Of the three factors,

he insists particularly on the first one. Yet he does not say much of the Indonesia-Malaysia Confrontation, which was an all-important regional factor in 1963-65. Whittier (1973:43) does not underestimate it: "(the) presence (of Indonesian Army troops in Long Nawang, Apo Kayan) had far reaching effects in all spheres of life. . . Confrontation brought . . . significant social changes to the Apo Kayan. Many of the Kenyah entered the military service as guerilla soldiers. . . In turn the Army shared air-dropped salt. . . During Confrontation, traditional politics, already affected by the new religion, suffered another critical change." It seems to us that both the new religion and the military service contributed to open new horizons to the Kenyah, while the need for salt and other basic products the supply of which the Government failed to ensure, and the temptation to connect more closely to modern economic networks finally induced the move.

2. About migrations to the lower Kayan river area (BRB 16.1:21).
For this area, Rudes (1965:10-15) gives a detailed account of the villages of Kenyah and Kayan sub-groups in the 1950s and 1960s, along with additional data on the migrations from the Apo Kayan and Punjungan areas to the lower Kayan river. From this account, it clearly appears that the lower course of the Kayan river (from the rapids down to Tanjung Selor) was in 1965 already occupied by those migrants from upstream. The total population was then 9,225 (Rudes 1965:11). Compare to the figure for 1980 - 36,907 (T.A.D., 1982:56).
3. On the Kenyah Uma' Timai (Note 5 to Table 1).
Complementary information recently provided by Jan Zwirs suggests that the Uma' Timai may have settled on the upper Belayan at the end of the 19th century and that by the beginning of this century they were already living at the mouth of the Ritan river. It is said that most of them were located on the site of present-day Ritan Baru, while two longhouses were on the opposite bank at Muara Ritan proper. Therefore, they must have been a very strong and numerous group since the early times of their settlement. Nevertheless, they were attacked by the Modang of Long Bleh with the help of the Sultan of Kutei and their villages were burnt. The Uma' Timai of Muara Ritan fled into the upper Ritan river, then reached the Bengen river, built a village known as Long Puak, then moved to Uma' Bekuai where they were residing in 1933. From there they moved out of the Bengen rather recently to settle in the village Kampung Bengen, which is actually located on the Belayan river. The Uma' Timai of "Ritan Bau" fled to the upper Belayan and settled at Tabang Lama (before the Uma' Bem arrived). It seems that they split there, a part of them moving back downstream to Long Pejalín (or Penialín), and gathered again at the villages of Uma' Dian/Karangan, probably before (or upon) the arrival of the Uma' Bem at Tabang Lama. In any case, Jan Zwirs states that both villages already existed in 1950.

As for the village of Bila Talang (see note 6 to Table 1), we do not know much. Part of its shrinking population (see Table 2) has possibly migrated to either Uma' Dian or Kampung Bengen or both, both being Uma' Timai villages and with an abnormal population increase.

4. On the Uma' Timai of Muara Pedohon and Kampung Bau (Table 1). It seems that this Uma' Timai group, upon arrival from Apo Kayan, first settled at Long Meluk on the Belayan, then moved (perhaps because of the Modang attack) upstream and into the Pedohon river. It is not known whether the village name Sungai Aka' refers to a tributary of the Pedohon. Around 1969-72 they settled near the confluence of the Pedohon on the right bank and this place is known as either Sungai Aka' or Muara Pedohon, while the Uma' Tukung village located on the opposite bank, also at the mouth of the Pedohon, is known as Uma' Tukung and also at times as Muara Pedohon. The latter name also refers to the agglomeration of the two villages. As official statistics mention Uma' Tukung and Muara Pedohon, we assume here that Muara Pedohon refers to Sungai Aka' and therefore to the Uma' Timai. Kampung Baru is a later off split of Muara Pedohon/Sungai Aka'.

5. On Kayan groups. The Kayan Uma' Lekan now in Long Kejiak/Miau Baru are relatively recent settlers. Other Uma' Lekan are mentioned by Jongbloed, the Dutch Controleur of West-Kutai. Those came from Apo Kayan (?) across Berau and settled after 1900 at Long Marah (in Kayan: Long Melah) on the Telen river basin. Now they reside in two villages: the original Long Melah (officially known as Muara Kenyah), a short distance up the Marah river, and an offsplit, Juk Aya' (Juk Ayak), on the Telen river.

Jongbloed (1939:27) also states that a Kayan group was living in 1939 at Muara Lesan, on the Belayan (a short distance from Long Bleh). They were called Kayan Uma' Lesan and numbered then 203. These Kayan are nowadays found at Long Lalang (Kec. Tabang) and number 164 (1980). They are said to be closely related to the Bahau Ma' Telibah, a branch of the middle Mahakam Bahau, and may well have come to the Mahakam basin two centuries ago, with or shortly after, the main wave of Bahau-Modang invasion.

6. On the Kenyah Uma' Bem (Table 1). Rudes (1965:22a) states that 300 Uma' Bem left the village of Long Leset (Kec. Kayan Hulu) in 1960. They were possibly the last Uma' Bem group that had remained in the Apo Kayan.

7. On the Kenyah Uma' Kulit and Uma' Jalan. According to Rudes (1965:22 and 22a), the Uma' Kulit (or Lepo Kulit) would have arrived at Tabang (or, say, on the Belayan river) in 1958. They may have spent several years in the Belayan area before moving over to the Telen river and settling at Long Noran (1968).

A similar question arises with the Uma' Jalan. Rudes (1965:22a) notes that 500 Uma' Jalan left the village of Long Matasai (?) in Kec. Kayan Hulu in 1956 for the Kayan lot river where they resided at Long Jeng and later for the Belayan, where they settled at Lekawai (?). According to our data, the first Uma' Jalan settlements on the Mahakam basin date back only to 1968-69.

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Zwirs, J.
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 1984 Personal Communication.

A RESPONSE TO GUERREIRO AND SELLATO ON KENYAH MIGRATION

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We would like to comment on the discussion of Kenyah migration by Guerreiro and Sellato (1984). We welcome the attention given to processes of migration--how and why people move--which are sometimes passed over in reconstructing who moved where and when. Zwirs' account of the trek from Sungai Barang to Ritan Baru (translated by the authors) is especially interesting to us because it complements information we collected in the Apo Kayan, particularly in Sungai Barang, as part of our research with the Man and Biosphere (MAB) Program. However, we feel compelled to correct several inaccuracies and to indicate what we see as shortcomings in the authors' analysis of migration processes. We also think the authors' portrayal of the Kenyah lacks adequate documentation while diverging at some points both from ethnographic accounts and from our own experience. The following seven points summarize our major criticisms.

1. The authors say that Kenyah migrations from the Apo Kayan "might well be the major movement of population in Borneo since. . .the 18th century. . ." (p. 20). Iban and Javanese migrations are mentioned as exceptions. Migration from the interior to the lowlands of East

Kalimantan is indeed of major demographic and ecological significance, in part because it has been mostly to regions of sparse or moderate population density. But greater numbers of Bugis, Butonese, Banjars, and others (including Javanese) have settled in the densely inhabited (for Borneo) regions of the lower Mahakam and the vicinities of Balikpapan and Tarakan. We see the accelerated movement of people out of the Apo Kayan during the 1960s and 1970s as part of this larger process, which was stimulated by the oil and timber booms.

2. The preceding inaccuracy in the relative magnitude of Kenyah migration is related to what we see as an analytic shortcoming: the notions of "traditional migration" and "migratory process" are neither clearly defined nor sufficiently distinguished from one another. For this reason, the authors cannot explain why, or in what circumstances, some traditions but not others are used by people to cope with problems and opportunities related to moving (see Jessup 1981, Vayda 1983, Vayda and McCay 1978, for discussion of various aspects of this approach). Some migrants, such as the Bugis (Kartawinata and Vayda 1982) and Kenyah, can take advantage of traditional knowledge, skills, and ethnic or kin-based ties with earlier settlers, as described by Guerreiro and Sellato. Others, the "transmigrants," depend to a greater extent on government assistance.

3. The authors imply (p. 21) there has been little migration from the Apo Kayan to the lower Kayan River (though no data on this are given) but this is not accurate. Whittier (1973) lists recently established Kenyah villages in the lower Kayan region as well as other places outside the Mahakam basin. Many of the most recent (1983-84) emigrants from the Apo Kayan left for the lower Kayan. Some of them intended to settle, with the expectation of some government help, in sparsely populated country below Tanjung Selor. This contradicts the authors' assertion that there is very little land open to new settlers in that region.

4. In general, there are many potential "causes" of migration and their importance can vary. In addition to warfare (discussed by Guerreiro and Sellato), epidemic disease, religious factionalism, and access to trade goods have all-affected migration. While the recent acceleration of migration to the lowlands is linked to the oil and timber booms, attraction to economic opportunities *per se* is not a "new stimulus" as the authors suggest (p. 21). There is evidence that migration in past centuries was also influenced by trade (Jessup 1981). Concerning the question of whether land scarcity in the Apo Kayan has ever been a reason for moving (p. 21), we suggest that it has been a factor in some places and at some times (e.g., Long Nawang in the 1960s, according to Whittier 1973) but not others.

5. We should point out that Kenyah migrations do not always follow the pattern described by the authors on the basis of Zwirs' account, in which large groups of people of all ages and both sexes move with elaborate logistical support. Some people, mainly young men, leave the Apo Kayan in smaller groups to seek work (*peselei*), usually in Sarawak. Many of

them do not return. (One consequence of this is a highly skewed sex ratio in the Apo Kayan.) Recently, some families have been leaving the Apo Kayan in small groups. They travel either by canoe and on foot or else by plane. (Church-affiliated flights to and from the Apo Kayan began in the early 1970s.) These family groups usually move to settlements established by earlier, larger migrant groups from their own home villages in the Apo Kayan. The young men who have gone to Sarawak, however, often have joined more distantly related Kenyah or even other ethnic groups.

6. We think the authors misrepresent the role of Kenyah aristocrats (*paren*) by portraying them as king-like rulers ("rajahs") able to command whole village groups (p. 20). Similarly, we object to the depiction of one group (the Punan-Top) as "vassals" of the leader of another group (the Lepo' Tau at Long Lebusan). First, Kenyah leaders, despite the privileges and status of aristocratic rank, depend for their authority on a consensus or majority opinion (a view supported by Galvin 1975 and Whittier 1978). Village heads (*paren lepo'*, or *kepala kampung* in Indonesian) are elected by their constituents. A village head must act more like a committee chairman (to take a familiar example) than a dictator, influencing and clarifying opinion rather than imposing his own. Therefore, it is not particularly surprising that the group from Sungai Barang, initially under the leadership of the *paren* Pajak, divided before reaching Ritan Baru. The reasons for this and other group fissions should be sought, not in the attributes of leaders, but in the circumstances and capabilities of all people in the groups concerned.

Second, we doubt that any *paren* nowadays can give orders to people of another village, if any ever could. The *paren bio'* ("paran bio" is incorrect) formerly played the roles of war leader, arbitrator (especially in disputes between villages), and representative of the Apo Kayan people in dealings with outsiders. Even this limited authority has been progressively eroded under the Dutch and Indonesian governments.

7. In speaking of "long-lasting enmities," supposedly now submerged in an amorphous Kenyah unity (p. 20), the authors ignore specific relations between the groups concerned. Accounts of Kenyah warfare collected by us and by Whittier (1973) show that, while the Lepo' Tau were indeed enemies of the Bakung, the Uma' Tukung were close allies of the Lepo' Tau. On the other hand, the Uma' Tukung are linked by aristocratic intermarriage with many groups, including the Bakung and Punan-Top as well as the Lepo' Tau. Religious affiliations as well as kinship and common ethnic identity promote (or can be used to promote) solidarity and mutual assistance. Increased contact with non-Kenyah and non-Christian peoples has probably reinforced these tendencies.

In spite of the foregoing criticism, we commend Guerreiro and Sellato's contribution to the study of migration and especially their aim of relating migration to other anthropological and ecological concerns. We look forward to presenting more of our own research in future articles.

NOTE

1. Mackie did research in the Apo Kayan from 1982 to 1983 as part of the MAB project, "Shifting Cultivation and Patch Dynamics in an Upland Forest in East Kalimantan." Jessup was an investigator in that project as well as in an earlier (1979-82) MAB project, "Interactions between People and Forests in East Kalimantan." Both projects were funded by the U.S. Forest Service through the U.S. MAB Consortium and were sponsored by LIPI. A. P. Vayda was principal investigator for both projects; K. Kartawinata was the senior Indonesian investigator.

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BRIEF COMMUNICATIONS

REVIEW ARTICLE: FOUR THESES ON THE NOMADS OF CENTRAL BORNEO

by
Jérôme Rousseau

- Harmut K. Hilderbrand
1982 *Die Wildbeutergruppen Borneos*. Münchner Ethnologische Abhandlungen, no. 2, München: Minerva Publikation. xxii + 374 pp., 11 maps, 2 tables, wordlists, bibliography, English summary.
- Carl Lewis Hoffman
1983 *Punan*. Ph.D. dissertation. University of Pennsylvania. Philadelphia. vi + 221 pp., 4 maps.
- M. Simandjuntak
1967 *Masyarakat Punan Ketjamatan Kelaj Kabupaten Berau Propinsi Kalimantan Timur*. Samarinda: Akademi Pemerintahan Dalam Negeri. iv + 77 pp., 2 maps, wordlist.
- Marcus Sinau
1970 *Usaha meningkatkan taraf kehidupan dan penghidupan suku Dayak Punan Ketjamatan Malinau Kabupaten Bulongan*. Samarinda: Akademi Pemerintahan Dalam Negeri. vii + 115 pp., 2 maps, wordlist.

The nomadic hunters-gatherers of central Borneo have always held a fascination for visitors to the island, but unlike the Kayan, Kenyah, Bahau and Kajang agriculturalists among whom they live, little fieldwork has been done among them. What we know of them is based mostly on short-term contacts or hear-say. Indeed, Fay Cooper Cole could still assert in 1945 that there were no nomads in Borneo. While such a view was untenable even at that time, it underlines how little information was available.

While there have been few anthropological studies of Borneo hunters-gatherers, a large body of scattered information exists, and Hildebrand synthesizes it. Hoffman focuses on the Punan of Kalimantan Timur, and especially kabupaten Bulongan, where he carried out an ethnographic survey in 1980-81. This review concentrates on these two doctoral theses, which are major contributions to our understanding of Borneo nomads; the two other works are more modest in scope, and will be described briefly.

1. The distribution of nomadic groups

Hildebrand's section on ethnic nomenclature will be of great use to researchers. It presents a lengthy alphabetical catalogue of all the nomadic groups and their distribution, with the available population figures and maps (Simandjuntak and Sinau also provide population figures and fairly detailed maps). Hildebrand manages to establish some order on what has been a very confusing body of data. Hoffman's thesis updates the information for Kalimantan Timur. Of the groups he visited, the Punan Batu and Punan Binai of kecamatan Tanjung Palas are still nomadic (p. 41), although some of them practice horticulture (p. 56). Most of the others have maintained a part-time orientation to the jungle: speaking of the Punan Tubu, for instance, he says that they "have all been nominally settled for a generation or more, but individuals and whole families continue to enter the forest for weeks at a time" (p. 24). In 1967, the Punan Kelai still practiced no agriculture (Simandjuntak, p. 40), nor did the Punan Malinau in 1970 (Sinau, p. 58).

2. Ethnic differentiation among hunters-gatherers

Hildebrand and Hoffman dispose of the long-held idea that the nomads are somatically distinct from the sedentary groups which surround them. Indeed, in the 19th century, it was even believed that Borneo nomads had tails!

Hildebrand approaches the problem of ethnic classification with a discussion of the ethnic labels Ot, Bukat, Bukitan, Ukit, Basap, Punan, Penan. The names exist primarily as exonyms; an ethnic label does not denote a specific ethnic group. Rather, the different ethnonyms are linked to the presence of specific settled groups: "The name Punan is mostly found in the Kayan and Kenyah areas, Ot in the Ngaju and Ot Danum area, Dukitan in Land Dayak and Iban areas, and Basap in the area of the east coast inhabited by the Malays". In fact, the situation is more complicated, but this is indeed part of the truth. In particular, 'Punan' has been used throughout Borneo as a generic term for 'nomadic hunter-gatherer'.

Hildebrand reviews the controversy between Harrison, Needham and others about the relative significance of 'Penan' and 'Punan'; it failed to come to any solid conclusion because it excluded a consideration of Kalimantan nomads. The difference between 'Punan' and 'Penan' is sometimes a dialectal variation, while in other cases it applies to different referents; some groups can be called both 'Penan' and 'Punan', while others are only 'Punan'. For some groups 'Punan' (or 'Penan') is the only ethnic designation, followed by the name of the area of residence; e.g. Punan Long Wat. In other cases, 'Punan' is a prefix to another ethnonym, thus 'Punan Lisum', 'Punan Labu', 'Punan Lugat', 'Punan Penyabung', 'Punan Seputan', 'Punan Sihan', all of which can also be referred to without 'Punan'. For at least some of the settled groups, 'Punan' means 'hunter-gatherer'; when I described to the Kayan the mode

of life of the Eskimos, they immediately called them 'Punan', and meant that they were Punan, not simply similar to Punan. Finally, some groups are not normally referred to as 'Punan', such as the Bukat and Baketan, maybe because they took up agriculture long ago.

3. Linguistic comparisons

In his consideration of the -scant- linguistic evidence, Hildebrand establishes some tentative subgroupings; with the exception of the Punan Busang, the 'Punan' or 'Penan' of the 4th and 7th Divisions of Sarawak speak the same language; on the other hand, he sees a relationship between the languages of the Ukit, Bukitan, Punan Busang, Punan Batu, Punan Sajau (or Sajau Basap), and Punan Ba. The similarity between Punan Sadjau and Punan Ba had already been pointed out by Cense and Uhlenbeck (1958). The Punan Ba are swidden agriculturalists in the 4th and 7th Divisions of Sarawak. They call themselves 'Punan' and are so called by their neighbours. 'Punan ba' (or 'Punan Bah') is the name of one of their villages, and does not exist as an ethnic label, except in the writings of anthropologists. Because they are called 'Punan', early authors included them among the nomadic groups. Leach showed, and Needham confirmed, that this attribution was unjustified, and that they form part of the Kayan-Kenyah-Kajang socio-cultural group. However, there are enough specific similarities in the wordlists of the Punan Ba and the nomadic Punan Sajau of Kalimantan Timur to suspect that, after all, the Punan Ba might indeed have a nomadic origin, although they themselves deny it. In the absence of adequate wordlists, Hildebrand does not develop the linguistic comparisons; this is however a promising area. My own data bear out the grouping of Punan Busang and Bukat (out of 128 words, 65 are cognates, i.e. 51% of the sample).

4. Settlement patterns, subsistence

Hildebrand's composite image of nomadic life--useful for comparative purposes--is complemented by Hoffman's first-hand description of two nomadic groups. Among the Punan Batu, "the usual pattern of residence involves a small grouping of two or three nuclear families, related by blood or marriage, living together in a temporary encampment in the forest by a stream at the headwaters of a river. . . . Each of these encampments is usually no more than an hour's walk (. . .) from at least one other similar encampment. . . . These local groups are by nature highly unstable units, subject to almost constant changes in personnel as individuals or whole families break away from one encampment to join another grouping some distance away. . . . Whatever their reasons for moving and wherever they decide to go, it is reasonably certain that the newly decamped individual or family will keep within the loosely demarcated territory that the group as a whole considers to be its home range" (pp. 41-42). Punan Batu settlement patterns are contrasted to those of the Punan Oho, Punan Lisum, Punan Beketan, and the Punan of the Tubu and Malinau rivers, who "lived in large base camps that accommodated the entire group" (p. 45). From what one can extract of

the literature, the latter pattern appears to have been more common in Sarawak. Hoffman goes on to say that the difference between these two models may not have been as marked as would at first glance appear to be in the case; apparently the base camps were primarily storage places for forest products, and only a few people stayed there at most times (p. 46).

Hoffman's valuable description applies only to the nomads of Kalimantan Timur; for instance, while he shows that there "the dispersed encampments of the Punan group are generally no more than a day's walk from one or more of these sedentary villages" (p. 104), this is generally not the case in the 7th Division, where it takes several days to reach the nomads.

We normally take for granted that hunting dogs are an essential element of hunting-gathering technology, but Hildebrand suggests the possibility that they may be a recent borrowing, because several sources state that the nomads obtain their dogs from settled groups, and the nomads themselves speak of a "pre-dog time". The fact that some nomads buy dogs from agriculturalists is no proof that they can't raise them themselves. Indeed, it is common for agriculturalists to buy dogs from nomads. Nomads and agriculturalists are not two distinct societies; they interact on a regular basis, and there is no reason why they should not trade dogs. As for the "pre-dog time", is that mythical or historical?

5. Social organization

An important gap in Hildebrand's work is filled by Hoffman when he discusses briefly the political organization of nomadic bands, kinship and marriage, childrearing, therapeutic procedures and religion. This absence in Hildebrand reflects a bias of the literature, which focuses on nomad-agriculturalist interaction. However, this was by no means terra incognita, because of various articles by Needham, Nicolaisen and others.

Among most nomadic groups of Kalimantan Timur, marriage between first cousins is forbidden, except for the Punan Batu and Punan Kelai (Hoffman, p. 80). However, Simandjuntak says that first cousins may not marry among the Punan Kelai (p. 29). As regards bridewealth, Hoffman contrasts the nomads and the agriculturalists; according to him, "the overwhelming majority of the sedentary peoples of Borneo observe the custom of bridewealth" (p. 81), while the practice exists only among some nomadic groups. The fact is that bridewealth is not universal among agriculturalists; it is required for viri-, but not uxori-locality. Hoffman's statement is understandable, however, as accounts of marriage payments in the literature are usually from the viewpoint of aristocratic males (e.g. Gau Jau 1957) and viri-locality is more common in the aristocratic stratum; furthermore, male informants are likely to describe viri-local arrangements as the norm even if they are not more common than uxori-locality. Even Kayan men, 70% of whom practice uxori-locality, describe this arrangement as most regrettable, and will never bring up the subject with casual observers. At betrothal, the bridegroom does give

something to his bride or her parents; this is not bridewealth, but the marker of a social contract. According to Hoffman, nomadic Punan establish neolocality immediately after marriage, settled Punan after a few months. Simandjuntak states that the pre-agricultural Punan Kelai practice uxori-locality for about three years after marriage (p. 24).

Both Hoffman and Hildebrand present the image of a very simple political system, where the band leader suggests courses of action rather than rules, and where even collective decisions cannot be enforced on those who refuse to abide by them. This is indeed what one would expect. Simandjuntak and Sinau present a more structured image of the Punan Kelai and Malinau, with a village leader chosen by the people and confirmed by the sub-district administration, a deputy chosen by the leader and confirmed by the people, and elders chosen by the people with the agreement of the leader and his deputy. This seems rather more complex than is likely; however, their description raises questions about Punan political organization. Because they are part of a larger and more complex society, we cannot expect a priori that their political organization will be as simple and consensual as that of independent hunters-gatherers. Indeed, it sometimes happens that nomadic groups are under the control of an agriculturalist chief. Simandjuntak also says that the Punan leaders represent their people in trade, and that they organize the collecting of jungle produce. We would also like to know the effect of sedentarization on political organization.

6. Interrelations between nomads and agriculturalists

Given the symbiotic relationship between nomads and agriculturalists, it is not possible to deal with the former as a separate society. The Punan have tended to confine themselves "to a tract of primary forest adjacent and contiguous to an area occupied by a specific sedentary agricultural people" (Hoffman, p. 47). The Punan's subsistence techniques are not peculiar to them, but are also common among sedentary groups (p. 58). Finally, Punan religion is seen as a "trimmed-down version" (p. 96) of the religion of sedentary groups, rather than a separate system.

This special relationship between a nomadic group and the neighbouring settled agriculturalists can be contrasted with the fact that the various nomadic groups have limited relations with each other (pp. 106-112). They distinguish between "peoples of our kind" and "peoples of other kinds"; the "peoples of our kind" include the settled agriculturalists with whom they have a special relationship, and the "peoples of the other kind" include the other sedentary groups as well as other Punan (p. 78).

7. Trade

Hildebrand provides an extensive and systematic discussion of the nomads' involvement in trade and the products they gather. This is his best-documented section, because the literature has dealt in greatest

detail with it; much of the interest in hunters-gatherers lay in their role as collectors of valuable jungle produce and slaves. Both Hildebrand and Hoffman emphasize the importance of trade in the nomadic economy.

In general, the nomads trade with agriculturalists who in turn sell the product to Malay and Chinese traders. Hoffman notes that while in theory any member of an agricultural village may trade with the nomads, in practice trade with nomads has been the virtual monopoly of the chief and other high-ranking members of the community (p. 152). The same applies in the 7th Division where the trade with nomads contributes to maintain class differences (Rousseau 1979:227). Simandjuntak also mentions that traders make agreements with some Punan so that the latter will not do business with other traders; this arrangement is a consequence of the fact that the Punan receive credit from traders.

Hoffman documents two exceptions whereby agriculturalists are not the middlemen between nomads and Malay or Chinese traders. The Punan Batu and Punan Binai of the coastal district of Tanjung Palas have no agriculturalist neighbours, and they have traditionally been trading directly with the Malays, and particularly the Sultan of Berau, who was the "owner" of birds' nests caves (p. 155). They are also unique in being "almost totally specialized to one role in life--the gathering of birds' nests for coastal traders, upon whom they are virtually dependent" (p. 156). Contrary to what one would expect, these coastal nomads demonstrate "a 'primitiveness' unusual even for present-day groups of 'Punan'" (p. 157). Hoffman explains this paradox as a consequence of trade; coastal Punan are more accessible to traders, hence more oriented to their requirements and more dependent upon the goods they provide, while the remote Punan of the interior have a more diversified economy. The coastal Punan appear more "primitive" because they are more nomadic; but their nomadism is the direct result of their encapsulation in a market economy.

For Hoffman, the "Punan do not trade in order to remain nomads; they have instead remained nomads in order to trade... Trade is not 'just another thing the Punan do'; it is essentially the thing that Punan do." (p. 171). Hoffman has made a convincing argument that this description applies to the Punan Batu and Punan Binai, but it is not generally true of Borneo hunters-gatherers. Indeed, in the interior of Borneo, opportunities for trade are usually too limited to make it the centre of nomadic economy. The Kayan of Uma Bawang, where I did fieldwork, strongly wished that the Punan would devote more time to gathering jungle produce and making rattan mats and baskets. They kept badgering them for these products, they even undertook lengthy trips to visit them in their settlements, but usually came back with very little; the Punan claimed to be too occupied with their daily subsistence to spend time on collecting jungle produce. This may have been just an excuse, but the fact remains that those Punan could hardly be said to put trade to the forefront

To this we could add that agriculturalists have eschewed the collection of jungle produce because of the presence of nomadic groups;

when there are no nomads in the vicinity, settled groups do gather forest produce, such as in the upper reaches of the Baluv.

Both Hoffman and Hildebrand describe the traditional trading situation. It must be kept in mind that the colonial administration intervened in trade; both in Sarawak and Kalimantan, administrators supervised trade with the nomads, to protect them against exploitative practices; the Kelai was closed to traders from 1922 to 1942 and trade meetings--with cash exchanges rather than barter--were organized under the supervision of the Government (Simandjuntak, p. 43). Similarly in Sarawak, local administrators established trade meetings which they supervised. This is bound to have had some effect on the nomads' perception of their relationship with their counterparts.

Hoffman considers that trade between nomads and agriculturalists establishes a symbiotic relationship between them. Hildebrand shows more clearly that the relation is or can be exploitative, and that the nomads have traditionally received very little for what they sell. Similarly, Simandjuntak mentions an exchange between Rp.90 worth of rattan for Rp.4 of tobacco, or Rp.6000 of gaharu for a parang worth Rp.200. Indeed, if the relation were not exploitative, why would the Merap "refuse to tell their settled Punan neighbours how much money they have been getting from selling forest products to the Chinese" (Hoffman, p. 153)? Of course, Hoffman is not wrong, because exploitation is a form of symbiosis.

8. The origins of Borneo hunters-gatherers

Why are there hunters-gatherers in Borneo, what is their relationship to settled groups? Trade clearly is an important element of this relationship, but the matter goes further.

Hildebrand and Hoffman point out that the various nomadic groups are not somatically or linguistically distinct from their settled neighbours. Hildebrand also sees the nomads as dependent on the agriculturalists, because they need to acquire iron tools from them, especially to make blowpipes, the most important implement in their hunt. From this he concludes that the nomads are dependent on agriculturalists for their very existence. But the fact that the nomads do not normally produce iron implements is no evidence that they are or were always unable to do so, but rather that it is more convenient for them to obtain iron through trade. In the same way, agriculturalists have ceased to smelt their own iron because iron bars can be bought inexpensively and readily. But it would be wrong to assume from that that they used to be dependent on trade for their iron implements. The nomads rely on settled groups for their iron tools, and this is an important element of the symbiotic relationship between nomads and agriculturalists (indeed the Basap of the Birang obtain their blowpipes from settled groups; see Hoffman, p. 156). But the presence of agriculturalists is not a condition of existence of the nomads. There are and have been blacksmiths in many nomadic communities.

On the basis of linguistic evidence, Blust (1976), to whom Hoffman refers, suggests that the Austronesian groups which migrated to Borneo had already mastered rice cultivation. His argument is plausible, and if it is correct, it follows that present-day hunters-gatherers are descendants of rice agriculturalists. But there are many ways to interpret this. Hoffman (p. 197) concludes that "the existence of 'Punan' groups in Borneo arose initially from the demand for various jungle products desired by the Chinese". To further demonstrate his point that trade is the *raison d'être* of the nomads, he argues that, because game is plentiful around villages of agriculturalists, the Punan would have "scant cause to dwell in primary forest areas for hunting considerations alone". Rather, he says, they do so because of the availability of tradeable jungle products (pp. 172-173). He is indubitably correct that jungle produce provides an attraction; but unless he can demonstrate that wild food sources as a whole are more available near settled villages, there is no reason for nomads to live anywhere else than in the primary jungle. Indeed, vegetable products, not meat, form the bulk of the nomads' diet, particularly wild sago (see Hildebrand pp. 261-267) and for this they need to be in the jungle. While Hoffman "almost derives the impression from some authors that (the Punan) would rather be doing almost anything else (than trading)" (p. 171), one almost gets the impression from Hoffman that they can't be intrinsically interested by a hunting-gathering existence in the absence of trade. But hunting and gathering can, at least in some parts of the world, be as desirable as agriculture, and it seems to me that this is the case in Borneo.

Trade does not have the same importance for all Borneo nomads. Hoffman's argument that nomadism arose out of trade is not compelling. Even if we start with Blust's hypothesis that the first Borneo settlers practiced rice agriculture, it is quite plausible that some of them switched to hunting-gathering because they found it more attractive. (I am not advancing this as the hypothesis; I am simply saying that with the evidence currently available, a number of hypotheses are equally plausible.)

9. Sedentarization of hunters-gatherers

In Hildebrand's account, the hypothetical shift from nomadic Punan Sadjau to settled Punan Ba appears as an isolated event. He should have emphasized that this was part of an ongoing and general process. Not only has there been in recent years a strong pressure on nomads to take up agriculture, but such shifts have been happening for a long time. We know that the Penihing, Sebop, Seputan and Bukat used to be nomadic, and some of the Penan seem to have been settled already in the 19th century. It has even been hypothesized that the Kenyah--the largest group of agriculturalists in the centre of Borneo--are nomads who took up agriculture under the influence of the Kayan. Taken in this wider context, Hildebrand's hypothesis that the Punan Ba might have been nomadic in the past takes on a different significance. The nomads and the

agriculturalists constitute a single system with two sectors, and movements take place from one to the other, according to circumstances.

This has a consequence on the way in which we can interpret data; if the nomads are not a separate socio-cultural system, one cannot with confidence use evidence from previously nomadic groups to build up a description of nomadic life. For instance Hildebrand's discussion of the nomads' role in warfare includes a discussion of the Berusu and the Bakatan (pp. 216-217); but by the time they were described, they had become agriculturalists, and those accounts tell us nothing about their attitude to warfare while they were nomads.

Simandjuntak and Sinau provide us with information about recent transformations. In particular, they echo the administrative viewpoint towards nomads. Sinau describes a failed attempt in 1958-59 to settle the various Punan Malinau groups in one settled village. By 1970, the sedentarization of the Punan was seen as an "urgent" task, and it is clear that a nomadic existence was perceived as unacceptable by them. (Sinau also notes with dismay the persistence of the traditional adat, and sees an urgent need for missionary activity, in particular because of the danger of communist ideology (p. 100). This bizarre assumption that the followers of traditional adat are particularly susceptible to communist indoctrination has also been noted in the Apau Kayan.) From Hoffman's account it is clear that since Simandjuntak and Sinau wrote their theses, the administration has had a large degree of success in sedentarizing the Punan.

In conclusion, Hoffman establishes a contrast between primary and secondary hunters-gatherers, the latter being those groups that derive from agricultural people; Borneo nomads are an example. He argues convincingly that the specificity of secondary hunters-gatherers must be recognized, especially because of the presence of trade among the secondary hunters-gatherers.

* * * * *

The works of Hildebrand and Hoffman are major contributions to our knowledge of Borneo nomads, indeed to our knowledge of Borneo as a whole. Anyone with more than a passing interest in the subject must read them both, as they are complementary. Hoffman, who deals with a limited body of data, finds it easier to present the image of a working system; Hildebrand provides us with the tools for a comparative analysis and the exhaustiveness of his survey of the literature helps us to identify the gaps that remain.

Simandjuntak's and Sinau's theses are more modest contributions. The data have been gathered in a somewhat haphazard fashion, but are nonetheless useful. In any case, they are no worse than much of what Hildebrand had to use in his synthesis of the literature. These theses were written by students of a school of public administration. Both follow essentially the same format, and deal with the origin of the Punan, the

geographical background, the social, economic and political situation, housing, culture and religion, education, health, traditional medicine, art, and recommendations for change. The sections on religion are elementary, but nevertheless informative, given the paucity of data. The description of the Punan's integration to a state organization is not available elsewhere. There are brief vocabularies, which may be of some use for vocabulary comparisons.

NOTES

1. In the 1970s, Johannes Nicolaisen started fieldwork among the nomadic Penan of the 7th Division, but his promising research was interrupted by his untimely death. If I read him correctly, Rodney Needham carried out fieldwork in the 1950s among previously nomadic Penan of the 4th Division, and also had episodic contacts with nomadic Penan and Punan.
2. His exclusive use of Indonesian for local terms suggests that fieldwork was carried out in that language. The contrast in orientation between the two works is shown by the fact that Hoffman refers to two, and Hildebrand to about 75, Dutch sources.
3. He lists about 280 names; several of these are alternative names for the same group, and there are about 130 substantive entries. In turn, there are fewer than 130 nomadic groups, as several entries deal with the same group as it migrated to different locations.
4. Hildebrand (p. 54) and Hoffman (p. 176) agree that 'Basap' does not refer to an ethnic group; for Hildebrand, this is the exonym used by settled groups to refer to nomadic groups in parts of Kalimantan Timur; but Hoffman states that there are some Basap who claim to have always been agriculturalists.
5. A local group can also be named after its leader; e.g. the Punan Sugun, near Uma Bawang in the Baluy.
6. Hoffman falls into this terminological trap when he quotes Beccari and Charles Brooke on the affinities of certain Punan groups to agriculturalists (p. 114). They are referring to the Punan Ba, not nomadic Punan.
7. The groups which lack brideprice are the Punan Batu, Punan Binai, Punan Berun, Punan Benyawung and Punan Kelai. The first two are still nomadic, while the other are "sporadically settled" (p. 27); by contrast, most of the groups with bridewealth are settled (with the exception of the Punan Tubu and Punan Malinau, who are also "sporadically settled"). This is not sufficient to establish a correspondence between bridewealth and sedentarization, but this would bear further analysis.

8. Hoffman may be underestimating the importance of sago because of his fieldwork experience; he notes that the use of wild sago is rapidly falling into decline, and indeed, that with the exception of the Punan of the upper Tubu, the Punan groups of his acquaintance hardly resort to it at all, but prefer to eat rice. It is fundamental to know this to understand the present circumstances of the Punan, but it tells us little about the previous state of affairs. By contrast, the Punan Kelai considered sago as their staple in 1967, and Simandjuntak describes six different dishes using sago (p. 51).

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THE BORNEO COLLECTION OF THE SOUTHEAST ASIAN CULTURAL
RESEARCH PROGRAMME, INSTITUTE OF SOUTHEAST ASIAN STUDIES
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According to its brief prospectus, the programme (SEACURP) was established at the Institute of Southeast Asian Studies in July 1981 with the object of collecting "resource materials documenting the cultural

heritage" of Southeast Asia; the focus of its first project has been the "documentation of the traditional built form." The main resource comprises slides and photographs, and the core of the archive is the Dorothy Pelzer Collection. The Pelzer Collection consists of 13,500 black-and-white photographs, 7,000 slides and six filing-cabinet drawers of notes assembled between 1962 and 1970 by Miss Pelzer, who graduated from the Massachusetts Institute of Technology in 1950 with a Masters degree in architecture. She travelled widely in Southeast Asia during those eight years and apparently documented some 34 culture groups and sub-groups, concentrating on house-types, the techniques of construction, layout and design, decorative motifs, and building materials used. Miss Pelzer died in 1972 before she had had the opportunity to work on her data in any detail, and without writing the book that she had planned.

In July 1984 I spent one week at the Institute going through the Borneo section of the Pelzer archive and I submitted a report to SEACURP giving my impressions of the value of the materials. I thought it might be useful to summarise this report for the benefit of members of the Borneo Research Council.

In general, I thought the Pelzer Collection on Borneo a valuable resource. It consists of 916 black-and-white photographs, 545 slides and some 550 to 600 pages of typewritten notes. It is particularly important for any scholar whose interests span material culture, architecture and anthropology. It is less significant for the anthropologist who needs to consult comparative material on such topics as oral history, social organization, the economy or religion, though there is information in Pelzer's notes relevant to some of these concerns. To be fair, her main focus was on house-forms.

The black-and-white photographs and slides which I consulted are by themselves of some value. I could easily identify the subject matter and import of some of them, but others were rather obscure, particularly those which serve to illustrate detailed constructional features of Borneo houses. For its full value the photographic collection has to be consulted along with Pelzer's notes, which provide a detailed commentary on the photographs. The photographs are numbered, catalogued and ordered in relation to the sequence of Pelzer's travels in Borneo from August 27 to November 24, 1968.

Most of the main ethnic groups in Sarawak, Sabah and Brunei are covered photographically - the Bidayuh, Iban, Kayan, Kenyah, Kajang, Berawan, Kadayan, Lun Dayeh, Tagal, Kadazan (Rungus, Tambunan, Tempasuk), Bajau and Illanun. Important groups not dealt with are the Selako, Kelabit, Melanau, Bisaya, the coastal Malays and some of the nomadic or formerly nomadic groups (e.g. Penan, Ukit, Bukitan). There are however, a few photographs of Brunei Malay houses, and Punan shelters near Long Tikan, and there are notes on Kelabit and Melanau. There are also notes on Kalimantan, but Pelzer never went there and much of her information comes from secondary sources.

Taking her notes, by far the most useful section, in my opinion, is that on the Kayan, Kenyah and Kajang. Not only was she concerned with longhouses here, but also funerary structures, granaries, and motifs in painting and carving. However, other sections on the Iban, Bidayuh, Lun Dayeh, Tagal, Rungus, Bajau and Illanun contain good detail on houses - the basic form, constituent parts and the terms for these, constructional techniques, materials used and distinctive characteristics. This written material is nicely complemented by the visual material (including sketches of house plans, front and side elevations and features of construction). But much of the general data on the particular ethnic groups in question are culled from the standard secondary sources. Some extra tidbits of information come from interviews she had with villagers, government officials, missionaries and staff of the Sarawak Museum. Pelzer also took notes on objects such as scale-models of houses in the Sarawak Museum. The sections on Kelabit and Melanau are somewhat superficial since she did not visit these peoples.

There are two additional general sections in the notes - one on the island of Borneo as a whole, the other on long-houses. The general Borneo material is largely taken from secondary sources on such things as history, the environment and ethnic classification. It also contains information on Pelzer's personal contacts and itinerary. The general section on long-houses is better. This appears to be a rough draft of a chapter intended for her book. For this reason, it tries to bring data together and it provides a useful list of the similarities and differences between the long-houses of the different ethnic groups. It addresses broad questions as well, such as the functions of the long-house, its possible origins, the viability of the house-form in the context of modernization, its relationship to the social order in a very general sense, and a few tentative comparative remarks about Borneo long-houses and house-types in Vietnam (especially among the Rhade) and on Nias. Some of this general section is very sketchy and tends to be preoccupied with evolutionary and functionalist explanations.

As to the sections on each ethnic group, it has to be said that the notes are not very ordered, though they are substantially typed and each section has a table of contents. Miscellaneous information on culture, history, social organization is interspersed with the detailed commentary on the contents of photographs, with references to informants and interviews, word-lists, personal observations and speculations and so on. Again the material on houses tends to be the most coherent and fluent.

Overall my view is that someone with an interest specifically in house-forms could work on this collection, especially if he (or she) has his (or her) own field-work material on long-houses to integrate with Pelzer's data. There would probably be sufficient information to produce either a very long article or a short monograph on long-houses and possibly other house-forms (e.g. those of the Bajau and Illanun) and other structures such as granaries, funeral monuments and the Bidayuh head-house in Malaysian Borneo. In addition, there is adequate material to provide ethnographic

illustration for a paper on motifs in Borneo painting and carving, especially among Kayan-Kenyah-Kajang and Berawan, though Pelzer does not offer any specific explanations for the significance of the symbols which she identifies.

At present the status of the Pelzer collection as a research resource is a little uncertain. The project, funded by the Toyota Foundation, is coming to an end because the grant was intended for a three-year period only. However, the Honorary Director, Datuk Lim Chong Keat is continuing in post for the time being. The administrative back-up will no longer be available from October 1984 and the archive will be moved from its present accommodation to the Institute's library. The Asian Cultural Council overseas SEACURP-ISEAS's temporary custodianship of the Pelzer Collection on behalf of the trustee of the late Miss Pelzer's estate. SEACURP is anxious that interested scholars should be encouraged to work on the Collection, and the Institute is in the process of making duplicates of Miss Pelzer's photographic material and notes. In future the archive will be available for use in the Institute's library. However, should researchers wish to use any of the data for publication purposes then presumably this would have to be referred, via the Institute and the Asian Cultural Council to the trustees of the estate. In addition to the Pelzer archive, the staff of SEACURP has also been building up from other sources photographic material and published literature on the 'traditional built form' in Southeast Asia. For Borneo there is a considerable quantity of duplicated photographs and slides from, for example the Sarawak and Sabh Museums and from individual scholars who have worked in Borneo. This material is also, of course, subject to copyright regulations.

O B I T U A R Y

Jan Muller, 1921-1983

On October 5th, 1983, Jan Muller died suddenly after a short illness, lost in action as it were. It is difficult to understand that he, who was still so full of ideas on the problems of the phylogeny of pollen and spores, is no longer among us.

He studied tropical agronomy in Deventer where he passed his final exam in 1941. The Second World War kept him from going to the tropics and instead he joined a group of scientists under the direction of Professor F. Florschütz. This group studied the subsoil of the recently drained 'Noordoost Polder'. Thus he became initiated in the method of modern pollen analysis.

After the War Jan started his career as a palynologist in the service of the Shell Oil Company. He began to work in Venezuela (1947-1958)

where his research resulted in a few important publications dealing with the application of palynology to oil geology. The first paper was together with Kuyl and Waterbolk (1955) and another described the palynology of the delta and shelf sediments of the Orinoco (1959).

His second assignment was to the palaeotropics. From 1958 to 1964 he was a palynologist in Sarawak where he observed (for the first time) the enormous swamps of large tropical rivers. He studied deep cores of these peat bogs and published a paper on the history of the mangrove vegetation of Borneo which again was internationally highly esteemed. However, not only the recent and subrecent pollen interested him. The pollen of Tertiary and Cretaceous sediments also highly aroused his curiosity which resulted in a few papers on this subject (e.g. in 1968: On Cretaceous/ Eocene pollen of Sarawak).

In 1964 Jan returned to the Netherlands where he was appointed to the Laboratory of the Royal Dutch Shell at Rijswijk. In September 1967 he was offered a job as a pollen morphologist at the Rijksherbarium. He eagerly accepted this wonderful chance to combine taxonomy with pollen morphology in a purely scientific atmosphere. He was asked to study the pollen grains of those taxa that were under study by his colleagues but, of course, he was relatively free to choose his own subjects and to concentrate on those that had his special interest. It was the beginning of a fruitful period in which not only pure morphology but also phylogeny and evolution were his main goals.

Because of his extensive knowledge of both recent and fossil pollen he was one of the few in the world to be able to give a synthesis of the history of Angiosperm pollen. His first publication ('Palynological evidence on early differentiation of Angiosperms', 1970) is a classic in this field. Ten years later it was followed by 'Fossil pollen records of extant Angiosperms' (1981), a publication that was the result of much experience and a vast insight.

In the seventies Jan kept himself occupied with phylogeny and evolution (e.g. of the Lythraceae, Sapindaceae, Sonneratiaceae, etc.). His theories of these subjects are lucid and acceptable giving the reader the impression of reality without doubt. With these and other publications he attracted the attention of pollen morphologists abroad and as a logical result he joined the boards of editors of several internationally renowned journals: e.g. those of the 'Review of Palaeobotany and Palynology' and of 'Grana Palynologica'. He was also asked to take a seat in the directorial board of the International Commission for Palynology. In the Netherlands, too, his work was recognised as a great importance and thus the University of Amsterdam bestowed an honorary Doctor's degree on him in 1979.

From the beginning of the eighties he was most interested in the functional part of the pollen grain. The harmomegathy and all that is connected with this phenomenon had his close attention. He was therefore an admirer of Wodehouse, the American father of pollen

morphology and initiator of the study of functions. According to Jan Wodehouse's work was acknowledged too little in literature. Jan's last papers mainly dealt with the architecture and function of the exine of some Lythraceae and Sonneratiaceae.

Jan Muller was a very industrious man but nevertheless always ready to help colleagues and students and so easily made many friends both in the Netherlands as well as abroad. His inobtrusive, friendly behaviour and immense knowledge of the field of palynology combined with a great zest for work will linger on for a long time in the minds of his many friends. (W. Punt.)

Prawirohardjo Sarwono (October 10, 1983)

As former chairman of the Council for the Sciences of Indonesia (MIPI) from 1956-1967, then first chairman of the Indonesian Institute of Sciences (LIPI) from 1967-1973 he always stood very sympathetically towards the attempts of the Rijksherbarium and the Foundation Flora Malesiana to develop the botanical knowledge in and of his country. We were always grateful for his cooperation and support and remember with respect meeting this balanced, dignified Indonesian scientist, a chemist by profession. We are thankful to learn that he passed away peacefully. (C. G. J. van Steenis)

Tributes to Dr. Peter G. Gowing

We first came to know the man called Peter Gordon Gowing from a distance (both physically and socially) sometime in 1960, at Silliman University, Dumaguete City, Philippines. The occasion was the first faculty and staff meeting for school year 1960-61. He was being introduced to the academic community. We can still vividly recall what he said then when asked to say a few words after he was introduced. Among other things, he said: "I am happy I decided to come to the Philippines. At least I am among my equals." Explaining further, he said he meant "equal in height". Most of the Filipino administrators, faculty and staff in Silliman were as short or as tall as he was.

A few minutes before he died of that fatal heart attack, we told him to relax more fully while he was reclining on a rattan chair at Dr. Edith Siqueira's Apartment. Fred Corpuz asked him if he would like his shoes removed, despite an excruciating chest pain, he could have simply replied, "No." - but he didn't. Instead, he said: "No, do not remove my shoes because there are holes in my socks." That was very typical of the gleeful Peter, and we all laughed even as we were concerned about his physical condition.

But we will remember Peter more than just a generally happy person who did not seem to have any share of the many problems of life in this world. We will remember him more as a preacher, teacher, administrator, scholar, and a champion of Muslim-Christian Relations. It is important to dichotomize the person into each of these roles. For Peter Gowing was an efficient pastor and administrator at the same time; he was a preacher, teacher and researcher par excellence; he was all these rolled into one as a champion of better Muslim-Christian Relations.

As a preacher, he will be remembered for his well-researched and eloquently delivered sermons. As a scholar, he is best known for the several books he wrote and the numerous articles he has published in several respectable journals besides this Quarterly he edited until his death. As an administrator he organized and managed efficiently the Southeast Asian Studies Program (1968-72) at Silliman University and the Dansalan Research Center (1974-83) here in Dansalan College Foundation. As a teacher/professor, he will be remembered best by "the fruits of his labor" - his students, and his colleagues. This aspect of his personal influence on the lives of people around him was best expressed by the students and faculty of the Divinity School of Silliman University in a cablegram they sent to us upon his death:

"DIVINITY SCHOOL COMMUNITY JOINS DANSALAN IN SORROW AT THE PASSING AWAY OF PETER GOWING CHERISHED MENTOR COLLEAGUE AND FRIEND, BUT REJOICE THAT BY GOD'S GRACE HE HAD LIVED AND ENRICHED OUR LIVES. . . .SITUY ELWOOD CAPULONG MENDOZA NIGUIDULA REMASOG UDARBES VANES AND STUDENTS"

As a scholar and a champion of better Muslim-Christian relations, Peter's memory will linger forever as long as there are Muslims and Christians on planet earth, because of the tremendous efforts and energy he exerted to advance the cause of peace and understanding between and among Muslims and Christians. The books and articles he wrote, the studies and dialogues he conducted or help conduct, and the papers he read in many conventions and conferences were all designed to promote better understanding and working relations between Muslims and Christians. In all these efforts, he could be described as the most Muslim among the Christians and the most Christian among the Muslims in such forums.

Minister Espaldon of the Ministry of Muslim Affairs is not one of the best friends of Dr. Gowing, but upon knowing about Peter's death, he recognized Peter's personal contribution to peace. In a message he sent to us, Minister Espaldon said:

"WE KNOW DR. GOWING NOT ONLY AS A SCHOLAR BUT AS ONE OF THE PRIME MOVERS IN PROMOTING PEACE AND UNDERSTANDING AMONG MUSLIMS AND NON-MUSLIMS IN THE PHILIPPINES STOP WE OFFER OUR PRAYERS FOR DR. GOWING'S LASTING PEACE."

Peter is indeed a great loss to all of us - in Dansalan, in Marawi, in this country and the whole Muslim-Christian world. At Dansalan he has created a vacuum we cannot possibly fill. In Marawi we have lost a friend; in the Muslim-Christian world, we have lost a champion for peace. On the day of his death, Peter said, "Sickness can't knock me down." Well, death has so suddenly knocked him down. We have to accept this reality. And the greatest tribute that we can give the man is to carry on the work he has left undone - the job he tried to do until the very last few minutes of his life. (Eulalio G. Maturan)

BORNEO NEWS

Regional News

5-Yr Ban on Export of Monkey: Malaysia, a major supplier of monkeys used for scientific research in the West, clamped a five-year ban on their export today.

A senior government official said Malaysia was concerned that the monkeys were being used in biological warfare experiments.

In 1979, the government set a 5,000 annual quota on the export of long-tailed Macquats - the type of monkey used in research - and set strict criteria that the animals were to be used solely for legitimate purposes.

"There was a very real worry over how the monkeys were used," the officer said.

"They are imported by middlemen and animal dealers. So once they leave Malaysia we have no way of knowing if our monkeys are being used in chemical and biological warfare experiments," he said.

He said the population of Macquats was also falling due to rapid clearing of jungle and the government wanted to carry out a census on their number and distribution.

There are three monkey farms in Malaysia exporting trapped or bred monkeys to developed countries.

The current price paid by an importer is US\$390 per animal.

H. M. KORTHOFF and J. F. VELDKAMP (L) prepared a revision of Aniselytron, formerly known as Aulacolepis. There are only two species, both very rare in Malesia. One, A. agrostoides, has been found only three

times on Mt. Pulog, Luzon, the other was found only by MS. CLEMENS on Mt. Kinabalu, Sabah, and by VAN STEENIS and the DE WILDES on G. Leusir, Aceh. They resemble Agrostis very much but have the lemma distinctly longer than the glumes. Visitors to these areas are invited to look out for them in shaded, moist ravines. Nomenclatorally the genus has been the victim of several irresponsible users of the Index Nominum Genericorum and the Kew Index who have made a fair number of relevant and irrelevant combinations for all names ever attributed to Aulacolepis, whether they belonged there or not.

K. BREMER (S) published a revision of Memecylon in Borneo (27 species).

W. MEIJER (KY) toured the world between 2 May and August 23, 1983, visiting the herbaria and/or botanic gardens of many institutes in search of material and literature of this family. He went to a number of localities in Thailand, Malaya, Sumatra, Sabah and the Philippines to find many of them destroyed by logging, souvenir hunters, so-called forest cleaning, whereby all lianas are cut, and other irresponsible activities.

Species of 'keruing' (Dipterocarpus). In a series of booklets issued by LIPI (no. 28) DR. K. KARTAWINATA (BO) has composed an atlas of 38 species of Dipterocarpus. Each has a page of explanation and notes (in Indonesian) and a page-size plate showing twigs, leaves, fruits. The series is intended to tie science with public interest with an emphasis on the education of the general public.

Joint Kalimantan Expedition. A mimeographed report of the 1981 expedition has been published including 39 pages of botanical records. It can be obtained from DR. K. IWATSUKI, Botanic Gardens, Koishikawa, 3-7-1 Hakusan, Tokyo 112, Japan.

Journal of Tropical Ecology. The International Society for Tropical Ecology (I.S.T.E.) has become increasingly concerned about both its declining membership and the diminishing circulation of its Journal of Tropical Ecology in recent years. The Society thus reluctantly took the decision to cease publication of its journal in India and to have it relaunched in 1985 by INTECOL, the general ecology section of the International Union of Biological Sciences. It will be published by Cambridge University Press in conjunction with ICSU Press, the publishing house of the International Council of Scientific Unions. J. FURTADO (University of Malaya) is convener of the committee that will oversee the Journal. A. G. MARSHALL has been appointed Editor with M. D. SWAINE as his Deputy. An international editorial board is being appointed.

They would be pleased to hear from anyone who would consider submitting a paper for publication in the Journal. Please write to Dr. A. G. Marshall, Department of Zoology, University of Aberdeen, Aberdeen AB9 2UD, Scotland, U.K.

Royal Society South-East Asian rain forest collaborative research program. KWITON JONG (E), the Scientific coordinator, visited Malaysia in July and August 1983. The primary purpose was to find out what local scientists thought about the latest proposals for a joint scientific research program on rain forest ecology and to consult individuals and organizations interested in the program. The latter will concentrate initially on studies which would bring a better understanding of the recovery processes involved when a species-rich rain forest is disturbed through natural causes or by man. The Danum Valley Conservation Area in Sabah is an area of primary mixed dipterocarp forest some 438 km² in extent with neighbouring areas of logged-over forest and is considered a promising site for the program. This area is in fact part of the Sabah Foundation timber concession and all indications are that it will be kept in pristine condition for a long time to come. It is hoped that the program will involve the production of a regular newsletter to keep all the participants informed.

On 1-2 September 1983 IUCN's Commission on Ecology held a symposium on the future of tropical rainforests in Southeast Asia at the Forest Research Institute, Kepong. The symposium was opened by the Malaysian Minister of Science, Technology and Environment, U. B. DATUK AMAR STEPHEN YOUNG KUET SZE and by DR. SOEDJARWO, the Indonesian Minister of Forestry. The latter gave a lecture on the 'Future of the Indonesian forests' in which he stressed the valuable role of tropical forests in providing a whole wealth of resources for economic development.

The alarming rate of destruction of tropical forests and associated consequences as soil erosion, reduction in genetic diversity and species richness were among the topics presented to over 150 delegates. More than half the world's original tropical rainforest area has been destroyed and Southeast Asia contains about 23% of the remainder. The meeting attempted to identify baseline data on which future land use management of rain forest areas could be based. Among the recommendations arising from the symposium were the development of better systems of management of both natural and plantation forests for productive uses, in particular the design of less destructive logging techniques and the promotion of better regeneration techniques. It ended with a call for governments to take further steps to implement the World Conservation Strategy.

The Symposium was followed by the autumn meeting of the Commission. Tropical forests were also among the topics being discussed.

In particular draft IUCN position statements on mangrove ecosystems and a report on the workshop on rehabilitation of degraded land once under tropical rainforests cover were given.

Japanese fear to lose income. As result of Japan's strategy to exhaust the Southeast Asian forests before turning to its own sizeable reserves of timber now most of the forest in the accessible areas is gone. Japan imports more wood than any other country in the world. In 1980 it bought 55% of all the round wood, sawn wood, and plywood traded in the world. It also takes 54% of all exports of tropical hardwood, 86% of which come from South and Southeast Asia. Japan takes the lion's share of the exports from Indonesia, Malaysia, and the Philippines and a large proportion of the export from Thailand - which is nearly out of timber now - and Papua New Guinea. The Malaysian Department of Forestry forecasts that their remaining forests will be exhausted by 1990. The same will be the case with Indonesian forests at the end of the century or sooner.

Reafforestation is rare. Concession holders excuse their failure to replant by their leases being too short to offer an incentive. Plantations are being established at only one tenth of the rate at which forest is disappearing.

Indonesia has made a belated attempt to reverse the trend. Concession holders now have to post a performance bond which is held in escrow until they prove their ability and willingness to reafforest. A problem is that large areas are statistically reafforested but the seedlings fail to grow because they are planted without any shade, causing the mycorrhiza and soon afterwards the - mainly meranti - seedlings to die. Lack of efficient personnel is the reason that the government has no means of control.

Pressure from the Japanese timber industry facing dwindling resources and - maybe - a bad conscience about the environment are the reasons behind two new Japanese initiatives to secure the future of the remaining Southeast Asian rainforests. One initiative is a plan for the countries exporting or importing tropical timbers to form an organization to regulate their trade. The new organization could also funnel funds and expertise into projects for reafforestation, forest management, and the development of local industry in the producing countries.

Tropical foresters hope that the organization would be a clearing house for information about research and training in forestry.

In the second initiative Japan's pulp manufacturers are preparing to spend US\$ 230 million to establish plantations of fast growing trees, such as *Pinus caribaea*, in selected countries. (From New Scientist, 16 Sept. 1982, reporting from a meeting of the British Association for the Advancement of Science in Liverpool.)

Comment: The Pinus plantation, which will only succeed when the soil is more fertile than it is in most places of Kalimantan, will be most profitable for the Japanese pulp mills. When the tropical rainforest is finished, the hardwood from that forest will be finished as well. (H. P. Noteboom)

JÉRÔME ROUSSEAU is carrying out a comparative analysis of central Borneo societies in what is now Sarawak and Kalimantan. The object is to identify the features of central Borneo social systems, the interrelations between the various groups, and the effect of the interaction of distinct cultural groups on ethnicity. This research is based on fieldwork in Sarawak (1970-72, 1974), Kalimantan Timur (1984), library and archival research (1969 onwards) of sources in Dutch, English, German and Indonesian. Archival work was carried out in Cambridge, Kuching, The Hague, Leiden, Amsterdam and Samarinda. Written sources allow a consideration of historical transformations. Rousseau visited the Mahakam in January and February 1984 for a brief survey of relevant groups.

Kalimantan News

MS. B. AXELIUS (S) spent two months at the end of 1982/early 1983 looking for *Lerchea* and *Xanthophytum* in NE. Kalimantan.

A group of staff members of the Bogor Botanical Garden visited East Kalimantan between February 1 and March 9, 1983, and returned with living plants and 58 herbarium specimens.

Ecological research was continued between April 3 and May 19, 1983, at Wanariset, Balikpapan, by a party from BO. Not less than 1500 vouchers were obtained.

MS. J. J. AFRIASTINI (BO) and A. MUNANDAR explored the areas around Batu Ampar, Putusibau and Selimbau, W. Kalimantan between April 15 and May 20, 1983. Living orchids were their prize.

E. MIRMANTO (BO) from August 6 to 25, 1983, went to the Barito River estuary, Banjarmasin, to do ecological research. Some herbarium specimens were brought back. K. KARTAWINATA accompanied him until the 10th.

Staff members of the Treub Laboratory were in Kumai and Lamandau, Central Kalimantan between July 19 and August 19, 1983. They collected living material only.

Between 10-18 February, 1984, A. J. M. LEEUWENBERG (WAG) and MR. RUDJIMAN (Gadjah Mada University, Jogjakarta) made a collecting trip to Kenangan, W of Balikpapan, looking especially for Apocynaceae.

Severe drought causes fires in Kalimantan. From about May 1982 until about May 1983 East Kalimantan experienced a long drought, an unusual event for the area where usually the mean monthly rainfall is more than 100 mm. Fire broke out in late 1982, continued until around the middle of 1983, and burnt a large area of secondary forests, logged forests, primary forests, and agricultural areas. The Kutai National Park and the Kersik Luwai Nature Reserve were reported to be partly ravaged by the wild fire. The origin of the fire was not known but 'ladang' burning was suspected to be the source. The extent of the burnt area is as yet not known, although the recent estimate (as published in newspapers) is about three and a half million hectares, the size of the Netherlands. The Forestry Department and the Mulawarman University are currently making an inventory. The effects of fire on the moist dipterocarp forest will be an interesting aspect to study. It is reported that islands of primary dipterocarp forest were saved, but that many mature dipterocarps farther inland, and not effected by the fire, died because of the preceding drought. DR. S. RISWAN, RAZALI YUSUF, and MISS PURWANINGSIH of the Herbarium Bogoriense recently investigated the fire effects on the primary and secondary forests in the permanent plots in Wanariset (near Balikpapan) and Lempaka (near Samarinda), which were established in 1979 and 1976 respectively. The results of the studies will be reported in due time. MARK LEIGHTON of the Harvard University spent some time in the Kutai National Park in 1983 to investigate the fire effects in the area. The smoke resulting from the fires caused a haze which kept the heat in Singapore to the ground, causing a 35-year record high temperature of 38° C. Also in Brunei forest fires produced smoke, forcing Shell helicopters to stay on the ground because of reduced visibility. The real cause of the fires most probably is large-scale deforestation and the resulting decreasing rainfall and drying of the forest itself through direct insolation. As large tracts of the forests involved are peat swamp forest, drying of the soil after deforestation makes it extremely vulnerable to burning. As is known from the past in Europe, peat can burn underground and cause fires long distances away from the original source.

JAMES SCHWEITHELM is planning to conduct research on watershed land use planning in the Riam Kanan watershed of South Kalimantan commencing in early 1985. He hopes to have long term research involvement in Kalimantan.

Sabah News

J. H. BEAMAN, Michigan State University, and Fulbright visiting professor at the Sabah Campus of the National University of Malaysia, initiated in July 1983 an exploration in Sabah in which he was supported by two American graduate students. After his formal appointment ended he remained for another five months in the area to extend exploration on the Crocker Range, Mt. Kinabalu, Mt. Trusmadi and in other areas with

unusual edaphic conditions. The extreme drought of this year permitted observation on possible drought-induced phenomena such as mast-fruiting, different mortality of primary forest trees and effects of edaphic aridity on evolution in a rain forest climate.

Looking for *Rafflesia* and assisting DR. BEAMAN in the orientation for the Forest Flora of Sabah, W. MEIJER (KY) visited the Bt. Hampuan, Kinabalu National Park, Bt. Padang, Pulau Gaya, Poring, Ranau, Sandakan, Sepilok, Sinsuran from July 26-August 8, 1983. Destruction was evident on the Pinosok Plateau of the Kinabalu and on the Sandakan Peninsula partly by large forest fires. After his visit new localities of *Rafflesia* were fortunately discovered near Nalumad and Poring by MS. A. PHILLIPPS.

In March-April 1984 DR. D. ARGENT, MR. BRIGGS (Brunei), MS. A. PHILLIPPS (Kinabalu National Park) and DR. M. SANDS (E) explored Mt. Trusadi.

We understand that the Royal Society's initiative with Malaysian institutions concerning long-term research in the Danum Valley will be launched in 1984. To coordinate the activities of the Scottish counterparts DR. M. D. SWAINE (ABD) has arranged a meeting on May 14, 1984, for tropical biologists to discuss their research efforts.

Sarawak News

The Mulu Caves. The Sarawak '84 Expedition, a sequel to the scientific exploration of the world's largest caves at Gunong Mulu National Park in 1978 and 1980, has added another high spot to the series.

The results were described as "spectacular" by Mr. Mike Meredith, a deputy leader of the eight week expedition probing the deepest secrets of the bats and snakes-infested caves.

The expedition added another 50 km to the 100 km of cave passages discovered, mapped and photographed in the previous two expeditions, 11 new caves were discovered.

The expedition team, comprising 16 British speleologists, were split into two teams.

With a lot of the new cave passages lying at the far end of the ones previously known, the explorers had to go into the caves for continuous periods of up to seven days and nights, eating, working and sleeping the whole time in pitch blackness illuminated only by their carbide lamps.

ACCURATE MAP

The Api team, exploring the Melinau Paku valley which runs to the south of Mount Mula, discovered 11 new caves in all. Lubang Nasib Bagus - containing Sarawak Chamber - the largest enclosed space in the world, has been photographed, and a more accurate map completed.

Clearwater Cave, already South East Asia's longest before the expedition has been extended to over 62 kilometres, thanks to the diving exploits of Martyn Farr, who dived through two fast-flowing and totally submerged 'sumps' to find new ways on.

Laggan, one of the local Berawan porters employed by the Forest Department for the expedition, found the entrance to a cave which was named after him. Laggan's cave runs right under an outlier of Mount Api called Batu Bungan.

UNUSUAL ROCK FORMATION

Cobra Cave was so named because of an unusual rock formation at its entrance, though the cavers found numerous less dangerous but very live snakes in the caves.

Drunken Forest Cave, first entered by expedition doctor Jon Buchan through a most unlikely and tiny entrance in the jumble of limestone boulders beneath the forest cover, got its name from strangely titled stalagmite columns which adorn its main gallery.

15 kilometres to the north the Benarat team faced technical difficulties never before experienced in the caves of Sarawak.

A cave entrance 300 metres up an overhanging cliff has long been local known as Lubang Harimau. Martyn Farr and Tim Lyons climbed an audacious route up the first 150 metres on vertical vegetation and loose overhanging rock to reach a lower entrance (Lower Tiger Cave). They camped here for nearly two weeks while exploring into the cave, where they discovered a route deep inside the mountain which led upwards and out to Lubang Harimau itself.

BIGGEST FIND

The single biggest find of the expedition was Cobweb Cave, first entered by Colin Boothroyd and Tim Fogg on May 11. It contains a giant network of interlinked passages and galleries. Over 14 kilometres were explored in all, to reach the underground course of the river Terikan, which after running 4,000 feet below the surface above. Cave swifts, nesting far into this cave, have scraped the walls and roofs of some passages so clean that they are smooth and almost white. Another feature of Cobweb Cave is the wind that blows through it. Due to differences in air pressure, this gives rise to permanent daily cloud at the highest point in some passages, while the lowest places are completely dry.

One mystery uncovered was the finding of millions of small animal skeletons preserved in Benarat Caverns. (Sarawak Tribune, June 14, 1984)

PRODUCE BOOK

It will be some months before all the cave-maps can be drawn up, and all the photographs developed, but the expedition expects to produce a book about its discoveries in about six months time.

Meanwhile, the photographs of the caves that have been produced by expedition photographer Jerry Wooldridge FRPS were actually developed in a makeshift dark-room at the expedition camp.

A Flourish for the Bishop - Brooke's Friend Grant. Studies in Sarawak History 1848-68 by Max Saint, will be published January 1985 by Merlin Books, Ltd., Braunton, Devon EX33 2LD at L7.50.

J. J. WOOD (K) is working on the orchids of the G. Mulu National Park, Sarawak, and together with A. LAMB is studying the family for Sabah.

For more information on work in the family see Orchid Research Newsletter 2 (1983).

Sarawak - MS. B. AXELIUS (S) hunted for *Lerchea* and *Xanthophytum* for a month.

Sarawak Museum, Kuching (SAR). To commemorate the Museum's 100th Anniversary, the "Year of Heritage" and the 20th year of Independence, the Sarawak Museum Journal issued a Special Issue (nr. 3) in August 1983. This contains interesting historical data amongst others by LUCAS CHIN et al. on the development of the Museum, by the EARL OF CRANBROOK on the history of zoology in Sarawak, by W. G. SOLHEIM II on archaeological research while the former Curator, EDWARD BANKS, provided his reminiscences. Other contributions relate to preservation on the heritage by LUCAS CHIN and setting up a conservation laboratory to treat and preserve its huge collections. Many other papers deal with subjects in the fields of political and social sciences. An interesting book, 299 pp., and profusely illustrated, and as all other volumes at the very cheap price of Mal\$ 10. - (C. G. G. J. van Steenis).

Havoc to land and lives in Sarawak. A SAM (Sahabat Alam Malaysia, Malaysian Nature Friends) study of logging activities in the Baram District in Sarawak revealed that widespread logging had caused havoc to the land and lives of the people. In an area of 8,521 square miles with a

population of 52,993 there are 20 timber licenses and 44 logging camps operating all over the district. Soil erosion and siltation have become serious problems - rural populations were finding their rivers choked with silt and fish life disappearing. The Sarawak Agricultural Department in its annual report stated that flooding and drought caused 12 million dollar worth of damage to farm crops, livestock, and property in 1981. The State Medical Services reported that 90,000 people were affected by diminished harvests. The revenue from timber in the whole of Sarawak will in the future not be enough to pay for the adverse results of logging. And what when there is no more forest left - and no revenues from timber? (From Malaysian Naturalist, November 1983).

BOOK REVIEWS, ABSTRACTS & BIBLIOGRAPHY

BOOK REVIEWS

What's Wildlife Worth? Economic Contributions of Wild Plants and Animals to Developing Countries, by Robert and Christine Prescott-Allen. Edited and produced by John Tinker, Barbara Cheney and John McCormick and based on research by PA DATA for a joint program of the US Agency for International Development and US Man and Biosphere Program. ISBN 0-905437-35-8, published by IIED, London. From the introduction: 'Wild plants and animals of obvious value are subject to a management 'Catch 22': if their economic utility is overlooked or ignored or if their use is in competition with some other human enterprise, they face the loss of the habitats on which they depend. If, however, their economic utility is evident, they are likely to be overexploited, often to economic extinction and sometimes to outright extinction.' It is also stressed that wild plants and animals bring much needed income to a great many people in developing countries. In the book many instances are given in an orderly and concise way of a host of wild living species that are or can be of economic value in as various ways as genes of wild populations that are indispensable for the future existence of some cultivated species, productions of essential oils from rainforest plants for perfumes and many other instances of profitable use of minor forest products, freshwater fish as food and aquarium fishes, and others. A valuable book with much information for the interested. (Flora Malesiana Bulletin, 9.1(37):45, 1984)

Language Atlas of the Pacific Area, Part II: Japan Area, Philippines, and Taiwan, Mainland and Insular South-East Asia, Stephen A. Wurm and Shiro Hattori, Editors.

Part II of the Language Atlas of the Pacific has been published (see Review in BRB 16:1, pp. 50-51). This completes a monumental task

undertaken by the editors, and provides an invaluable research tool for all students of Southeast Asia and the Pacific.

The Atlas contains maps which are arranged in a West-to-East and North-to-South sequence. Readers will be particularly interested in maps of Taiwan (1 map), the Philippines (4), Mainland Southeast Asia (3), and Insular Southeast Asia (8).

The Language Atlas may be purchased for DM 500 including binder, or separate maps for DM 22. The agent is: Internationales Landkartenhaus, GeoCenter GMBH, Post Fach 80 08 30, Schockenriedstrasse 40a, D7000, Stuttgart 80.

ANDERSON, J. A. R., A checklist of the trees of Sarawak, 364 pp. (1983, Dewan Bahasa dan Pustaka Cawangan Sarawak, for Forest Department, Kuching, Sarawak). Cloth MAL\$ 15.00.

When Dr. Anderson retired from the Forest Department in 1973 he left the manuscript of this checklist for publication. Unfortunately publication was delayed for 10 years. It contains data on over 2500 arboreal plant species. The text consists mainly of two parts: the first is a list of vernacular names with their scientific equivalents, the second is a list of plant names alphabetically arranged by family. Each species is concisely annotated with its vernacular name(s), maximum diameter, ecology, frequency, soils, etc. Species names have been coded: the first two figures are for the family, the next two for the genus and the last two for the species. A list is given of the trees of the peat-swamp forests of which Anderson was a great expert. A small draw-back is that the literature of the last ten years has not been included. Nevertheless this is a most helpful book - (C.G.G.J. van Steenis).

FRANKEL, O. H. & M. E. SOULE, Conservation and evolution, viii + 327 pp. (1981, Cambridge Univ. Press, Cambridge, New York, Melbourne; hardcover ISBN 0521 23257, paperback ISBN 0521 29889).

This excellent book explores the details of long-range genetic and evolutionary problems associated with nature conservation. It is the first book systematically to review and critically to examine the principles and practice of genetic conservation of crops and livestock. The authors argue that the purely ecological or biogeographic approaches to nature conservation are not sufficient if reasonable samples of the planet's biota are to be preserved. They point out how the understanding and application of relatively simple genetic guidelines are essential if populations of large or rare animals and plants are to maintain their fitness, and if ecosystems are to maintain their diversity and stability. They demonstrate that even large islands like Borneo, after arising from the Sunda shelf, lost part of their species. The smaller conservation areas, the more species even in historical time will be lost from them. The book examines the origin, characteristics, and usefulness of the various kinds of genetic resources of

crops, forest species, and livestock, the threat to their continuing existence, appropriate measures to secure their survival, and the value and limitations of germplasm collections. This book will serve as a valuable source of information for students and research workers, and as a practical guide for all those who are concerned with wildlife and nature conservation. (H. P. Nooteboom)

JERMY, A. C. & K. KAVANAGH (eds.), Gunung Mulu National Park, Sarawak, 279 pp., figs., photographs, maps (July 1982, recvd. Jan. 1984, Sarawak Mus. J. 30, n.s. no. 51, Special Issue 2). Mal\$ 10.00.

In 1977-1978 the Royal Geographical Society of London together with the Sarawak Government launched a 15 month survey of some 560 km² of rain forest on the borders of Brunei and Sarawak, the newest and largest National Park of Sarawak named after its highest elevation, G. Mulu. On this Dr. A. C. Jermy of the BM (Nat. Hist.) gave a full account of the extent and purpose previously (Fl. Mal. Bull. 32, 1979, 3197-3198). This huge multinational and multidisciplinary expedition was most successful. For a ridiculously low price an outline of the results is now embodied in a most valuable account of several aspects. The many photographs give an excellent picture of the very rich diversity of the Park from swamp forest to subalpine vegetation at 2376 m, and a great variety of soils and bedrock among which the huge limestones with their many caves. Some hundred scientists of all sorts had an unexpected opportunity for research in the field.

In this volume a general account of the survey of the Park is given by Jermy, one of the main organizers, J. Proctor, deals with the place names, R. P. D. Walsh gives a survey of the climate and examines the hydrology and water chemistry, H. A. Osmaston & M. M. Sweeting discuss the geomorphology, A. C. Waltham & B. Debb deal with the geology, D. B. Brook c.s. describe the caves, I. C. Baillie c.s. the soils (with a large map), J. Proctor c.s. give studies of four forest types, while P. Kedit wrote an ecological survey of the life of the Penan people.

In all it is a magnificent survey of a first rate primary rain forest reserve. Everyone who is concerned with rain forest conditions and their conservation should have this book. We eagerly look forward for the second volume. Together they will give a good insight on the management of such vital parks. The Sarawak Government, the Royal Geographical Society and the two main promoters of the undertaking, Dr. Jermy and Dr. Anderson are warmly congratulated with this achievement. (C.G.G.J. van Steenis)

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(Notes from the Editor (Cont'd.))

is 250,000 about ten percent of whom are Bidayuh and Iban. And the percentages of indigenes in both cities will increase.

From hinterland to city, Borneo is changing dramatically and rapidly. And there is an urgent need for informed policy based upon sound research and open communication.

We thank the following persons for their contributions to the work of the Borneo Research Council: Carol J. Colfer, John Fox, Craig Lockard, H.A. Sutherland, John A. Sutter, and Wang Gungwu.

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The Borneo Research Council was founded in 1968 and its membership consists of Fellows, an international group of scholars who are professionally engaged in research in Borneo. The goals of the Council are (1) to promote scientific research in Borneo; (2) to permit the research community, interested Borneo government departments and others to keep abreast of ongoing research and its results; (3) to serve as a vehicle for drawing attention to urgent research problems; (4) to coordinate the flow of information on Borneo research arising from many diverse sources; (5) to disseminate rapidly the initial results of research activity; and (6) to facilitate research by reporting on current conditions. The functions of the Council also include providing counsel and assistance to research endeavors, conservation activities, and the practical application of research results.

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