



## CHAPTER V

### ANALYSIS AND CLASSIFICATION OF FARMING HOUSEHOLDS, AND THE IMPORTANCE OF LAND & WATER AND LABOUR INTERACTIONS

As the understanding of on- and off-farm decision-making processes is paramount to explain local RLR management practices the diversity of APS needs to be taken into account. However, it is very difficult to do so because all farms are different. Nonetheless, a holistic view of these farming systems can be taken in order to analyze the functioning of APS by focusing on interactions between local agroecological and socioeconomic dynamics; from this approach, a farmer typology can be adopted. Essentially, a comprehensive knowledge of APS functioning in their diversity and their classification into a farmer typology is necessary in the initial conceptualization stage of my modelling process; moreover, it is important in the selection of participating farmers.

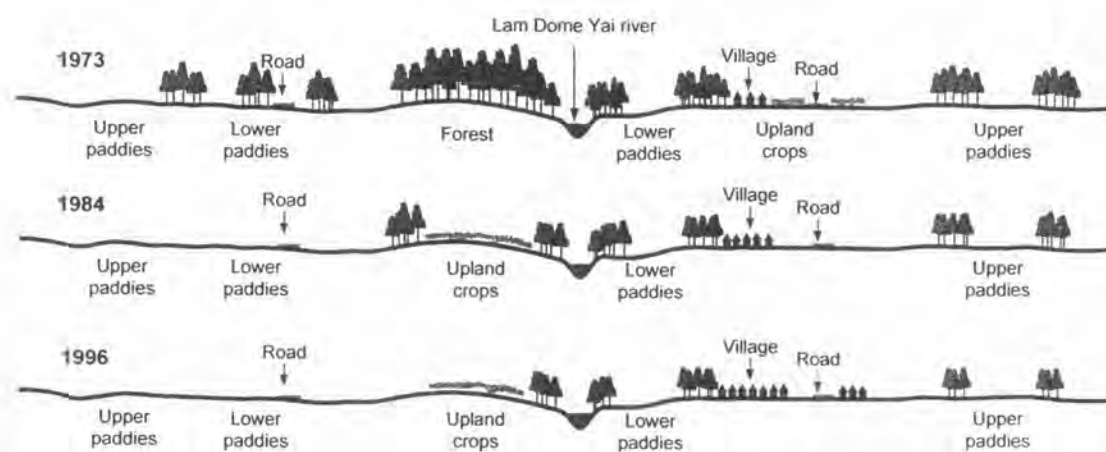
An APS is defined as the whole structured set of plants, animals, and other activities selected for production by a farmer to achieve his or her objectives (Trébuil and Dufumier, 1993). APS analysis enhances my understanding of the system and problems at stake. The goal of this analysis is to group farmers into a limited number of types according to similarities in their socioeconomic objectives/goals, and strategies to achieve those goals through a reliance on an agro-ecosystem and specific means of productions.

The sample of farming households analyzed in 2003 was the same sample used in two previous studies conducted at this site in 1994 and 2000. Twenty farming households were selected to cover the broadest diversity of cropping and animal rearing systems presented at the study site. This extensive diversity within the sample is required to uncover the different objectives and strategies of the various types of APS (Trébuil, Kam et al., 1997). In 2004-2005, two farm surveys with semi-structured guidelines were carried out to gather data on the different main types of household-based APS and to examine the determinants of labour migration among these different categories of farming households.

The second farm survey carried out in April 2005 specifically addressed the relationship between labour migration and the serious drought of the 2003 crop year (Naivinit, 2005; Naivinit and Trébuil, 2004). Based on this knowledge, diagrammatic representations of APS were produced to illustrate the relationships among farmers' objectives, strategic APS management practices, and means of productions. Then, based on the comparison and identification of similarities and differences between these APS functioning diagrams, several main types of farmers were defined into a typology.

### 5.1. Characterization of Main Combinations of Productions on Agricultural Production Systems

Recent agricultural transitions in the study area, where the mini-watershed is the dominant landform, has seen the forest cover decrease and be replaced by upland crops such as cassava and long fibre crops (Figure 5.1). But rice is still the major crop. The growth cycle of rice is central in determining other on-farm and off-farm activities. Three main combinations of productions were found in this village.



Source: Aerial photographs taken in 1973, 1984 and 1996 by Royal Thai Survey Department, Royal Thai Army, Ministry of Defence, Bangkok.

Figure 5.1 Land use change along a transect in Ban Mak Mai village, Klang sub-district, Det Udom district, Ubon Ratchathani province (1973, 1984, 1996).

### 5.1.1. Rice-based Systems with On-farm and Off-farm Employment Including Labour Migration

The majority of APS found in this village belongs to this category. Rice production is first and foremost done for family consumption and to sell any surplus. This rice-based system often lacks the production of crops other than rice, due to limitations related to irrigation and inadequate cash reserves for the diversification of farm production. Furthermore, additional income can be, and is, generated by means of labour migration. Rice production is usually managed by family labour, which employs transplanting techniques. There are small vegetable plots for family consumption near the house. Livestock rearing is rarely seen.

Because of very small land holdings, debt burdens, and lack of local employment alternatives in agriculture, farmers working in exclusively rice-based systems commonly migrate to search for more profitable employment in cities during the dry season and between periods of transplanting and harvest.

### 5.1.2. Rice-based System with Diversification out of Rice

Non-rice productions are found in this kind of APS. Rice is commonly produced in lower and upper paddies, while cash crops such as cassava or perennial plantations, such as cashew nut, are grown in upland areas. The type of perennial cash crops grown is often promoted by the government, and some of them are supported by private companies offering price support programs, as has been the case of cashew nut plantations. Cattle and buffaloes are also raised for sale. Well-off farmers often invest in fish farming and fingerling production. The use of more farm machinery is being seen on large farms to alleviate labour shortage.

In the last decade, Para rubber, which was promoted as a new perennial cash crop for the northeast region, has extensively replaced annual cash crops and eucalyptus because of their higher economic returns. Nonetheless, it was not rapidly adopted by poor farmers due to a lack of funds to cover the initial high investment, longer harvesting times, and a lack of skill needed to work with such plantations, compared to other traditional cash crops (Phupak and Theerapongtanakorn, 2006).

### 5.1.3. Rice-based Systems with Integrated Farming

Since 1995, the northeast region has been the target of both government and non-government organizations for the promotion of integrated farming systems, an alternative to seasonal migration for off-farm employment (Wigzell and Setboonsarng, 1995). Integrated farming is defined as a household-based APS with a diversity of complementary agricultural productions to enhance the efficient use of limited resources (Faculty of Economics Kasetsart University, 2000). The aim of integrated farming is to assist farmers in producing for home consumption and a surplus for sale, according to the principles of the “sufficiency economy” (Mongsawad, 2007).

Rice is still the main crop produced for family consumption and sale. Other cash crops and vegetables are grown near water resources, which are also used for livestock rearing. Thus, reliable water availability is central to integrated farming. Small water retention programs have been carried out to support the construction of individual farm ponds. However, changing from conventional to integrated farming still requires substantial investment, with farmers reaping benefits from such investments only after a few years. This has caused the slow diffusion of integrated farming practices among relatively poor farmers. Despite the proof that farmers adopting this system have become more self-reliant, the evidence gathered so far suggests that integrated farming has had only a limited impact on labour migration.

## 5.2. Farmer Typology at Study Site

Based on the above-mentioned main combinations of productions, three kinds of APS were identified, forming the basis of a farmer classification system, or typology; moreover, the farmers' socio-economic objectives, strategic choices of farm and non-farm practices, and means of productions were also integrated into the farmer typology. These farm types represent the diversity of farming households in the study area (Table 5.1).

Table 5.1 Characteristics of the three main types of farmers in Lam Dome Yai watershed, Ubon Ratchathani province (2004).

Type	<i>A: Very small rice-based and subsistence oriented farms</i>			<i>B: Medium-sized rice-based and integrated farming, more market-oriented farms</i>		<i>C: Large market-oriented farms with diversification out of rice or high remittances</i>	
Farm size (ha)	1.6 - 4.8			4.8 - 9.6		8 - 19	
Family size (person)	4 - 6			5 - 7		6 - 8	
Farmed area per family labour (ha/labour)	0.64 - 1.6			2.2 - 4		1.7 - 2	
Objective	Family staple food security and income through selling surplus aromatic rice and full employment of family labour			Produce non-glutinous aromatic rice for sale and increase land productivity through integrated farming		Increase labour productivity through diversification out of rice	
Strategy	<ul style="list-style-type: none"> <li>• Motorized farm equipment is used for land preparation and water management.</li> <li>• Late-maturing non-glutinous (KDML 105) rice for sale</li> <li>• Early-maturing (traditional glutinous) rice for family consumption</li> <li>• Cattle and buffalo are raised and sold when cash is needed</li> <li>• Fish and poultry is for family consumption and sale. Off-farm employment is important source of income to support on-farm activities.</li> </ul>			<ul style="list-style-type: none"> <li>• Late-maturing (non-glutinous, KDML105 and glutinous, RD6) rice for sale,</li> <li>• Early-maturing (traditional glutinous) rice for family consumption</li> <li>• Hire 1 labourers to harvest late maturing rice</li> <li>• Products of integrated farms for family consumption and sell surplus</li> <li>• Livestock is raised for savings and sale</li> </ul>		<ul style="list-style-type: none"> <li>• Late-maturing (non-glutinous, KDML105 and glutinous, RD6) rice for sale</li> <li>• Early-maturing (traditional glutinous) rice for family consumption</li> <li>• Use farm machinery e.g. hands tractors, rice threshers to alleviate family labour scarcity</li> </ul>	
Sub-types	<b>A1:</b> <ul style="list-style-type: none"> <li>• Low access to water</li> <li>• Migrate seasonally for non-farm employment</li> <li>• Receive low remittance</li> </ul>	<b>A2:</b> <ul style="list-style-type: none"> <li>• Poor access to water</li> <li>• More-Permanent off-farm labour</li> <li>• Receive medium to high remittance</li> </ul>	<b>A3:</b> <ul style="list-style-type: none"> <li>• Good access to water</li> <li>• Migrate seasonally for non-farm employment</li> <li>• Receive low remittance</li> </ul>	<b>B1:</b> <ul style="list-style-type: none"> <li>• Good access to water</li> <li>• More-permanent off-farm labour</li> <li>• Relative high remittance</li> </ul>	<b>B2:</b> <ul style="list-style-type: none"> <li>• Very good access to water</li> <li>• Raise livestock for sale</li> <li>• No migrants</li> </ul>	<b>C1:</b> <ul style="list-style-type: none"> <li>• Upland crops e.g. cassava</li> <li>• Plantation crops e.g. cashew nut, para rubber</li> <li>• Fish production to maximize labour productivity</li> <li>• No migrant</li> </ul>	<b>C2:</b> <ul style="list-style-type: none"> <li>• Large rice-based farms</li> <li>• Permanent off-farm employment or entrepreneurs in village</li> <li>• More-permanent off-farm labour</li> <li>• Relative high remittance</li> </ul>
Volume of water stored in ponds (m <sup>3</sup> )	170	450	1950	2160	2400	4500	
Investment capacity	Insufficient			Limited due to debts		High	
Average annual gross income (euros)	1,150 (min: 400 - max: 1,600)			2,100 (min: 650 - max: 2600)		4,900 (min: 1,700 - max: 7,700)	
Share of off-farm income (%)	66 (min: 50 - max: 71)			22 (min: 0 - max: 31)		6 (min: 0 - max: 29)	
Share of Debts (% of annual gross income)	31 (min: 25 - max: 57)			31 (min: 17 - max: 46)		4 (min: 0 - max: 6)	

### 5.2.1. Farm type A: Very Small Rice-based and Subsistence Oriented Farms

The farmers' main constraints in this category are high indebtedness and the very small size of their land holdings, ranging from 1.6 to 4.8 ha (3.2 ha on average). Their objectives are to produce enough rice to meet family food requirements (in rice first) and make cash income through the sale of rice surpluses, and the full employment of family labourers. Almost 70% of local farmers belong to this farm type. These very small farms evolved from the medium-sized rice-based farm holdings (4-6 ha) with limited off-farm activities found in 1994 (Table 5.2). Farmers belonging to this type play an important role in supplying labour to larger holdings because their land per labour ratio is low. Even if the harvesting time of the famous aromatic jasmine rice, KDML105, is the same for all farms, they finish their own harvest sooner and subsequently sell their labour to larger holdings. However, the share of farm land planted to KDML105 and glutinous rice is determined by the family consumption requirements, which needs to be met first (highest priority). If the family consumption is secured by an adequate amount of stored glutinous rice, these farmers are likely to plant a higher share of glutinous rice and KDML105 to increase their household income, especially when rice prices are high, such as in the 2008 wet season.

Livestock is rarely raised on this farm type. If it is present, the herd is small (2-5 heads) and the purpose is mainly for savings. Access to water is another factor determining the RLR cropping calendar, but not the choice of non-rice productions. However, water use is carefully managed since the purpose of having small ponds is to store water and use it to water RLR nurseries in case of dry spells. Rice is always the major crop even if the land is located in upper paddies where water is even less accessible. A way to increase their on-farm labour productivity is to rent more farm land. The rental payments can be made in cash or in the form of a sharecropping arrangement.

The farmers' capacity to make investments is none to very limited, and indebtedness is high. Off-farm, including non-farm, employment is a very important source of income. More permanent and seasonal labour migrations are key strategies used to cope with financial difficulties. But it is risky to rely mainly on migrant labour because most of the workers are unskilled, and the industrial and service sectors are

normally unable to absorb a large number of labourers under secure contracts. Therefore, the seasonal migratory pattern is common for members of this farm type.

Three sub-types of farmers were identified according to their access to water resources and off-farm income, both factors influential in their choices of farm production. Farmers belonging to sub-type A3, who have better access to water, have usually adopted integrated farming practice. Seasonal and more-permanent migration is found, but the migratory patterns do not significantly relate to their current access to water. A1 and A3 farmers usually migrate seasonally but migrant workers generate relatively low income. A2 farmers receive higher remittances but they often use it for home improvement and their children's education.

#### 5.2.2. Farm type B: Medium-sized Rice-based, and Integrated Farming; More Market Oriented Farms

This farm type evolved from medium-sized farms studied in 1994 through the increased adoption of farm machinery along an evolving trajectory (Table 5.2). This type of farmer's main objective is to produce high quality KDML105 rice for sale and to increase land productivity through integrated farming. Unlike farm type A, their size is not a main constraint. Thus, it is possible for these farmers to consistently set aside enough area planted to glutinous rice to meet family needs, while adjusting the KDML105 area to cope with climatic risk. The key constraint here is labour shortage at peaks of labour demand periods of the RLR crop cycle. Type B farms are employing local labour during RLR transplanting and harvesting periods, as these two operations cannot be fully mechanized under local conditions. Their implementation by manual labour also ensures a better quality of the product, particularly at harvest. This is very important as high-quality paddy can help to compensate for the low yield achieved in this RLR agroecosystem. For example, the government-supported price for quality aromatic jasmine rice is 19,000 baht/ton for 2008 main harvest, compared with only 12,000 baht/ton, and 9,000 baht/ton for ordinary non-glutinous rice and glutinous rice respectively (Thai Rice Mills Association, 2008).

Table 5.2 Change among the three main types of farmer in Lam Dome Yai between 1994 and 2000- 2004.

Type		A: Very small rice-based and subsistence oriented farms		B: Medium-sized rice-based and integrated farming, more market-oriented farms		C: Large market-oriented farms with diversification out of rice or high remittances	
Changes between 1994 and 200-2004		Change	Consistent	Change	Consistent	Change	Consistent
Family situation		<ul style="list-style-type: none"> <li>• Smaller farm size</li> <li>• More rental of land</li> </ul>	<ul style="list-style-type: none"> <li>• Rice producing farm.</li> <li>• Self-subsistence farm</li> <li>• Cattle as saving asset</li> </ul>	-	<ul style="list-style-type: none"> <li>• Rice produced for both family consumption and sale of surplus</li> </ul>	-	<ul style="list-style-type: none"> <li>• Diversified farm productions</li> <li>• Rice produced for both family consumption and sale</li> </ul>
Determinants of family choices	As strategic constraints	<ul style="list-style-type: none"> <li>• Smaller farm size</li> </ul>	<ul style="list-style-type: none"> <li>• Low land per labour ratio</li> <li>• Lack of cash flow for investment</li> <li>• Poor access to water resources</li> </ul>	<ul style="list-style-type: none"> <li>• Larger farm size causing higher land per labour ratio</li> </ul>	<ul style="list-style-type: none"> <li>• Labour shortage</li> </ul>	<ul style="list-style-type: none"> <li>• Larger farm size causing higher land per labour ratio</li> </ul>	<ul style="list-style-type: none"> <li>• Labour shortage</li> </ul>
	As strategic potentialities	<ul style="list-style-type: none"> <li>• More water storage and use of agricultural machinery e.g. motorized water pump</li> </ul>	<ul style="list-style-type: none"> <li>• Extra labour for off-farm jobs</li> </ul>	<ul style="list-style-type: none"> <li>• More farm machinery used</li> </ul>	<ul style="list-style-type: none"> <li>• Good access to water resources</li> </ul>	<ul style="list-style-type: none"> <li>• More farming contracts</li> <li>• High remittances</li> </ul>	<ul style="list-style-type: none"> <li>• Diversify farm productions.</li> <li>• Good access to water resources</li> </ul>
Strategy	Choice of productions	<ul style="list-style-type: none"> <li>• Integrated farming introduced</li> <li>• More poultry and fish productions for family consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Produce rice</li> </ul>	<ul style="list-style-type: none"> <li>• More livestock rearing</li> </ul>	<ul style="list-style-type: none"> <li>• Produce rice</li> <li>• Integrated farming</li> </ul>	<ul style="list-style-type: none"> <li>• Fish production</li> <li>• Perennial plantations (para-rubber)</li> </ul>	<ul style="list-style-type: none"> <li>• Produce rice</li> <li>• Integrated farming</li> </ul>
	Choice of management	<ul style="list-style-type: none"> <li>• Rent more land and agricultural machinery</li> <li>• Become major source of hired labour in village</li> <li>• More migrants working off-farm</li> </ul>	<ul style="list-style-type: none"> <li>• Use mainly family labour including returned migrants to produce rice.</li> </ul>	<ul style="list-style-type: none"> <li>• More use of chemical inputs and farm machinery.</li> <li>• More hired labour</li> </ul>	-	<ul style="list-style-type: none"> <li>• Invest more in international migration of family labour</li> </ul>	<ul style="list-style-type: none"> <li>• Use farm machinery and hired additional labour</li> </ul>
	Choices concerning the production system	<ul style="list-style-type: none"> <li>• Off-farm and on-farm employment to improve household income</li> <li>• Products from integrated farming for home consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Glutinous rice for family consumption</li> <li>• Non-glutinous jasmine rice for sale</li> </ul>	-	<ul style="list-style-type: none"> <li>• Glutinous rice for family consumption</li> <li>• Non-glutinous jasmine rice for sale</li> <li>• Livestock rearing for sale</li> <li>• Products from integrated farming for home consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Fish and fingerlings produced for sale</li> <li>• Products from perennial plantation for sale</li> </ul>	<ul style="list-style-type: none"> <li>• Glutinous rice for family consumption</li> <li>• Non-glutinous jasmine rice for sale</li> <li>• Products from integrated farming for home consumption</li> </ul>



Their integrated farming activities are generally found near the house where it is easy to monitor them and collect products for family consumption. Because the farm area is relatively large (7.2 ha on average), the lowlands are planted to rice, while cassava and long fibre crops are produced in upland areas. But many farmers have replaced those other crops with cashew nut since 1996, and Para rubber plantations since 2000. However, cashew nut production had limited success because of low yields. Para rubber, on the other hand, seems more successful because of the support of state agencies, and its current high market price.

Livestock rearing is also an important source of income. Therefore, a significant herd of cattle and water buffaloes (10-20 heads) is usually raised. Water availability through the presence of individual farm ponds makes year-round production of fruits and vegetables through integrated farming possible. Furthermore, it is often used to water RLR nurseries at the beginning of the rice-growing season. To better match farming activities with the labour force available, sometimes farmers lease part of their land to relatives or type A neighbours.

Although off-farm employment can be an important additional source of income for some farmers, most of them are likely to keep all available family workers to manage their own farm activities. But some farmers have more-permanent migrants who do not return home to help their family members to grow rice. These migrants generally remit money back home so that their family can hire additional labour when needed. Even if indebtedness is a problem, these farms have some capability to invest in agricultural production through savings assets (livestock herd) on B2 farms and relatively high remittances in some cases (B1 sub-type).

### 5.2.3. Farm type C: Large Market Oriented Farms with Diversification out of Rice or High Remittances

These are the most well-off farms, having evolved from the extensive rice farming holdings studied in 1994 (Table 5.2). This farm type is characterized by relatively large holdings, averaging 8.6 ha. Their objective is to maximize labour productivity through diversification out of rice into Para rubber plantations, livestock rearing, and fish and fingerling productions. If the diversification out of rice is not used to increase labour productivity, more-permanent off-farm employment is an important strategy

used to increase household income. Because farm workers belonging to this farm type have a generally high level of education, they have access to better paid employment opportunities e.g. working abroad and as government officers. Thus, their family members in the village usually receive regular remittances.

Two sub-types can be distinguished under this farm type. Both are large rice-based producers who try to rely on family labour and farm machinery rather than hired labour. But they differ in the strategies used to increase labour productivity. C1 farms use farm diversification out of rice; these households can keep all members busy on their own farm. In contrast, C2 holdings, which have a long experience in off-farm employment, often sell labour according to market demands, and thus receive high remittances. Rice is grown on a large area and farm diversification is less developed.

Of course, this farmer typology is an oversimplified presentation of the diversity of situations, and where all individual farmers cannot be represented in a model, but it does depict major differences among holdings. A limited sample of different farms from among the three core farm types can be used to represent the heterogeneity of the greater farming community. Figure 5.2 summarizes the functioning of these three main farm types to display the relationships between the families' objectives, opportunities/constraints and their respective selected strategies. The economic outcomes resulting from such relationships and choices are an important determining factor of migratory patterns. Once households in a particular village are classified, it is possible to typify the village by aggregating the characteristics of the households (Rindfuss, Jampaklay et al., 2004). Farmers belonging to the same type are likely to have similar decision-making processes regarding farming activities and migration practices. It is important that the processes are integrated into a model. Furthermore, this farmer typology is useful in the selection of potential participating farmers; the typology aims to ensure a broad representation and participation of the whole farming community in the Companion Modelling activities described below.

### **5.3. Importance of the Interaction between Land & Water Use and Labour Migration for Local Rural Development**

Understanding land and water use in relation to labour migration in this RLR ecosystem is a very complex issue because of the numerous interacting components involved, such as the biophysical and socio-economic dynamics. Labour migration has emerged from agroecological constraints limiting farm productivity, shaped by natural endowment and its deterioration, in interaction with state policies, interventions and other socio-economic factors. As a consequence, the labour shortage occurring in the village is an outcome of migrations, leading to changes in farming practices affecting the use of land and water resources.

The scarcity of farm workers on some holdings has a negative impact on medium and large farms because of the higher labour costs, but a rather positive one on small holders as it provides an alternative source of income. In my case, a brief account of land and water use influenced by labour migration will illustrate the key human-environment interactions leading to complexity. Understanding these interactions by involving the concerned stakeholders is critical to discover acceptable and appropriate local rural development pathways.

#### **5.3.1. Complexity as a Result of Interaction between Rainfed Lowland Rice Ecosystems and Socioeconomic Dynamics**

According to Woodhill and Röling (1998), the complexity with which humans have had to deal with has escalated as forms of knowledge expand, and as social and environmental influences become global. Therefore, to understand a current complex phenomenon, it is necessary to look at human-environment interactions as a cause of complexity through social learning and knowledge exchange involving all concerned stakeholders.

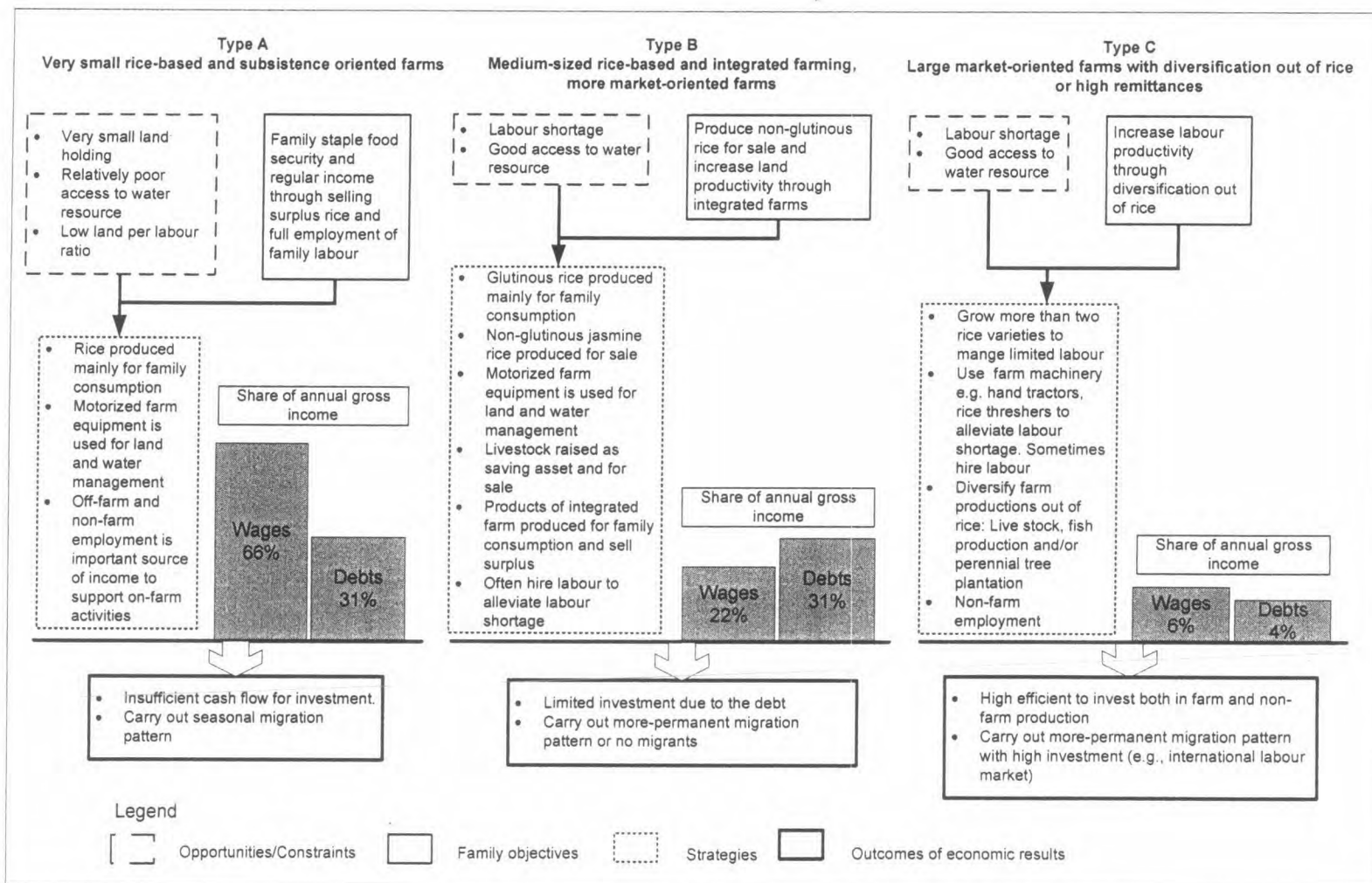


Figure 5.2 Diagrammatic representation of the functioning of the three main types of farming households in Ban Mak Mai village, Klang sub-district, Det Udom district, Ubon Ratchathani province (2007).

The concept of reductionistic Newtonian has been used to explain natural phenomena based on deterministic, linear, equilibrium-based predictable interactions among objects and forces, and oriented towards sequential change. Model implementation under this physics-based concept represents only interactions between natural forces that have been proved to be accurate (Mann, 1991). However, this concept has limited explanatory power when dealing with non-linear, irreversible dynamics and evolution often found in biology, economics, or in social sciences. In this case, the key focus is on human behaviour in the system characterized by subjectivity, uncertainty, and self-organization resulting from interactions among heterogeneous components. To overcome these limitations, the concept of complex adaptive systems was introduced by scholars in the field of economics and social sciences. Complexity is related to the various manifestations of life, and the emergence of a complex system at a macro scale always involves interactions between micro-components in the system (Janssen, 2002; Nicolis and Prigogine, 1989).

Four decades ago, the agroecosystem in the Lam Dome Yai watershed was not very complex due to fewer interacting components and actors aiming only at the exploitation of natural resources for self-subsistence. Today, this system is a very complex one as a result of more diverse actors involved at multiple levels and interacting with change within a larger system boundary. The next section will provide insight on interactions between land and water use, and labour migration in this study area through cause-effect relationships.

### 5.3.2. Causal Relationships between Land and Water Use and Labour Migration in the Study Area

In this study, labour migration is seen as an adaptive management strategy for resource-poor farmers to mitigate climatic risk and alleviate poverty. Migrating to seek relatively better paid employment and remitting money to the place of residence is theoretically a way to stabilize household income (Rattanawarang and Punpuing, 2003). In the context of Ban Mak Mai residents, farm workers are motivated to migrate as a result of poverty because of feeling poor (relatively) rather than because of absolute deprivation (Skeldon, 2002). Increasing household expenses through farm

inputs, such as chemical fertilizer, pesticides, farm machinery, and the purchase of more consumer goods by the day in an increasingly commercialized Thai society drives local farmers to search for additional income.

Figure 5.3 depicts the causal relationships of labour migration by linking key factors at macro and meso-levels. According to neoclassical economic theory, macro factors like the low price of farm products, and rapid industrial growth are key pulling forces. Meanwhile, local residents feel relatively poor as a result of low residential satisfaction due to an unfavourable agroecosystem and unavailability of job opportunities. Interregional income inequality at the national level also pushes farm workers to migrate to seek better paid jobs.

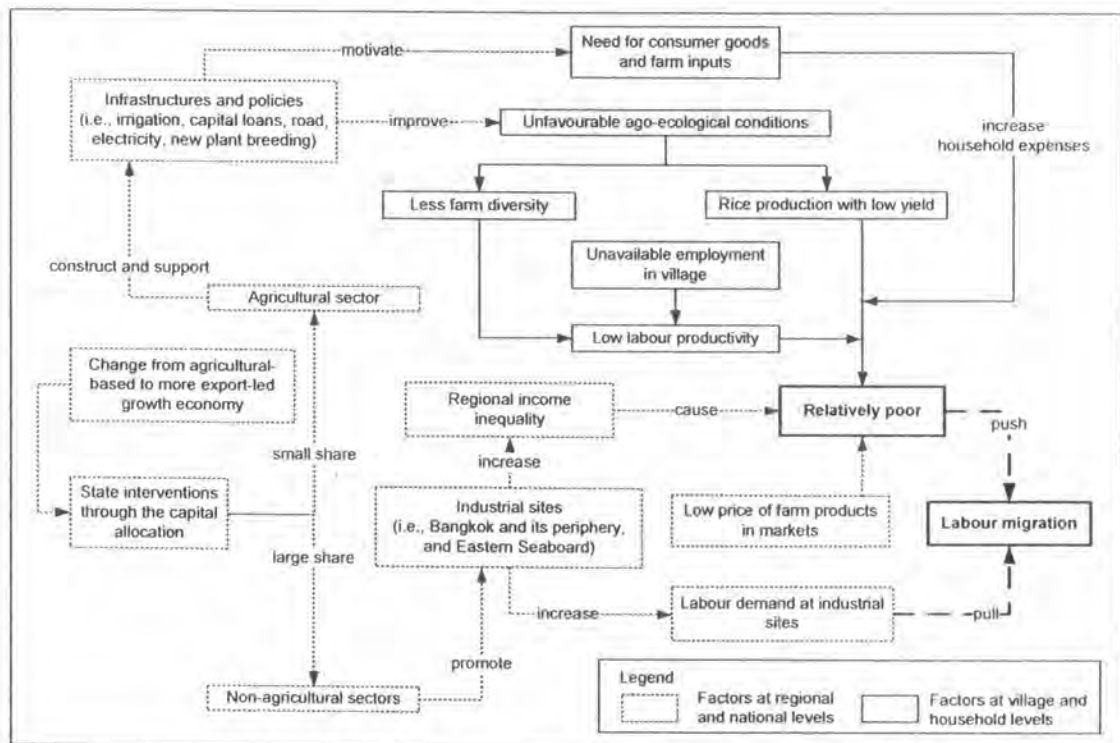


Figure 5.3 Causal relationships of labour migration reflected by macro and meso factors influencing farm production in northeast Thailand.

Figure 5.4 depicts the consequences of labour migration on a sending village like Ban Mak Mai. Labour shortage for farm production is an eminent problem at household and community levels once family workers decide to take off-farm employment outside of the village. Migration of family workers changes the pattern

of allocation of work within a household (Shinawatra et al., 1996) and affects the ways that land and water are used. These macro- and meso- factors of land and water use related to labour migration provides a holistic view of the situation under study. However, this causal relationship inadequately represents the migration decision-making process at micro level. Integration of this holistic knowledge into the V-E model (see detail in chapter III) provides a more comprehensive and integrative migration model that enables the implementation of individual migration decisions in my model.

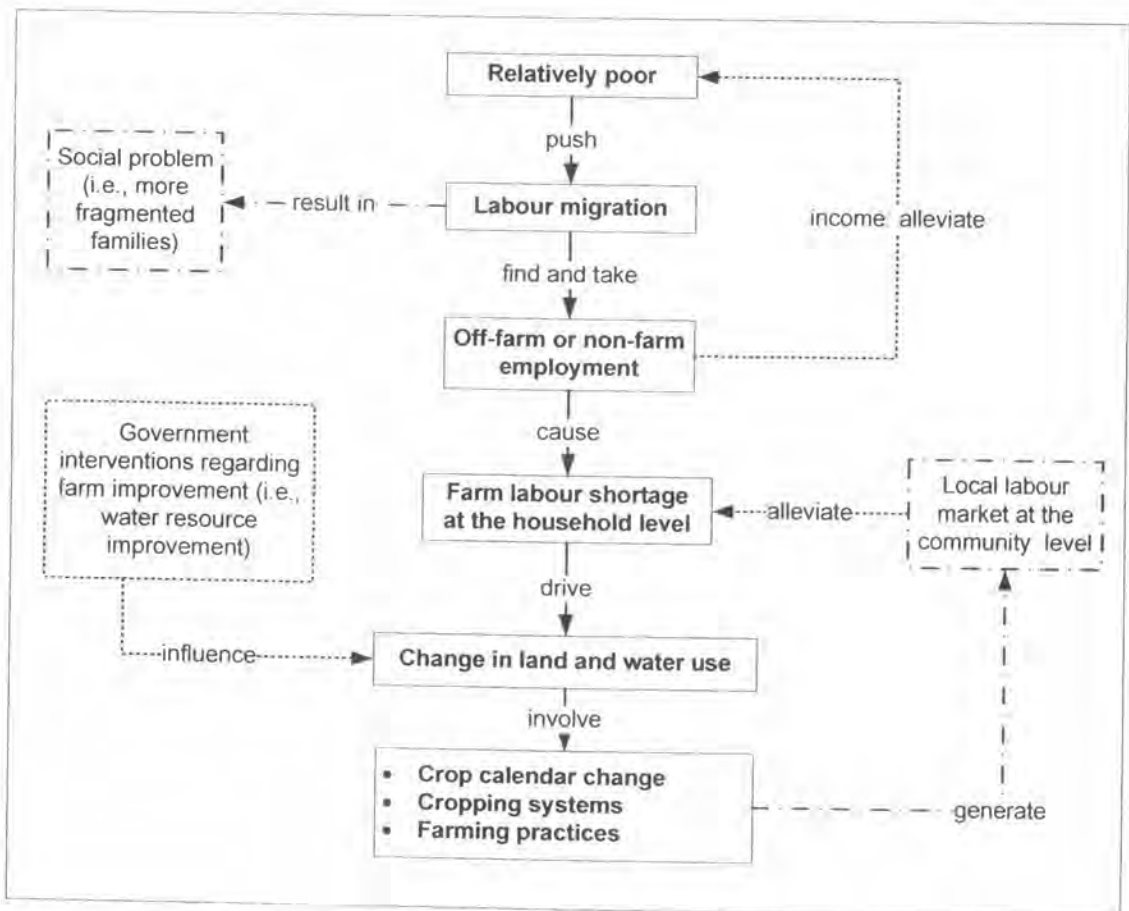


Figure 5.4 Impact of labour migration on change in land and water use at household and village levels in a sending community.

Regarding changes in cropping systems, medium to large farmers (types B and C) who usually grow dry season crops face serious labour shortage since many farmers migrate to cities during this period. They have to downsize the area planted to

dry season crops or even stop producing them (Paris, 2003). For changes in farming practices, some local rice farmers adopt direct seeding technique to mitigate the labour shortage problem at RLR crop establishment, while well-off farmers often invest in farm machinery to replace human labour (see chapter III for more details about changes in farming practices in relation to labour migration). Because of advanced market integration and competitive labour recruitment, mutual help among relatives does not exist anymore. Instead, a local market for hired labour has emerged in response to the increased demand for farm workers to help alleviate labour shortage at the village level. Moreover, pools of illegal foreign workers from Laos and Cambodia are also becoming available for hire at lower cost at RLR harvest.

### 5.3.3. Need for Comprehensive Knowledge about Interactions between Land & Water Use and Labour Migration prior to Implementation of Major State Investments in Water Resources

Most of Thailand's agricultural development projects have been implemented by focusing on improving agroecological conditions, while usually ignoring the socioeconomic dimensions. In the northeast region, the improvement of water availability has been the focus of many past governments. Regional irrigation projects have aimed at improving local farmers' livelihoods by extending their ability to produce farm products for sale, particularly in the dry season. However, the success of state attempts to support all-year round farm production is limited as seen by the consistent flow of labour migrations from the northeast to Bangkok and other urban areas.

Moreover, the establishment of local administrative organizations (TAO) to manage local resources according to the national policy of decentralization makes the participation of locals in any development projects at the community level mandatory (Charoensutipun, 2001). Recently, without a clear understanding of such interactions among key components of the system, and a lack of involvement of locals, the Royal Thai Government has been preparing an extensive water grid system to ensure that sufficient volumes of water feed huge areas of the country, in particular the dry and impoverished northeast region (Molle and Koma, 2005). A 500,000 million baht (one billion euro) mega infrastructure project to divert water from the Mekong river



through a “hydro-shield tunnel” is often cited (Bangkok Business News, 2008; Matichon, 2008).

Such top-down development approaches cannot handle such complex interactions. An in-depth understanding of these key interactions acquired through truly participatory approaches is definitely required to ensure the design of useful, acceptable and practical development plans prior to their implementation. Initially, this understanding is also necessary to improve my preliminary knowledge before model implementation. The results from subsequent simulations can answer questions related to possible future scenarios. The exploration of scenarios with local farmers is a promising way forward for researchers, decision-makers, and policy makers to begin future interventions in a collaborative and more bottom-up fashion.