

DORAS - DELTA: Research report n°11

**The impact of the access to irrigation water
on the evolution of farming systems:
A case study of three villages in the Chao Phraya Delta**

François Molle

Thippawal Srijantr

Lionel Latham

Fuangladda Thepsatitsilp

DORAS Center – DELTA Project

Kasetsart University

IRD

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François Molle

DORAS, IRD (Institut de Recherche pour le Développement)

Thippawal Srijantr

DORAS, Kasetsart University (Faculty of Agriculture)

Lionel Latham

DORAS, IRD (Institut de Recherche pour le Développement)

Fuengladda Thepsatitsilp

DORAS, Kasetsart University (Faculty of Agriculture)

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Please direct inquiries and comments to:

DORAS Center
Kasetsart University
Administrative building, 10th floor
Bangkhen, 10900 Bangkok
Thailand

francois.molle@ird.fr

or

agrtws@nontri.ku.ac.th

<http://www.ku.ac.th/delta>

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Report 1:

Dry-season water allocation and management in the Chao Phraya Delta

Annexe report: The impact of the access to irrigation water on the evolution of farming systems: a case study of three villages in the Chao Phraya Delta

Report 2:

Patterns of social interaction and organisation in irrigated agriculture:
the case of the Chao Phraya Delta

Report 3:

Agricultural diversification in the Chao Phraya Delta:
agro-economic and environmental aspects of raised bed systems

These research reports are parts of a comprehensive comparative study between the Red River, Mekong and Chao Phraya Deltas. This project addresses three topics: 1) water management along the "water chain"; 2) social and institutional aspects of water resources management; 3) agricultural diversification in raised bed systems. Three companion reports are available for each of the three deltas

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Abstract

Cropping intensity, as a measure of how many crops are grown per year on a given plot, displays contrasting patterns over space and time in the Chao Phraya Delta. This is due to varied levels of access to water in the dry season. The reports document the effective impact of the access to water on the sustainability of farming systems. Three villages with contrasting environments and cropping intensities have been surveyed and are compared (they are located in Suphan Buri, Lop Buri and Ayutthaya).

Differentiated access to water and water control (whether the environment is flood prone or allows conventional irrigation) translates in sharp differences in land productivity. However, differences in farm and family size tend to mitigate the economic consequences of productivity differentials on the *per capita* income. The three villages all responded to population growth by a mix of agricultural intensification (on rice and field crops), agricultural diversification (orchards), off-farm work (notably local factory work), and emigration (to uplands or urban centres). Household incomes appear very composite (both in terms of types of activities and numbers of individuals contributing to them) and inter-household strategies and economic performance also differ significantly. It was not possible to explain such differences only in terms of resource endowment, and the 'human factor' appeared to be crucial too. Ayutthaya village compensated its ecological constraints to intensification by a higher migration rate and much factory work, while Lop Buri was able to develop animal farming. Suphan Buri capitalised on its good access to water and complemented rice triple cropping with water chestnut as a cash crop.

Despite these rebalancing factors, the average household income in Ayutthaya appeared to be half of that of the other two villages and many aspects of farming systems, such as average farm land, tenure, demography, household strategies, level of education and capitalisation, etc. displayed significant contrasts.

The crucial impact of access to water in the dry season, to grow a second crop of rice, shows that the current inequitable pattern of allocation is damaging to overall equity and to agricultural sustainability as a whole, calling for a more balanced planning of the allocation of the water resources.

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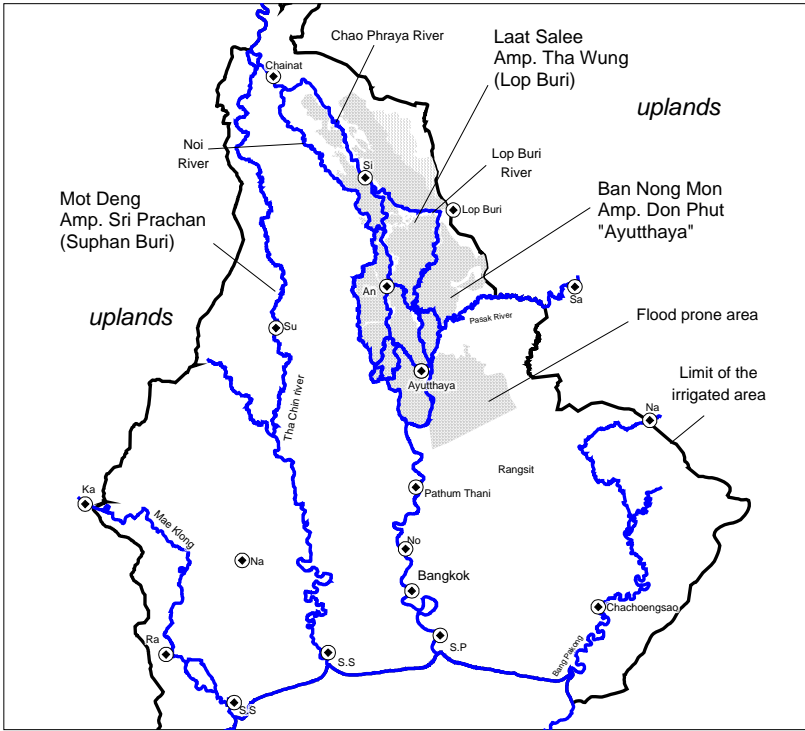
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1 Introduction

Cropping intensity, as a measure of how many crops are grown per year on a given plot, displays contrasting patterns over space and time in the Chao Phraya Delta (Molle *et al.* 2001). This is due to varied levels of access to water in the dry season. In order to document the effective impact of access to water on the sustainability of farming systems, a field survey has been undertaken in three villages. These villages have been chosen in three contrasting environments: The first (*tambon* Mot Deng, *amphoe* Sri Prachan, *changwat* Suphan Buri) one of the finest areas in the delta, commonly grows two or three crops of rice and also cultivates water chestnut, a labour-intensive cash crop. The second (*tambon* Laat Salee, *amphoe* Tha Wung, *changwat* Lop Buri) receives limited supply during the dry season. The lower part of the *tambon* is cropped with floating rice and has only recently engaged in dry season cropping. The third (Ban Nong Mon, *tambon* Ban Luang, *amphoe* Don Phut, *changwat* Saraburi) is a typical floating rice area and has only recently started to grow some field crops in the dry season. To make reading easier we will refer to these three villages by the province names but this by no means imply that they are representative of the provinces (which indeed have different sub-regions). As the last village straddles the frontier of Saraburi and Ayutthaya Provinces and is more representative of the latter, we will refer to it by the name of Ayutthaya Province.

FIGURE 1: LOCATION OF THE THREE VILLAGES SURVEYED



In each village, approximately 70 households were surveyed¹. In addition all of the village households were listed and analysed in terms of family structure, land endowment and occupation. The survey included questions about the family (last three generations), migration, occupation, agriculture, assets, indebtedness, income, and covered both the actual situation, the history of the farm and its strategy regarding the future. Data were analysed comparatively and interpreted based on a few factors, with special attention to the degree of agricultural intensification allowed by a given access to water. The following account shows the impact of inequity in water allocation upon farming systems.

1.1 Brief historical background of the three villages

1.1.1 Ayutthaya village

Ban Nong Mon is a typical traditional village of the flood-prone area of the delta. Houses on stilts are constructed on the levees of a natural waterway, and the initial settlement, centred on the *wat*, later expanded on both sides of the river; it is now divided into three villages (*mu* 5, *mu* 6 and *mu* 7), with close kinship relations.

Ban Nong Mon originated as an off-spring of Don Phut, a village located 6 km to the north, which was settled by ethnic *Lao Phuan* coming from *amphoe* Bang Pahan, near Ayutthaya, where they arrived at the time of Rama II (they are said to originate from Chieng Khong and Vientiane)². Don Phut still has some Lao-style houses (in particular barns) and a few elderly people still communicate in Lao³.

Initially, immigrants concentrated on rice farming, planting floating rice on the vast plains nearby. They used buffaloes, which were entrusted to *isan* people during the flood period⁴. Fish was also an important complement of the food supply but only those who had paid for a concession could engage in commercial fishing. In practice, these fishermen were often Chinese migrants, who would come once a year (after the receding of the flood) to catch fish in the depressions. Some of these Chinese ended up settling in the village and raised pigs as their main occupation.

¹ Lop Buri village was surveyed in 1998 and 1999 (see Latham, 1999) and the other two villages in 1999 and 2000.

² It is somewhat surprising that these areas have been settled so late. They lie a few kilometres away from Lop Buri River, which was the oldest waterway linking Lop Buri and Ayutthaya, and could have been expected to be planted with rice much earlier. It is possible, however, that such was the case in the Ayutthaya period but with the depopulation that followed the fall of Ayutthaya, they were abandoned.

³ Such is the case of Kamnan 'Meng', 85 years old, a key informant on history.

⁴ After completing the land preparation, villagers would band together and take their animals to acquaintances in the uplands of Lop Buri and Saraburi Provinces. The person looking after the buffaloes would bring them back just after the harvesting period, to graze in the rice fields. Old farmers do not recall severe cases of cheating and the system worked smoothly based on mutual trust (newly born buffaloes were handed to the owner; the shepherd would be responsible for cases of theft or would inform villagers in cases of disease).

At the beginning of the century the village was well connected to Bangkok. Chinese rice middlemen would come by boat along the Lop Buri River in the wet season, or reach Tha Rua, on the Pasak River, during the dry season. In 1925 (and probably earlier), villagers could use a boat service taking them to the capital. The boat would leave Tha Rua at 3:00 p.m and reach Bangkok the following morning. At the same time the northern line of the railway was constructed and also passed near Tha Rua.

The Second World War affected the village only slightly. War planes were observed (the Allies successfully bombed the Tha Rua bridge over the Pasak River) and youths between 25 and 30 years old were drafted, some of them for a period of eight years (the Japanese forces tried mass recruitment for construction and railway work but this was partly resisted by the Thai government). During that time, the village also stopped producing its own clothes and started to buy them, along with other goods, from Chinese merchants at Don Phut or Ban Moo. The 1950s and 1960s were periods of agrarian crisis (growing populations and stagnating production) and the upland boom was felt as being extremely timely. Several families migrated temporarily to newly reclaimed lands where they planted corn. Some arrived only at harvest time; some ended up staying in the area. Land was cleared by *isan* people who would produce charcoal and sell the land to migrants (generally 25 *rai* per household, at the price of 100 baht/*rai*)⁵. In the 1970s, when a 'gate' was constructed further south down the river, rice farming conditions significantly improved⁶. This enticed several villagers to sell their land, the area of which in the meantime had considerably increased because of the construction of roads and factories, and to return to their village.

In the past moneylending, not agriculture, was the main avenue to the accumulation of wealth. Moneylenders often had to protect their interests through threats or by using touts (*nakleng*) who on some occasions could even kill defaulters. In the late 1960s and early 1970s, the situation changed for several reasons. Fearing for their security, some rich families preferred to move to the district, where they could benefit from the protection of the police who were absent from the villages. They also realised, at that time, that various opportunities to invest their capital were afforded by the soaring economy (transportation, construction, commerce, miscellaneous illegal businesses, etc.). These investments were less risky and much more profitable than moneylending, which was starting to be curtailed by the development of institutional credit. At present, land foreclosure is rare but several villagers are severely indebted to the Bank of Agriculture and Agricultural Co-operatives (BAAC).

⁵ In Phraputhabat, there were also large estates reclaimed by the government. The government of Pibun Songkram sent many of the pedicabs that were congesting Bangkok to this area.

⁶ The natural hydrological regime was regulated by the construction of dikes and regulators. This allowed the control of water at the end of the rainy season and decreased risk by avoiding years in which water would recede too early. For a complete description of these traditional floating rice systems, see Molle *et al.* (1999).

During the last 25 years, the village economy has been marked by a trend towards the demise of agriculture and openings to multifarious activities. Communications, in particular village and provincial roads, improved and several industries (in Maharat or Nakhon Luang) started to offer jobs. Several anecdotes serve as examples to stress the opening of the village to the outside world. The first example is the provision of goods: Even more than 20 years ago, a fertiliser company from nearby *amphoe* Ban Mo had introduced several pilot projects in the area in order to demonstrate using chemicals for transplanted rice. During one of our surveys in the village, the driver of a pick-up coming from so far as Kanchanaburi, who had no particular knowledge of or acquaintances in the village, proposed selling pineapples at the price of 1 baht each!⁷ Another striking example is the connection of some villagers with external religious movements, including the Japanese-funded "Yolé" (some villagers had already been to a centre in Khorat) and Wat Dhammakaya in Bangkok⁸. A final example is the penetration of drug use in the village, although to a lesser extent than in many other places⁹.

Nowadays *tambon* Don Phut comprises 1,560 persons living in 362 households, divided into seven villages. Because of the decline in fertility and out-migration, the population has levelled out. The school, with its eight levels, has more or less the same number of pupils (98) that it used to have in the past with only five levels. State action can be sensed from the accumulation of occupation groups, which can be found in the *tambon*. They include a saving group, a basketry group (56 members), a bamboo handicraft group, a chilli-planting group (75 members), a fish-raising group, a cremation group (212 households), a frog-breeding group, a fish sauce makers' group, a community store and rice banks. Groups are also paralleled with projects (*krongkan*), such as the 'Backyard Gardening Project' or the 'Greenhouse Project'¹⁰. The savings group of Ban Nong Mon is considered relatively successful (membership has risen from 15 to 141 persons). These groups are nevertheless often amorphous and repeatedly face the problem of marketing their products at a profitable price. On the other hand, they contribute to maintaining some skills in handicraft making (hats, baskets, fish-traps, etc. are still made locally) and social interaction (group members often work together).

⁷ Heavy rainfall in Kanchanaburi had triggered the harvest of immature pineapples for fear they would rot.

⁸ Lay representatives of Wat Dhammakaya were reported to visit the school and the temple, to distribute brochures, signs with the temple name, and to offer subsidies (40,000 Baht) to the abbot if he could bring 40 people to a ceremony in Bangkok. The abbot was indecisive but faced the opposition of villagers.

⁹ The village has been awarded a prize of a 'drug-free village', although several youths are reported to be addicted, including a member of the *phuyayban* entourage (*phuak*). As elsewhere, the local police are perfectly well aware of the traffic and of who are engaged in it, and receive bribes to turn a blind eye.

¹⁰ This project is cited as an example of top-down projects proposed by the Kaset *amphoe* who succeeded in rallying a few villagers but failed to deliver the promised equipment; the project budget has reportedly been used.

Ban Nong Mon temple is attended by people from the three villages and is rather well identified, spatially and socially, with this community. It now has eight monks and hosts a festival each year in December.

1.1.2 Lop Buri village

Ban Laat Saali is a typical rice-growing village of the floodplain of the northern delta. It is located in the heart of a backswamp and presents a classical toposequence from the river levees (Lop Buri River and some of its natural arms) down to lowlands where floating rice is grown. Judging from the proximity of Lop Buri (10 km) it is possible that the area might have been occupied and cultivated as early as the sixth century. Mon-Khmer, and later Thai people, settled on the river embankments to protect themselves from floods.

Initially centred on the *wat*, located at the highest point of the area, Laat Saali expanded along an arm of the Lop Buri River (Laat Saali canal). This created a twofold settlement pattern and the initial village ended up being split into two administrative divisions. On the one hand the main village (*mu 2*) clustered around the *wat*, in a quite dense combination of compounds. On the other hand, villagers settled all along the canal from *mu 2* up to the Lop Buri River, near the city of Tha Wung (*mu 1*). Although it is difficult to get clear information on the historical chronology, it appears that these villagers arrived later and reclaimed the upper lands where rice yields were lower because of the irregularity of the floods and weed pressure. *Mu 1* is still the poorest village, while the bigger farms are all found in *mu 2*.

The first migrants cleared the lowlands and planted them with floating rice varieties, while the upper parts remained covered with shrubs and forests, providing bamboo, wood for house construction and charcoal. Both cows and buffaloes contributed to agricultural work and to the transportation of goods. Most houses had a backyard where some fruit and medicinal plants were planted, vegetables were grown outside the flooding season and farm animals (chicken, pigs) were bred. Diet was supplemented with fish that were caught in natural waterways.

Old villagers remember that Chinese fishermen had concessions on the Lop Buri River and were engaged in commercial fishing. They would come up from Bangkok each year after the floods to catch fish. Chinese were also involved in rice trading and milling. These rice middlemen collected rice surpluses from the countryside to transport it either to Lop Buri rice mills or directly to Bangkok mills. Amongst Chinese migrants engaged in commercial activities, many settled in the city of Tha Wung and continued their activities. The very few Chinese families who settled in Laat Saali (two families) concentrated on selling food or pig raising. There are also two Mon families in the village who arrived before the Second

World War and are related to other Mon villages located near Lop Buri; one of them is currently the richest family in the village.

Like all the villages of the delta, Laat Saali underwent an agrarian crisis during the 1950s and 1960s which forced some villagers to migrate to the newly reclaimed uplands. Land owners sometimes sold part of their land to buy larger areas in Lam Ai Duan or elsewhere in Lop Buri Province. Cultivating field crops (e.g. corn), they would come back to Laat Saali at harvesting time. Landless villagers also went to the uplands, but only seasonally, to work as labourers. As a result of the improvement of irrigation in the 1970s, some of these upland farmers returned to the village, attracted by the better farming conditions (and also because they could make a handsome profit by selling the land they had acquired cheaply a few years previously).

Together with the expansion of the double crop of rice, cows disappeared progressively from the fields. Later, at the end of the 1980s, new agricultural activities such as intensive chicken breeding or commercial orchards emerged on high land. Also in the 1980s, some factories were built near Lop Buri, which created additional sources of employment for the new generation. This evolution reduced the proportion of villagers involved in agricultural activities, even if agriculture was still the occupation of the majority of villagers (either as land owners or as agricultural employees).

1.2 Community and leadership

It is commonplace in the delta to observe administrative villages that poorly overlap with 'natural communities' or 'indigenous villages' and even, in some cases, the absence of such communities (Shigetomi, forthcoming; Kemp, 1989, 1991). This has an impact on the way official and local leaderships overlap, as well as on how much social capital can be mobilised at the level of the administrative village (Molle *et al.* 2001b).

Ayutthaya village is a cluster divided into two administrative villages (*mu* 6 and *mu* 7) but with the same historical and social nucleus. *Mu* 5 corresponds to the expansion of these villages and is not physically detached from the original group. This cluster is however elongated in shape, as houses are built on the levee of the natural waterway, and is in general not very dense as most compounds have backyards. The three villages can be termed a community, although there are numerous kinship and neighbouring relationships with Bang Luang and Don Phut villages, all of them initially settled by ethnic Lao Phuan. Marriage has brought outsiders (in general male) into the village as can be seen by the presence of two Muslim household heads originating from Muslim communities near Nakhon Luang, on the Pasak River. One portion of *mu* 7 is formed by several houses, which are erected on public land (*thi satarana*); they tend to shelter less well-off families. Two households (from the same

family), also on public land (school) near the *wat*, are extremely destitute. Their occupants had no kinship link or acquaintances in the villages and settled here because their forebears were from this village. The parents of the old man of the first house sold part of their land, then lost another part because of gambling, and eventually moved to the uplands. He himself later married a woman from Nakhon Luang and stayed there with her family for 2 years. They later moved to Bangkok to find jobs and lived there until their grandchildren had to go to school. As they could not afford both the school and the costs of living they decided to move back to this village.

The three *phuyayban* wield significant power in the village (the headman of *mu 5* is also the *kamnan* of the district) and are leaders in most village activities. The headman of *mu 7* owns almost 200 *rai* and his wife has been an active money lender for a long time. By lending land and money they can rely on a wide web of patron-client relationships with villagers¹¹. He is widely praised by villagers for his earnestness and has admittedly built most of his fortune through hard work, although his wife's activities may have been a contributory factor. Other influential people in the village include two school teachers (one retired) who also have over 100 *rai* of land; they lend small sums of money to neighbours and one is active in local political life (he is a canvasser). Other successful villagers often have non-agricultural activities outside the village (construction firm, business in Bangkok, etc) and are often members of the *Tambon* Administration Organisation (TAO).

As one of the most respected persons of the Lop Buri village community, Lung Chua appears to be the most influential: Although he was never headman of the village (possibly because he had married someone in the village from which he did not originate) he is prominent in his drive for innovation, helpful in lending money or renting out land under fair conditions, charitable to the village (he donated one *rai* for the health centre (*anamai*) and has a recurring role as a "pilot farmer" in the different initiatives of the kaset *tambon* ("bio" orchard, "new theory", etc).

Other influential persons include Somchai, a young farmer who was among the first to engage in contract chicken breeding and now lends advice to newcomers; and Pa Peo, who runs the central shop, is significantly wealthy, and has the upper hand in village life and hearsay. Noteworthy is Lung Chien, who started from scratch and is now owner of 100 *rai* cropped with fruit trees and also used for fish farming. He attracts malicious gossip and is poorly integrated in the village as his wealth is allegedly linked to his wife's job as an officer in the district Land

¹¹ For example two destitute old women who live nearby often receive food or medicine from him. In exchange they often show up in the compound and help with several domestic tasks.

Department. The village headman has little influence and there are no non-farmer personalities in the village.

Suphan Buri seems to lack leadership. There is the feeling (more than the evidence) that people are less tied to one another and are more autonomous in their daily economic activities.

Sanit Klaiwan, however, stands out as a 'model farmer'. Although practising double and triple rice cropping he felt that his income was uncertain and he adopted the King's 'new theory' in 1995. This consists in diversifying activities, digging a pond to raise fish, making some raised beds for a mixed orchard (mango, rose apple and jack fruit), planting vegetables (onion, coriander), and raising ducks for eggs. On a total of only 10 *rai*, with seven people in the house and only one working outside, he could get 167,000 baht of cash income, in addition of auto-consumption.

1.3 Physical environment

Suphan Buri village is located in the Samchok Irrigation Project, which is one of the finest rice-growing areas of the delta. It has good irrigation infrastructures and partial land consolidation¹². *Tambon* Mot Deng lies outside this area (but has good on-farm infrastructure) and is located along the Tha Chin River, which represents an additional source of water for riparian farmers, especially when irrigation supplies are cut (they generally unite to set up one powerful pump and channel water under the road down to the irrigation area).

Lop Buri village extends from the high levees along the Lop Buri River, where the main irrigation canal is located, down to the large depression, southward. Topography and the irrigation network define two main areas:

- On the non-flooded area, close by the canal, water is distributed by gravity or by pumping, through a network of ditches. This area has no drainage problems.
- In the lower part of the area the objective is to control the water level as much as possible. Regulators in the drainage systems release water in case of excess and retain it during normal periods, regulating the level so that only the desired area is flooded.

¹² The term for areas that have benefited from complete land development . The term is inherited from the problem of land fragmentation, experienced in Japan, which made land consolidation a critical issue some decades ago. The concern was 'exported' to other countries where the problem was minimal but where on-farm development was needed and it was the most salient aspect (much before land consolidation). The misnomer, however, remained.

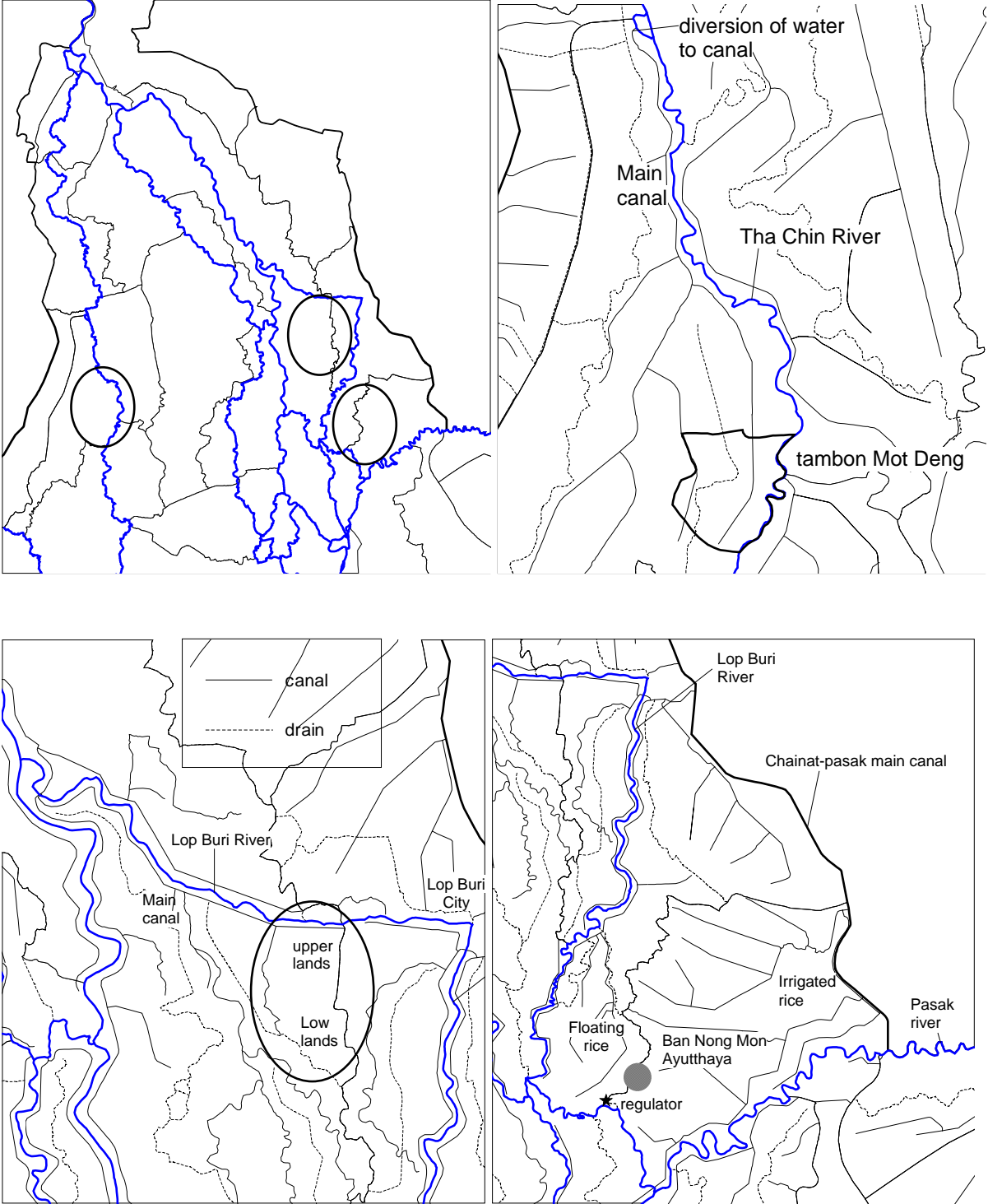
Other water sources include farm ponds and a few tubewells. In 1993, the provincial administration implemented a large programme of well drilling aimed at mitigating the effect of the water shortages experienced at that time. It seems that farmers were not really involved and that the programme was carried out hastily, resulting in the total uselessness of the wells. The farmers interviewed have never used the wells for the following reasons:

- the economic profitability of this irrigation means has been totally omitted. The diameter (too small according to farmers) and the depth of these wells makes pumping very costly compared to pumping from the canal. Moreover, pump sets were not provided and some farmers could not afford them;
- the water quality was not appropriate for rice cultivation.

In Ayutthaya there is no real irrigation system. Water control consists of regulating the water level in the different units (backswamps surrounded by a dike), as conducted in the lower part of Lop Buri. The irrigation 'canal' is in fact a natural waterway (an arm of the Lop Buri River) which collects drainage water from upper areas in the Roeng Rang Project, to which it belongs. Its water can nevertheless be used in the dry season (by pumping) to irrigate field crops in the nearby plots.

Regarding road communication, the three areas are nowadays well served by asphalt roads. Suphan Buri is linked to the main road (Chai Nat-Suphan Buri); good access to Lop Buri village is more recent but the main road that follows the Lop Buri River is not far. In Ayutthaya, the village was until recently extremely isolated (for delta standards). The construction of the Ang Thong-Tha Rua asphalt road has considerably eased communications. (It has also generated the interest of outside investors in adjacent land.)

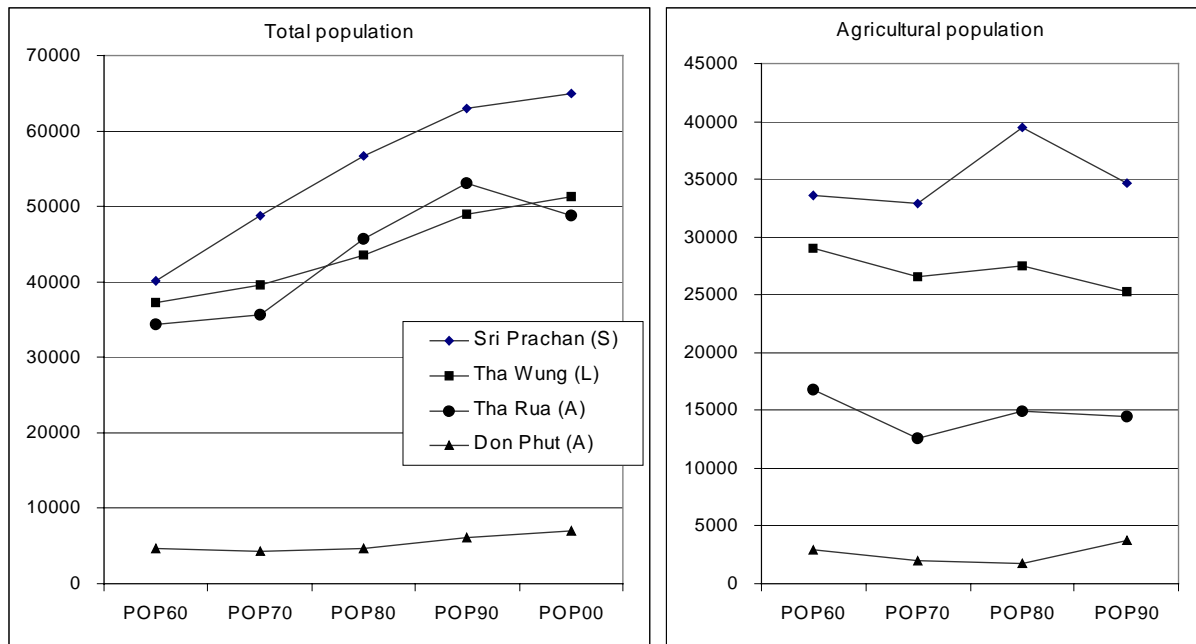
FIGURE 2: IRRIGATION LAYOUT OF THE THREE DIFFERENT STUDY AREAS



1.4 Population

Population data by *amphoe* have been available every 10 years since 1960. This allows us to examine the historical trends of the *amphoe* in which our villages are located¹³. It can be seen that since 1970, Sri Prachan (Suphan Buri) and Tha Rua have experienced population growth. The latter can be ascribed to industrialisation along the Pasak River, where Tha Rua is located. Noteworthy, but unexplained (the crisis?), is the drop of population in Tha Rua in the last decade. The changes in agricultural population are all the more telling because all *amphoe* experienced a decline in the 1960s and the slope of the decline has been in line with expectations: More severe in Lop Buri than in Suphan Buri, and more severe in Ayutthaya than in Lop Buri. The intensification of rice (HYVs) in the 1970s corresponded with the steep increase in Suphan Buri in the 1970s, while Lop Buri stagnated and Ayutthaya continued its decline.

FIGURE 3: POPULATION CHANGE AT THE AMPHOE LEVEL



¹³ As Ayutthaya village is between Tha Rua and Don Phut, both data are presented. Don Phut was divided in the 1980s. Therefore the data for 1960 and 1970 are inferred from the respective percentages of the two subdivisions in 1990.

2 Households and activities

2.1 Household structure and labour force

The very definition of what a household is and the identification of its head is problematic from the outset. There is a wide range of situations such as:

- The house is registered in the name of an old man (or woman) who lives with one or several of his children. This formal household head may still be economically active, or only contribute by some income such as land rental, or, more commonly, may be totally dependent upon his children.
- The house is registered in the name of an old man (or woman) but he lives in another house, sometimes not in the village (typically with one of his children in Bangkok) and the house is occupied by another child (or the wife).
- In some cases, an old couple (or a single person) is totally dependent upon one of the children who lives next to them in another house which has not been registered formally. The head of the household (eldest person) is not the real one. The opposite case also happens where three generations live together but members want to access credit independently. In this case they ask for a new house number in order to be able to open a new account with the bank.
- Finally, it occurs that some poor families build a house which is not register at the administration (ex: 2 families in Lop Buri)

Although an effort was made to identify the head of the household (in terms of economic decisions), the difficulties mentioned above introduced a certain bias in the categorisation of households. Table 1 shows the distribution of the whole population of the three villages by main age class. The most striking difference is the much lower percentage of children under 15 in Ayutthaya. This can be attributed to a higher rate of out-migration of families with young children and, possibly, to lower fertility.

TABLE 1: DISTRIBUTION OF POPULATION BY AGE CLASS (IN %)

Age class	<15	15-60	> 60
Ayutthaya	<u>18</u>	63	20
Lop Buri	29	49	22
Suphan Buri	27	48	24

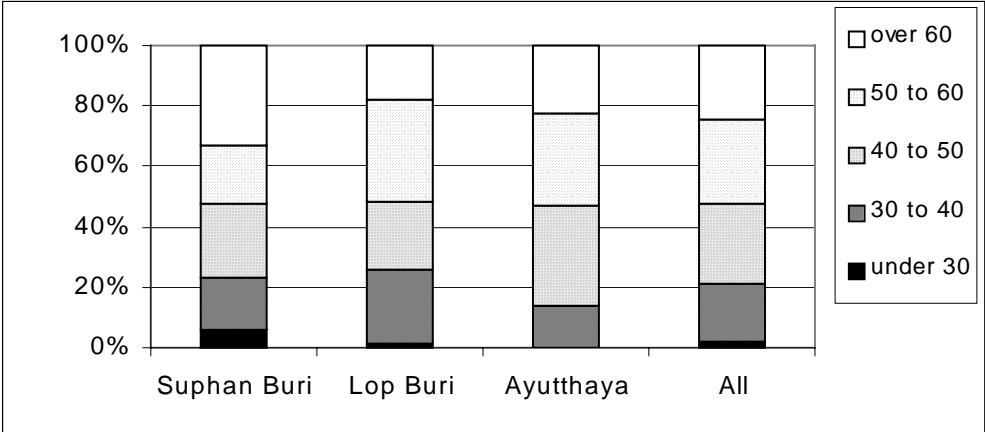
Studies at the level of the whole delta (Kasetsart University and IRD, 1996) have shown that the heads of agricultural holdings tend to be older in the flood-prone area than in other areas. Table 2 shows that indeed the average age in Ayutthaya and Lop

Buri is higher than in Suphan Buri and that non-farmers tend to be older than farmers. This second feature may be partly attributed to the fact that old farmers leasing all their land or having either sold or passed it to their children are not registered as farmers. Figure 4 gives more details on the distribution by age of *farming household* heads and shows that there are proportionally more people over 60 years old in Lop Buri, while the percentage of the population over 50 tends to be the same. Because of the delay in the updating of the official registration of the houses, statistics on the average age of households heads may reflect the increase in age expectancy and only partly the ageing of farm operators (who are sometimes children within the household registered in the father's name).

TABLE 2: AVERAGE AGE OF THE HEADS OF HOUSEHOLD

	Farming	Non-farming	All
Ayutthaya	50	56	53
Lop Buri	52	55	54
Suphan Buri	51	50	50

FIGURE 4: DISTRIBUTION OF THE AGE OF THE FARM HOUSEHOLD HEAD (WHOLE VILLAGES)



A striking detail, which corroborates the general statistics on life expectancy by gender, is that 82% of the widowed population (for the three villages) is female (and only 12% is male). The total occurrence of single males or females amount to 6%¹⁴ (with 61% of them being male).

The composition of households regarding generations was rather surprising: Only one third were composed of parents and children (type 1-2). However, if we compute the percentage of 3 (or 4) generational households, we get 38% on the average, a rate quite commonly encountered (see Molle and Srijantr, 1999).

¹⁴ But some other singles live with siblings and are not registered as household heads.

Noteworthy is the lower percentage of three- generational households in Ayutthaya. It can be hypothesised that the greater rate of out-migration tends to dislocate families and raises the share of one- and two- generational households. For example, there are five cases of households composed of grandparents (or a grandmother alone), who take care of grandchildren, while their parents are away working in factories. Single third-generation elderly (or couples) amount to 10 and 12% in Suphan Buri and Ayutthaya, which are rather high rates. However, out of seven such cases found in Ayutthaya, four corresponded to active persons, two to old women with a daughter living nearby (but not in the same house), and one to a destitute woman. The picture is similar in Suphan Buri with an unmarried woman in addition.

TABLE 3: DISTRIBUTION OF HOUSEHOLDS IN TERMS OF GENERATIONS (IN %) (WHOLE VILLAGES)

Generations*	Ayutthaya	Lop Buri	Suphan Buri	All
1	0	0	2	1
1-3	6	0	0	2
1-2	33	38	29	33
1-2-4	5	7	6	6
1-2-3	16	29	35	27
1-2-3-4	4	5	2	3
2	9	7	3	6
2-3	13	10	9	10
2-4	3	0	0	1
3	10	2	12	8
3-4	1	0	0	0
2-3-4	0	2	3	2
1 generation	19	10	17	15
2 generations	56	48	38	47
3 generations	<u>22</u>	38	44	35
4 generations	4	5	2	3

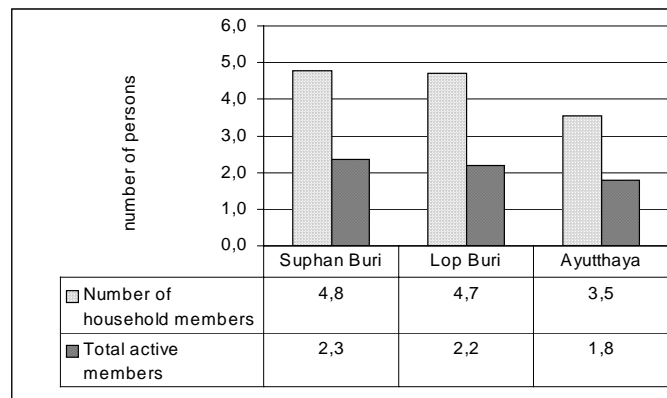
1 = children (1st generation); 2 = parents (2nd generation); 3 = grandparents (3rd generation); 4 = great grandparents (4th generation)

These different factors translate in varied average sizes of households and also affect the available labour force. Ayutthaya has significantly smaller households (only 3.5 members) and the available labour force¹⁵ is also much more reduced (Figure 5). This number can be compared with the average membership of 5.2 per household found by Amyot (1976) in 1969 in 3 villages close to Ayutthaya. This shows the impact of migration and the differences between the three environments in terms of labour absorption capacity. Differences in fertility could not be established but studies

¹⁵ Children or grandparents helping occasionally (on week-ends) have been considered as 0.25 units of labour. Adults were attributed a factor of 0, 0.50 or 1.0, depending on their level of involvement in farming.

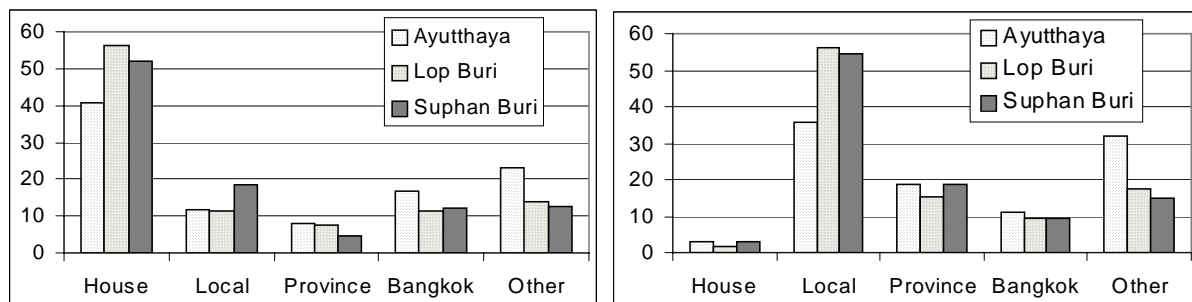
by Foster (1977) and by Lauro (1979) in the 1970s suggest that households with grimmer economic perspectives tend to curtail their fertility.

FIGURE 5: HOUSEHOLD SIZE AND LABOUR FORCE



The current geographical residence of both the family members of the household and of the siblings of the parents is also instructive (Figure 6). (From now onward, data refer to the selected samples and not to the whole village, except otherwise indicated.) The highest percentage of family members reside in the house (they correspond to children, when the head is not too old); between 10 and 15% of the family reside in Bangkok and over 10% in other provinces: This rate is significantly higher for Ayutthaya (25%), which shows that permanent out-migration to other provinces (often upland areas of the Central Region) or even other regions is quite common (this also includes, and favours, males marrying girls from other provinces).

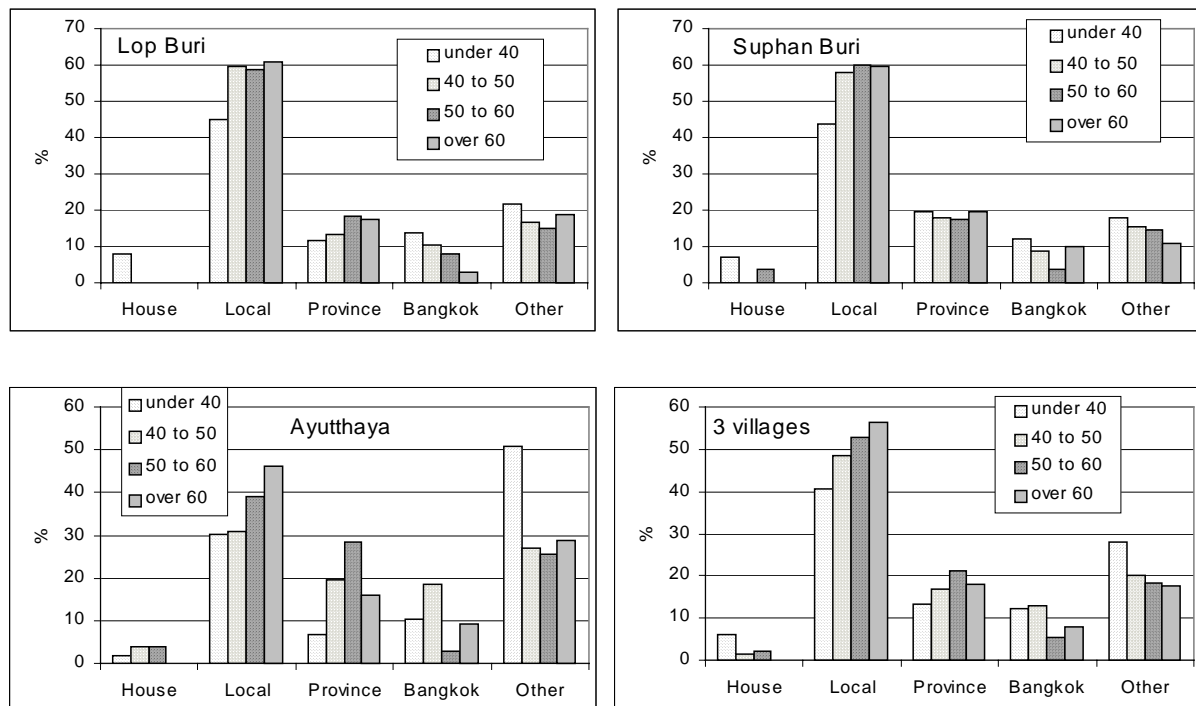
FIGURE 6: PLACE OF RESIDENCE OF FAMILY MEMBERS AND SIBLINGS OF PARENTS (IN %)



The siblings of household heads form a quasi, exclusively adult population that is therefore more homogeneous. They were found to have settled in Bangkok (10%) but more commonly in other provinces, especially for Ayutthaya village, which has over 30% of its population in such a situation. It can be seen that slightly more than half the population that reached adulthood in the last 40 years remained in the village for Suphan Buri and Lop Buri, against only 35% in Ayutthaya. If we look at these data by class age (of the household head), we can observe that the rate of settlement in

the village for the siblings of the generation under 40 is lower by 15% than the value for former generations. For Ayutthaya this rate is now as low as 30% and the decline dates back one generation earlier (Figure 7). The increased mobility is shown by the fascinating shift of migration destinations, from the province and Bangkok in earlier times to 'other *changwat*' at present, with an occurrence of as much as 50%.

FIGURE 7: PLACE OF RESIDENCE OF SIBLINGS OF PARENTS, BY CLASS OF HOUSEHOLD HEADS



2.2 Genealogical information

Investigating the origin of the farming families was also attempted. Table 4 shows that only 80% of the fathers/mothers of farming families originated from farming families too. This suggests that 20% of the people marrying into a farming family and maintaining this as the major activity come from a non-farming background. Those born in the 1950s show a higher rate of farming descent, which is consistent with history¹⁶. When we look at these rates by gender, we can see that females tend to come from farming families with higher frequency but that for the class under 40 years old, this trend is inverted in Suphan Buri (only 63% of the females). It is not clear whether this comes from an insufficient sample or whether it mirrors the appreciation of land.

¹⁶ They were born after the upheaval of WW II and before economic diversification.

TABLE 4: PERCENTAGE OF FARMERS (HUSBAND & WIFE) WHOSE PARENTS WERE FARMERS

Age	Suphan Buri	Lop Buri	Ayutthaya	All
Under 40	71	81	76	76
40 to 50	90	80	89	86
50 to 60	81	79	80	80
over 60	76	89	71	78
All	79	82	80	80

Table 5 provides details on the geographic origin of both parents of the household head couple. We can see that the level of endogamy is quite high in Lop Buri and Ayutthaya, while in Suphan Buri 48% of all individuals come from the *tambon* or surroundings locations (“local”). It can also be observed that youths in Ayutthaya village tend to marry individuals from the province (23%) more than from the direct surroundings. This might be linked to the greater mobility of the younger generations, who often commute to industries located in other *amphoe* (Maharat, Muang, etc).

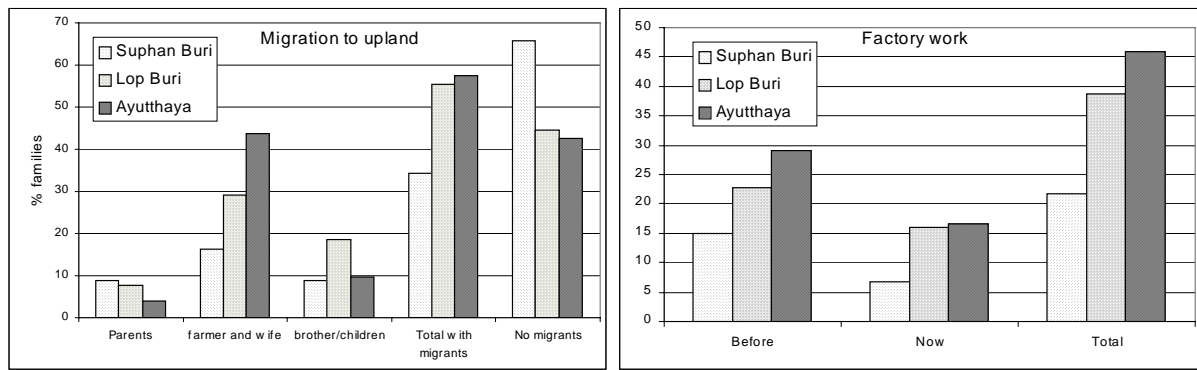
TABLE 5: GEOGRAPHIC ORIGIN OF HOUSEHOLD HEADS (IN %)

Age	Suphan Buri	Lop Buri	Ayutthaya	All
Village	36	65	54	52
Local	<u>48</u>	24	16	29
Province	6	4	<u>23</u>	11
Other*	10	7	7	8

* from other provinces, including Bangkok

In the 1950s and early 1960s, the delta experienced an agrarian crisis, when the increasing population density was not paralleled by an increase in crop productivity nor by the development of other job opportunities. Figure 8 shows that the current heads of households (and to a lesser extent their parents and their children) have been involved in the migration flows between the delta and the uplands which developed at that time [to the point that the absolute farming population decreased between 1960 and 1970 (Molle and Srijantr, 1999)]. On the whole, 55% of families in Lop Buri and Ayutthaya had members concerned with a temporary or permanent move to the uplands, against 34% in Suphan Buri. Although the whole delta was affected by these migrations, Suphan Buri was provided with better farming conditions and could more easily accommodate its growing population than the flood-prone area.

FIGURE 8: PERCENTAGE OF FAMILIES WITH UPLAND MIGRATION AND FACTORY LABOUR



These discrepancies in land productivity also appear in the much lower percentage (22%) of Suphan Buri households with at least a member working, or having worked in a factory (Figure 8, right). In Ayutthaya, this percentage is as high as 46%. The fact that such jobs rarely last beyond the age of 40 (Neulla-ong, 1992; Kitahara, forthcoming) is probably responsible for the higher rate of members having worked in factories in the past than at present. It must be noted that only 21% of the total factory jobs reported were in Bangkok, the others being found in the province itself (or its neighbour).

2.3 Occupations

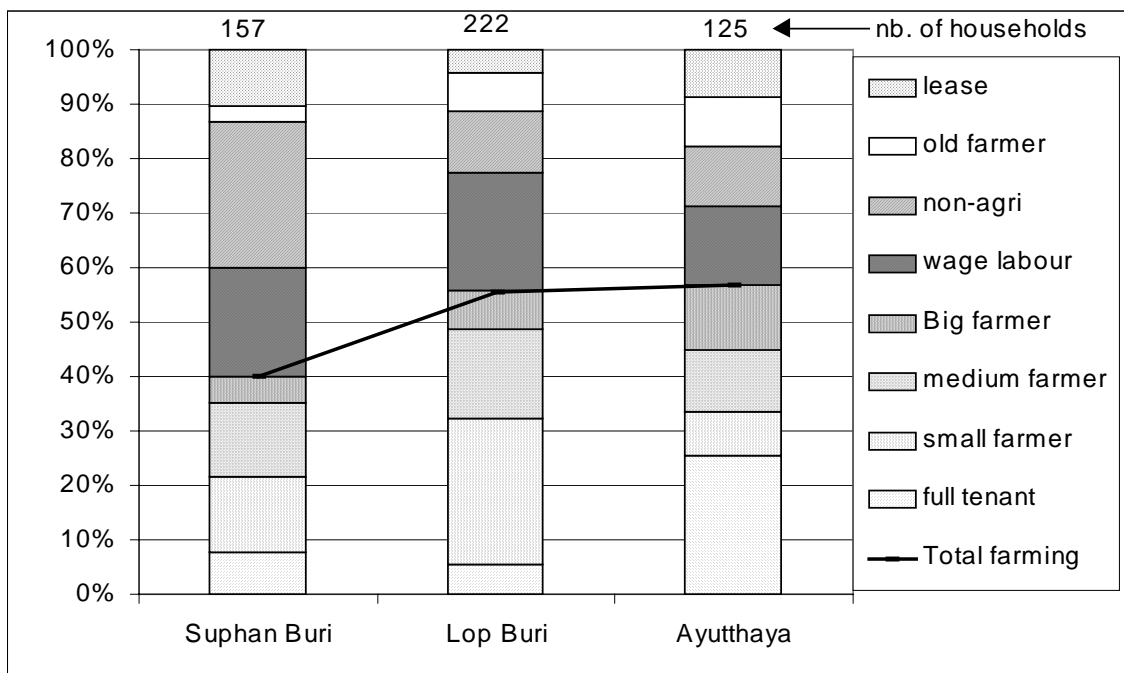
The classification of households according to their main activities was an arduous task from the outset as households with only one economic activity were exceptional. In many cases, it was difficult to select which was the main activity (or if both the husband and the wife had a full time job, which one was to be chosen). The number of people contributing to the household income was also a source of confusion. Some people mainly work in Bangkok but still have their main residence in the village (one is even a member of the *Tambon* Administration Organisation), where another member of the family (wife, son) may still take care of the rice fields. Some older people may lease most of their land, but still have one of the children cultivating a few *rai* for them from which they receive remittances. Other households are composed of two or three single adult siblings with different activities. In other words, the difficulty of defining households mentioned earlier, together with the composite nature of the household economy (both in terms of contributing members and diversity of activities) appear as main features, deserving emphasis rather than being perceived only as disturbing factors affecting the relevance of classificatory attempts.

Households classified in *tambon* records as relying on a single main activity do have in reality several minor economic activities (one son repairs motorcycles, another catches fish, the wife dries chillies for the Women's Group, they grow home vegetables and raise poultry, join groups for harvesting, receive occasional

remittances, etc). It is obviously extremely difficult to quantify the income derived from all the activities as well as the degree of food self-sufficiency, but there are many cases which are obviously not negligible and even sometimes paramount. This suggests that classical household surveys and resulting aggregated statistics capture the complexity of the rural household economy imperfectly. These shortcomings also partly apply to this study and when interpreting the following results one should keep this more general situation in mind.

The first view, limited to the main occupation of the household heads, is shown in Figure 9. The classification was done according to the list of households provided by the *Tambon* Administration Organisation (TAO) and checked with the village headmen. It was therefore not possible to specify cases of multiple income nor to know the exact occupation of those classified as 'employees': These include *khon rap jang* who look for daily wages from a diversity of short-term tasks (harvesting, spraying crops, construction, etc.), employees such as truck or tractor drivers, guards or factory employees, while 'non-agri' occupations refer to own-account workers (blacksmiths, electricians, etc) or officers (teachers, nurses, etc). The 'lease' category refers to (often old) farmers who rent out all of their land and who either receive remittances or have other activities (e.g. teachers). The first striking point is that only 40% of the households in Suphan Buri can be classified as farmers, while this rate is close to 60% in the other two villages. It must be kept in mind that a wide variety of (administrative) villages can be found in the delta. It is possible to find villages in rural areas with only 10% or so of the households engaged in farming, and others still predominantly agrarian, therefore representativeness is not ensured. It can also be seen that the 'non-agri' category is large in Suphan Buri. This can be attributed to the diversion of economic activities allowed by capital accumulation. They include transportation, construction, commercial activities, but also official positions allowed by better educational levels (investments in education). The percentage of waged labourers is around 20%, but only 15% in Ayutthaya, while full tenants are prominent in Ayutthaya, as will be seen later.

FIGURE 9: DISTRIBUTION OF MAIN ACTIVITIES IN THE 3 VILLAGES



From these sets of households, sub-samples were chosen in order to focus on the population predominantly engaged in agriculture. This was motivated by the chief objective of investigating the impact of the access to water on farming systems and, therefore, a first sample of farmers was chosen, with caution, to cover the whole range of tenure type and farm size. In a subsequent step, it was felt that the surveys would gain by adding households from the landless category, in order to better understand their role in providing labour. Therefore the sub-samples were completed by questionnaires directed at landless households. A limited number eventually appeared to correspond to villagers not involved in farming but they were nevertheless kept in the sub-sample. They included landowners leasing the totality of their land, some landless families with no agricultural income (either waged or fixed salary), and inactive people (in general senior citizens taking care of grandchildren and sustained by remittances). Waged labourers were divided into two categories¹⁷: 'Wage_agri' are characterised by the fact that waged labour in agriculture is the chief income of the family, while 'waged' are only secondarily (or not at all) engaged in agricultural waged labour. 'Non-agri' households have no land, a fixed salary (truck driver, officer, etc), and may also have some income from waged labour (including agriculture). The structure of our final sub-samples according to main occupation is given in Figure 10. It can be seen that non-farmers are under-represented with regard to the whole village, except in Suphan Buri.

¹⁷ This was done *a posteriori*, based on the economic data collected

FIGURE 10: DISTRIBUTION OF SUB-SAMPLES ACCORDING TO MAIN OCCUPATIONS

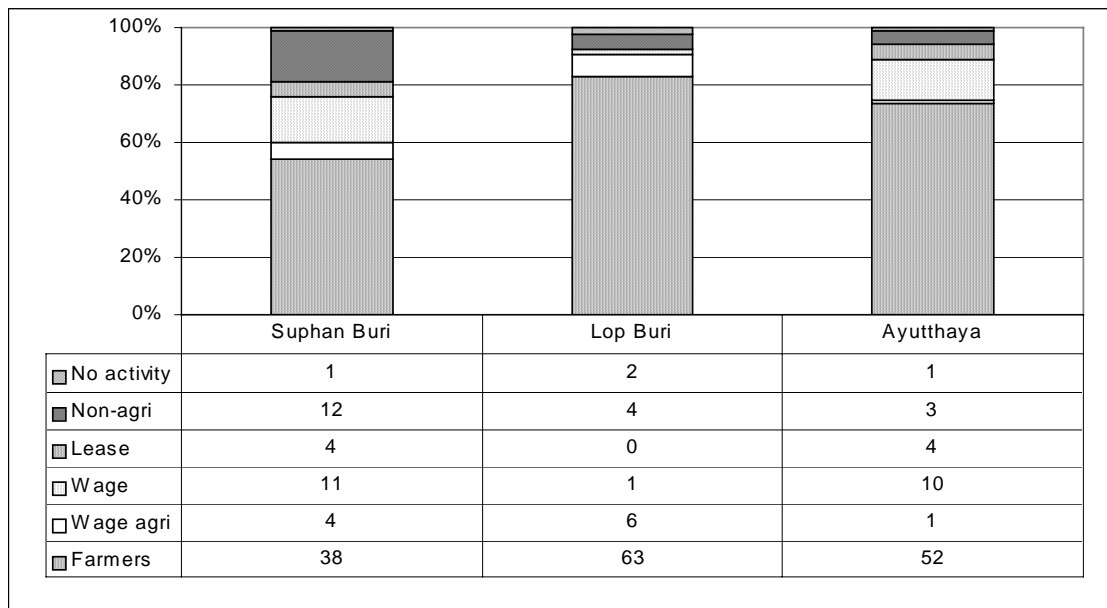


Figure 11 shows the distribution of occupations of the heads of holdings and of their siblings (independently of their place of residence). The distribution in the three villages is similar, with relatively few waged labourers (around 15-20%) and a dominant population of farmers (50-60%), while other occupations are more or less evenly distributed in the remaining categories, all under 10%. These distributions are discriminated by age class in the Annexe.

Figure 12 presents a similar distribution but relative to all the children of the (economic) household heads of our sub-samples — therefore to a sample, on average, one generation younger than the former one. Younger children still studying at school or at the university make up 31% of the total population but have been excluded from the figure so that the percentages relate only to active individuals, who may be young but also middle-aged, if the household is of generation 3 (see earlier section). The first striking difference is that to the (already low) percentage of children engaged in farming in Suphan Buri and Lop Buri (around 30%) corresponds an even lower rate of 10% in Ayutthaya. The percentage of individuals working in companies, on own-account or as civil servants is higher in Suphan Buri (while those working in factories amount to only 7%) which suggests that better economic conditions have allowed capitalisation in the form of education for children. In contrast, factory work and daily waged labour are both higher than 25% in Ayutthaya.

FIGURE 11: DISTRIBUTION OF OCCUPATIONS FOR PARENTS AND THEIR SIBLINGS

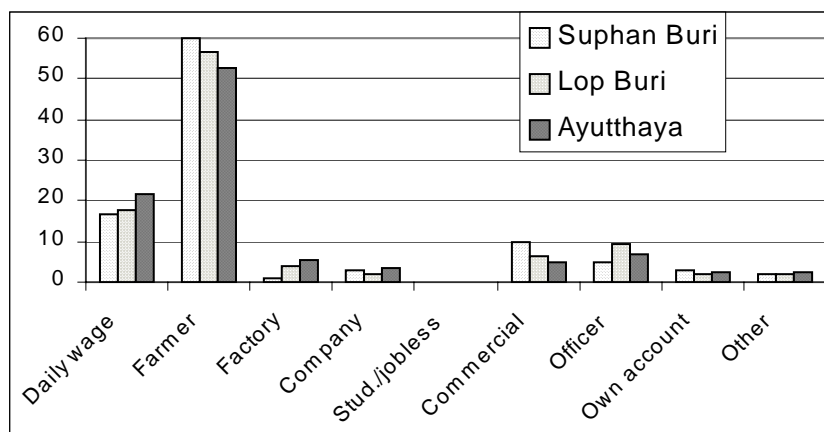
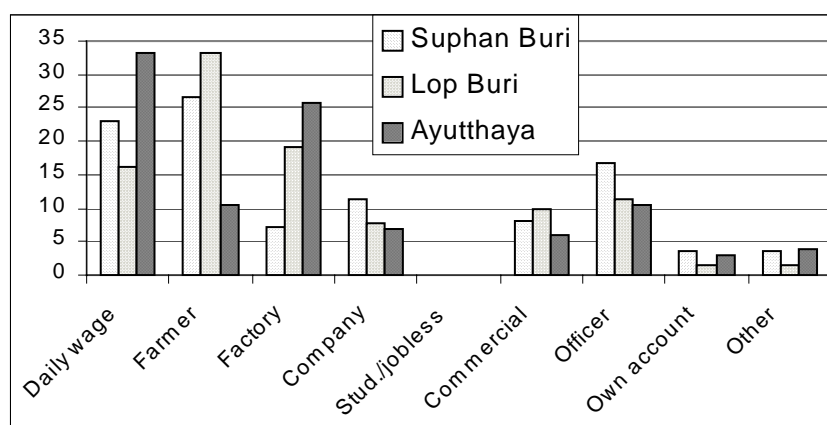


FIGURE 12: DISTRIBUTION OF OCCUPATIONS FOR FAMILY CHILDREN (EXCLUDING STUDENTS)



'Other' includes nuns, monks, soldier, prisoners

These data show that while more than half of the senior generation is engaged in agriculture, this rate has been halved for the junior one, except in Ayutthaya where the decline is far more dramatic (down to 10%). The two samples are not ideally discriminated by generation in that heads of household include economically active individuals from different ages. In addition, a farmer aged 40 can be the eldest or the youngest of five siblings, which introduces a heavy bias in the attempt to relate data to an age class. Even with such limitations, the occupational distribution according to the age class of the household head provides some interesting insight (see Annexe) and shows how older generations were predominantly farmers, while younger ones are increasingly distributed in the “waged labour”, “company”, “own account” and “factory” classes.

Noteworthy is the growing division of labour between grandparents and parents, whereby the former take care of children while the latter work out of the village, either on a daily commuting or a temporary basis. This was clear in Ayutthaya where several single grandmothers were taking care of grandchildren (*faw laan*). Table 6

shows that around 30% of households come under such a category, except for Lop Buri (only 9%).

TABLE 6: PERCENTAGE OF HOUSEHOLDS WITH YOUNG CHILDREN TAKEN CARE OF BY GRANDPARENTS

Age	Suphan Buri	Lop Buri	Ayutthaya	All
Under 40	13	0	0	4
40 to 50	12	0	25	14
50 to 60	46	23	48	37
Over 60	39	7	31	28
All	28	9	30	22

Further investigation was carried out concerning the occupations of the households. The surveys recorded up to five activities for each of the household heads, his wife and two members with economic activities within the household. All activities were classified among 34 types (see list in Annexe) pooled in seven main categories: 1) farming; 2) agricultural waged labour; 3) non-agricultural waged labour or employee; 4) commercial (own-account); 5) civil servant (officer); 6) self employed (craftsmen, drivers, etc); 7) factory employees. Three variables were defined as follows:

Tot2_Ac: Total number of activities performed by the head and his wife (or one of them in case of widows or singles).

Tot_Ac: Total number of activities performed by the head and his wife (or one of them in case of widows or singles), together with the first two members of the family with more economic activities.

Tot_Div: Total activities performed by at least one member of the household. If the four members only participate in rice cultivation, the index is 1; this gives an idea of the diversity of occupations within the households.

Table 7 shows that the average number of activities is 2.7 for a couple (or singles) under 40 years of age and that this number is to be decreased by one unit for household heads over 40. The comparison between farms with less or more land than the village average does not show large differences. Considering the total of the economic activities of the household (*Tot_Ac*), averages are over 3.4 and significantly higher in Lop Buri, especially for younger households (5.3). The index of activity diversity (*Tot_Div*) is found to vary between 2.2 and 2.9, with slightly higher values for younger farms or farms with less land. This shows that on average a household has 2.5 different economic activities: This takes us quite far from the picture of rice-growing villages typical of the delta.

These indexes are discriminated by land tenure type in Table 8. The number of activities and their diversity index is very high for owners and owner/tenants in

Suphan Buri, which shows that pluri-activity is a feature of economic precariousness, as suggested by the higher values obtained for full tenants in Ayutthaya.

Table 9 provides further information on the distribution of activities by type in the different villages. This is similar to former information given by Figure 11 but also includes (lower half of the table) secondary and tertiary occupations of family members. As expected, more children are engaged in agricultural waged labour than in their parents' generation. (These data, however, should not be interpreted fully as depicting the village occupational distribution because of the bias towards farming households.)

TABLE 7: MULTIPLICITY OF OCCUPATIONS IN THE HOUSEHOLDS

		Age of household head		Land cultivated	
		< 40	> 40	< average	> average
Tot2Ac	Suphan	2.7	1.7	1.8	2.3
	Lop Buri	2.4	1.8	2.1	1.7
	Ayutthaya	2.9	1.7	1.9	1.9
Tot_Ac	Suphan	3.8	3.7	3.3	<u>4.9</u>
	Lop Buri	<u>5.3</u>	<u>4.1</u>	4.0	<u>5.2</u>
	Ayutthaya	3.4	3.4	3.5	3.3
Tot_Div	Suphan	2.7	2.4	2.4	2.6
	Lop Buri	2.5	2.2	2.3	2.0
	Ayutthaya	2.9	2.3	2.5	2.0

TABLE 8: MULTIPLICITY OF OCCUPATIONS IN THE HOUSEHOLDS ACCORDING TO TENURE TYPE

		Owner	Owner/tenant	Tenant	Lease	Other
		Tot2Ac	Suphan	2.1	2.4	2.1
	Lop Buri	2.0	2.0	1.9		1.6
	Ayutthaya	1.0	1.9	<u>2.7</u>	0.3	1.5
Tot_Ac	Suphan	5.1	5.1	4.3	1.3	2.7
	Lop Buri	4.8	4.8	4.4		2.9
	Ayutthaya	2.1	3.2	<u>4.7</u>	2.0	3.0
Tot_Div	Suphan	3.2	2.6	2.6	0.8	2.4
	Lop Buri	2.2	2.2	2.4		2.1
	Ayutthaya	1.6	2.0	<u>3.0</u>	1.8	2.5

TABLE 9: CLASSIFICATION OF MAIN AND ALL ACTIVITIES OF THE HOUSEHOLDS

Activities	Suphan	Lop Buri	Ayutthaya	Suphan	Lop Buri	Ayutthaya
	Total occurrences			In %		
All main activities of all the household heads and spouses						
Farming	61	96	85	56	73	79
Agricultural waged labour	24	6	7	22	5	7
Non-agricultural waged labour	6	10	3	6	8	3
Commercial (own-account)	1	5	2	1	4	2
Officers	0	3	0	0	2	0
Self employed	14	5	7	13	4	7
Employees	1	4	3	1	3	3
All activities of all members in the family						
Farming	136	225	144	49	70	55
Agricultural waged labour	69	42	52	25	13	20
Non-agricultural waged labour	16	19	25	6	6	10
Commercial (own-account)	13	7	7	5	2	3
Officers	8	6	2	3	2	1
Self-employed	26	15	18	9	5	7
Employees	6	9	15	2	3	6

3 Agriculture

3.1 Main crops and activities

Rice is of course the dominant crop in the three villages. In Suphan Buri and the higher parts of Lop Buri (or in the dry season in all locations), High Yield Varieties (HYVs) are planted. They are short term (three to four months) non-photosensitive varieties, established with wet-broadcasting after preparing the land by ploughing and puddling (*nam tom* technique). Transplanting disappeared more than 15 years ago (Molle and Chompadist, 1999). Land preparation is done with two-wheeled or small four-wheeled tractors. With all of these technical changes, labour input has decreased from almost 100 person days/ha to 20 person days/ha.

On the lower land of Lop Buri and Ayutthaya, deep-water and floating rice are sown under dry conditions (dry broadcasting). The land is ploughed with four-wheeled tractors. Fertilisation, unknown in the past, is now common in such systems. Harvesting is also highly mechanised (70%) but still partly manual because of some difficulties with swampy land and/or long straw (Molle *et al.* 1999).

In Suphan Buri, water chestnut is a popular complementary cash crop. Because it is intensive in labour and capital one household only cultivates an average of 2 *rai*. Water chestnut has a long cycle, including three months of nursery until seedling are about 30 cm high and are transplanted (*dam haew*). During the next six months, farmers need to use fertilizers of different formulas to stimulate the growth, with a frequency of one time per month on average. Production costs are at around 6,000-10,000 baht/rai (including land preparation, fertilizer and chemical), but with a yield of 3,000 kg/rai and a price of 65-100 bath/15 kg they get a benefit of approximately 9,000 bath/rai. In addition, water chestnut can remain in the field (with only the expense of pumping) and farmers can conveniently wait for higher prices in the December-January period.

Field crops are not very common. In Ayutthaya, corn and chilli, which had been cultivated for many years in the dry season in Ban Luang, in the same *tambon*, were eventually adopted by Ban Nong Mon farmers five years ago. Corn can be grown without much investment or risk but its return is very low. Chilli can reach high prices but requires costly input (in particular frequent spraying with pesticide that is extremely dangerous to health) and its price is subject to high fluctuations.

All villages have some orchards but in limited proportions. In Ayutthaya and Lop Buri, they are limited by the flood-prone conditions (they can be found in the upper part of the villages and are poldered); they have expanded in Lop Buri since 1990, with the improvement of some marketing channels. In Suphan Buri, they may have not

compared so favourably with the existing land productivity and have expanded less than in the neighbouring areas of Don Chedi, for example.

Apart from cropping activities, animal husbandry is also important, especially in Lop Buri. This includes chicken, chicken-fish, ducks, geese, and pigs. Contract farming of chicken-fish husbandry has been a source of wealth for the village, which could diversify its income. The firm provides the chicks and all the inputs (food, vaccines, etc.); in exchange the farmer is committed to breeding the animals for 45 days. The firm also takes care of marketing and the farmgate price is fixed at the beginning. The investments for the henhouse and the fish pond are supported by the farmer. This type of breeding first emerged in the study area in 1990. A young farmer, the son of a middle-class rice farmer with comfortable capital, first concluded a contract with a factory established at that time (CP factory). Intensive poultry breeding has now developed and there are 10 transformation factories in the region that buy the production directly on the farms.

While some analysts see such contract farming as the ultimate integration of farmers as a rural proletariat in a fully capitalist agro-food production channel, it does have the advantage of decreasing the risk of the undertaking by fixing prices in advance. In Lop Buri, but this does not necessarily make the case for generalisation, it has provided farmers with unexpectedly high income and such chicken farms have mushroomed over all of the area. One person can take care of 3,000 chickens, with five to six 'crops' per year, each round giving a net income of 30,000 baht. The company also takes the fish (and even comes with the workers to catch them) which yield a much higher income than chickens!¹⁸ Problems with disease may occur with chickens (the losses are discounted from the next production).

3.2 Farm types

Households engaged in farming as their main economic activities include landed households (full owners and mixed owned/rented farms) and landless ones, which further divide into full tenants (hiring land for cultivation) and agricultural waged labourers.

It is apparent from Figure 13 that Suphan Buri stands out with its high percentage of waged labourers (40%, but only 11% receive main income from agricultural tasks); this is mostly due to the constitution of samples¹⁹. Ayutthaya has a high level of tenancy, which results from the higher stock of land in the rental market released by both urban investors who have bought land in the area, and by local people who

¹⁸ This depends on the types of fish raised in the ponds. For *pla duk*, which fetches 25 to 49 baht/kg, benefits can be extremely high.

¹⁹ All values are expressed in % of the total of households with own-account farming activity.

have migrated but still retain their land rights. This is also indicative of a higher sensitivity of Ayutthaya farming systems to crop failure and economic failure, with a large part of the land being sold to outsiders. In contrast, the percentage of full and mixed owners is higher in Lop Buri, where fewer full tenants can be found.

3.3 Land use

Suphan Buri village has a rather low number of farms that rely only on rice (40%), although it is commonly proclaimed as a typical intensive rice-growing area (this is also true as triple cropping is common). Diversification (and the high rate of mixed (rice + non-rice) farming) is mainly due to the cultivation of water chestnut. Lop Buri and Ayutthaya are rice-based villages (two-thirds) but associations with non-rice crops are not rare and are economically important. Cases of farms in Ayutthaya not growing rice include some farmers growing only chilli or corn in the dry season and one man raising fish. Figure 12 shows the distribution of land use by crop type, indicating in particular the different categories of rice.

FIGURE 13: TYPES OF AGRICULTURAL HOLDINGS

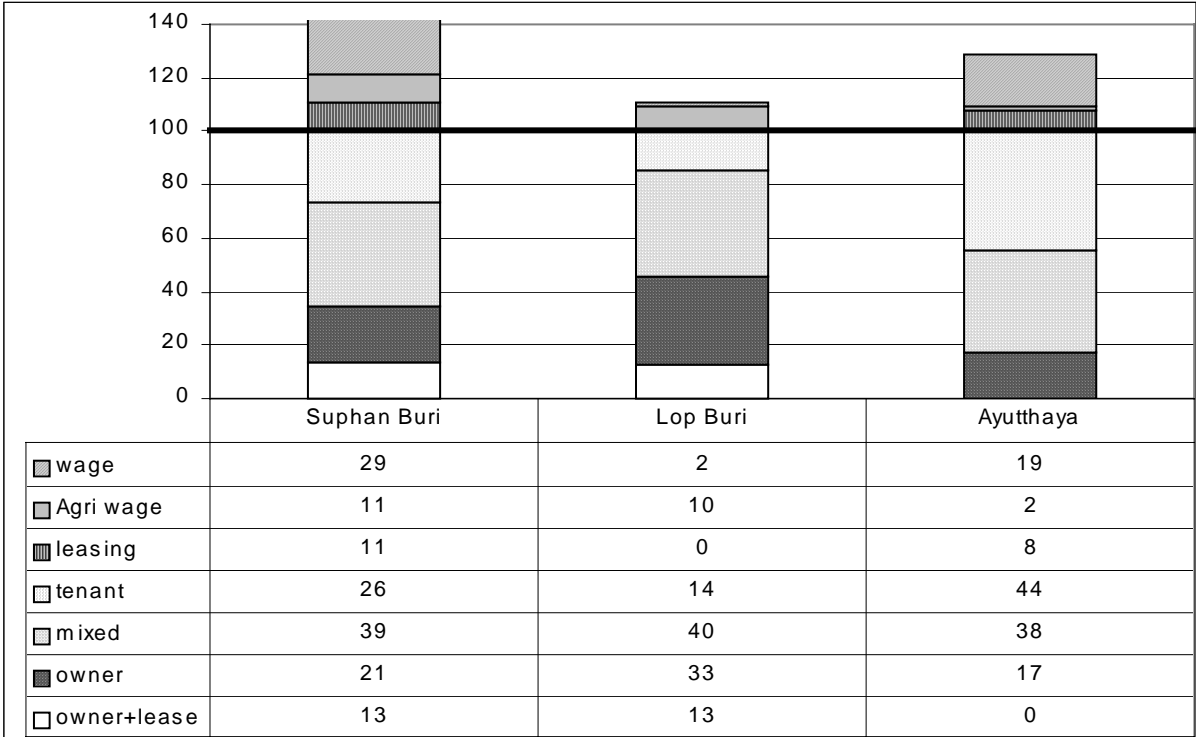
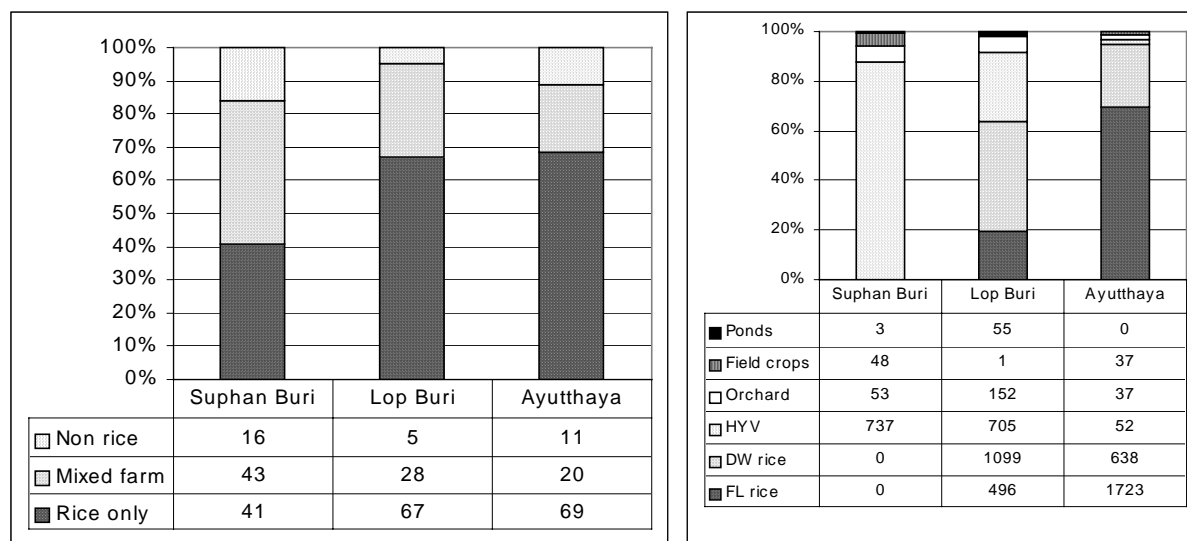


FIGURE 14: FARM TYPES AND LAND USE (IN % OF FARM LAND)



3.4 Farming equipment

The type of farming equipment owned by the households is of course related to their ecological environment. Four-wheeled tractors (4W) are more common in Ayutthaya (13%) and in Lop Buri (21%), where they are used to plough the land under dry conditions (dry broadcasting). Two-wheeled tractors are widespread in Suphan Buri (79% of the households have one), while four-wheeled small tractors are, surprisingly, very common in Lop Buri (38%): They can be used for land preparation both under dry and wet conditions and therefore suit local conditions. The number of pumping devices is impressive. Households with at least one pump set amount to 95%, 87%, and 62%, in Suphan Buri, Lop Buri and Ayutthaya respectively. Many have several sets and the overall equipment average is 1.6, 1.7, and 0.96 in the three villages. The farms are also well endowed with sprayers but Suphan Buri is equipped with more expensive motorised sets in almost half of the cases.

TABLE 10: PERCENTAGE OF FARMS OWNING A GIVEN TYPE OF FARMING EQUIPMENT (% FARMING HOUSEHOLDS)

	Tractor				Pump sets				Sprayers			
	2W*	2W_cart	4W_small	4W_big	Benzine	Diesel	Electric	Axial**	Manual	Manual 2	Motor	Mot.+pipe
Suphan Buri	79	37	8	0	68	13	8	61	18	3	47	13
Lop Buri	21	2	38	5	73	22	13	35	67	5	17	2
Ayutthaya	13	8	2	8	35	13	27	21	69	8	17	17

* Two-wheeled tractors, **axial lowlift pump (*tho phayanaak*)

3.5 Labour and hired service

Many farmers hire labour for the main operations in rice cropping. This is for several reasons, including the lack of physical capacity (older villagers), lack of equipment (tractors), aversion to drudgery, or physical absence (landowners settled temporarily outside the village). A total of 57% of farmers growing HYVs in all villages (48% in Suphan Buri) hire land preparation services (because few farmers have four-wheeled tractors in Ayutthaya, nearly all rice growers resort to service). Full owners hire such services in 66%, full tenants in 81%, and owners/tenants in 37% of such cases.

Groups of labour exchange also exist, mostly in Lop Buri but also in Ayutthaya. During the harvesting period for example, groups are formed for the different steps of the harvest (transport of bags, paddy selling to middlemen, etc.). The exchange of labour is much less common than in the past but occurs spontaneously when the conditions are fulfilled.

TABLE 11: PERCENTAGE OF FARMS HIRING SERVICES

Farm type	Land preparation				Spraying			
	Full tenants	Mixed tenure	Full owner	All	Full tenants	Mixed tenure	Full owner	All
Suphan Buri	71	29	60	48	29	57	60	52
Lop Buri	88	44	68	61	0	24	50	33

Land preparation in Lop Buri is mostly done with four-wheeled small tractors.

3.6 Land resources and tenure

Distribution of land by tenure also shows marked differences (Table 12). Lop Buri stands out as the village with less cultivated land that is rented (30% of total). On the other extreme, Ayutthaya has two-thirds of its land cultivated by tenants. With 18% of the land leased by local farmers, 47% of the land belongs to owners living outside the village. This percentage is only 17 and 22% for Suphan Buri and Lop Buri. The table (right) also gives these percentages for our sample and shows that the rented part of the cultivated land is even higher than for the whole village (reaching 73% in Ayutthaya).

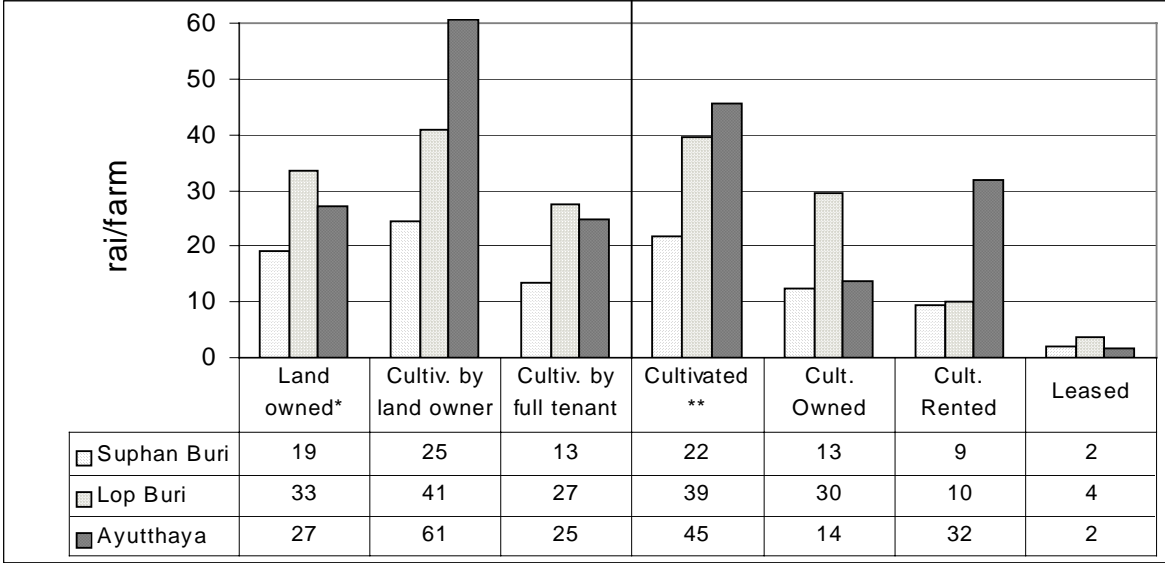
TABLE 12: DISTRIBUTION OF CULTIVATED LAND BY TENURE TYPE

	Total cultivated (rai)	Whole village				Sample	
		Owned (%)	Rented (%)	Leased (%)*	Rented-leased	Owned (% cultivated)	Rented (% cultivated)
Suphan Buri	1,220	59	41	23	17	49	51
Lop Buri	4,044	70	30	7	22	64	36
Ayutthaya	3,210	35	65	18	47	27	73

* Expressed in % of the cultivated area

Figure 15 provides more details on the respective average areas owned and cultivated by farms in each village. There is a clear ranking which dovetails the productivity of the land itself. This illustrates how land division by inheritance is constrained by the capacity to develop intensive agriculture, which itself is closely related to ecological and water conditions. This translates in average farm sizes of 22, 39, and 45 *rai* for Suphan Buri, Lop Buri and Ayutthaya respectively, in line with land productivity.

FIGURE 15: LAND ENDOWMENT PER FARM



* Average land owned by all farmers owning some land; ** Average land cultivated by all households with own-account farming activity.

An attempt was made to better capture the relationships between tenants and landowners and to specify the origin, place of residence, and occupation of the latter. It was apparent that most landowners (over two-thirds) in Suphan Buri and Lop Buri were local residents, whereas for Ayutthaya many were residing in the province capital or in Bangkok. This also applies, by and large, to the origin of the landowner (Figure 16). Figure 17 is even more telling about the kinship links between the tenant and the landowner: 50% in Ayutthaya and 70% in the other two villages. This means that even Bangkok residents may be relatives who have inherited land and rent it out to relatives who have stayed in the village. This redistribution of land from non-farming children to their siblings still engaged in agriculture combined with the sharp decrease in fertility have been shown elsewhere to be the main contributing factors to the relief of the land system (Molle and Srijantr, 1999). Interestingly, such landowners used to be farmers in the past in half of the cases for Ayutthaya, but this is a little less in the other two villages. Lop Buri is specific in that one-third of the landowners are also farmers (Figure 17).

Overall, these data show that the number of absentee Bangkok-based capitalist landlords is not as high as common wisdom often assumes, although of course the figure is not negligible, especially in Ayutthaya where it is a major trend.

FIGURE 16: ORIGIN AND PLACE OF RESIDENCE OF LANDLORD

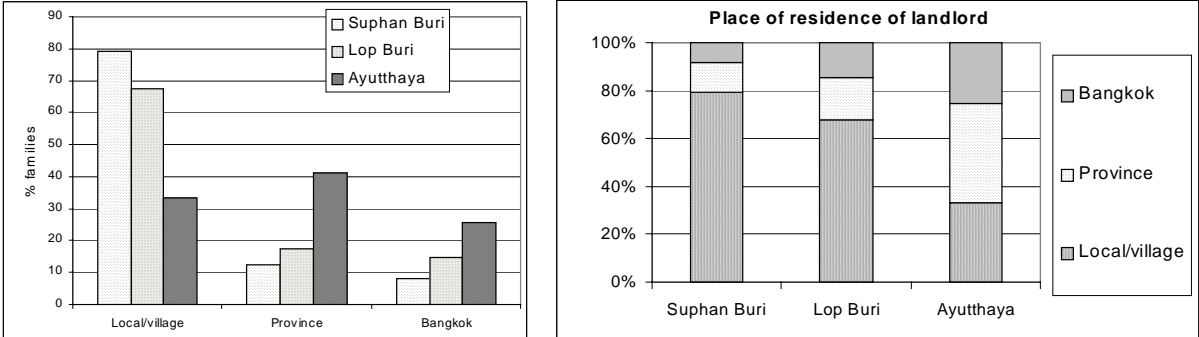
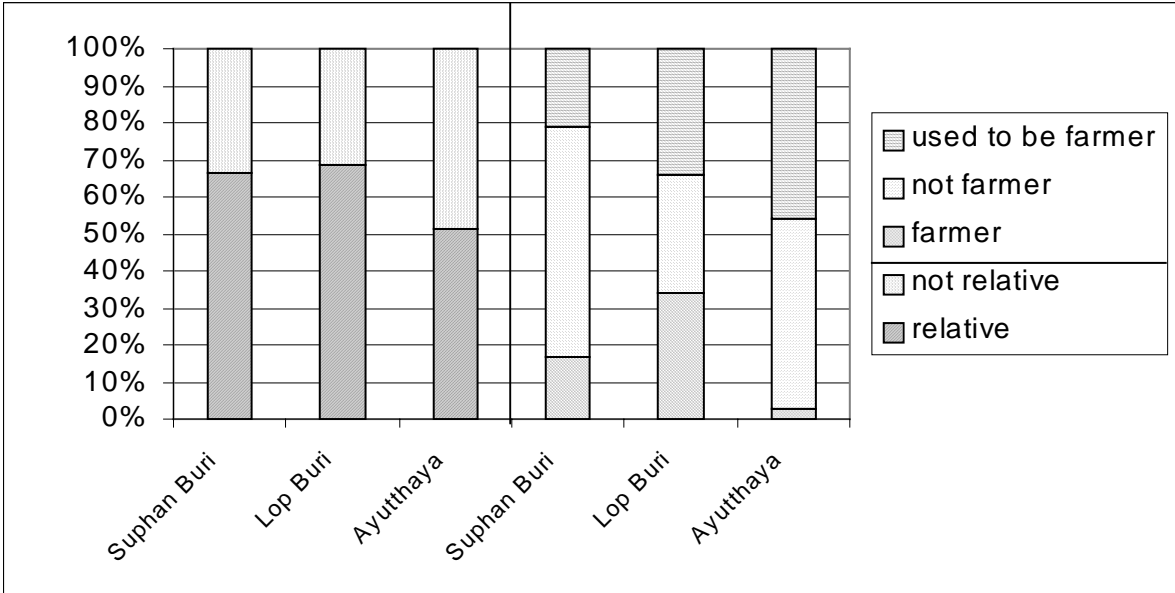


FIGURE 17: FAMILY LINK AND OCCUPATION OF LANDLORD



An examination of the type of contractual relationships between landowners and tenants reveals a slight difference between Ayutthaya and Suphan Buri where 92% of rental contracts are made orally, and Lop Buri, where the rate is 81%. The same difference is observed regarding the type of payment. While in the two former provinces, rents in crop-equivalent (*thang/rai*) prevail, Lop Buri distinguishes itself by rent in cash, together with a few remaining share-cropping arrangements. No evident reason can be found to explain the situation. Molle and Srijantr (1999) have studied the evolution of rental contracts and found significant sub-regional variability.

TABLE 13: TYPE OF PAYMENT FOR LAND RENTAL CONTRACTS

	Cash	Crop equivalent	Share	Free
Suphan Buri	19	59	0	22
Lop Buri	83	0	6	11
Ayutthaya	33	58	0	9

The transmission of land through inheritance is a key aspect of the evolution of the agrarian system. This is all the more true in the Thai cultural context, where the parents' assets tend to be divided equally among the children²⁰, meaning that land is likely to be fragmented extremely rapidly. This is now counterbalanced by the decline in fertility and regulated by the alteration of the inheritance customs. When the family land becomes so small that its division would not allow an economically viable activity, then it is often observed that the land is given to one of the children (often a girl), while his/her siblings receive cash or other assets. It can be seen from Table 14 that approximately half of the husbands/wives of households received no land from their parents. When considering inheritance from both sides, Ayutthaya has only 48% of new families receiving land, while Suphan Buri fares better (57%) and Lop Buri exhibits a rather high rate (70%). It is also apparent that females get land more frequently than males (which is in accordance with the traditional preference for land inheritance to girls, especially the youngest). If we limit ourselves to the sub-group of individuals who had landed parents, then 79, 77, and 66% of the households obtained land from their parents in Suphan Buri, Lop Buri, and Ayutthaya respectively. For example in the case of Ayutthaya, one-third of the children of landed parents of our sample (which excludes those children who left the village) did not receive any land. This is a measure of the impossibility of dividing the land when it becomes too small (it is either given to one child or sold against cash distributed later to the children as inheritance).

Regarding the average area of the land inherited (considering only those who do inherit), this ranges from 12 *rai* in Suphan Buri to 18 *rai* in Ayutthaya, which is in accordance with the productivity of land. Such an amount of land corresponds to 30, 34, and 38% of the parents' land only.

²⁰ Although the rule is often loose and, in particular, is modified when pressure on land resources increases (see discussion in Molle and Thippawal (1999)).

TABLE 14: LAND ENDOWMENT FROM INHERITANCE

	% of households with landed parents and which received land by inheritance					Average land from parents and received by inheritance				
	Husband		Wife		Total	Husband		Wife		Total
	Parents land	Inheritance	Parents land	Inheritance	At least one side	Parents land	Inheritance	Parents land	Inheritance	At least one side
Suphan Buri	46	38	54	41	57	25	8	31	8	12
Lop Buri	57	43	67	53	70	33	11	36	12	16
Ayutthaya	44	26	52	37	48	36	13	36	14	18

3.7 Credit, indebtedness, and foreclosure

Access to credit was also investigated by looking at the present state of membership of credit institutions and in current loans (short, medium, and long term).

Data on membership of credit institutions show that most farmers are members in Lop Buri and Ayutthaya, while farmers in Suphan Buri auto-finance their activity in 67% of the cases. Co-operative membership is dominant in Lop Buri, while the BAAC is the most common credit provider in Ayutthaya where, it must be noted, 42% of the farmer members of an institution do not have pending credit at the moment, while the two other villages have half of this rate.

TABLE 15: MEMBERSHIP OF CREDIT INSTITUTIONS

	No (%)	Yes (%)	No credit at the moment*	BAAC	Co-operative	Farmers group	Other and non-specified
Suphan Buri	<u>67</u>	33	23	23	2	0	8
Lop Buri	32	68	24	24	41	3	0
Ayutthaya	27	73	42	42	28	1	1

* In % of farmer members of one institution

Pending short-term credit is very limited in Suphan Buri, as most farmers seem to have the financial capacity to fund their running costs, including the purchase of fertilisers, but it is also rather limited in the two other villages, as only one-third of the households resort to this kind of credit²¹. Many farmers mentioned that they do not automatically use credit facilities: This depends on the year, and whether they have enough cash at the time it is needed to buy inputs. These short-term loans typically amount to approximately 30,000 baht.

²¹ This may underscore reality as it is possible that some farmers were interviewed at a time (or a season) when they had not taken credit yet. Questions on indebtedness are also sometimes reluctantly answered to.

Mid-term credit (one to three years) is insignificant in Suphan Buri (one case), while it is limited in the other two villages (10%), and amounts on average to 60,000-120,000 baht. Surprisingly, long-term credit (>3 years) is rather common and even concerns 19% of households in Ayutthaya, with typical amounts of several hundreds of thousands of baht.

Discriminating these loans according to their origin²², we can see that cooperatives are more committed to providing short-term loans and that most of the long-term credit originates from the BAAC.

TABLE 16: HOUSEHOLDS WITH PENDING LOANS

Credit type	Short term			Medium term			Long term		
	% household concerned	Average amount	Interest rate	% household concerned	Average amount	Interest rate	% household concerned	Average amount	Interest rate
Suphan Buri	17	35,167	12	1	60,000	12	13	161,389	15
Lop Buri	34	31,181	15	11	117,500	15	11	358,750	11
Ayutthaya	36	34,615	13	10	76,429	11	19	162,857	14

TABLE 17: TYPE OF CREDIT SOURCE (NUMBER OF HOUSEHOLDS); INCOMPLETE DATA

Credit type	Short term			Medium term			Long term		
	Suphan	Lop Buri	Ayutthaya	Suphan	Lop Buri	Ayutthaya	Suphan	Lop Buri	Ayutthaya
Source									
Cooperative	4	11	9		5	3	1	2	1
BAAC	7	8	18	1	1	3	5	6	13
Relative							2	1	
Villager		3			1	1	2		
Commerc.	1	1							
Groups		2							

Data on indebtedness are difficult to interpret because it is hard to estimate whether credit is taken for productive use or investment (and then appears as positive), or because of economic failure (and then appears as negative) or other reasons (notably gambling). The reasons for selling land suggest that part of these debts are a recurring burden which sometimes results in land sale, but this only represents a minority of cases.

Social ceremonies are often a reason why villagers incur debts. A monk's ordination (in Ayutthaya village) is reported to cost a minimum of 100,000 baht, and reaches four to five times this amount for richer families. Cremation is even more important

²² Not all the questionnaires bear information on the source of loan, thus reducing our sample.

and usually costs 150,000 to 200,000 baht. Gambling or drinking debts are also frequent. Like most villages, Ban Nong Mon operates a clandestine parallel lottery (*huay tai din*) which creates tremendous excitement twice a month in the village²³.

It was not possible to analyse all the causes of indebtedness within this limited survey but the questionnaires yield some hints on those farms with long-term loans (which are also the largest in terms of amount of money). In Suphan Buri, loans with the BAAC were made for various reasons such as investing in an orchard, buying land for one's daughter, repaying old debts incurred for house building and consumption items. In Ayutthaya, reasons included cow breeding (followed by bankruptcy); intensive fish breeding (2,failed); to help a brother in Bangkok; house building and throat cancer surgery; supporting elderly relations, education, consumption; renting land; personal investment; and 'crop investment' (2). In Lop Buri, where such credit is not common, reasons included the purchase of a tractor, buying land (from a relative), and investment for chicken breeding.

If such an inventory is of any help, it is to show the diversity of reasons for which such loans are contracted, and also that very few are made to pay back old debts. This suggests that farmers rarely fall into debt with traditional crops, including rice, but, rather, that it is more often the failure of some risky undertakings which sink farmers in non-repayable debts. The 'crop investment' category is often the one officially declared to the BAAC by farmers, but the BAAC has been notorious in past years for releasing credit which was increasingly diverted from its alleged intentions, most often for consumption goods.

Mortgage and foreclosure may also be valid indications of the rate of economic failure due to unresolved debts. Table 18 shows that present rates of mortgage are consistent with current mid-to-long-term credit (between 15 and 20%) and that foreclosure was almost unknown in Suphan Buri and Ayutthaya. However, there are some cases of land sales forced by debt repayment, which are tantamount to foreclosure. As shown by Molle and Srijantr (1999), this procedure is nowadays much more limited than commonly thought and most cases of loss of land because of debts are rather old.

TABLE 18: RATE OF MORTGAGING AND FORECLOSURE (% OF SUB-SAMPLE OF HOUSEHOLDS)

	Mortgage in the past	Mortgage at present	Foreclosure (ever)
Suphan Buri	15	15	2
Lop Buri	25	19	22
Ayutthaya	9	16	0

²³ The *chao mu* who runs the underground lottery reported to the *phuyayban* to deal with 30-40,000 baht each time (which is probably a conservative estimate).

Although the information gathered is fragmentary, the reasons for selling land can also be revealing of a wide range of situations. They include:

Lop Buri:

- debts for bad business (including one construction contractor who did not assess his costs properly) (2)
- land exchange (for convenience or otherwise) (3)
- for investments (2)
- for indebtedness (1)

Suphan Buri:

- debts for health hazards (further to accident) (2)
- land exchange (2)
- money for wedding (1)
- for investment (pick-up; water chestnut) (2)
- bad income (1)
- indebtedness (3)

Ayutthaya:

- to buy uplands (1)
- investment for a tractor (1)
- money for wedding (1)
- land exchange (1)
- debts (1)

This short list conveys the impression, rather than the conclusion, because of the limited number of cases, that selling land is far from being only the result of economic distress. If we consider the 20% of cases in which land sale was forced by bad debts, and combine this with the variety of reasons for which villagers incur debts, it appears that there is no strong case to link land sale with economic bankruptcy (that is economic failure in the productive activity proper). It follows that the higher share of land sold to absentee investors (again only a small part of the rented land because even in Ayutthaya half of the land rented is owned by a relative) is also the consequence of farmers making investments thanks to the high price fetched by their land (the buyers eventually appear to be investors because there is no or little scope for another villager to buy land only for the purpose of agriculture)²⁴.

²⁴ Because of the total decoupling between the nominal value of land and the income it can generate through agriculture (particularly with rice cropping).

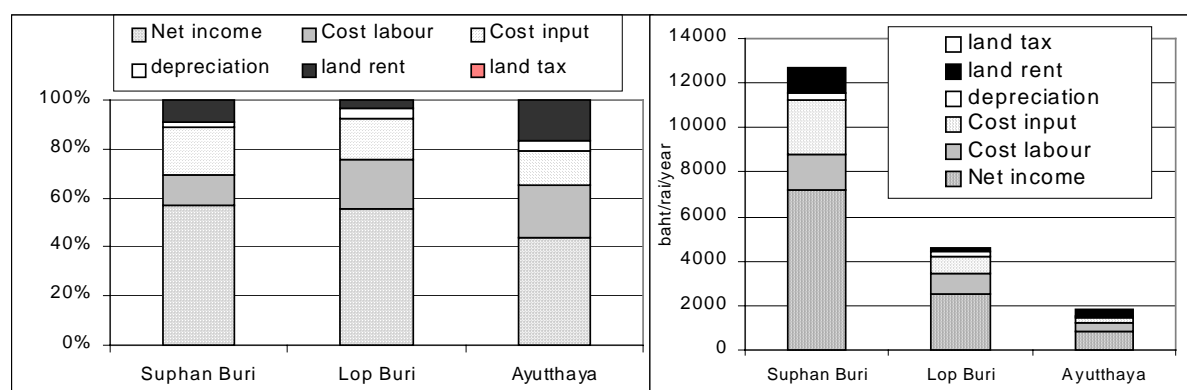
4 Income

4.1 Return from main crops

Rice cropping in these three different environments of course has contrasting production costs and value added²⁵. The first reason is the cropping intensity *per se*. Over the last 10 years the average cropping intensity (number of crops per year) was 2.9, 1.45 and 1.02 in the three villages. If we consider only the last five years, these values are raised to 2.9, 2.65 and 1.03. The second reason is the yield of each type of rice cultivation: Predominantly floating rice in Ayutthaya (367 kg/*rai*), together with deep-water rice (421 kg/*rai*), deep-water rice (460 kg/*rai*) and HYVs (748 kg/*rai*) in Lop Buri, and HYVs (849 kg/*rai*) in Suphan Buri. The third reason is that production costs are higher for HYVs than for traditional varieties.

Figure 18 provides the distribution of average costs and net incomes of rice production in the three villages, in percentage and absolute values, for one *rai* and one year. The net income amounts to almost 60% of the value added in Suphan Buri and Lop Buri, but to only 43% in Ayutthaya. The cost of labour corresponds to approximately 20% (less in Suphan Buri) of the value added and the share of land rent is, of course, higher in Ayutthaya. The resulting net incomes are 7,195 baht/*rai*, 2,560 baht/*rai* and 822 baht/*rai*²⁶.

FIGURE 18: RICE PRODUCTION COSTS AND INCOME (IN % AND BAHT/RAI/YEAR)

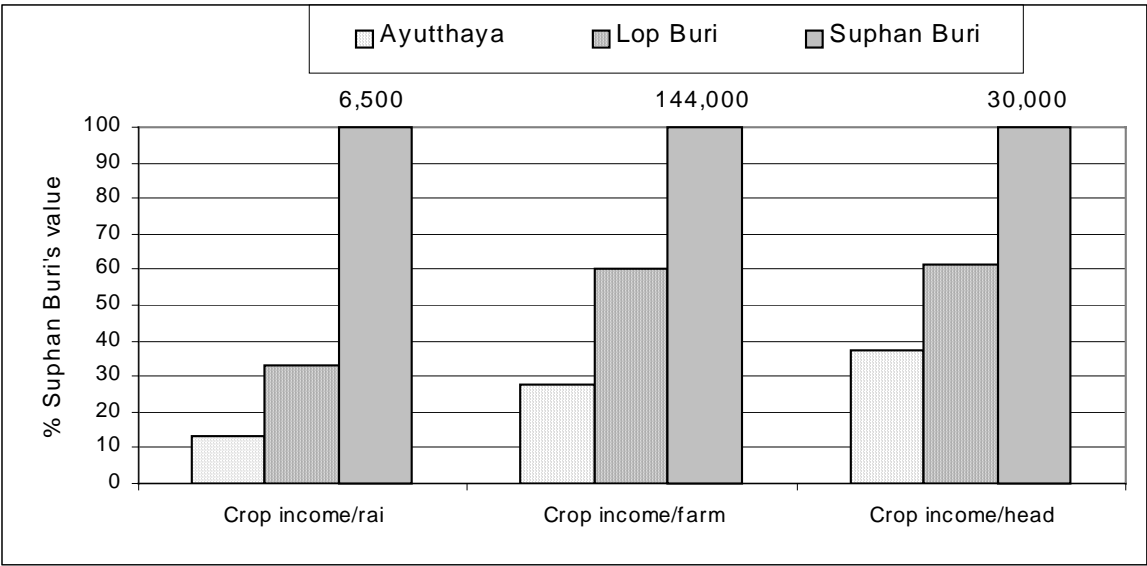


²⁵ Because some surveys were conducted in Lop Buri in 1999, while the other villages were surveyed in 2000, the prices of rice have been homogenised and taken as 5,000 baht/ton in the basic calculation (roughly the deflated average over the last 10 years and close to the price of the year 2000 (5,300 baht)).

²⁶ Including non-rice crops (principally water chestnut in Suphan Buri and corn/chilli in Ayutthaya), the net income per *rai* was 6,494 baht, 1,966 and 843 baht in Suphan Buri, Lop Buri and Ayutthaya respectively.

This sheer discrepancy in land productivity must however be taken with caution. Figure 19 gives insight on a rather fascinating re-balancing of this initial stark contrast. Because the average farm size is correlated to the ecological conditions (farms in Ayutthaya are twice as big as those in Suphan Buri), the gap is significantly reduced if seen in terms of crop income per household. Furthermore, because of the lower average number of people in a household in Ayutthaya the gap is further reduced, albeit obviously not bridged, when expressed in terms of crop income per capita (household member).

FIGURE 19: COMPARISON OF NET INCOMES



4.2 Household income

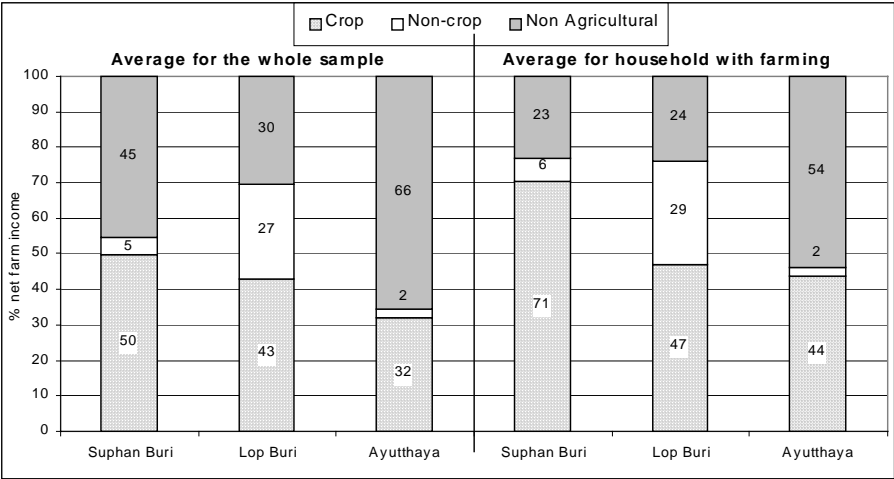
As is apparent from the multiplicity of occupations observed earlier, the household income is also very composite. Moreover, it was not always possible to determine the real income derived from waged labour, fishing, etc. The incomes from all the specific activities other than agriculture were investigated in a direct way. Those which could not be assessed were divided into two classes: The *main wage* is the main income of a waged labourer and has been set tentatively at a yearly total of 30,000 baht. The *secondary wage* was often earned by spouses or children and consisted of occasional jobs (spraying, harvesting, construction, etc). This was evaluated at 5,000 baht/year. With all the economic activities quantitatively assessed, it was possible to estimate the income of different categories of households.

The overall contrasting picture further changes when all sources of income are considered. The first factor is the large amount of non-crop agricultural income in Lop Buri. Animal husbandry, most prominently chickens, chickens/fish, ducks and swine, has grown dramatically in the last decade and now almost equals the crop-based

income of the farm sample. Figure 20 shows the respective shares of crop (agri), non-crop (agri), and non-agricultural net incomes for the whole sample and for those with own-account farming activities. Considering the latter group of households, it appears that agricultural activities make up 75% of the household income, except in Ayutthaya, where the level of 50% is not reached. If we consider the full sample, the share of agricultural income varies widely, from a low 34% in Ayutthaya, to 70% in Lop Buri, while Suphan Buri is at 55%. These values are obviously overrated as our sample is biased towards farming households. The overall picture emerging from these data is that in the three environments and in the three villages, which can still be considered as rural and agricultural villages, the income from crop production is unlikely to exceed one half of the total net income. Lop Buri distinguishes itself because of the high income derived from animal breeding.

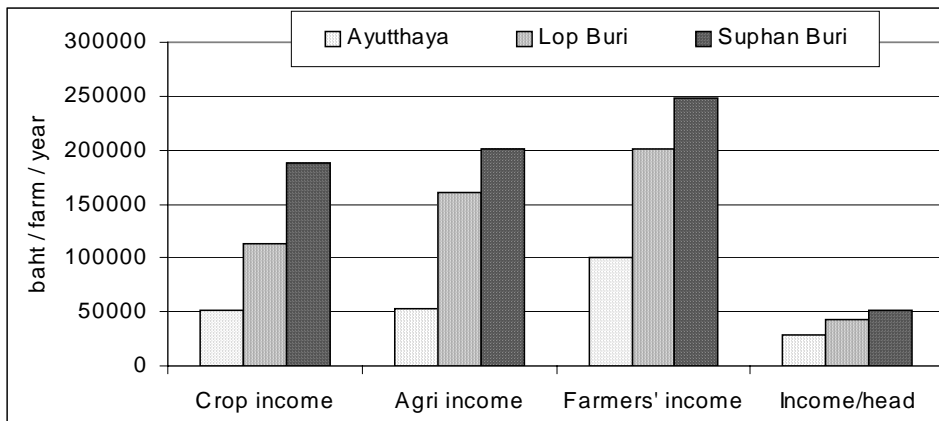
These results are not surprising as the trend towards pluriactivity has long been observed in Thailand (Onchan and Chalamwong, 1983; Akrasanee et al., 1983). The Central Plain always appeared as the region where this trend was less accentuated, on account of the better production facilities offered in irrigated areas. In 1980, villages in Suphan Buri Province were found to draw 70% of their income from on-farm work, whereas this rate was much lower in villages of other provinces (Akrasanee et al., 1983). Nowadays, the share of the farm income, although decreasing, remains much higher than in other regions.

FIGURE 20: CROP/NON-CROP INCOME SHARES



We may first examine the income of those households engaged in own-account farming activities (farms). Figure 21 gives a clear view of both the differences between villages and of the contribution of the different sources of income.

FIGURE 21: YEARLY INCOME FOR FARMING HOUSEHOLDS

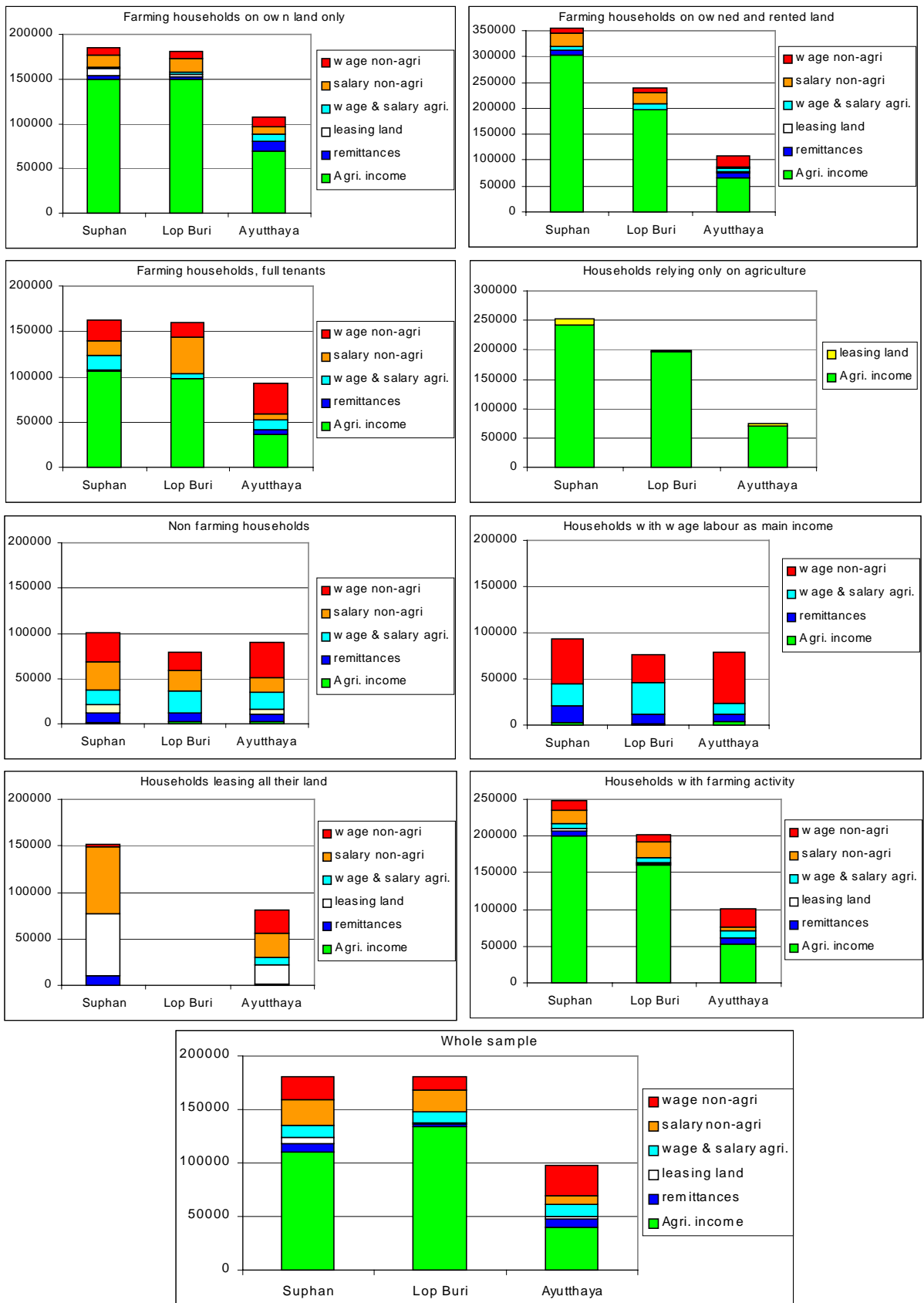


This analysis can be refined by distinguishing the average income of different categories of households (Figure 22). Farmers who are full owners have income close to the village average, mostly coming from their own farming activities, with some additional non-agricultural income, and remittances in Ayutthaya. Owner/tenants fare much higher and appear as the most productive category of households engaged in farming²⁷, with an income of over 350,000 baht/year in Suphan Buri. Full tenants' income is close to that of full owners but a much higher share is drawn from waged labour and non-agricultural salaries. Households wholly dedicated to farming (which include many owner/tenant holdings) also have rather high incomes, except for Ayutthaya, where on the contrary, they correspond to older people hiring labour for most operations. Non-farming households have extremely composite incomes, which is partly due to the fact that this category includes distinct categories (waged labourers, craftsmen, households relying on remittances, etc), but are significantly less well-off than other fellow villagers, with income slightly under 100,000 baht/year. Similar levels of income were obtained for the sub-samples of those working as employees of waged labourers. Households leasing all their land (only four in Suphan Buri and four in Ayutthaya) generally work outside agriculture (e.g. teachers).

The chart corresponding to the whole sample shows that the total average net incomes are similar in Suphan Buri and Lop Buri (around 175,000 baht/year) and 100,000 in Ayutthaya. Lop Buri fares higher than expected thanks to animal husbandry. The value for Lop Buri is an average value and fails to indicate that only a small portion of farmers are concerned with animal farming, which reduces the economic impact of this activity in terms of distribution. Suphan Buri displays a higher share of waged and off-farm income. This is mostly due to the higher share of landless holdings in our sample, but also to the fact that these occupations are widespread in Suphan Buri; waged labour, in particular, is well developed because of the labour demand in rice triple cropping and water chestnut.

²⁷ The scale of the corresponding chart is different from that of all other charts.

FIGURE 22: AVERAGE COMPOSITION OF HOUSEHOLD YEARLY INCOME, BY CATEGORY



It must also be kept in mind that because of the smaller average number of members in Ayutthaya's households, the corresponding incomes per capita would be less contrasting, as Ayutthaya's values would be raised by 35% with regard to the two other villages. This analysis provides some insight on yearly income in the three villages but did not evaluate autoconsumption of backyard products (chickens, ducks, eggs, vegetables, fruit, fish, etc). It is evident that their contribution to the daily diet is far from negligible and should also be considered when assessing food supply or poverty lines. Visser (1980), for example, conducted a one-year village study that led him to estimate autoconsumption to as much as 200 days/yr.

We may now test the sensitivity of the village income (sample) to the variation of some parameters. Main wage and secondary wage parameters have been reduced by 30 and 50% from their 30,000 baht and 5,000 baht/year values. The baseline price of rice (5,000 baht/ton) has also been changed to 4,000 and 6,000 baht/ton. Table 19 shows the variation of the average farm income (for the farming household sample), as well as the overall village per capita income. The reduction of wage only gives a decrease of 2-5% of the village per capita income (but of course some households are more affected than others). A decrease of the rice price of 1% impacts on the per capita income by 0.5% in Ayutthaya, 0.6% in Suphan Buri and 0.7% in Lop Buri. The table shows that a low price for rice, for example 4,000 baht/ton, entails a drop of 10-15% in the per capita income, with a higher sensitivity for Lop Buri²⁸.

TABLE 19: SENSITIVITY TEST ON SOME PARAMETERS

	Baseline		Wage reduction		Rice at 4,000 bt.		Rice at 6,000 bt.	
	Farm income	Village income/head	Farm income	Village income/head	Farm income	Village income/head	Farm income	Village income/head
Suphan Buri	180,839	43,925	176,280	42,497	156,837	38,811	204,841	49,038
Lop Buri	180,502	41,341	177,562	40629	153,893	35,294	207,111	47,387
Ayutthaya	98,105	32,903	92,194	31,253	88,354	29,598	107,856	36,208
In%	100	100	97	97	87	88	113	112
	100	100	98	98	85	85	115	115
	100	100	94	95	90	90	110	110

It is interesting to compare the results of Ayutthaya village with the figures reported by Amyot (1976) for three villages of Ayutthaya Province²⁹. Table 20 shows

²⁸ Because of a smaller margin per rai.

²⁹ Among the three villages studied by CUSRI, one was found to derive 77% of its income from brick making; only the other two, centred on rice production, are considered in this comparison. As one of these two villages had better water control, it is likely that the value of Amyot's village exceeded that of our village.

that real rice prices have declined significantly but that real household income has only slightly appreciated (6.5 for the price index against 7.1 for the income). However, because of the change in the household structure, real income per head appeared to have increased by 65% over the 31-year span. These figures must be considered with caution because they do not correspond to the same villages and may serve to illustrate qualitatively some of the changes. Also noteworthy, with the same reservations, is that the percentage of non-farm income increased from 15% in 1969 to over 50% in 2000.

TABLE 20: COMPARISON OF INCOME BETWEEN AYUTTHAYA VILLAGES IN 1960 AND 2000

	Average farm land	Price index	Rice price (baht/ton)	Farm membership	Farm income (baht/year)	Income per head
1969	28	100	1,150	5,2	14,000	2,700
2000	45 (27.2)*	650	5,000	3,5	100,000	28,600
Ratio		6.5	4.3	0.67	7.1	10.6

* Average for Ayutthaya in 1993 (census data)

These calculations were made considering net incomes from different activities. The indebtedness of the household has been considered regarding financial costs but not regarding principal. For short-term credit this is justified because the price of agricultural input is already computed at its nominal real value. Medium- and long-term credit were not considered because they corresponded either to investments (asset depreciation computed) or to specific investments (for ceremonies, health hazard, land buying, etc) which, strictly speaking, are most often disconnected from production.

4.3 Distribution of household income

These average values obscure the inter-household variations in income. Figure 23 and Figure 24 provide the frequential values for the *per capita* yearly income and the household net income. It is interesting to see that Lop Buri fares better than Suphan Buri in the lower ranges, probably because of the lower proportion of waged labourers in the sample³⁰. The *per capita* rounded values of half of the population are higher 35,000, 30,000 and 26,000 baht/year for Suphan Buri, Lop Buri and Ayutthaya respectively. Nine households of Ayutthaya had a per capita income of less than 10,000 baht, against only one in Lop Buri and none in Suphan Buri. For a rice price at 4,000 baht/ton, the numbers are 12, 5 and 1. In the three villages as a whole, 20% of the individuals live on less than 17,000 baht/year (but this also includes children).

³⁰ One must be cautioned not to view these results as the whole village economy because, again, the samples are biased towards farming households.

FIGURE 23: FREQUENTIAL DISTRIBUTION OF PER CAPITA INCOME (WHOLE SAMPLES)

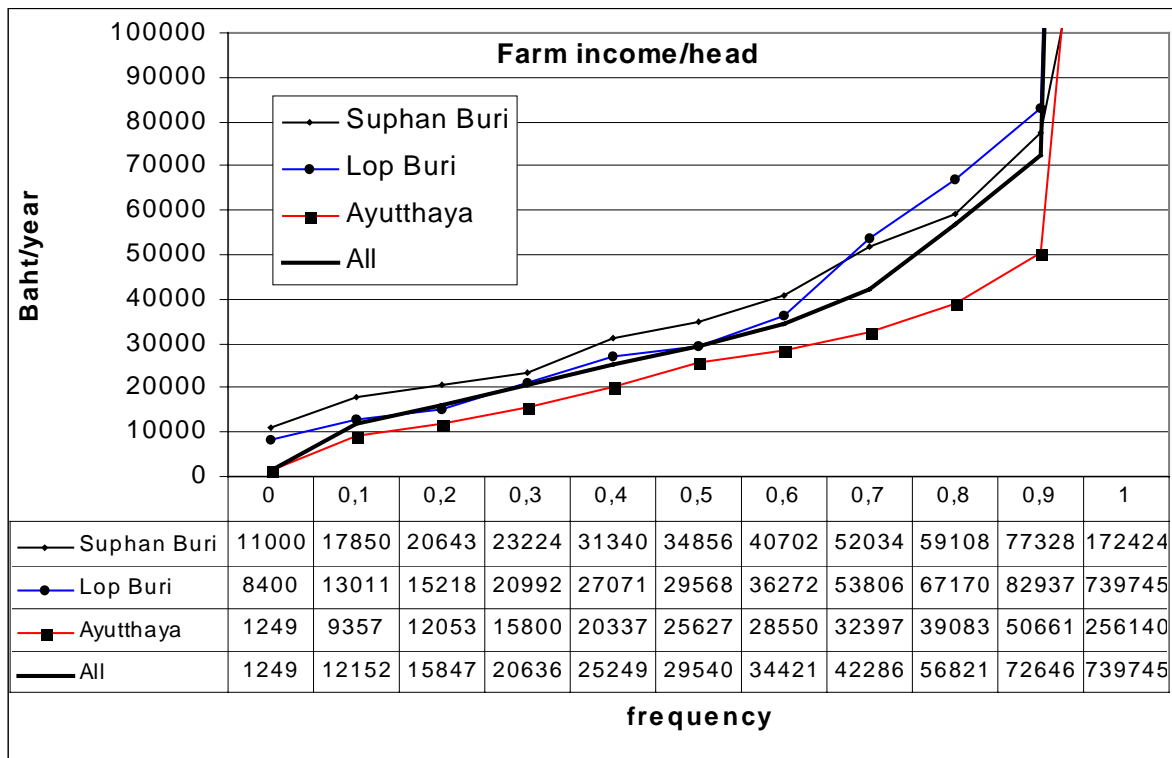


FIGURE 24: FREQUENTIAL DISTRIBUTION OF NET HOUSEHOLD INCOME (WHOLE SAMPLES)

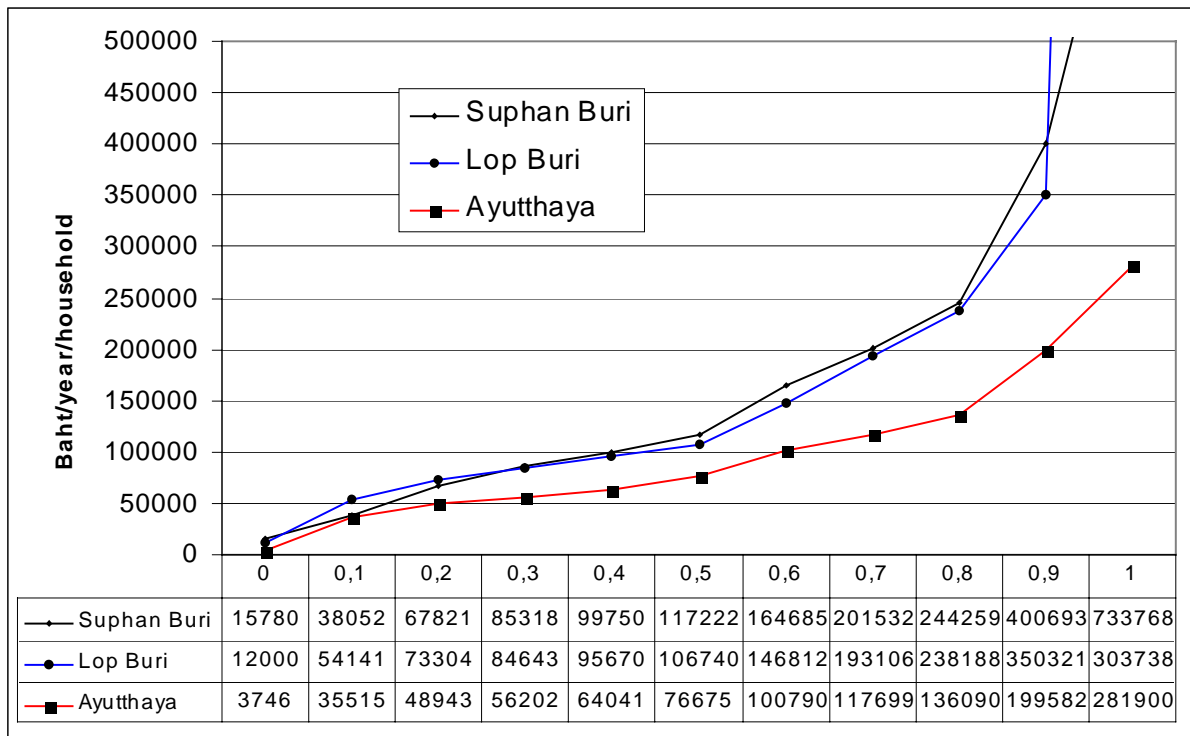


Figure 25 focuses on the households with own-account farming activity (but which may also have other activities). It can be seen that less than 10% of the households have an extremely high income, with regard to the remainder — for which differences are much more limited. These upper strata correspond most of the time to households fully implementing agricultural activities.³¹ These farmers have either orchards (e.g. 15 *rai*), or their own large rice fields (70 *rai* or more in Ayutthaya, or over 40 *rai* in Suphan Buri) and offer tractor services, or have successful fish and/or poultry farming activities.

Figure 26 shows how the per capita income distribution varies with the price of rice, using Suphan Buri as an example. It can be seen that the maximum *per capita* income of the poorest 20% decreases from 29,000 baht to 21,000 baht when the price of rice declines from 5,000 to 4,000 baht/ton, which is more or less what happened between 2000 and 2001. Despite such an impact, the consequences of rice price fluctuations are mitigated by the composite nature of most household incomes, but are still critical for those houses existing principally on rice cultivation.

³¹ This is also due to the distortion caused by cases in which the number of household members is low (2 or 3), while the income is high. If we considered total household incomes, we would have the opposite problem with those households with high income but high membership. It must be noted that these definitions are simplifications of the reality because family and kinship links have expanded spatially and the number of people residing in the house does not capture all the flows of resources between individuals (although those such as remittances have been considered). Another distortion may result from not distinguishing between adults and children within the households (the cost of living of the latter being, perhaps, lower).

FIGURE 25: FREQUENTIAL DISTRIBUTION OF PER CAPITA INCOME (OWN-ACCOUNT FARMING HOUSEHOLDS)

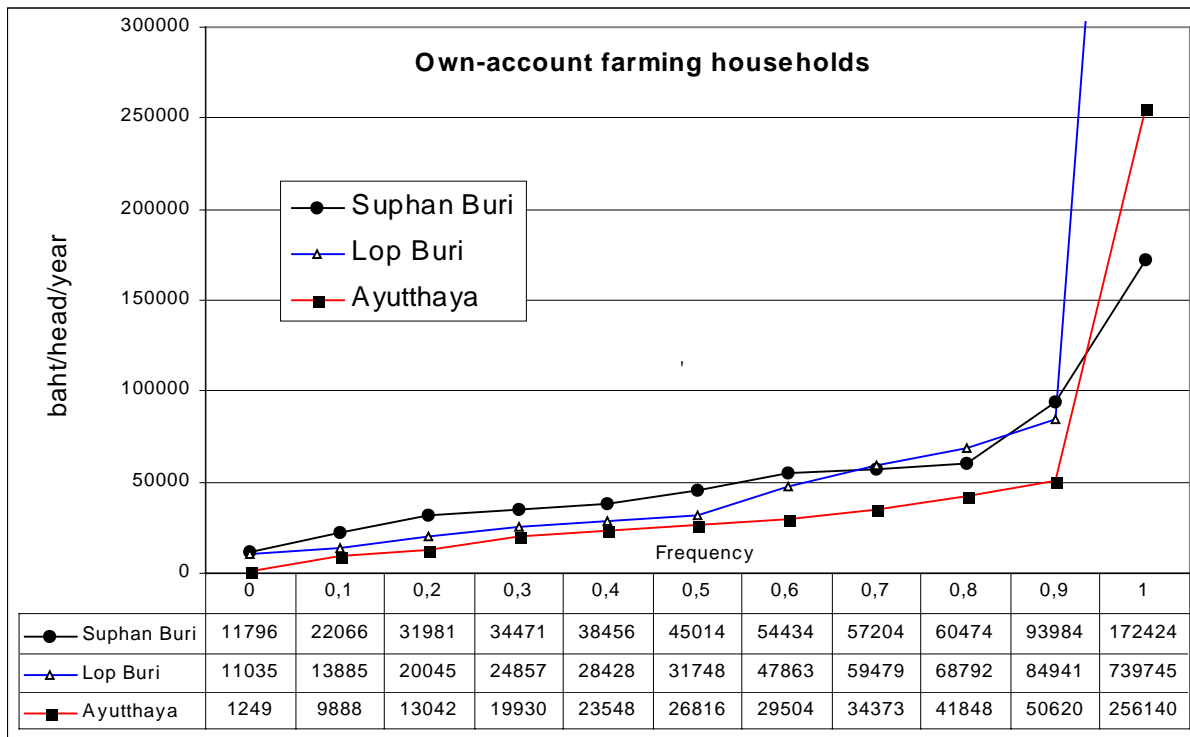
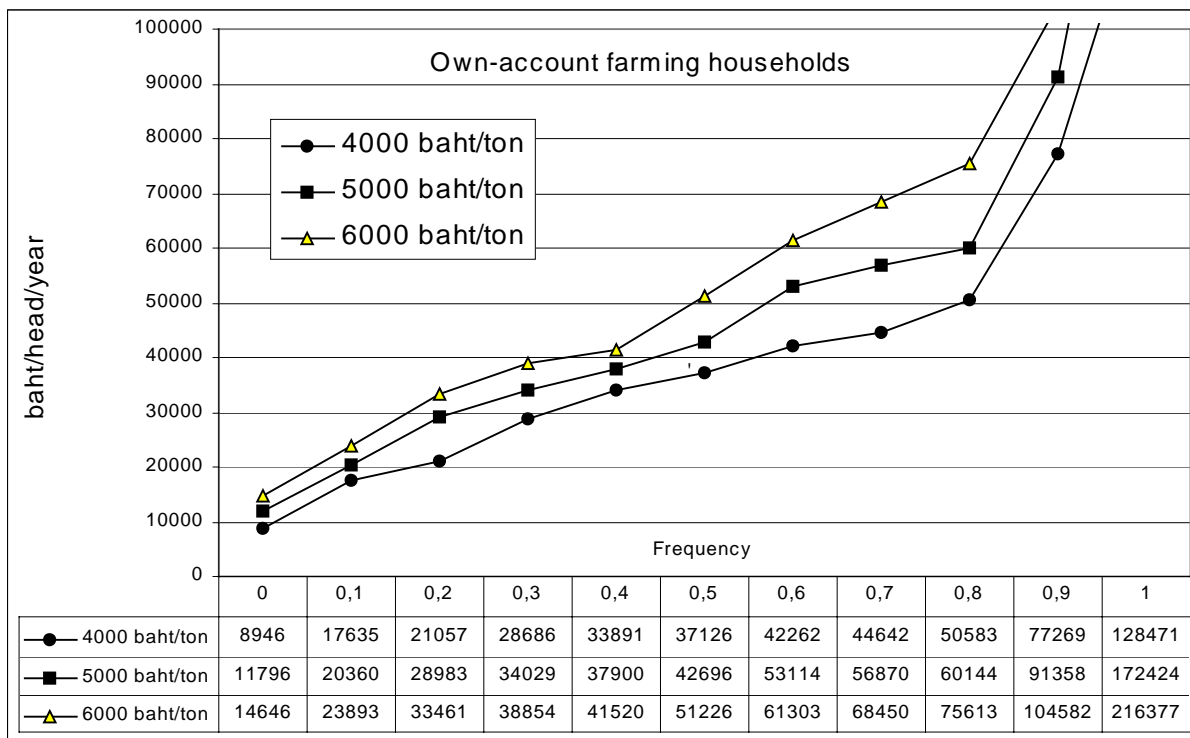


FIGURE 26: FREQUENTIAL DISTRIBUTION OF PER CAPITA INCOME WITH THE PRICE OF RICE (OWN- ACCOUNT FARMING HOUSEHOLDS IN SUPHAN BURI ONLY)



5 Aspects of village life and processes at work

The quantitative data presented above can be brought into a more qualitative analysis of the transformations in the villages. This section provides a few hints on important dimensions of change and starts with an outline of the lives of two women of Ayutthaya village, which reveal many of the processes at work.

Weera Kongcheep has worked in factories in Rangsit (Bangkok) for 10 years; she married there and returned with her family to the village, where she bought a plot of land, after the birth of two children. She and her husband first left the children with their grandparents and worked for two years in a factory in Tha Rua, the neighbouring *amphoe*. After experiencing some health problems she stayed in the village and looked for some activity. She and her husband rented 16 *rai* of rice land, then 30 *rai*, from an absentee owner but gave up because the plot was too far away. They also invested 15,000 baht in the excavation of a pond and the breeding of *pladuk*, a valued fish. They perceived that the activity was very risky and stopped after some time, without having incurred financial loss. For the last five years, they have planted 2 *rai* of chilli in the dry season. Like other farmers, they recall the year when the price was 45 baht/kg and left everyone with an unexpectedly high income; last year, the price was as low as 2-3 baht/kg and early rainfall damaged the crops: They invested 7,000 baht and received 200 baht in income; they will not plant again this year.

Weera sometimes works in a shop in Saraburi (for 200 baht/day) but very irregularly and intermittently. Her husband is almost 40 years old and therefore cannot easily find factory work. He looks for waged labour in rice, corn, and chilli cultivation, fishes in the canal and in the depressions at the end of the rainy season. Although she says that there is no better income than being in Bangkok (*may mii rayday di kwa you krungthep*), she also thinks that most people who go there think of going back after some years. Their income is limited but 700 baht is sufficient for one week, as fish and fruit can be obtained for nothing. She has learnt the importance of health (she pays 198 baht/month for health insurance) and of education (she wants to push her children to study). They own a sprayer equipped with a motor (but do not want to do service spraying because they are aware of the impact on health), a motor and pipes for chilli cultivation, a motorised boat, and a motorcycle.

Encouraged by a governmental project to form a group of women for piece-meal sewing, she organised a group that eventually failed because of lack of work. She started again on an individual basis, invested 3,500 baht in a machine, and is now sewing shorts, at 3.5 baht/piece (she can make up to 350 pieces/week, but generally less than that).

Weera's three siblings also work in factories (two in Ayutthaya, one in Roi Et), while her husband's five siblings are dispersed in Ranong (one soldier, and one married sister), Tha Luang (farmer), Samut Prakan (factory worker).

Saweng Aim-Amon is in her forties and is the housewife in a house where seven persons from four generations live together. At the age of 15, she came to the village with her parents, coming from Maharat (10 km south), where she was born. Her father had some land but died prematurely and her mother ended up losing her land. (She is now 88 and lives with them). As migrants with little capital they were landless as they are now. Like her mother she has been making and selling *khanom* (confectionery) for many years. She even bought a boat to access houses more conveniently in the wet season. She also makes daily wages in the corn or chilli fields in the dry season, sometimes in the village, sometimes outside, and during rice harvesting. She makes *nam plaa* (fish sauce) and artificial flowers with the village women's group. One of her sisters used to live in the village but is now too old and went to live with her son in Bangkok. Another sister lives in Saraburi where she 'cleans' (for reprocessing) plastic bags catered by other people in the garbage dumps. She never thought about renting land because, unfamiliar with expenditures and techniques, she was too afraid to incur debts. Her husband did not inherit land too (he was married to another woman with whom he had four children who sometimes visit him). His father also died prematurely and his older siblings took over the land, with nothing remaining for him. He also looks for all kinds of work (*rap jang tuapay*): He harvests rice and chilli, sells *khanom*, chickens, digs ponds, and takes care of the banana trees at the health centre (*anamay*) (for 400 baht/month!). All these jobs, which have become scarcer with time, can be secured through maintaining privileged relationships with some fellow villagers (often following traditional patron-client relationships) (*tong chopkan*).

Saweng has six children. The eldest daughter lives in Bangkok, has a better income but must now take care of her young son and is pregnant again. Her in-laws come from Krabinburi but they do not like her because her family was not in a position to afford a "good" ordination ceremony for her husband. Three sons have made their way to varied destinations: Saraburi, Phetburi, and Khon Kaen. The fifth child, a daughter is married to the son of a local policeman and they both work in a shoe factory in Nakhon Luang. Saweng had to buy a motorcycle to enable them to reach Bang Na, where they can catch a bus for which they must pay 500 baht/month each. They did not lose their jobs with the crisis but their salaries decreased from 160 to 130 baht/day and the work time from 6 to 5 days/week, with no over time. They now have a three-year old child who is taken care of by Saweng who, therefore, had to stop her *khanom* business. The daughter's husband is from a rich family but his father, a policeman (with an official modest salary), cut relationships with his son after he married a "poor girl". The last son is 22 and still lives in the house. He had the opportunity to work, like many of the villagers, in the nearby Sukhothai Cement Factory, but he vehemently refused because his mother could not give him a

motorcycle, as she did for his sister. He currently idles around with other youths of his age. Amphetamines are available in the village but less than in other villages. He was recently ordained as a monk in the village *wat* (temple).

For Saweng a *ngan buat* (ordination) was much better than a wedding because it brought merit to the parents and also because it reduced costs by having her son-in-law ordained with seven other persons simultaneously. Five hundred people were invited and divided among traditional 10-seat Chinese tables served by a specialised local entrepreneur. For a total cost of 75,000 baht (only 20,000 baht was received from the parents of her son-in-law), she had to borrow a large sum from a shopkeeper in Ang Thong (with whom she has a longstanding relationship) and from the wife of the village headman (with no interest).³²

Her meagre income, added to that of her husband and to the money brought by her daughter working in the factory, is sometimes complemented by remittances and by one or two thousand baht given by her sons when they come home for new year. Life sometimes brings unexpected necessities but she then borrows money and pays back as soon as she can. Her son-in-law, for example, had to pay 20,000 baht to avoid conscription. She borrowed the sum from the *phuyayban*, with 4,000 baht interest, and paid it back in one year. Six years ago, she bought one *ngan* of land (a quarter of a *rai*, roughly 400 m²) from her neighbour for her house. But the exceptional flood of 1995 showed that it was prone to flooding and she invested 24,000 baht to elevate it; for such an exceptional expenditure she requested 5,000 baht from each of her children.

Farmers' strategies and differentiation

Population growth, and agrarian saturation, started a long time ago in the three villages and earlier in Ayutthaya, where land could not be divided as in the other villages because of its lower productivity. Landless families increased and remained in the village in proportions directly related to the local supply of waged labour and non-agricultural work. Emigration was the other solution.

It is often assumed that the risks inherent in farming and the lack of capital (hence money lending at high interest rates and subsequent indebtedness), lead small farms to economic failure and oblige them to sell their land. This process may have been dominant in the 1950s and 1960s but became more complex in the last 25 years. It is readily obvious that the persons that quit agriculture come from all socio-economic strata of the village society. They include Saweng's three sons but also the four children of the village headman, although he owns over 150 *rai* of rice land and can

³² The problem, said Saweng, had been the rain during the ceremony (she did not have any debt with the ordination of the first son): When it rained, people looked for shelter but took the whisky bottles away with them. When they returned, after the rain had ceased, she had to replace many bottles, which increased her costs...

accumulate enough to invest in several activities. While farming could be economically attractive for one of his sons (he also owns two tractors, a pick-up, etc), they all have studied, with the support of their parents, and have found occupations in the city (Ayutthaya and Bangkok), with no desire whatsoever to engage in farming. The decision to migrate is thus far from being a simple consequence of economic failure but reflects a wide range of reasons (better opportunity, lack of interest in farming, attraction of the urban way of life, *rite de passage*, etc.). This decision is also governed by several factors, such as the age (factory work for a person over 40 is very unlikely; youths are attracted by the city life), personal network conditions (people generally move only if they have some relative or friend to stay with first), etc.

The higher, and earlier, rates of migration in Ayutthaya (up to 70% for the siblings of household heads under 40 years old!), together with the differences in average farm land, are clearly indicative of how ecological conditions govern the degree of land division possible with a given technological level. In Suphan Buri it is possible to make one's living in the village with much less land than in Ayutthaya or Lop Buri, and, therefore, it is possible to accommodate a higher population density by dividing the land further.

In this sense, if we consider the process in terms of bearing capacity of the land, it can be said that the failure and successes of some farms, for whatever reason, chiefly contributes to determine who in the process gives up farming and who continues.

It is also self-evident that the degree of intensification, allowed by the level of input in labour and capital (water control), is relative and so is the 'bearing capacity'. The degree of absorption of labour and people outside agriculture determines the level of agrarian pressure which, in turn, dictates the necessity of innovation and investments to allow further 'vertical growth'. This is a classical Boserupian scenario, and in this respect the differences between the Red River, Mekong, and Chao Phraya Deltas are illuminating (see Molle and Dao The Tuan, 2001). The latter distinguishes itself by a higher degree of opportunities out of agriculture, less agrarian pressure, and therefore a lower drive for intensification.

Just as there are many factors that govern the choice to migrate or to engage in off-farm work, there are also varied reasons for economic failure. Obviously, the endowment in land and capital at the beginning of the family cycle is paramount. It must be noted that economic failure can occur for those who are engaged in farming almost exclusively, and mostly for those who have their own land. Full tenants may experience poor harvests (and/or low prices) but generally have no large debts because they have no collateral to offer and are, like Saweng, borrowing money only if they can safely repay it. Waged labour, in average terms, provides lower income than farming but also has little risk (at least inherent in the activity; on the other hand there may be more exposure to health hazards).

We have noted earlier that the reasons for incurring undesired debts (taken here as an indicator of 'economic failure'), are seldom the direct result of farming *per se*. More frequently, they stem from failed investments in more capital intensive ventures, typically, fish breeding in Ayutthaya: Because of the enduring success of one of the villagers in raising high value fish for restaurants, both in backyards, ponds, and in cages in the river, many fellow farmers have attempted to follow his example. However, as a rule, the most profitable activities are also the most risky (see Szuster *et al.*, forthcoming). Interestingly, the villager raising valuable fish in Ayutthaya experienced a severe loss of 200,000 baht in 1999; he was able to weather his loss because of his capital and to continue his activity (whereas others would have gone under) because of the certainty that he could recoup this loss in the next year(s)³³. It follows that no other villager succeeded in achieving the same success and a few remained with bad debts.

Other typical reasons for 'economic failure' are health hazards, expenditures for ceremonies (notably cremations³⁴ and ordinations), drinking, and gambling. Since time immemorial the latter reason is cited. Prince Dilok (1904), for example, observed that debt slavery was often caused "by an age-old passionate gambling compulsion which had spread very widely" with the immigration of the Chinese. Another reason can be linked to consumerism and to the resulting psychological pressure on people to buy expensive items, either for prestige or not. This includes CD players, karaoke theatres, motorcycles, pick-ups, etc. An example from Lop Buri is that of the family who owned the largest cattle herd (80 heads). As pastures shrank with the expansion of dry season cropping, the father sold 70 heads to invest in chicken breeding. His son, married, 23 years, was reported to engage in a compulsive flurry of consumerism and in addition got addicted to amphetamines (*yaa baa*).

The increased ease in getting credit from the banks has led to a vicious circle alluded to earlier, where many farmers borrow money officially for crop investments but in fact for other personal purposes. In one case, the farmer had mortgaged his land and had been rolling his debts for many years but was not very concerned by the probable loss of his land in the future. This was explained by the fact that he was willing to give up agriculture (he had no child to continue farming on his almost 40 *rai*) and that offering his land as collateral was an intermediate strategy before selling it (for which he might have received three times more money but would not have received any more income from rice). By doing so he could get significant cash, hoping maybe to make profitable investments which would both pay back his debts and retain his land asset. This was tantamount to selling his land at a lower price but

³³ He can earn as much as one million baht in one year and draws his certainty from his knowledge of the market and of the breeding techniques.

³⁴ This prompted one woman, married to a Muslim from Nakhon Luang, to state that 'all the religions are good but Islam is better because there is no expense for cremation'.

keeping its usufruct for some years and conserving some chance to keep it at the end. This strategy may or may not be widespread but it does make sense in the context of the demise of agriculture (in Ayutthaya), in which often there are no children to take over the farm, and where the selling of land is sometimes viewed as an unexpected bonanza rather than a curse.

The most critical situations are those of the elderly who have few work options and may find themselves lonely if all the children are away. If most of them are supported financially by remittances³⁵, most especially when they take care of grandchildren, they may lack daily assistance and their old age may become more precarious and lonely. There are always cases of people who do not enjoy such support, for a variety of reasons (they may have remained single and have no children; they may have one or two children who are away but with have limited financial capacity, etc). They usually have to get special assistance from the government and to rely on neighbours. These cases are not frequent (two or three per village), but cannot be glossed over.

When surveying villagers, one cannot avoid being struck by the diversity in determination, energy, interest, and entrepreneurship that the different individuals put into their activities and decisions. When one correlates these obviously highly subjective impressions with the life trajectories outlined in the interviews it is hard to deny the importance of the 'human factor' in the paths followed by the different villagers. It is striking, in particular, to observe that some individuals who inherited a similar amount of land at the time they started working on their own account have sometimes prospered, and sometimes declined and contracted debts³⁶. Such a mundane remark may be stating the obvious (some people are more *kayaan* (*hard-working*) than others) but the relevance of the human factor is given little acknowledgement in the literature, which tends to see economic activities as predetermined by the resources on hand, by the constraints of the environments, and by (lopsided) market relationships. This is reminiscent, however of observations made by several authors, such as Visser (1980) or Amyot (1975) who concludes that,

“Reviewing the households one by one, obvious reasons for success or failure were found. The very successful farmer is intelligent, resourceful, hard-working and has the collaboration of likewise endowed, cheerful and united family members. The unsuccessful farmer is not too bright, lazy, set in his ways, individualistic and unsupported by his kin group. Such intangibles do not lend themselves easily to

³⁵ Remittances can sometimes be of paramount importance, as shown by one of the villages in Lop Buri, which virtually relies on the money transferred by children who work to the cities.

³⁶ Visser (1980) reports that "Six of the two hundred households [of the village he studied] have managed to enrich themselves considerably within about ten years and, at present, they all own more than 100 rai. Only one of these households has inherited considerably more than average... The present distribution of landownership is only partly the result of an unequal size of inheritance."

quantification and generalisation however. In the last analysis it is the quality of the human resource that makes for success or for failure..."

While Saweng and Weera undoubtedly fit in the categories of industrious landless villagers who manage, despite hardship and adversity, to make a decent living, it was also striking to see, in the same family (Saweng's), the presence of a 22-year old youth who was unwilling to work and spending his life in idleness. Another example came from the poorest family in the village (migrants who settled on public land but did not have any personal social link in the village before), where the younger son, when asked why he did not join the group that had just left to harvest rice, replied that he was "not interested".

All of these factors do not allow the researcher to easily draw classifications (such as those based on land and family size, equipment and other sizeable variables) but the interviews strongly suggest that the human factor cannot be relegated as marginal and eventually ignored³⁷. Job opportunities in the wider economy, together with the increased mobility found earlier, tend to open new avenues to people and families who would have had otherwise little future in the village economy. This is not to overstate the degree of social mobility (the degree of detail of the surveys certainly does not allow such investigation) but indicates that the presence of resourceless households sustained by successful offspring, as well as well-endowed ones with severe debts, must also be accounted for.

Labour opportunities

Pluriactivity was often mentioned in the previous sections. It is in particular notable in the poorest households that endeavour to build a decent income on the basis of any waged labour they can find. Also common, and not to be confounded with individual pluriactivity, is the occurrence of households with several incomes stemming from different activities but with each member (or most members) engaged in only one of them. Richer families also tend to have varied sources of income because of the investment of their capital. Altogether, there is a trend towards economic diversification at all levels, although there are indications from earlier village studies that this phenomenon is not new.

These income-generating activities are diverse. They include the underground lottery, the fortune teller, the hairdresser, the dressmaker, the fighting cock breeders (a good cock can be sold for 10,000 baht), people having noodle stands, making fish sauce, hats, artificial flowers, nets, knives, wooden furniture, etc.; they sometimes help in construction work, go to harvest rice in Sao Hai (earlier harvesting calendar), travel to upland areas to de-tassel or harvest corn, separate seeds from water melons, etc.

³⁷ Although it will probably continue to be so because it cannot be captured in conventional surveys, is too prone to subjectivity and does not fit conventional deterministic theories.

All these activities are not equivalent. In particular spraying of agro-chemical (especially in chilli crops) was reported to have caused several people to go to the hospital. This has consequently caused the price of spraying service to reach 200 baht/*rai* (as a comparison, the normal rate for spraying one *rai* of rice is 30 baht). This also sadly informs on the quality of pesticides which are allowed to enter the market and on the lack of sanitary control.

Likewise, work in factories is often a *sine que non* of the household sustainability but is generally reserved to people under 40 (and more often under 30). In some cases daily commuting can entail long distances: buses leave daily from Lop Buri areas to bring workers to the 'Mini Bear' electronic component factory of Ayutthaya. Depending on the type of industry, the health conditions are also often inadequate. Neulla-ong (1992), for example, found that the majority of workers in the factories of Sena (Ayutthaya Province) were single, aged between 20 and 27 years old, staying with their parents, and that if their income and their responsibility towards the family had increased their health had also been affected.

Water

The productivity of land is a direct consequence of the control and access to water, which governs much of the contrast between the three villages. In the flood-prone areas of Lop Buri and Ayutthaya, significant improvements in water control have also been made. The vast backswamps and floodplains have been divided into sub-units which have been surrounded by dikes and provided with regulators in order to regulate the flow between the river and inland. This made much better regulation of the water level in the rice fields possible, and also retained water at the end of the rainy season until the rice was ripe (water receding too early from the fields formerly was a major cause of yield reduction).³⁸ In the two villages concerned with such improvements, the stabilisation of the yield was clear enough to make some villagers return from the upland. This clearly shows the relationship between a given degree of technological development (which allows a certain degree of intensification), and population density.

In Suphan Buri, despite the area not having been included in the 'consolidation areas' located a few kilometres further north, mechanisation and the development of double cropping have encouraged farmers to upgrade their plots (by levelling) and to develop the on-farm level (via ditches); consequently water control has also improved. The decisive step was the dissemination of axial pumps powered by two-wheeled tractors, which allowed the control of flow between the plots and adjacent ditches at will.

³⁸ A full description of these flood-prone environments and corresponding rice systems can be found in Molle *et al.* (1999).

Also noteworthy are the changes that occurred in Lop Buri. Although most of the area, two or three decades ago, was planted to deep-water rice and was deprived of plot infrastructures, farmers have gradually expanded the ditch system and levelled their plots, making them candidates for growing HYVs in the dry season. The lack of on-farm development, and also the middle to tail-end location in the canal network, were the chief reasons why the area was ignored for water allocation in the dry season. Every year the area would receive an amount of water that exceeded the planting capacity, then some farmers would grade their land to grow HYVs. This was most spectacularly observed in the 1996-1998 period, when generous water supply and high rice prices triggered a spectacular expansion of dry season rice in areas formerly unfit for it. Plot levelling is done by bulldozers (or tractors equipped with a front blade) and has to be done regularly during the first years following the first dry season. It can take more than 10 years with regular plot levelling before obtaining a flat plot.

This is a juncture for reviewing the hitherto inequitable pattern of water allocation in the dry season (see Molle *et al.*, 2001a for a detailed discussion on the issue.) More equal water allocation could increase the cropping intensity of Lop Buri, as has already occurred in the last five years, and contribute to bridging the gap with areas like Suphan Buri.

Mobility

Labour is certainly characterised by its high mobility and flexibility. People easily shift and adapt to demand. This is also taken advantage of by factories, which can modulate their activity according to demand. The Sukhothai Cement Factory, for example (in Ayutthaya), employs between 50 and 140 persons, and adapted smoothly to the post-crisis conditions. This is, on the one hand, detrimental to farmers who do not enjoy stable jobs as found in Bangkok but, on the other hand, may also be the condition for a higher competitiveness and adaptiveness of the factory (which thus continue supplying jobs).

Kinship networks are very important regarding the decision to work in factories in the Bangkok Metropolitan Area (BMA). They work in both directions. A youth willing to leave the village will ask friends or relatives who are already settled to find a job for him, or will spend a few days in their homes to look for work. Factories also use these networks to recruit relatives from workers who have given them satisfaction (they want the 'same *namsakun* [surname]'). For example 10 youths from Ayutthaya village and vicinity had recently departed together for Samut Prakan (five of them were working in the same milk factory), after a villager came back on a mission to recruit more workers.

Similarly, migration to the uplands was in general done in groups, and following the same kinship channels. This contributes to furthering in the city the social modes of interaction prevailing in the countryside, as has been observed by urban

anthropologists (Akin, 1975, Johnson, 1978). This helps to keep individuals in a framework of social cohesion and mutual aid, as they move away from their communities. (We may note, in passing, the sheer difference in many countries, for example Latin America, where the kinship structure (and even the nuclear family structure) has been widely disintegrated).

Education

As in most of Southeast Asia, education has now become the principal form of capitalisation of the households (Rigg, 1997). This is closely linked to the perception of farming as a non-prestigious activity, in addition to the limited economic perspective it offers. It cannot be overemphasised that the first people to migrate and leave the villages are the children of the richest families. Lung Chua, the 'pilot farmer' of Lop Buri, and also the most successful (and industrious), has five children who have all studied and found urban jobs (one is a doctor from Chulalongkorn University). The village headman in Ayutthaya also has four children who are away, as mentioned earlier.

6 Conclusions

This study, aimed at comparing three villages with contrasting levels of access to water and ecological environments, evidenced dramatic differences in productivity, village life and farmers' strategies.

At one extreme, Ayutthaya appeared to be extremely constrained by its flood-prone environment, which allows for little intensification and agricultural diversification. Almost all the variables studied showed significant differences: Land ownership is widely held by absentee owners who, contrary to common wisdom, are not predominantly capitalist investors (although they are also more present than elsewhere), but by villagers who have migrated and retained ownership, and rent out their land to relatives or other villagers. The pressure on land is much less than in the other villages: Significantly, many rents have been reduced (typically from 10 to 6 *thang/rai*) after the floods of 1995 (and 1996) in which the damage incurred discouraged many tenants from continuing farming. The main reason why much more land has been sold to outsiders in Ayutthaya is that the land is cheaper than elsewhere³⁹ and well located in terms of proximity from the Asia Highway and Bangkok; also that no one would buy land at such prices with the objective of agricultural production⁴⁰. Speculators could also more easily buy more land in one chunk (they are not interested to buy scattered small plots) because the average plot size is larger and because it is easier to convince people to sell their land. As mentioned earlier, ageing farmers with no children to farm (or owners of land who have already migrated), were often disappointed for not having sold before the crisis and see this opportunity as positive. This does not do justice to those farmers who sold their land because of economic failure but they were not in the majority and had in general contracted debts for reasons other than conventional farming.

Ayutthaya was also notable for its demographic peculiarities, which include a highly likely lower average fertility (induced by the lack of economic perspectives) and a higher rate of emigration. In particular 70% of the adult generation under 40 had left the village. This translates into a much lower average household membership (only 3.5, against 4.8 in the other villages). Contrary to expectations, waged labour was not higher in Ayutthaya (in particular, agricultural waged labourers were non-existent) and most off-farm income came from factory work, handicrafts, remittances, etc.

³⁹ Before the crisis land in the area would fetch around 30,000 to 40,000 *baht/rai*, while land with irrigation infrastructures would fetch 100,000 to 250,000 *baht/rai*. The difference in price reflects the fact that estate development requires huge earthfilling and poldering, which makes the undertaking more expensive (but still profitable, judging from some large factories installed in the area).

⁴⁰ Except marginal cases for a pond or a small garden.

There is a strong case that waged labour exists in proportion to the supply of such work opportunities (and not in proportion to poverty), as shown by the fact that its occurrence is higher in Suphan Buri than in Ayutthaya. In other words the opportunities offered in the wider economy are sufficient to absorb most of those who would not otherwise be able to make a living in the village (for having no land and insufficient job opportunities). The decision between migrating, engaging (locally) in non-agricultural work or trying to survive on waged labour depends on several factors, foremost being age (villagers over 40 are unlikely to move), skills and level of education, and kinship connections. The most critical situation is that of the elderly whose children are away and who have little or no personal income.

At the other extreme, Suphan Buri appears to be much more prosperous, and can accommodate twice as many (farming) populations per unit of land because of extremely high land productivity. Economic prosperity means higher acquisitive power and allows other activities, notably commercial ones, to develop in the area. Waged labour is significant (20%), mostly because of the demand for work in triple rice cropping and water chestnut cultivation. Capitalisation has allowed better education and the village has more youths who have joined government offices. Higher incomes are also reflected in the many modern houses that can be seen in the area. At the same time, there are fewer collective activities in the village (such as the groups found in Ayutthaya) and leadership is loose. Patron-client relationships between richer villagers and the poorest people, as observed in Ayutthaya, are not readily obvious in Suphan Buri. Work is much more an individual enterprise and its relative abundance gives more independence to individuals.

Pressure on land is high, in that it is extremely difficult to find land to rent. A total of 40% of the cultivated land is rented, but 80% of landowners live in the *tambon* and have kinship relations with the tenant in 65% of cases. Because of the higher accumulation of capital (e.g. few farmers resort to the BAAC to buy their fertiliser and other inputs) and of the productivity of the land, villagers — either away or still in the village — tend to retain their ownership on land.

The situation found in Lop Buri is indicative of another type of response. Experiencing similar ecological constraints to those of Ayutthaya in the lowlands, rice farming intensified chiefly in the upper parts of the village. With improvements in water management and on-farm infrastructure, a growing portion of the area has been able to engage in dry season cropping, thus partly benefiting from water supply. As in Ayutthaya, but to a lesser extent, off-farm job opportunities have been provided by local industries (and by the proximity of Lop Buri), but the main activity allowing 'vertical growth' in the village, has been contract poultry breeding. This activity has offset the economic limitations attached to rice cropping (itself constrained by ecology and water supply) and dramatically raised the village income: Husbandry now brings as much income as cropping activities. Despite the expansion of the activities to a growing number of farms, this wealth is nevertheless not distributed over the whole

village, as it is limited to those who can find money for the investment⁴¹; this must be taken into account when considering that the average farm income of Lop Buri is 20% lower than that of Suphan Buri.

In conclusion, the study yielded a fascinating picture of how village economies respond to varied ecological constraints, either capitalising on high land productivity, diversifying agricultural activities to cash crops or animal breeding, engaging in local off-farm activities, or migrating to Bangkok or other provinces. This raises the question of whether these ecological constraints can be altered and at what cost. It is important to understand that while little can be done to overcome the constraints of the flood-prone environments⁴², dry season cropping depends heavily on decision-making for the allocation of water. There is no doubt that farming conditions in Lop Buri, and consequently the sustainability of farming systems, could be significantly improved by increasing the supply of water in the dry season. This, however, would have to be done at the expense of other areas. Despite having a slightly higher productivity (that is a better economic return by cubic metre of water), there is little scope to justify the fact that Suphan Buri is able to grow three crops while, at the same time, other areas cannot even grow a second one. Even when considering all of the different physical and managerial constraints to a fully equitable allocation (this is discussed at length in Molle *et al.* 2001a), there is no way to deny that a better balance could be achieved by adjusting the current patterns of allocation.

What this report shows is that much of how village economies evolve is linked to their access to water (in the dry season) and to the level of its control (flood-prone/non-flood prone environments, in the wet season). While the expected dramatic discrepancies in land productivity, as a result of the contrasting levels of access to water (based on which the villages were chosen), were confirmed, the surprise came from the way non-cropping activities, off-farm work, remittances, and differences in farm and family size significantly worked to bridging the income gap between the farming populations of the three villages. This was only partially achieved, as the income per head in Suphan Buri still remains twice as high as in Ayutthaya, but it took us quite a long way from the initial ratio in land productivity, which is close to 8!

The agrarian evolutions of these three villages, distant from one another by only a few tens of kilometres, also show the diversity in development path and 'life' trajectory. A much higher diversity was found when looking at the household level

⁴¹ This often means having land as collateral or linkage with a wealthy person. One very poor family living in Muang Lop Buri came back to the village and borrowed money from Lung Chua, to whom they were related, and successfully paid back their debts after investing in chicken breeding.

⁴² It could be possible, at the cost of more diking of the river system, to equip the drainage units of the flood-prone area with pumps aimed at draining water out. This is the system which has been adopted in the Red River Delta because population pressure made it necessary to improve cropping conditions as much as technologically

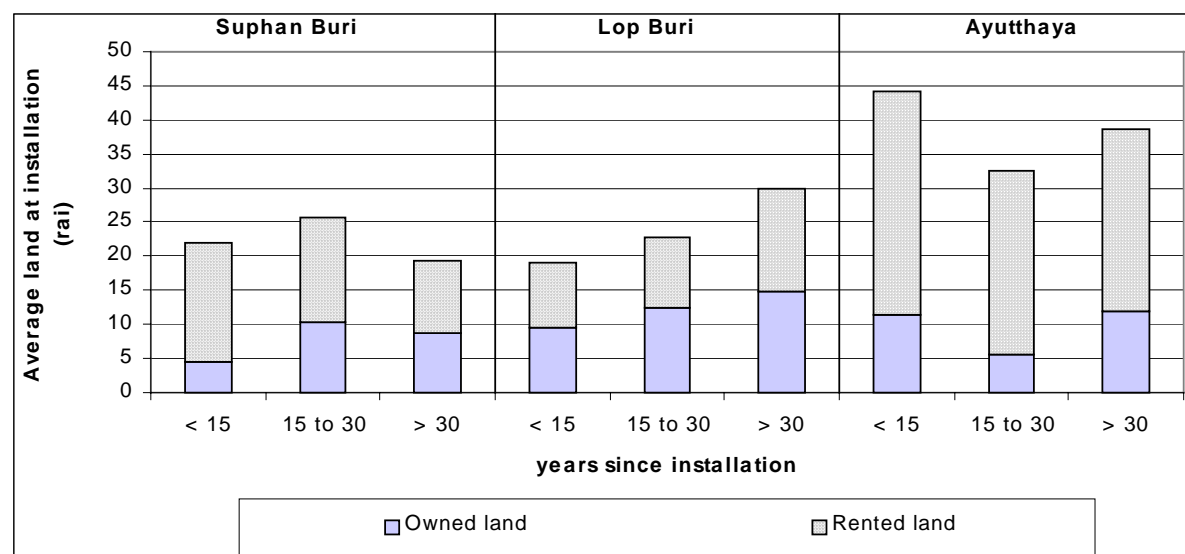
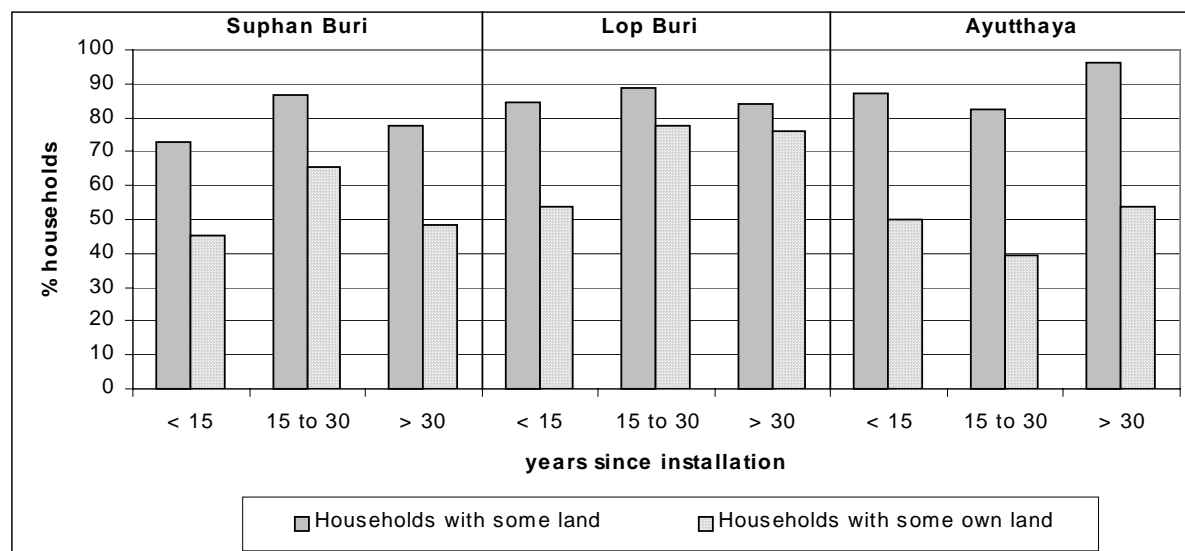
and it was shown that the different individual strategies and trajectories could not be satisfactorily understood on the sole basis of factor endowment. Much of the common wisdom on land sale, indebtedness and migration, for example, did not accord with our empirical data, which showed a wide range of situations, motivations and responses. It remains that, by and large, the demise of agriculture in Ayutthaya, as well as the overall transfer of people and labour from the agricultural to the non-agricultural sectors, is a measure of how alternatives were eventually made available and embraced by villagers, more often by a pull than by a push, and for reasons which are not only socio-economic but also cultural.

Despite the central questions of whether agriculture suffers from an urban bias and on how its contribution to and insertion in the wider economy could be strengthened (by regulating markets, organising producers, and raising their bargaining power, etc), there is little doubt that economic diversification has been critical in relieving agrarian pressure. While the integration to market is seen as deleterious in some quarters, it is hard to see how an agrarian system that reached saturation 40 years ago could remain both self-sufficient and insulated from the wider economy.

possible. In the Thai case, there is now a way to justify the huge costs that this would incur. See Molle and Dao The Tuan (2001) for a comparison of land development in the deltaic environments of Southeast Asia.

7 Annexes

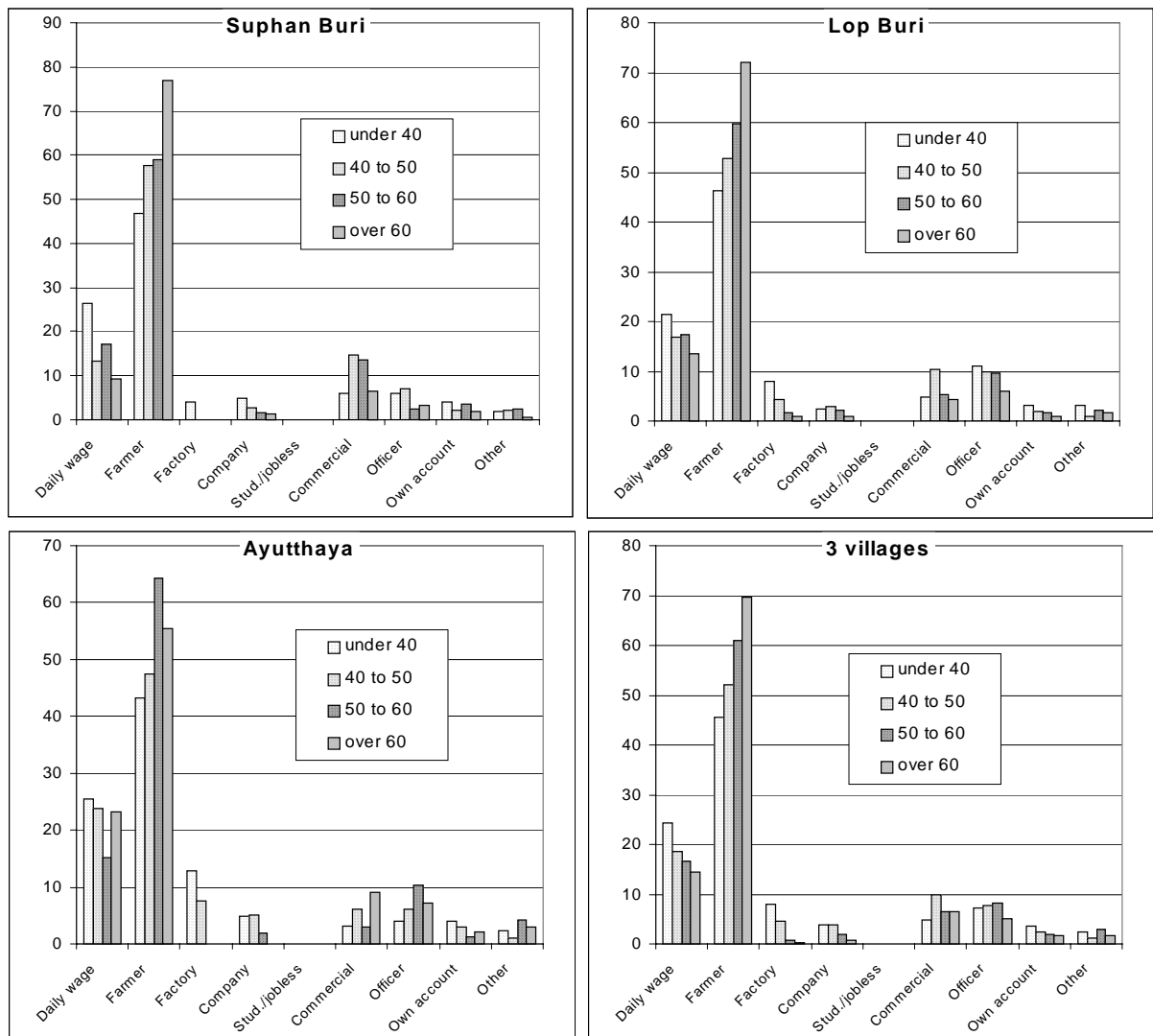
ANNEXE 1: LAND ENDOWMENT AT THE TIME OF INSTALLATION



ANNEXE 2: FARMING ORIGIN OF PARENTS OF HOUSEHOLD HEADS

Age Class	Were parents farmers?				Husband				Wife			
	Suphan Buri	Lop Buri	Ayut-thaya	All	Suphan Buri	Lop Buri	Ayut-thaya	All	Suphan Buri	Lop Buri	Ayut-thaya	All
Under 40	0,71	0,81	0,76	0,76	0,8	0,82	0,73	0,79	0,63	0,80	0,79	0,74
40 to 50	0,90	0,80	0,89	0,86	0,87	0,85	0,80	0,84	0,94	0,76	0,96	0,89
50 to 60	0,81	0,79	0,80	0,80	0,8	0,75	0,76	0,77	0,82	0,83	0,85	0,83
Over 60	0,76	0,89	0,71	0,78	0,68	0,93	0,71	0,76	0,83	0,85	0,71	0,80
All	0,79	0,82	0,80	0,80	0,78	0,83	0,75	0,79	0,80	0,81	0,85	0,82

ANNEXE 3: DISTRIBUTION OF OCCUPATIONS FOR HOUSEHOLD HEADS AND THEIR SIBLINGS, BY AGE CLASS OF HEADS



Annexe 4: List of categories of activities

	FARMING
1	rice
2	field crop such as chilli, corn, or vegetables
3	water chestnut
4	fishing
5	animal breeding
6	orchard
	II- AGRICULTURAL WORK/ peacemeal or daily work
7	tractor, harvestor driver
8	spraying
9	harvesting
10	peeling
11	cropcare
	III- NON AGRICULTURAL WORK/ Piecemeal or daily work
12	Constructions
13	Electricity
14	truck driver
	IV – COMMERCIAL
15	shopkeeper such as noodle shop
16	Rice middleman, WCN middleman
	V- OFFICER
17	teacher, administration officer
18	soldier
19	policeman
20	nurse, public health
21	Administration & public companies
	VI - Own-account
22	blacksmith
23	taxi such as motorcycle taxi
24	Mechanics
25	dress maker, hair dresser
26	carpenter
27	sell kanom or necklace
28	handicrafts
29	other activity which not see often such as DJ.
	VII Employee
30	janitor, yam
31	factory
32	student
33	Housewife
34	no activity/jobless

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