

CHAPTER VI

GENERAL DISCUSSION AND RECOMMENDATION

The present study has attempted to gain a better understanding of rice production at village level in Lao PDR. Sobngouang was chosen as a representative of villages in the upper watershed area of the Theun River, located in one of the major hydroelectric dam development projects in the country. The Theun-Hinboun Hydropower Project also conducts development activities in order to improve the living standards of people and communities affected by the dam construction. This project also applied upland management policies as the framework for implementing agricultural development activities in the area. In this context, the issues of rice production, improvement of food security and possible impacts on the ecology have been raised with respect to the extensive practices of shifting agriculture in the project area.

In this study, the whole range of rice production systems in Sobngouang have been identified and classified into four production system types. These systems are a) bush fallow rotation in Bon Phu, b) permanent upland in Bon Phieng, c) highland paddy in Bon Homhuai, d) and mixed annuals and perennials in Bon Phieng close to the Theun River. With exception of the bush fallow rotational systems, the rest of the production systems are fairly recent in the village. They are encouraged as alternative land use systems to traditional practice of upland rice in shifting cultivation for improving productivity and protecting the ecology of the upstream area of the Project. In this respect, the trade off between productivity and sustainability of the current rice production systems and the implications for ecology, at the field and landscape levels, and the livelihoods of the local community are summarized in Table 6.1.

Although the Project has partially achieved its objectives with respect to environmental conservation and improvement of local livelihoods in general, alternatives to shifting cultivation systems have partially released fallow land from shifting cultivation for natural regeneration of secondary forests for both protected and production areas. However, natural regeneration of fallows could proceed productively effectively as have been expected from existing studies in rotational shifting cultivation elsewhere, for example the Karen and Lua systems in northern Thailand (Kunstadter, et al. 1978). Evidence from the current study suggest that productivity of shifting cultivation in Sobngouang was low in terms of both upland rice production during the cropping phase and aboveground productivity of forest fallows. In short, productivity and sustainability of shifting cultivation in Sobngouang are relatively low in relation to other rotational systems.

Table 6.1 Productivity and sustainability rice production systems.

Rice Production Systems	Area (ha)	Impact of government intervention	Farmers' coping strategies	Productivity	Outcomes on ecology		Outcomes on livelihoods
					Field	Landscapes	
Bon Phu-Bush Fallow Rotational - Low fertility - Steep slope - Rainfed	38.2	<ul style="list-style-type: none"> - Shifting cultivation suppressed - Fallow land reduced 	<ul style="list-style-type: none"> - Agroforest alternative: establishment of agar wood in former fallows of shifting cultivation - Shifting cultivation remained with short fallow 	Low and unstable production - Grain yield 1.23 t/ha - Biomass: 5.69 t/ha	<ul style="list-style-type: none"> - Fallow released for both protection and production forests. - Unproductive and slow rate of forest recovery 	<ul style="list-style-type: none"> - Declining rice yield - Increasing land degradation due to removal of soil nutrients - Loss of biodiversity as the results of cash crop promotion - Over harvesting of non-timber forest products 	<ul style="list-style-type: none"> - Shortage of rice for household consumption - Availability of non-timber forest products likely decreased - Potential high income from agar wood in the future
Bon Phieng-Permanent Upland - Low/moderate fertility - Gently slope - Rainfed	13.8	<ul style="list-style-type: none"> - Land security increased - Land conservation measures increased - Land intensification increased - Labor requirement reduced with new tools and equipment 	<ul style="list-style-type: none"> - Permanent rice production with support on land investment - Intensive cropping practices with incorporation of cash crops 	Low and moderate stable - Grain yield 1.75 t/ha - Biomass: 7.91 t/ha	<ul style="list-style-type: none"> - Better land conservation achieved - Increasing pests, diseases and weeds due to delay in natural regeneration and heavy use of chemicals 	<ul style="list-style-type: none"> - Pressure on surrounding forest reduced - High risk of chemical contamination - Increasing of weed infestation due continuous use of land 	<ul style="list-style-type: none"> - Alternative income from cash crops - Possible improvement of rice yield with potential sustainability to ensure food security on a long run

Rice Production Systems	Area (ha)	Impact of government intervention	Farmers' coping strategies	Productivity	Outcomes on ecology		Outcomes on livelihoods
					Field	Landscapes	
Bon Homhuai-Highland Paddy - More fertile soil - Irrigated	12.9	<ul style="list-style-type: none"> - Land security increased - Permanent cultivation - Alternative rice production to shifting cultivation 	<ul style="list-style-type: none"> - Intensive and permanent production with high labor input 	Moderately high and stable <ul style="list-style-type: none"> - Grain yield 3.5 t/ha - Biomass: 12.93 t/ha 	<ul style="list-style-type: none"> - Soil degradation prevented - Minimum risk from chemical use 	<ul style="list-style-type: none"> - Pressure on surrounding forest reduced - Land degradation minimal - Increased water requirement in upstream 	<ul style="list-style-type: none"> - Rice production restored for overall production systems
Bon Phieng-Mixed Annual-Perennials - Low fertility - Gently slope - Irrigated with can watering	2.6	<ul style="list-style-type: none"> - Fixed area of 0.16 ha allocated for individual household for land compensation due to loss of river bank gardens - Permanent cultivation with intensive cash crops and fruit trees 	<ul style="list-style-type: none"> - Diverse and intensive production - Incorporation of upland rice - Intensively use of chemicals to improve soil fertility and overcome pest and weed problems 	Low to moderate and stable <ul style="list-style-type: none"> - Grain yield 1.96 t/ha - Biomass: 8.83 t/ha 	<ul style="list-style-type: none"> - Maintenance of local crop germplasms from the former river banks - Over use of chemicals associated with new cash crops and vegetables 	<ul style="list-style-type: none"> - Creation of patchiness in the landscape with diverse systems of cropping and agroforests - High risk of chemical contamination 	<ul style="list-style-type: none"> - Increase diversity sources of income from cash crops, vegetable and fruit trees - Supplement rice production

Highland paddy systems are the most promising alternative to shifting cultivation. Opportunities to increase productivity of the highland paddy systems remain fairly high with potential high production. However, potential for extensification (expansion of cultivating area) and intensification (increasing cropping intensity) will have to be dealt with in the near future in order to restore rice production for household food security and reduce pressures on forest area. Other alternative production systems in Bon Phieng (permanent uplands and mixed annuals and perennials) have yet to have significant impacts on the positive outcomes of the ecology and local livelihoods. Improvement of soil fertility on Bon Phieng has been discussed in Chapter 5.

On the basis of the above findings, some generalization and major cross-cutting issues may be outlined and discussed, with recommendations for improvement and advancement of Project implementation, at the end of this chapter.

6.1 Suppression of shifting cultivation

Despite the full implementation of government policy and direction, shifting cultivation remains in the Project area since the completion of the dam construction. Several efforts have been made to support alternative forms of land use for permanent agriculture, and a decline in shifting agriculture is evident. The number of families practicing shifting agriculture was reduced by more than half, from 267,274 families in 1996 to 104,136 families in 2003 (Ministry of Agriculture and Forestry, 2004). The area under shifting cultivation is reduced by almost 60 percent from 176,605 ha to 71,145 ha in the same period.

Although the indigenous community practices shifting cultivation, evidence indicates that they appear to be more pioneer forms of shifting cultivation (Chapter 3). With population pressures, resettlement and migration, rotational cultivation was inevitable. This shift occurred extensively, especially in the mountainous area of mainland Southeast Asia, including Lao PDR, Thailand, Cambodia, Vietnam and Southwest China in Yunnan province (Kunstader, 1978; Rerkasem, and Rerkasem, 1994; Sam, 1994 and Rerkasem, 2003; Yin, 2001 and Roder, 2001).

In this case, the policy assumption that shifting cultivation leads to unsustainable forms of land use may be partially correct, but ecological degradation also depends upon the original resource base, which could complicate the overall situation (Blaikie and Brookfield, 1987). This indicates the need for more nuanced understanding of shifting cultivation systems and the resource base upon which they are practiced. Without certainty of the negative impact of shifting cultivation on the ecology of an area, it would take a long time to achieve total voluntary suppression. Without proper external assistance, moving out of shifting cultivation to intensive land use can be disastrous on the ecology of area, as seen in the experience of rubber and sugar cane plantations in Yunnan (Yulin, 2002) or planting Canna in Vietnam to replace opium poppy (Sam, et al. 1997) or intensive cash crop and vegetables in Northern Thailand (Kampe and Iamprapai, 2002).

6.2 Upland rice and food security

People in Sobngouang are traditionally dependent on upland rice food with additional upland annual and perennial non-rice crops such as maize, yam, vegetables, beans and many others (Chapter 4). Rice is commonly in deficit in shifting cultivation systems, and the development of new systems offers opportunities for rice production after the completion of Theun-Hinboun Hydropower Project.

Despite newly developed paddy which contributes to rice sufficiency of about 1/3 of total farming households in the village, upland rice remains a significant contribution to the other farming households. It appears in the majority of production systems, ranging from the bush fallow rotational system to permanent upland farming and mixed annual-perennial plots.

Nevertheless, rice deficiency remains a problem in the village and this issue will have to be addressed in Project development plans in the near future. Many opportunities do exist for improvement of rice productivity. Current productivity is low and may continue to decline if no action is taken.

6.3 Creation and recreation of agroecosystems

With external support, alternative systems of production development aim to improve production and sustain the ecology as a whole. As mentioned earlier, rice is the dominant component of these agroecosystems, despite the patterns of diversity – ranging from pure culture of wet rice in paddy to diverse mixture of annual-perennial cash crops – in these agroecosystems.

Changes in production technologies, organization of production systems, use of external inputs and so on are taking place. At the same time, local knowledge and traditional practices are shaping the systems so that they can accommodate rice as the major stable food crop in the village.

On the surface it appears that intensification of land use with cash crops may somehow compensate for upland rice production and hence total suppression of shifting cultivation could have been achieved. Based on the present results, this does not appear to be the case. An abrupt shift from subsistence to commercial agriculture could have had negative impacts on the social wellbeing as well as economic adaptability of farming households, ultimately resulting in unequal distribution of benefits from external support.

Incorporation of farmers' initiatives, their process in creating or recreating of alternative production system should be considered in efforts to generate a wide range of technological options for diverse agroecosystems.

6.4 Pitfalls in stabilization of shifting cultivation

In the National Agriculture and Forestry Strategy 2020, the Lao government recognized different forms of shifting cultivation, such as *hai kheuan nhai* (pioneer shifting cultivation: destructive form of land use) and *hai moun vien* (rotational shifting cultivation: constructive form of land use) (NAFRI, 2003). In practice, the problem arises in distinguishing these different form of land use, and therefore shifting cultivation is taken in general as a form of improper land use and land

management on sloping hills. In some areas, land reforms and agricultural policies with initial good ideas were implemented poorly without clear linkages to decentralization, public participation and promotion of local empowerment and so on (Putzel, 2000). The government's policy to allocate agriculture and forest land to villagers is one area that would benefit from more nuanced understanding of shifting cultivation systems, because as UNDP (2001) has stated, as "currently practiced, land allocation may aggravate poverty". Moizo, (2004) outlined major local problems encountered since the initial implementation of the programme, the understanding of local perceptions of space and use of natural resources and drew on several examples in the Luangphabang area where farmers have developed alternatives directly or indirectly prompted by the land allocation policy. Here then concluded that swidden farmers and their land (including scared preserved forests) are now directly threatened by the way in which this policy is implemented. Therefore, further and deeper environmental and social crisis is should be addressed urgently.

The situation in Sobngouang and the Project area in generally differs to a large extent from other areas in the country and else where. Minor adjustments may be required for Project implementation of stabilization policy, as already discussed. Land allocation reforms appear to have positive impact in Project area and Sobngouang in particular. It did not trigger bad feeling on either side, i.e. implementing agencies (local government and Project) and local community. Although, relocation occurred recently in Sobngouang, the whole process was voluntary with support for improvement and development of infrastructure and local livelihoods. Shortening of follow and lower yields are unlikely to be related to Project implementation. The natural resource base in Sobngouang is perhaps poorer than those in the other regions of the country, such as in Luangphabang.

One of the major differences between Sobngouang (and other villages in Project) and other project sites is that Theun-Hinboun Hydropower Project has made a commitment to full-scale implementation on long term basis. Monitoring and evaluation systems are well established to support national policy at the top and implementing agencies at local levels, i.e. province, district, villages and communities. This advantage could have enabled the Project to smoothly implement government policy on a tripartite structure: (1) community, (2) local district officers and policy makers, (3) the Project. However, critical evaluation may be attempted to examine the possible need for adjustments and major improvement of Project development plan and implementation in the future.

Elsewhere in the Mekong sub-region, stabilization of shifting cultivation has been blamed as having negative impacts on both natural and agricultural biodiversity (Sutthi, 1989, Santasombat, 2003 and Ganjanaphan, et al. 2004) and ecology of uplands as a whole (Renard, 2001, McCaskill, and Khampe, 1979). However, the impacts on these are complicated by the fact that biodiversity could be maintained at higher level than just merely a village landscape. Flow and exchange of germplasm exists both within and between villages at different levels (Sirabanchongkran, et al. 2004 and Coffey, et at. 2006). Therefore, loss in rice biodiversity in Sobngouang may not be so straight forward, as seed exchange between and within communities exists. Kinship networks remain fairly tight within and between villages as well. Further study should be conducted to elaborate the point. In order to maintain and enhance

conservation of this rich-biodiversity of rice germplasm with respect to the ecology of the uplands, the uncontrolled expansion of cash crops after the implementation of the opium poppy eradication programme and suppression of traditional sifting cultivation has resulted in greater encroachment on the natural forests in and around village landscapes and has extended beyond local watershed boundaries. Threats to national watersheds have been one of the major concerns of the Royal Thai Government with a strong policy on restriction of upland land use (Rerkasem, 2003). Deforestation and land degradation are treated behind their causes.

In Sobngouang and the Project area at large, it may be too early to detect this process. Degradation of land and forest is likely to be the result of many external and internal factors. The incidence of civil war, in- and out-migration and resettlement, population increase, and above all the marginality of the natural resource base, will have to be taken into account with analysis of the situation. Newer thesis, unintended expansion of dominant cash crop with large-scale production will need to be addressed despite the above discussion. Any actions that promote deforestation and land degradation will have to be prevented. Empowering local communities in land use planning and development activities should be promoted and encouraged to sustain land use and management in the fields as well as village landscapes and local watersheds.

6.5 Recommendation

Many suggestions and technical recommendations were already made in the text of this thesis. In this section specific area of recommendations for Theun-Hinboun Hydropower Project will be outlined and highlighted as follows.

6.5.1 National demonstration as stabilization of shifting cultivation policy

At national policy level, the Project has the potential to demonstrate Project implementation of stabilization of shifting cultivation policy. As already mentioned, Theun-Hinboun Hydropower Project is somewhat different from other donor supported projects dealing with this policy issue. National policy dialogue and exchange across with other projects should be considered.

6.5.2 Diversified options for agricultural development

At the present, the Project has successfully developed a diversity of agricultural production systems over diverse biophysical settings in different land use types covering Bon Phu, Bon Phieng and Homhuai. Despite certain difficulties in both technical and socio-economic factors, the Project seems to put more bias towards the solution and strategy for market economy. However, mixed subsistence and market economy seems to create a whole range of options for different socio-economic status of farming households. The mixed strategy is expected to cover the whole range of production, i.e. from rice for subsistence to agar wood for external markets. The mixed strategy would also help to evenly distribute Project support and services among the farming households at different levels, from community to village to the Project area and above. The Project should consider opening up a wider scope for the formulation of Project development plan for implementation.

6.5.3 Significant role of rice in household economy

More attention should be paid to the improvement of rice productivity in the Project area. As already indicated in Chapters 4 and 5, much more can be made to increase and sustain rice productivity and this has direct impact on livelihoods of people in the Project area. From the analysis of results in Chapters 4 and 5, it is suggested that farmers and villages as a whole perceive rice sufficiency to be their main agenda in development. The significant role of rice in most agricultural landscapes (i.e., Bon Phu, Bon Phieng and Bon Homhuai) and production systems (i.e., upland fields with bush fallow and permanent practice to mixed annual perennial production systems) are obvious.

The Project may consider local perspective in development agenda for sustainable livelihoods.

6.5.4 Degradation and rehabilitation of upland ecosystem

Conventional thinking is based on the idea that releasing land from improper management of shifting cultivation could rehabilitate upland ecosystems, and therefore the ecology of upper watershed would be improved and sustained on a longer term basis.

Results from the present study indicate that the above premise is only partially correct. The Project should pay more attention to the broader processes of degradation. The natural ecology in the area is found to be generally poor as compared to other parts of the country, or neighboring countries with similar biophysical and ecological characters. Suppression of shifting cultivation could help to improve the ecology to some extent but other processes of degradation should not be overlooked. Understanding of nutrient cycling, dynamics of vegetation and restoration of land degradation would help to rehabilitate degraded upland ecosystem at present stage.

Relevant research institutes should be invited to provide technical inputs and monitor the ecosystems in the project area.

6.5.5 Appropriate technologies and peoples' participation

Elsewhere in this thesis (Chapters 4 and 5), the importance of local knowledge and indigenous technology were discussed, in relation to the development of alternative production systems. Although the present study is only focused on rice-based production systems, other non-rice based systems, agroforest systems and all the like are assumed to have similar contributions.

The Project should take advantage of those local knowledge systems and indigenous technologies in the design and implementation of project activities in the future.

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