

OPPORTUNITIES AND CONSTRAINTS FOR AGRICULTURAL INTENSIFICATION IN COMMUNITIES ADJACENT TO THE CROCKER RANGE NATIONAL PARK SABAH, MALAYSIA

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ABSTRACT

Agricultural intensification has high priority in Sabah and through interviews in two Dusun communities, Patau and Kuyongan, located close to the Crocker Range National Park, this study analyses their opportunities and constraints for agricultural intensification. Farming practices are still dominated by shifting cultivation although increased wet rice cultivation, permanent fruit tree plantations and replacement of upland rice with ginger are signs of agricultural intensification. Shortage of labour appears to be a major constraint for intensifying land use inly because of young people engaging in off-farm labour or labour migration. Land tenure is the most crucial issue in Kuyongan which is located in a recently gazetted water catchment area and much of the land is therefore not eligible for official titling. Various government agencies or government supported NGOs support agricultural intensification with subsidised infrastructure and inputs or credit schemes. However, many schemes have not been successful, probably because the labour and other socio-economic issues are not adequately addressed. Perspectives for intensification in Patau are good, however, whereas they are very uncertain in Kuyongan due to the land tenure situation.

INTRODUCTION

Intensification and commercialisation of agriculture are seen as crucial elements in the process of agricultural development in Sabah and these efforts are applied to most agricultural lands, including areas adjacent to national parks. Approaches to intensification are frequently focused on two pathways: further intensification of existing lowland wet rice cultivation and replacement of shifting cultivation in upland areas with permanent farming. While shifting cultivation is considered an environmentally and economically unsustainable farming system by most Southeast Asian governments (Bryant and Parnwell 1996; King 1996), it may play an important role in transitory systems where agricultural intensification is taking place at a rapid pace either driven by population increase or other external pressures (Cramb 1993; Padoch et al. 1998).

Agricultural intensification is driven by the need for higher productivity of the land, and can be defined as: 1) increases in labour or capital inputs per area unit; 2) the creation of landesque capital (e.g. in the form of soil/water conservation structures or irrigation systems); and 3) changes in land management. The latter may include changes in cultivation frequency (or fallow interval); the percentage of land cultivated, the farming technologies used, the methods used to manage soil fertility, the crops selected, the ways in which crops and livestock are integrated, and the management of natural vegetation (Adams and Mortimore 1997).

To overcome constraints and to motivate small farmers to intensify, various government agencies and farmer organisations provide resources in the form of subsidised production inputs (e.g. seeds, fertilisers, pesticides, etc.) and knowledge. The process of changing traditional farming systems is very fragile, however. As Lim and Douglas (1998) emphasise, poverty in the rural areas of Sabah is still a significant barrier for small farmers' further reliance on cash cropping since increased market dependency for resource weak farmers "potentially give rise to serious socio-economic ramifications and environmental degradation". This relates to the disruption of traditional complex patterns of livelihood strategies aimed at minimising risk which poor farmers rely on in situations of economic and ecological uncertainty (Christensen and Mertz 1993; Chambers 1997; Adams and Mortimore 1997). This article aims at contributing to the understanding of the efforts to intensify agricultural practices in an area where agricultural expansion is limited by the presence of the Crocker Range National Park (CRNP). We will analyse farmers' motivations for decision-making on agricultural intensification processes and focus on opportunities and constraints for a higher degree of reliance on cash cropping in the farming system.

STUDY AREA

The villages of Kuyongan and Patau are inhabited mainly by the *Kadazan Dusun* and located in the Pegalan watershed area within Tambunan District in the Sabah Interior Residency. The population of Kuyongan is about 260 persons distributed between 35 households. The village is located in the Tondulu river valley about 5km from Tambunan town. It is stretched approximately four km along the valley at an altitude of about 950 metres above sea level. A gravel road running along the valley and a primary school are the only public infrastructure. Wet rice is cultivated to a limited extent in the valley bottom and upland crops such as upland rice, vegetables, and fruit trees are cultivated on the relatively steep hillsides bordering the valley. There are also a few newly established fish ponds in the valley bottom. The village lies on the border of the Crocker Range National Park (CRNP) which can be accessed only through a small foot path. Moreover, the village is located within a water catchment area officially proclaimed in early 1999 in order to protect the water supply for Tambunan town. This may constitute the single most important factor for development in the area as agricultural activities in water catchment areas are subject to very strict limitations.

Patau consists of three hamlets: Patau, Katagayan, and Narayat, altogether with around 660 inhabitants. Official buildings are the primary school a small post office, a police station and the community house. Patau and Katagayan hamlets are situated in a flat valley bottom comprising the largest part of the village. Narayat divides the lowland, being situated on a ridge 100 to 150m above its surroundings. The main access to the village is through a fairly good gravel road connected to the main Tambunan-Ranau highway. Tambunan town is located 20km south of Patau. There is also a gravel road leading to the CRNP located five to six km from the main road. Farming practices are similar to Kuyongan, but wet rice cultivation is much more important whereas cultivation of upland cash crops is more limited. Both villages lie in hilly areas with slopes of up to 30° inclination. The upland is mostly covered with secondary forest, mixed with farmed land. The soils are predominantly ultisols. The climate is tropical-equatorial with temperatures ranging from 24 to 28°C, modified only by altitude and humidity around 80 and 85%. Average annual rainfall in Tambunan is

1900mm, with October-February being the wettest months (Phillips 1988; Adams and Mortimore 1997).

METHODS

In line with the epistemological debate of the 1980-1990s (Scoones and Thompson 1994; Adams and Mortimore 1997), the methodological approach of this study emphasises the individual villagers' interpretation of opportunities and constraints. Consequently, the results reflect the villagers' evaluation of the given situation, rather than providing a complete list of existing possibilities and constraints.

Household surveys

Base line surveys were performed in both villages in order to assess the villagers' livelihoods in terms of activities performed (off-farm/on-farm; subsistence/cash crop); the household resource bases (land, labour, etc.); and parameters for income (cash and goods). In the village of Kuyongan 23 households were interviewed (70% of total), and in Patau 16 (18% of total).

Selected households

Four households from Kuyongan and seven from Patau were chosen for further study of their farming practices. The households of Kuyongan were selected to represent a range of stages of intensification and dependence on market economy. However, each household in Kuyongan is relying on very individually formed livelihoods, and the representativity of the sample is difficult to assess. In Patau the chosen households represent the majority of the villagers who are considered to be in a process of intensifying and changing farming practices towards cash cropping. Data was obtained through observations, semi-structured interviews with individuals and groups, and participatory mapping and matrix scoring with small focus groups.

Institutional survey

At community level, interviews were conducted with the Village Development Councils (JKKK - Jawasan Kuasa Kemajuan dan Keselamatan Kampung). Moreover, in order to assess the government efforts in supporting rural development, information was obtained from the District Office, the Department of Agriculture (DoA), the Rural Development Corporation (KPD - Korporasi Pembangunan Desa), and the Local Farmers' Association (PPK - Pertubuhan Peladang Kawasan), all in Tambunan.

RESULTS AND DISCUSSION

Farming is the primary occupation in the villages of Patau and Kuyongan and is considered the main source of income for the majority of the population. The bulk of the agricultural production is consumed by the households in the villages, although surplus vegetables and fruits are sold at the market in Tambunan. It should be noted, however, that off-farm labour and remittances from labour migration probably also play an important role for cash income in both villages

Wet rice production and government subsidies

Traditionally, wet rice is cultivated under rainfed conditions in the rainy season with local, low-yielding varieties. In Patau, however, the installation of an irrigation system taken into operation in 1999 has given the farmers the possibility for cultivating twice a year. However, in the 1999-2000 season only four farmers had experimented with two crops a year and the results had been disappointing. They blamed the poor yield of the off-season crop on bird attacks, which became unusually serious because the birds had only a small rice crop to feed on. In order to increase wet rice productivity, the Department of Agriculture (DoA) encourages double cropping and provides subsidies in the form of fertilisers and 100 RM per acre of wet rice for each growing season. It is, however, necessary that entire villages engage in double cropping to prevent bird attacks and serious crop losses.

Most of the informants in Patau and Kuyongan also mentioned that insects reduce wet rice yields substantially, and that the widespread use of pesticides has led to substantial increases in yields and a reduction in crop damage. However, some farmers had reservations regarding the use of these products and mentioned that small fish had been killed near the wet rice fields and there were complaints of dizziness from using chemicals. Traditional methods of pest protection such as scare crows and rodent traps are still used, but their effectiveness is difficult to assess. Weeds are not a major problem in wet rice.

In Kuyongan wet rice cultivation is limited by the fact that the village lies within the officially protected water catchment area. Therefore much of the land has not been titled and, consequently, is not eligible for government subsidies and investment in landesque capital such as irrigation systems.

Upland farming, shifting cultivation and cash crops

Shifting cultivation remains the predominant farming practice in upland fields in both villages. The farming practices are very similar to other places in Borneo (Padoch 1982; Cramb 1993; Mertz and Christensen 1997; Doolittle 1999). The fallow periods vary, but generally range from 2-10 years depending on the proximity of the field to the homestead and the suitability of the area for production. Moreover, in Patau at least four fields in the 1999-2000 cropping season had been cut in old secondary forest, probably more than 30 years old. These were cultivated with upland rice and vegetables, but the farmers had also planted most of the area with a variety of fruit trees and were thus in a process of converting these areas to permanent plantations.

In Kuyongan production of ginger in upland fields is very important. This crop was introduced to the area in 1962 for own consumption and by the early 1980s some farmers began selling ginger at the Tambunan market. The main incentive to increase production had come when the village road was constructed, thus opening up the village for access by car and travelling merchants. These encouraged farmers in Kuyongan to increase their ginger, which has now become the most important cash crop in Kuyongan and some neighbouring villages. Ginger can be planted all year around, but the best planting period is in March and the normal period is between January and May. After one year, ginger reaches full maturity and can be kept in the soil up to 3 years if prices are low. The fields are fallowed 2-4 years after cultivation and ginger has thus to some extent replaced upland rice in the shifting cultivation cycle.

Fertilisers and pesticides are rarely used in upland rice and ginger production as pest and disease problems are limited. Weed competition, however, is a major constraint in upland fields and current trends towards shorter fallow periods and more intensive use of the upland soils might further aggravate this problem. Herbicides are used to a limited extent as a means of land clearing and after planting, but the cost is often prohibitive. As the use of mechanical weeders is impossible, farmers rely largely on hand weeding one or two times a year. This method is slow, laborious, and inefficient as the crop may be damaged and many weeds are left in the field (Doolittle 1999), but it may be the only feasible method, particularly in Kuyongan where farmers are not allowed to use pesticides and herbicides in areas closer than 1 km from Tondulu River. However, if the crop damage becomes intense, farmers will use pesticides anyway.

Certain upland areas have been converted to permanent cultivation of cash crops. As part of the efforts to discourage shifting cultivation, the DoA supports a coffee scheme in Patau as well as the plantation of rubber trees. To provide adequate yields, coffee production requires intensive use of chemical fertilisers and insecticides to control especially ants and various diseases. The application of fertilisers is recommended three times a year, but according to one respondent he applies the whole amount once a year due to a delay in getting fertilisers at the right time. It is to be seen whether the returns on labour and capital investment will be sufficient for the farmers to maintain this production.

Also as an incentive for farmers to improve their income, the Rural Development Corporation has provided facilities for mushroom production and 8 farmers in Patau joined a mushroom project in 1990. This production has not been very successful as only one farmer remains in the scheme. The main reason is mentioned to be insufficient returns on invested labour as well as problems with insect attacks. A passion fruit scheme has also been abandoned with no farmers participating anymore.

In Kuyongan there are no cash crop schemes because of the water catchment area, but a few farmers cultivate vegetables for sale. Some of the wealthier farmers have established fishponds, which require large capital inputs but provide good income when in operation. Moreover, labour inputs are low once the ponds have been established.

Land tenure and access to land

As a consequence of a mix between modern law for official and authoritative recognition of property and the traditional rules of the *Adat* system, land tenure, property rights, and use rights for land in Sabah are very complex. Access and usufruct to land are not only a question of obtaining official titles as applications for property rights are based on more than simple principles of a free market. Furthermore, in line with official government policies, aid in the form of production inputs and extension services is reserved production on land with official titles. Thus, to determine the causality between possibilities for agricultural intensification and access to land in Kuyongan and Patau, it is necessary to analyse the structures, which determine such access.

Traditional institutions have significant impact on land rights in both villages. First of all, because the *Adat* system is integrated in the official land ordinance, indigenous people can make use of traditional hereditary rights when applying for a piece land. Moreover, in case of

disputes over land rights, local institutional leaders such as the headman/woman or the village council (JKKK) mediate, and in most cases solve the problems without external involvement from government authorities. The Adat also ensures that people without social, cultural or historical relations to a given locality are unable to gain access to land without the consent of the village. Consequently, access to land in both Patau and Kuyongan is principally based on rights according to the Adat system. Thus, in many cases ownership to land is claimed without official titles and these claims are fully respected by the village.

Due to the problem of the water catchment area, only very few areas in Kuyongan are officially recognised as private property by the state. As mentioned above, this has prevented farmers from receiving agricultural subsidies whereas in Patau many projects have been initiated, including the fully subsidised installation of an irrigation system. Hence, the role of land titles seems more relevant for access to government funding than for securing land rights. However, the possibility that Kuyongan in the future may be resettled has prompted farmers to invest in fruit tree plantations in order to maintain their access rights. For a more detailed discussion on land tenure in the area, see Long et al. (2000).

Labour

Lack of sufficient labour is a constraint for land use intensification in both communities, and is to some degree a result of the changing needs in the local society. External pressure for a transition from subsistence production with shifting cultivation techniques, to a higher degree of cash cropping, may be partly responsible for labour constraints (Lim and Douglas 1998).

It is suggested that the resource shortage of both land and labour will continue to prevail during cash crop production in co-existence with the shifting cultivation system, unless a full transition to cash cropping is achieved (Lim and Douglas 1998).

Kuyongan and Patau are similar in the sense that shifting cultivation is widespread on the upland fields, and labour is derived from within the household itself. Subsequently, the size of the household decides the availability of labour force for both on- and off-farm work. The internal division of labour tasks between gender and generation in the households also showed similar patterns in the two villages. Typically, both husband and wife worked the fields, while in some households, the men are in charge of the physically heavy work e.g. land clearing while women choose the lighter work. Younger children who attend school normally only help with farm work in their spare time, and sometimes more intensively during workload peaks e.g. when carrying the harvest from the fields. Older children typically contribute more unless they move away from the village due to studies, marriage outside the village, or off-farm work. This kind of migration of younger villagers is common in the two villages and other studies in rural Malaysia suggest that the steady outflow of rural youths is the main cause of lack of labour and an increase in the average age of the rural population. As a consequence, due to the diminishing household labour pools and advancing age, farmers may take land out of production (Vincent and Au 1997).

Community labour - *gotong-royong* - is important in Patau and used for various tasks, e.g. land clearing, planting and harvesting. At times a few farmers even hire wage labour. In Kuyongan official *gotong-royong* is more seldom, and then mostly used in connection with land clearing around the community house or to help very resource-poor households. Wage

labour was also uncommon in Kuyongan, whereas exchange labour is used between relatives and neighbouring households to solve various temporary labour-demanding tasks. As a gesture of appreciation, the receiver of the help is expected to arrange a feast for the participants and also return the labour in the future if needed. The reason for the higher tendency to use the *gotong-royong* in Patau is probably to be found in the bigger village size and division in hamlets, which should promote a higher degree of community co-operation but also a higher exchange of work against cash payment. Therefore, farmers in Patau did not in the early stage of our survey identify labour shortage as a problem, since most of the labour-intensive tasks such as land clearing is handled through the *gotong-royong* system. However, villagers in both communities recognised the 'lack of time' as an important obstruction for increased cultivation and production, indicating a limited labour resource.

Even if villagers in Patau and Kuyongan expressed wishes for improving their livelihood through agricultural activities, the size of the household as a labour resource functioned as a limiting factor for increased production or change in land use, unless the change meant a secure harvest. Since only few households hire external labour, most households rely solely on the labour capacity within each household in order to fulfil their needs.

In both villages more suitable land in the upland fields was accessible, but that the long distance to the fields, health reasons or lack of time and labour kept households from cultivating it. The accessibility of the fields thus plays an important role for the allocation of labour assignments, as fields situated more than 1-1.5 hours from the homestead in walking distance are often not desirable (Mertz, Christensen, et al. 1999 ID: 1133).

It can be concluded that the full transition to permanent cash cropping mentioned by Lim and Douglas (1998) is not likely to happen in any near future due to lack of labour and focus on risk avoidance rather than maximum productivity. Poor extension efforts and lack of farmer participation in the process could cause the failure of some of the government subsidised agricultural intensification measures discussed above. But it could also be argued that the area has not reached the population threshold needed to trigger labour intensive intensification of land use (Boserup 1965 ID: 130; Tiffen and Mortimore 1994 ID: 1008; Adams and Mortimore 1997 ID: 447).

Agricultural Agencies, Organisations and Extension

Several state agencies and NGOs promoting local agricultural and economic development are represented in the two villages, either through official representatives or by village members. The representation by the official agencies is much higher in Patau than in Kuyongan, probably because Kuyongan is situated within a gazetted water catchment area.

Jawasan Kuasa Kemajuan dan Keselamatan Kampung (JKKK) - The Village Council

The local village council is very important for the communication between the state and the villagers, and functions as the main agent for internal dissemination of information from external agencies within the village. In fact, the chairman of the JKKK normally functions as the village headman, and is politically appointed by the State Government. The chairman then appoints other villagers for the other posts, which cover matters concerning village social welfare, security, local development, local school matters, contacts to official authorities, etc. Before the existence of JKKK, the villages had a locally elected headman who functioned both

as a village chief in the above matters and as a mediator and judge in local conflicts. Kuyongan is an exception, though, since the responsibilities are divided between the JKKK and the headwoman.

The Department of Agriculture (DoA)

The DoA is responsible for agricultural extension and has nine extension officers in Tambunan District, responsible for about ten villages each. Their assignment is to continuously inform target groups in each village of new cultivation techniques, safe conduct with chemical inputs, alternative income possibilities through handicraft etc. However, many villagers in Patau and Kuyongan claim never or only rarely to receive information from the DoA. This may be due to the inability of the DoA to reach a majority of the villagers, but it may also be caused by a lack farmer interest in the information that the DoA has to offer. The success of growing commercial ginger in Kuyongan, for example, was originally started as a local initiative and most of the techniques have been inherited from earlier generations. Thus, there is no general reluctance to adopt new crops or techniques, but their suitability in terms of labour investment, economical feasibility, and adaptability to the current farming system are likely to be carefully scrutinised by farmers.

As an example, the DoA is trying to introduce the use of engine-powered cultivators in wet rice production in Patau in order to solve the problems of labour shortage. Farmers have expressed their interest, but the cost of the equipment (RM18,000) is a significant barrier. On the other hand, the introduction of chemical inputs in Kuyongan by the DoA extension staff and travelling salesmen, proves that the villagers are adopting some important inputs from the extension work. Therefore, it is relevant to say that even if there may be some communication fallacies, the DoA is still performing important tasks in the two villages through education in cultivation techniques, crop introductions, and other activities that might be of use for income generating activities.

Pertubuhan Peladang Kawasan (PPK), the Local Farmers' Association The local branch of the Malaysian Farmers' Association, is partly a cooperative farmers' organisation, and partly a government agency, with the main objective to increase farmers' income. The PPK often cooperates with the village councils in planning, and implements various development projects with funding from the government, banking facilities and members of the organisation. The PPK also offers several farm inputs for sale to its members at low prices. Membership subscription is only RM1 per year, and there are no conditions of ownership of land or level of income to become member. All members and the village councils can apply for funding of projects from the PPK, and the PPK mainly promotes cash crop schemes such as maize, tobacco, coffee, ginger and yam. They also encourage their members to use pesticides and fertilisers, in combination with advice on safe handling. The PPK has very few members in Kuyongan, but Patau has the biggest section of the PPK in the district and a chicken farm is being planned with PPK funding. The activities of PPK complement the extension services of the DoA through the sale of agricultural inputs, development projects, and member education.

Korporasi Pembangunan Desa (KPD), the Rural Development Corporation

Being entirely a government-funded agency under the Department of Agriculture, the KPD focuses primarily on contract farming projects with upland crops. By setting up projects with a minimum number of five participant farmers, the idea is to establish sustainable co-operative

production units, increase farmer income and create “modern and self-reliant farmers”. Farmers in Narayat have participated in several projects as a result of official encouragement from the DoA and KPD to abandon shifting cultivation and turn to more permanent cultivation. Even though the KPD has good intentions, the results in Patau have not been successful, probably because of a rather limited agronomic-economic approach to agricultural development, which does not adequately address labour and cultural issues.

CONCLUSION

Agricultural intensification is definitely taking place in Kuyongan and Patau, but a very different pace. In Patau, focus is on subsidised wet rice production and a variety of upland activities also receiving government support. In Kuyongan, ginger is the most important agricultural production while many of the traditional, extensive practices are still important. Due to shortages of labour and the cost of chemical inputs, shifting cultivation with adequate fallow periods is often preferred by farmers in order to maintain soil fertility, control weed infestation, and prevent soil erosion. However, cash crops such as ginger are, according to farmers, appropriately cultivated with a short fallow period and may partially replace upland rice. In Patau, upland rice is usually grown in the first year after clearing, in order to benefit from the higher soil fertility. The use of swiddening as a means of taking new land under cultivation and establish permanent fruit tree and rubber plantations also indicate the utility of this traditional farming practice. It is difficult to assess whether population pressure in the two villages is sufficiently high to trigger further intensification of land use, but the increasing need for cash income to cover e.g. school expenses and a better livelihood stimulates the farmers to intensify their agricultural production.

Farmers in the two villages do not lack assistance. They can receive subsidies and advice from a number of different agencies and organisations. Instead, the problems seem to be the relevance of assistance and advice as well as the way it is communicated and implemented. A lack of thorough analysis of farmer needs may be the main reason for difficulties in achieving sustainability in a number of the project farming activities implemented previously. Moreover, co-ordination, evaluation and feedback of the assistance to the farmers could be improved in order for the different agencies to capitalise on past experiences.

The perspectives for agricultural intensification are much better in Patau than in Kuyongan, since the latter is situated within an area entirely gazetted as a water catchment area. Access to secured property rights and subsidies is very restricted in this village. In a long-term perspective, the only obvious solution would be to resettle this village, unless other measures are taken. Given the situation of lack of labour in Patau, a future possibility for agricultural intensification could be adaptation of new technologies and more systematic double cropping of improved wet rice varieties. This, however, will require a better dialogue between the villagers and agricultural agencies to ensure that the advantages of intensification are acknowledged by the farmers, and the technical and socio-economic shortcomings of technology packages are adequately taken into consideration.

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