

**ROADS, REMOTENESS AND RURAL DEVELOPMENT:
SOCIAL IMPACTS OF RURAL ROADS
IN UPLAND AREAS OF SARAWAK, MALAYSIA**

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INTRODUCTION

In most developing countries, rural development remains a high priority because the majority of the population, and of the poor, lives in rural areas. Nevertheless, progress in rural development has been hampered by structural and institutional biases against the rural poor. Lipton (1977), echoing the dependency theorists' notion of core-periphery relationships, has identified the problem of "urban bias". He argues that there is a systematic tendency for a country's resources to be unfairly and inefficiently distributed in favour of urban areas, to the detriment of people living in rural areas. Chambers (1983) exposes the "invisible" side of rural poverty and highlights some of the inequalities within rural areas. Both Chambers (1983) and Johnston and Clark (1982) advocate the use of broad based rural development strategies that benefit the majority of the rural poor.

Rural roads represent the link between the urban "core" and the rural "periphery". They have the potential to counter some of the disadvantages of remoteness and provide benefits to all groups within a community. They do not inherently favour the rural elite, thus satisfying Chambers'(1983) requirement for rural development strategies that benefit women, the most remote, and the most poor. In addition, rural road provision addresses Johnston and Clark's (1982) call for a three-pronged approach to rural development, addressing production, consumption and institutional aspects of development. There exists a vast literature on the impacts of rural roads (Windle 1997). While in the past assessment has concentrated on economic impacts (discussed in relation to Sarawak in Windle and Cramb (1997)), more recent studies have shown that social impacts are equally if not more important.

This paper, part of a wider study that examines economic, social and environmental impacts of rural roads in Sarawak, discusses some of the social impacts of rural roads and how they are related to accessibility. It highlights the disadvantage associated with remoteness both within a particular area and between areas of differing regional accessibility.

ROADS AND RURAL DEVELOPMENT IN SARAWAK

Years of strong economic growth in Sarawak have permitted high levels of government spending, the effects of which are evident throughout Sarawak. Overall, there has been a sharp decline in the percentage of the population falling below the official poverty line, from 31.9% in 1985, to 21.0% in 1990. "Hard-core" poverty fell from 10.0% in 1985, to 3.3% in 1990 (Malaysia 1994). However, both public and private expenditure has been concentrated in the urban areas (Leigh 1979; Cramb and Dixon 1988), rather than being broadly dispersed to rural areas. In 1984,

51% of rural but only 32% of the urban population of Sabah and Sarawak were classed as living below the poverty line (Cleary and Eaton 1992:63).

As the majority of the population in Sarawak lives in rural areas, issues of rural development remain of major importance (Cramb and Reece 1988; King 1988; Abdul Majid Mat Salleh et. al. 1990; Cleary and Eaton 1992). However, the rural population is widely scattered throughout the remote areas of the State, which has a population density of only 13 people per square kilometre (Malaysia 1994). To overcome these problems of isolation, one rural development strategy applied in Sarawak has been to concentrate resources in large-scale land development schemes and bring people to these centres. However, these land schemes have encountered many problems (King 1986; Cramb 1992) and in any case can only cater for a fraction of the rural population. An alternative development strategy, which would address the needs of the majority of people living in rural areas, is to provide road access and encourage the rural population to develop in situ. Rural roads are seen as having potential to ease the problem of remoteness and to facilitate rural development. However, the impacts of rural roads are likely to be complex and to differ from one area to another.

Remoteness has been a feature of Sarawak's historical development. In past centuries when tribal warfare was common, remoteness provided some form of protection. However, today it is more of a disadvantage and restricts communities from participating in benefits enjoyed by others in the state as economic development progresses. Water has formed the basis of settlement patterns and communication networks. In the swampy coastal areas, settlements were connected by sea, while the hilly inland areas were reached through the different river systems. An infrastructure of land transport has been slow to develop and, after the Second World War, only a few short, poorly surfaced roads existed in the immediate vicinity of the larger towns of Kuching, Miri and Sibü. The lack of infrastructure was identified as an impediment to economic and social development of the country and there has been a steady investment in road construction ever since.

Apart from studies in Sabah (Bonney 1966; Abdullah and Mustapha 1985), most studies of rural roads and accessibility in Malaysia have been confined to Peninsular Malaysia (Hughes 1969; Buang 1981; Smith 1981). However, one study of the socio-economic impacts of rural roads in Sarawak has been made by Niew and Lim (1977). Unfortunately the findings of this study are very generalised because it combines both rural and urban samples from three different regions of Sarawak (the former 1st, 2nd and 4th Divisions), and is somewhat dated as fieldwork was conducted in 1975, when road provision was still very limited. Niew (1978) concluded (as do many

authors) that road provision alone will not guarantee development, citing that roads in the Second Division were completed much earlier than those in the Fourth Division, yet lands along the former were less developed. Obviously factors other than road provision are important and may limit the development process.

This study involved populations from two Dayak groups, the Iban and the Bidayuh. These groups have a similar farming system based on shifting cultivation for subsistence crops, the cultivation of cash crops (principally pepper, rubber and cocoa for export), and a continuing reliance on forest products to satisfy a variety of household needs. They also have a similar social organisation and both traditionally lived in longhouses, though most Bidayuh communities now have separate dwellings (some Bidayuh communities in the Krokong area have no history of ever having lived in a longhouse). Both groups have lived in relatively isolated communities where the influence of people within the community has been stronger than external influences.

METHODOLOGY AND STUDY AREAS

A case study approach was adopted which aimed to provide an overall picture of road impacts in the broadest possible context. Emphasis was placed on examining processes, tendencies and relationships, and how they changed in more remote areas. Although some impacts were quantified, more emphasis was placed on comprehensive reasoning and "plausible inferences" (Casely and Kumar 1988). No attempt was made to make any predictions that required detailed statistical analysis, and arbitrary tests of statistical significance were not considered appropriate.

The results reported in this paper were collected with the use of a questionnaire survey, supplemented by interviews with key informants, participant observation, and women's focused discussion groups. Fieldwork was conducted in 1994-5. All interviews were conducted with the assistance of translators, under the guidance of the senior author.

Three roads were selected for study, each in areas of differing regional accessibility (Figure 1). The Layar road (the Layar area) provided Iban communities with access to Betong, a small district town, 251 km from Kuching, the capital city. The Bengoh road (the Padawan area) and the Tringus road (the Krokong area) provided Bidayuh communities with access to Kuching. However, the Padawan area was more remote than the Krokong area as historically it had been more isolated and less open to external influences (there has long been a Chinese presence in the latter area, associated with gold mining). In order to assess the relative impacts of road provision within a selected area, three domains of accessibility were defined. Circumstances at communities

with "road access" were compared to those with "bad" access and those with "very bad" access. These accessibility domains were relative concepts and not uniformly defined; they reflected the context of a particular area and were not strictly comparable across study areas.

The Layar road branches from the main trunk road which traverses Sarawak (nine kilometres from Betong) and stretches 26.5 km to Nanga Tiga. Construction of the road began in 1975 and although it briefly reached Nanga Tiga (an official opening ceremony was held) in late 1992, by early 1993 the road had been washed out and Nanga Mutok was the furthestmost longhouse to retain road access (Figure 2). The road reached Batu Lintang in the early 1980s and it was the section from Batu Lintang onwards that was considered for study. The road condition was poor with steep unsurfaced slopes subject to erosion and could be impassable in wet weather. The area of influence included all longhouses in the "catchment area"; those in the Layar river and its main tributary, the Spak. The study area comprised 46 longhouses and a total of 793 farm families, from which 90 farm families (11 percent of the population) from six longhouses were selected for detailed survey. The area was divided into three accessibility domains and 30 households were selected to represent each domain, 15 households from each of two longhouses. Jambu and Nanga Muman represented the domain of "very bad access" (approximately five hours journey from the road); Kerapa and Nanga Tapih had "bad access" (approximately three and one hours journey from the road, respectively), and Nanga Mutok and Batu Lintang had "road access" (Figure 2).

Construction of the Bengoh road (5 km) started from the junction at Bayur in 1986 and the road reached Bengoh at the end of 1988. The road condition was good, with no steep slopes and a good gravel surface which is permanently sealed on bends and near Bayur. The Bengoh road provides Bidayuh households in the area with access both to intermediate market bazaars, and to Kuching (approximately 1-1.5 hr by car). There are five villages in the area of influence of the Bengoh road (Figure 3) and a total of 224 farm families. Sixty households (27 percent of the population) were selected for interview from three domains; 10 households each from Semban and Rejai represented the "very bad access" domain (approximately four hours walk from the road); 10 households each from Bojong and Taba Sait represented the "bad access" domain (approximately two hours walk from the road), and 20 households from Bengoh were selected to represent the "road access" domain.

The Tringgus road (14 km) was built in three sections; the first part started from Krokong (10 km from Bau) in 1983 and reached Pedaun Bawah in 1985 (Figure 4). The second section started from Pedaun Bawah in 1989 and reached Pengkalan Tebang in 1990. The road up to this

point is in good condition, flat with a gravel surface. The third section to Tringgus was built in 1993, it is not surfaced and is steeper in places than the other sections. While the road was badly damaged due to daily use by heavy logging trucks, the logging companies kept the road graded and it was generally kept passable for most vehicles. The road provided local Bidayuh communities with easy access to Bau, but also to Kuching (approximately 1-1.5 hr by car). As Krokong (a group of three villages) and nearby Buta had had road access to Bau since the 1950s, they were excluded from the study area. Eight villages were considered under the area of influence of the road (Figure 4) which included 375 households. A sample of 60 households (16 percent of the population) was selected for detailed survey from three domains.

There were some anomalies in the distinction of the accessibility domains in the Krokong area, however, where appropriate these are noted in the text. Twelve households from Gumbang (one hour walk from the road) and eight from Plaman Redan comprised the "very bad access" domain. This however, was not a totally accurate description; some households from Gumbang had moved to be closer to the road and formed a new village, Plaman Redan. At the time of study, households associated with Plaman Redan were in the process of moving; some did live beside the road, but others still lived near Gumbang. Twenty households were selected from Tringgus, the "bad access" domain. As the village was very elongated and the roadhead reached one end of the village, some but not all households had road access. However, the village was more accessible than Gumbang and the most people had to walk was 20 minutes. Also, because the road had only recently reached Tringgus, it was not classified as having "road access". Ten households each from Kaman and Bijuray represented the "road access" domain; they had had road access since the early 1980s. So, while these three accessibility domains differed from those in the other study areas, they did represent relative accessibility within the Krokong area, which was all that was required.

SOCIAL IMPACTS OF RURAL ROADS

Mobility

Gender and Mobility

Traditionally men (particularly Iban) enjoyed more mobility than women because of their affinity for circular migration, where men would leave the village for short term wage employment or for longer periods, seeking material wealth and social prestige. Road access provided an important means to improve the mobility of women and is best considered in terms of transport modes used. Walking favoured neither gender and, although women were unlikely to travel alone,

they did not need to be accompanied by an adult male. Boat travel was more restrictive for women as they generally did not drive boats (women did paddle canoes on their own, but not with outboard motors), which meant they had to be accompanied by an adult male and so could not travel exactly when they might wish. Road travel increased women's mobility as they could travel alone, either on buses or private vans. However, unless women drive vehicles as frequently as men, rural road access will improve the mobility of men to a greater extent than it does for women.

Transport Provision

In all three areas some form of passenger service was provided along the entire length of the road, albeit of differing regularity. In the Layar area, a bus service ran between Betong and Batu Lintang, four times daily. Upriver from Batu Lintang, private (locally owned) passenger vans provided a daily service to Betong, though principally in the mornings. In the Padawan area there were two bus services, each running four times daily, from Kuching to Bengoh. In the Krokong area there was a frequent bus service between Bau and Krokong village, but it did not extend along the Tringus road; instead, private vans provided a regular passenger service. Bus and passenger van fares were comparable and were accessible to women and men alike. Although the cost of transport may have deterred some people from travelling, it did not appear to be a major deterrent. When asked about disadvantages associated with the road, only two respondents from the Layar area and two from the Padawan area mentioned a problem with the cost of transport.

Road Users

In all three study areas, not only did more people in the roadside villages make more journeys outside their area, but the proportion of women travelling also increased with accessibility. However, traffic flows were considerably different between the three roads, with the Tringus road being much more heavily used than the other two (Figure 5). The same pattern was found when traffic flows were related to population size (measured as the number of households) of the road catchment; the proportion increased as regional accessibility increased. In the Layar area the daily traffic flow was 0.08 vehicles per household, compared with 0.28 for the Padawan area and 1.01 for the Krokong area.

Most vehicles using the roads were locally owned, apart from in the Layar area where there was regular use by work vehicles (mainly related to road construction) and commercial trading vans. Apart from one mobile trader and three trucks belonging to local shops, all these vehicles

were owned by people outside the area. The common use of passenger vans which were locally owned meant that the returns from running a passenger service accrued locally. In contrast, where the main passenger service was provided by the Chinese-owned bus company, profits went outside the area. This was the case on the Bengoh road where local politics had restricted the use of a passenger van service.

Increases in weekend traffic in the Layar area were mainly from moving school children around (most of whom have to board at school and return home every second week-end). The poor road condition deterred those from outside the area coming to visit. In the two Bidayuh areas, the main increases in week-end traffic were related to people visiting their friends and relatives. In the Padawan area the increase was mainly in the use of motorcycles; as road conditions before reaching the Bengoh road were not always good, some car owners were possibly deterred from visiting the area. In contrast, the main increase in weekend traffic in the Krokong area was in cars (from outside the area). Before reaching the Tringgus road, all roads had a bitumen surface and were in good condition, and car owners were not deterred from visiting the area.

The prominence of passenger vans and the regularity of a van-service meant that people, of both genders and all ages, could travel with minimum inconvenience. Although there were no cultural restrictions on female mobility and the only restriction on their use of the van or bus services was probably financial, they were rarely seen driving any vehicle. The incidence of female drivers appeared to be strongly correlated with accessibility. In Kuching, women drivers were common, but they were never seen driving a vehicle on the Layar or Bengoh roads. During the traffic survey only five women were seen driving a vehicle on the Tringgus road, and only one possibly lived locally. As women were not driving vehicles in the study areas it meant that while bus and passenger van services were gender neutral, motorcycle use was dominated by men and gave them a greater degree of mobility than women as they could go where they wanted, when they wanted.

No clear relationship was established between accessibility and the reasons for journeys taken by respondents in the different areas. However, increased mobility had a much greater impact in the two more accessible Bidayuh areas. First, there appeared to be more inter-village contact e.g., in Bidayuh areas, young men would go to play football in another village after work, there were more inter-school sports competitions, and more social visits were made to non-relatives. These activities rarely occurred in the Layar area. Second, the size of town to which an area had reasonable access was a major factor. Betong was a small town with little choice of goods and

services to offer residents from the Layar area. The market for local produce and labour was saturated, leisure activities were limited, and culturally the town was dominated by Iban and Chinese. In contrast, Kuching had all the attractions of a capital city; employment could be found, local produce sold, but perhaps of most importance was the increased choice of leisure activities and social interaction with people from the broad range of ethnic groups in Sarawak.

Migration

The availability of employment and entertainment in urban areas was attracting people away from rural areas, but it was unclear how the provision of a road affected this migration. In the Padawan area, since the road was built, nobody had migrated out of the area nor had new people moved in.

In the Krokong area, migration was more apparent. Tringgus was the only village that reported in-migration; three people from Kuching had married people from Tringgus and had come to live in the village. Out-migration was more common and, as it was greatest at the roadside villages, Bijuray and Kaman, it was possibly related to accessibility. At Tringgus, more than 10 people were reported to have moved out of the area since the road had been built; six families had left from Bijuray and fifteen people from Kaman, all to go and live in Kuching. At Gumbang, approximately a third of the village moved because of the road, but they did not move out of the area.

In the Layar area, there appeared to be a decline in the longhouse populations, though it was unclear if or how the road affected this decline. Between 1980 and 1989 the population at Batu Lintang remained stable whereas at Nanga Tapih the population had increased, although the number of households had increased at both longhouses (Cramb 1993). By 1994 the populations of both longhouses had declined significantly (Table 1).

Table 1. Demographic Characteristics of Two Longhouses in the Layar Area, 1980 - 1994

Longhouse	Access	1980 ^a	1985 ^a	1989 ^a	1994
Batu Lintang	Roadside				
No. of households		30	31	33	32 ^b
Total population		185	183	182	149
Nanga Tapih	Off-road				
No. of households		19	20	22	24
Total Population		110	111	132	114

^a Reproduced from Cramb (1993b:215)

^b At the time of fieldwork only 29 households (134 people) were resident and six were absent. At least three were absent on a more long-term basis and were discounted. The other three absent households were assumed to be absent temporarily and to be of average size (five).

In the two Bidayuh areas, people who had migrated to the city could still return to their village at week-ends and so could maintain their contribution to household and community welfare. In the Layar area, urban migrants had less contact with their longhouse and were only likely to return once or twice a year. The problem of young people leaving the area was an often-voiced concern, particularly by the elderly.

Not all people who migrated out of their area did so on a permanent basis; particularly in the Layar area, some of the urban migration was circular in nature. However, it tended to be people who had retired from their jobs who came back to reside permanently in the longhouse. In the more accessible areas in Kuching Division some young people were reported to be moving back home and reversing the trend of urban migration. They were continuing to work in Kuching, but rather than returning home at the week-ends they had decided to commute to work on a daily basis. So, while road access did not affect returning migrants in the Layar area, it had a direct effect in the Bidayuh areas, because of the access to Kuching.

Transport Demand

While a road produced many benefits in terms of improved mobility and access to places outside the immediate area, did it satisfy the demand for transport within the area of influence? The main occupation of households in all study areas was farming. So the main demand for transport came from farmers moving between their homes, their fields and their main marketing centre. Most farmers grew both food crops and export crops and so had more than one field. Over 90% of farmers in all three study areas walked to their fields, which could involve a journey of up to two hours. Fields generally were located closer to the village as accessibility improved, and export crops were located closer than hill padi fields (Table 2).

Table 2. Average Annual Household Effort and Time Spent on Headloading

Layar	Jambu	Ng Muman	Kerapa	Ng Tapih	Ng Mutok	Batu Lintang
Ave time (mins) to padi field	40	50	50	30	40	30

Ave time (mins) to pepper/cocoa field	20	15	15	15	25	15
Ave time headloading (hrs/yr)^a	265	23	86	18	37	14
Padawan	Semban	Rejoi	Bojong	T'Sait	Bengoh	
Ave time (mins) to padi field	70	55	60	45	30	
Ave time (mins) to pepper/cocoa field	50	35	40	25	25	
Ave time headloading (hrs/yr)^a	97	47	87	81	24	
Krokong	Gumbang ^b	Tringgus	P.Redan ^b	Bijuray	Kaman	
Ave time (mins) to padi field	50	45	13	40	32	
Ave time (mins) to pepper/cocoa field	33	19	18	5	13	
Ave time headloading (hrs/yr)^a	38	20^c	6	11	4	

^a Assuming an average load of 35kg.

^b Two Plaman Redan households were located close to Gumbang and were included in that sample.

^c Some households at Tringgus did have to walk to the road and so values were underestimated.

If travel time was calculated as a percentage of the total labour requirement for hill padi, an additional 10-25% of the time spent working in the fields was required for travelling. This compares with a range of 10-33% reported by Chisholm (1979). Draught animals were not used and all farm inputs and outputs were headloaded. In addition, those without road or river access had to headload goods to and from the main marketing point. So the burden of headloading varied with location and the amount farmers produced; in extreme cases such as Jambu, the burden could be enormous (Table 2).

In general, in all three areas the new road replaced river transport and so made journeys quicker and cheaper, but roads have not directly decreased the burden of headloading. In the Krokong area, the river was small and could only be used when water levels permitted and so the road has been of more benefit to headloaders. However, indirectly, new road access has reduced the burden of headloading as improved accessibility appears to be related to shorter distances to farmers' fields.

Education

In all study areas only primary school education was provided and pupils attending secondary school had to travel outside the area. Most pupils had to board at school and returned home every second weekend. Although new roads had not resulted in an increase in service

provision, improved accessibility reduced the burden of travel for school children and improved the standard of existing facilities.

There did not appear to be a direct relationship between accessibility and primary school performance (Figure 6). Nonetheless, a higher proportion of students continuing on to higher education (past Form 3) came from roadside locations - 55% in the Layar and 64% in the Padawan area. In the Krokong area, where problems associated with remoteness were not as pronounced, there was no apparent relationship between those with a higher education and accessibility.

Rural schools generally did not perform as well as urban schools, for reasons related to accessibility. Primary schools in rural areas received less facilities (especially those without road access) than their urban counterparts and not all those with road access were connected to the main electricity supply. Most urban children would have attended kindergarten classes before entering primary school, but this was generally not the case for rural children. In addition, rural students had less encouragement from their parents, many of whom were without formal education. Better and more experienced teachers tended to be located in the urban schools where they were likely to remain, whereas in the more remote areas schools were staffed by a high proportion of new teachers who were often unhappy and applied for transfers as soon as they were eligible. Teaching staff in the study areas did not receive a remote living allowance, unlike the teachers from Peninsular Malaysia working in urban areas within Sarawak. In an urban environment there were more information sources and external influences to stimulate both teachers and pupils, compared with the rural areas. Discussions with Education Officers suggested that one of the most important influences at a school was that of the principal and, without sound leadership, teachers were less likely to tolerate the problems of inaccessibility. The problem of absent principals resulting in teachers curtailing classes in rural areas appeared to occur throughout Sarawak (*Sarawak Tribune* 25/7/94). In the three study areas, there were two schools where the principal was often absent and this appeared to contribute to low staff morale.

Shah and Ling (1993) found four main factors that impeded the progress of education in the rural areas - the educational level of the students' parents, the students themselves, the teachers, and the school facilities. Tan (1993) has suggested that heat can affect the performance of both teachers and pupils in rural schools. In addition, various studies have suggested a relationship between malnutrition and behavioural and mental development problems and, although evidence remains inconclusive, the overall body of knowledge suggests such a relationship does exist (Pollitt 1987). If this is the case, then it is probable that poor diet and malnutrition (higher rates of which

occurred in rural areas) affected the learning ability of some pupils.

In the past there have been problems with absenteeism at primary schools, but discussions with teachers suggested these problems had been largely overcome. There was no evidence to suggest absenteeism was related to accessibility, apart from Kaman (the most accessible village in the most accessible area, Krokong) where a third of survey respondents thought their children were absent from school more often since the road was built. Absenteeism was historically associated with the parents; either they did not feel it was important to send their children to school or children were kept out of school to help at home or on the farm. More recent evidence suggests the children themselves (mainly boys) did not want to go to school and the parents were not willing or able to insist they did. During the period of fieldwork, although it was not common, some young boys were observed at home during term-time.

In most but not all schools, discussions with teachers suggested that the performance of the girls was better than that of the boys. When probed, most teachers thought it was because girls were better disciplined than boys.

Health

In all three study areas the provision of a road did not result in an increase in the provision of medical services to the villages, but it did provide improved access to existing facilities which, particularly in emergencies, could save lives.

Households in both the Padawan and Krokong areas were asked if they made greater use of specialised health care facilities such as hospitals and doctors since the road was built (a different question was asked in the Layar area, but results were inconsistent and are not reported). In the Padawan area, only five respondents did not reply in the affirmative. In the Krokong area, the affirmative response was slightly lower, but even at Gumbang where it was the lowest, 58% of respondents still replied in the affirmative.

Women's Health

Women were strongly encouraged by government health workers not to give birth at home; traditional midwives were discredited and sometimes even given incentives (e.g., sarongs) to discontinue their practice. This made access to a birthing clinic or hospital of primary importance. The impact of inaccessibility on women's health was well illustrated by Gumbang, the only village in the Krokong area without road access. Discussions with a group of women revealed that three out

of the 12 present had given birth in the forest before managing to reach the birthing clinic at Krokong.

General observations during fieldwork suggested the incidence of babies being fed on powder formula increased with accessibility and was certainly the fashion if parents could afford it. In many cases this would have had a negative impact on the health of a young baby.

As women rarely drove boats or motor vehicles in rural areas, they were dependent on men to access medical facilities, unless they could walk.

Nutrition

The survey results strongly suggest that new road access led to an improvement in diet. In the Layar area, the proportions of households purchasing meat, fish, and vegetables, were all related to accessibility (Figure 7). Fruit was mainly grown locally and few households purchased additional amounts, none of whom were from the most remote villages. In the Bidayuh areas, the proportion of households purchasing certain nutritional foods on a weekly basis was assessed; there were notable increases as accessibility improved (Figure 8). In the Padawan area, where off-road villages had a more difficult journey to a roadhead than in the Krokong area, the increases at the roadside village were particularly dramatic.

One negative impact of accessibility on nutrition was the increased consumption of sweets, processed snacks and soft drinks by the children. This would certainly have increased dental problems which were already inadequately addressed.

Community

Rapid economic growth in recent years has brought change to many aspects of life in Sarawak and even the most remote villages have not been excluded. This study has tried to concentrate on change brought about by road provision and separate it from that which is occurring generally within Sarawak. However, the distinction is not always clear because roads act as conductors of change as it emanates from the urban centres and permeates the rural periphery. Some changes can be seen in roadside communities that have not (as yet?) occurred in off-road communities, and these can be viewed as indirect road impacts.

Sharing

Key informants in all three areas were asked for their opinions on the impacts of the new

road. One impact mentioned (particularly by church leaders) was that there was less sharing in the roadside communities. One of the reasons given was that households were more independent and had less need to rely on the community; an obvious example was that they no longer needed to rely on others to carry out the sick. If road or river access was not possible, sick people had to be carried, and all communities had a system that shared this burden equally between households. Households in roadside communities also appeared to engage in labour exchange (a traditional community institution in all areas) to a lesser extent than those in off-road communities.

Another example of reduced sharing could be seen in the Krokong area with the abuse of a common property resource; whereas before certain individuals had collected birds' nests on behalf of the whole community, they now deceived the community and kept the rewards for themselves. Because individual survival no longer relied on support from other members of the community, certain people could "afford" to be more selfish.

Although sharing within the community appeared to diminish in roadside villages, this did not mean that all community institutions were becoming redundant, and even in roadside villages communal feasting was still prevalent and people still gained considerable pleasure from being part of a group. In all Dayak groups, there has always been a balance between individualism and community orientation, but perhaps increased accessibility is causing a shift in that balance in favour of individualism.

Youth

One anticipated impact of roads was an increase in socially unacceptable behaviour by rural youth as they spent more time in urban areas where there was a wide range of influences and their behaviour went unmonitored by older members of their community. Although the question was probed, in none of the study areas did this appear to be a problem. Only in Bidayuh areas was there some criticism of young boys driving around too fast and noisily on their motorcycles.

However, there appeared to be some relationship between increased discipline problems and accessibility; children were learning to be more disobedient of their parents which was possibly influenced by two main factors. First, improved accessibility gave children more exposure to peers from different cultures and backgrounds. This gave them more choice, and they were learning that the way they had been brought up to behave was not the only way to behave. Second, better access was providing them with the opportunity for increased contact with urban life, which had a very different culture than the one in which they were raised. There was a nationally promoted concept

that "traditional" ways of doing things (particularly farming) were old fashioned and redundant, and people should become "modern". Concepts of modernity were very much defined by the central, urban based, government, and were promoted by centrally controlled institutions such as the education system. So children were learning to focus on a new culture, of which they often had a better understanding than their parents. Some children were discovering that their parents were not always a more knowledgeable authority than themselves, particularly regarding "modern" lifestyles. Although there was no evidence to suggest that the traditional respect children had for their parents was being jeopardised, it was becoming increasingly common for children to tell their parents what to do and how they should live, and roles were becoming reversed. The hegemony of the new culture was gradually spreading into the rural areas, and so was directly related to accessibility.

Overall Perceptions

When respondents were asked for their opinions on the effects of a new road, most found it hard to think of negative impacts (Figure 9), but this was not the case with those who came from roadside longhouses in the Layar area. People there were more concerned with the condition of the road ("road specific" problems) as soil erosion was a major problem and the road was not always passable.

Respondents in the Layar area generally had problems managing their finances ("budget control" problems). Since the road was built, people were exposed to a more accessible and wider range of consumer products and many people were spending money on a more regular basis (children were particularly demanding with their desire for sweets and snack foods), and people with limited incomes were finding it difficult to manage.

People (more from off-road villages) were also concerned about thieves or "bad" people coming in. This appeared to be an unrealistic concern but illustrated how aware people were that the flow of traffic goes both ways on a road. Several people in the Padawan area from off-road villages thought the road was "too far away" (a "road specific" problem).

Opinions about the advantages of a new road were more diverse and harder to classify. In the Layar area, the most commonly cited benefits were related to marketing (associated with selling (farm produce) in the case of off-road responses, and buying (mainly food) in roadside responses) (Figure 10). In the Padawan area, cited benefits were mainly associated with improved access to Kuching, although this was more pronounced in the off-road responses. Nobody in the off-road villages in the Padawan area cited better transport as a road benefit, and health reasons were more

important than at the roadside village. In the Krokong area, most benefits related to aspects of improved transport.

Most people wanted a road and felt disadvantaged by not having one. In this respect it can be said that road provision increased the feeling of disadvantage of those without a road. During the period of fieldwork, nobody was ever heard to say they did not want a road, although in the past this was not the case. During the period of Confrontation with Indonesia (1963-66), the Australian army had offered to build a road to Gumbang, in the Krokong area, but the offer was declined. In the Padawan area, the headman at Bengoh had originally opposed construction of a road as he ran a river transport service which would become redundant. However, he no longer opposes the road and has concentrated his business interests in a shop, which he also operated before the road was built but has since been expanded.

DISCUSSION AND CONCLUSION

Farming was the dominant activity in all the study areas and as the majority of farmers continued to walk to their fields and headload their inputs and outputs, roads had little impact on this aspect of transport demand. However, roads did improve the mobility of local residents which had a considerable impact. There were obvious benefits of having a broader range of leisure activities and social contact, a wider range of information and experiences, but costs were also incurred in terms of a decline in the importance of traditional culture.

Although new road provision did not result in an increase in the provision of government services such as health and education, the quality of service provided did improve with accessibility. New roads provided people with better access to existing services; with education this meant a less arduous (and perhaps cheaper) journey for school children, and in the area of health it could even result in lives being saved. However, the increased influence of both these services contributed to the undermining of more "traditional" community knowledge (e.g., medicine) and institutions (e.g., sharing), and the younger generation required advice on matters with which the older generation were unfamiliar.

The opinions of respondents in the Bidayuh areas suggested little negative impact of roads, but in the Layar area there was more concern with the bad condition of the road (not a problem with a road as such) and with the increased financial pressure it placed on households. However, most people still wanted a road and felt disadvantaged without one.

In summary, while most impacts were obviously beneficial, other impacts such as changes

within the community had a more ambiguous effect. The diminution of traditional culture must be of concern, but it is a change that is occurring throughout Sarawak. Rural roads were not causing the change but they did act to accelerate the pace of change. However, the magnitude of impacts was very much related to accessibility, which highlights the disadvantages associated with remoteness. From a regional perspective, the Krokong area (most accessible region) appeared to benefit more from road access than the Layar area (less accessible region). Road usage, and hence mobility, was far greater in the Krokong area, and there was a larger proportion of households purchasing nutritional foods. Both the Padawan and Krokong areas benefited from improved access to a large urban centre and the wide range of goods and services on offer. This was not the case in the Layar area, where access to a small town was far less influential. The disadvantage of remoteness was also apparent within each study area, though to a lesser extent in the Krokong area. The journey to town or government facilities became quicker, easier, and cheaper when road transport replaced river transport, for even the most remote communities in the area of influence of a road. However, those communities that gained roadside access had an obvious advantage over those which did not.

Overall, the social impacts of rural roads were far reaching and of benefit to all, even people in the most remote communities. Consequently, in terms of rural development, provision of rural roads is an appropriate policy option as it addresses the needs of the majority of the rural population. However, the distribution of impacts was not uniform; men benefited to a greater extent than women from increased mobility, young people benefited more than old, roadside communities more than remote communities, and those with access to a large urban centre benefited more than those with access to a small town. If then, an equitable policy of rural development is to be pursued, the needs of these more disadvantaged groups must be more specifically targeted.

It has been shown that the social impacts of roads are very important though difficult to assess in any quantitative manner. However, road impact studies tend to be evaluated in quantitative terms with an emphasis on more tangible (usually economic) aspects. Such analysis would be misleading and would fail to provide a comprehensive understanding and appreciation of road impacts.

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