

The Irrigation Associations bring together farmers under the same irrigation system to organise and operate it themselves, employing staff who (at least in principle) are responsible to farmers' representatives, and dividing up the operating and maintenance expenses between themselves. Such a form provides for effective liaison between staff and farmers, and disciplines the staff to operate the system effectively through the mechanisms of accountability of staff to farmers. (Wade 1982: 9)

Decentralisation of water management is an important means of increasing the efficiency and equity of water distribution, as the contrasting cases of Meiqian in the People's Republic of China and Dhahi Kalan in Haryana, India demonstrate (Nickum 1980; VanderVelde 1980: 259). Indeed it is widely acknowledged that the lack of decentralisation on the sub-continent adversely affects the efficiency of water control projects (Vaidyanathan 1983: 76-85). But successful decentralisation often presupposes skills and knowledge, as well as a willingness to cooperate, on the part of local farmers. These are more likely to be found where irrigation or water control associations were already in operation, that is to say, where water control facilities were already in existence. Thus improvements to the traditional irrigation systems of Northern Thailand involve certain modifications to the traditional irrigation organisations, but can rely upon their support and are generally successful, whereas the introduction of completely new water control facilities to Northeastern Thailand has aroused the local farmers, innocent of any experience of water control, to nothing more than apathy and indifference; even on the technical level, the schemes must be judged only partially successful. The mandarin approach to water control can be highly counterproductive. Instructing and involving local farmers so that new or enlarged schemes can function more efficiently may be no easy task, but it is perhaps the most urgent problem now facing agricultural planners (Affiuddin 1977; Tamaki 1977; Chambers 1980; Vaidyanathan 1983).

Rice and the wider economy

The specific technical and organisational requirements of rice cultivation have a pervading influence on the rural economy as a whole, which is manifested at a number of levels. The relatively inflexible ratio of irrigated to non-irrigated land will influence crop choices, for example, while the demands of operating an irrigation system will determine the timing of all agricultural operations, as well as the organisation of labour within the community as a whole. The intensive but intermittent labour requirements of rice cultivation have the effect of tying large numbers of skilled workers to the land, at the same time leaving considerable scope for investing surplus household labour in commercial cropping or petty commodity production. This chapter will examine how the specificities of rice cultivation affect the development of other types of economic activity.

'Skill-oriented' and 'mechanical' technologies

There is a significant divergence between the evolution of agricultural systems like those of Northern Europe and North America, which emphasise the importance of increasing the productivity of labour (see appendix A), and of those like the rice economies of Asia, which stress raising the productivity of land. These distinct processes involve distinct types of technical change: in the first, labour is the scarce or costly resource and there is a historical trend towards the substitution of machinery for labour; in the second, there is an increase in the use of skilled manual labour accompanied by the development of managerial skills, and in effect labour is substituted for land.

For purposes of easy reference it would be useful if one could make a simple terminological distinction between these two types of technical

change, and indeed between the two types of technology which they engender. A contrast between 'technical' and 'technological' change (i.e. change based on the one hand on the development of low-capital labour and management skills, and on the other of the development of capital-intensive equipment and machinery) might have seemed appropriate, given the common vernacular usage of 'technique' as skilled performance and 'technology' as sophisticated equipment, were it not for a generally accepted convention among economists and other specialists that 'techniques' are in fact constituent elements of a technology, though how far a 'technology' extends beyond being simply a combination of related techniques is subject to much debate. Unfortunately 'nothing better indicates the underdeveloped state of technological studies than the basic disagreements over fundamental terms' (Layton 1977: 198). Some of the difficulties inherent in attempting to define or subdivide such a vague and complex notion as 'technology' are outlined by Rapp (1985: 128-9). Mitcham (1978) proposes a functional typology, distinguishing technology-as-object (apparatus, tools, machines), technology-as-knowledge (skills, rules, theories), technology-as-process (invention, design, making, using) and technology-as-volution (will, motive, need, intention); the first two categories might at first appear to provide the distinction sought here, but closer inspection shows that they are not in fact appropriate. Economists have described technical change which involves no new capital investment in equipment (for example organisational improvement) as *disembodied* technical change, and that which does require new investment in plant and equipment as *embodied* (Freeman 1977: 227), but it does not follow that one can contrast 'embodied' and 'disembodied' technologies, and as the contrast focuses on the presence or absence of capital in a single instance rather than on long-term characteristics, it too seems inadequate for present purposes.

In the absence of any more appropriate terminology and in order to avoid clumsy circumlocution, it is proposed here to use the terms 'skill-oriented' and 'mechanical' to denote respectively technologies which tend towards the development and intensive use of human skills, both practical and managerial, and technologies which favour the development of equipment and machinery as a substitute for human labour. Technological trends in Asian rice economies would then be characterised as 'skill-oriented', and those in modern Western agriculture as 'mechanical'. Of course the distinction does not imply that managerial and practical skills are absent from 'mechanical' technologies, nor that the development of 'skill-oriented' technologies precludes the use of complex equipment, including labour-substituting machinery. But as chapter 2 showed, there are often considerable technical

difficulties in developing suitable machinery to substitute for highly skilled labour; furthermore if the principal requirement is to raise the productivity of land, the benefits of mechanisation may be restricted to equipment which eliminates bottlenecks and permits the intensification of land and labour use.

Any technical innovation in agriculture is likely to provoke shifts in the allocation of resources which will benefit certain social groups to the disadvantage of others. The capital-intensive nature of most agricultural innovations in early modern Europe encouraged a polarisation of rural society into entrepreneurial farmers and landless labourers. One of the advantages of a 'skill-oriented' agricultural system such as wet-rice cultivation, which provides little scope for economies of scale and depends far less upon capital investment, should be that technological advance does not promote economic inequalities to the same extent.

The new inputs typical of many phases of development in rice agriculture are *divisible*, that is to say, new seed or improved fertilisers can be bought in any quantity according to the farmer's inclination or financial situation. Innovation is thus within the scope of farmers of all income groups. Often organisational improvements or a more careful carrying out of operations can make important contributions to increasing output without requiring any increase in capital outlay at all.

Since in a 'skill-oriented' technology like rice cultivation efficiency depends less upon the range of equipment than on the quality of labour, and since economies of scale do not operate as they do, for example, in the European case described in appendix A, a skilled and experienced smallholder or tenant farmer is in just as good a position to raise the productivity of his land as a wealthy landlord¹ (see chapter 5). Indeed as productivity rises, the costs of adequately supervising the many tasks involved in wet-rice farming become prohibitive: inspecting an irrigated field for weeds is almost as onerous as weeding it oneself.

So although prices of land rise as production is intensified and yields increase, and although there are often very high rates of tenancy in areas where wet rice is intensively farmed, the difficulties of effective supervision mean that landlords find little or no economic advantage in evicting their tenants to run large, centrally managed estates. Instead they generally prefer to leave their tenants to manage their small farms independently, shouldering all or part of the risks of production. Thus, contrary to the pattern set by the development of the 'mechanical' technology of Northwest Europe, in wet-rice societies there has been little trend towards the consolidation of landholding and the polarisation of rural society into managerial farms and landless labourers. Units of management remain small, usually at the scale of the family farm (table

Table 4.1 Farm sizes in Asia

	Farm size (ha)	Wet-rice area (ha)
Japan	1960 ^a 1978 ^a	0.56 0.64
Korea	1965 ^b 1979 ^b	0.91 1.02
Taiwan	1965 ^c 1979 ^c	1.05 1.02
Java Central Java	1969/70 ^d 1971/2 ^e	0.8 0.5
Thailand (Rai Roi)	1972 ^d	6.0
Philippines (Laguna)	1966 ^d 1975 ^d	2.2 2.2
Malaysia (Kelantan)	1971/2 ^e	0.9
Sri Lanka	1972/3 ^d	0.8

Sources:

^a Hou and Yu 1982: 131^b Ibid.: 206^c Ibid.: 611^d Taylor 1981: 89^e IRRI 1978: 8-9

4.1), and the producers are not separated from control of the means of production (see chapter 6, and appendices B and C for the historical cases of China and Japan). The small-scale independent management units controlling land and skills are, however, inextricably linked into much larger-scale cooperative units for the management of water and the redistribution of labour. The paradox between the individual and the communal nature of rice cultivation has frequently been remarked upon by Japanese social scientists (e.g. Kanazawa 1971; Tanaki 1979).

The specificity of wet-rice agriculture

Wet-rice cultivation shapes and divides a landscape decisively, imposing a technical, economic and linguistic distinction between wet and dry.

Flying over Kelantan [Malaysia], one is immediately struck by the contrast between the wide tracts of flat green riceland with the irrigation channels glinting in the sun, and the distinct patches of dark wooded land which hide the homesteads from view. Near the coast the sea of ricefields is most extensive, the islands of woodland becoming larger and more contiguous as one flies westward, until they finally merge into dense jungle. The distinction between riceland (*pendang*) and village land (*kampung*) is determined primarily by the elevation of the land. The low-lying areas, usually with moist heavy soils, are suitable for rice farming and not much else; land which is even a few feet higher is comparatively dry and safe from floods, providing a natural place to build houses, plant trees for shade and protection from the wind, and grow vegetables, spices and fruit. This distinction between padi fields and village land (respectively 57% and 35% of the land area) looms large in the life of Kelantanese communities. *Pendang*, or padi fields, provide the staple rice necessary for subsistence; no individual *kampung* crop is necessary to physical survival, but together these two types of land provide a varied diet and a source of cash income. (Bray and Robertson 1980: 217)

The same distinction and complementarity are found in all rice-growing regions. Rice-fields which are undrained and permanently waterlogged are suitable for very few other crops apart from semi-aquatics like taro, ginger, indigo and sugar cane (Bray 1984: 112). On the whole dry and wet land are not interchangeable, and rice-farmers must make a long-term choice as to the proportion of land to be allotted primarily to rice and that given over to other crops. The concentrated periods of heavy labour requirements are also a determining factor.

Some crops compete with rice for land, labour and water, and cases where rice-farmers have given up producing their subsistence requirements to turn their wet-fields over entirely to commercial crops, though comparatively rare, are not unknown. In fifteenth-century Fujian province, China, many farmers chose to devote their wet-fields principally to sugar, which fetched a high price on the export market, and to buy their rice from other provinces (Rawski 1972). And in nineteenth-century Java the 'Culture System' produced intense competition between sugar-cane and rice, for land, irrigation-water and labour. As a result localities where the sugar quota was high tended to produce only a single crop of rice a year; at the same time rice production intensified in localities where little sugar was grown, and such areas supplemented the food needs of the sugar districts.²

Of course the farmer's choice as to how to allocate his resources will be determined by the demands of the market as well as by technological constraints, and in fact a fair degree of technical flexibility is possible. In the Japanese village of Niinke, studied by Beardsley and Hall, rice was grown only for subsistence until the 1930s, and cotton was the most important economic crop, grown in hillside fields throughout the area.

The farmers of Niiike have shifted in recent years to an increasing emphasis upon paddy farming for a number of reasons, among them the increased importance of cash-crop farming, the collapse of the market for locally grown cotton, and the improvement of hitherto marshy paddy land... Cotton was [formerly] a major product of the Okayama Plain, where some of Japan's largest spinning mills had been built after the Meiji Restoration. The mills later turned to the cheaper and more plentiful cotton imported from the United States and southern Asia. The market for domestic cotton thus declined sharply after 1910. The Niiike farmers turned to raising mat rush, the basic material for the covering of floor mats. A swamp plant, this rush could be grown as a second crop even in hard-to-drain paddy fields. Intensive use of chemical fertilisers began about the same time. [With the programme of rice-land improvements of 1925 to 1930] household labour was needed now in the paddy fields or could be profitably employed in weaving the mat rush into *tatami* covers. Gradually cultivation of the hillside dry fields was abandoned, and pine trees were planted... Niiike became a paddy farming village. All parts of the valley floor low enough to lead water are utilised for paddy. (Beardsley and Hall et al. 1980 edn: 134-6)

Greater flexibility in the redeployment of limited land and labour resources can sometimes be achieved through mechanisation, and the possibility of mechanising certain agricultural operations has recently permitted many Asian farmers to make the transition from subsistence to commercial cropping. To take two examples from Thailand, the introduction of tractors permitted the Lue farmers of Ban Ping in the north to open up a large area of new fields in a nearby flood-plain for the commercial production of non-glutinous rice, although they continued to use the plough in the home fields where they grew glutinous rice for their own consumption. The case of the Ban Ping farmers is interesting, as they were very quick to adopt tractor ploughing but continued it only for a few years, to clear the new land and also to till it quickly at a period before local water control networks had been constructed which eliminated seasonal flooding. The Lue farmers preferred using ploughs to tractors, partly because ploughs are said to give higher yields, and they only used the tractors for a brief period; nevertheless tractors were an essential element in the transition to commercial rice-cropping (Moerman 1968).

Nearby, in the Chiengmai Basin, rice-farmers wishing to supplement their incomes turned not to commercial rice production but to the cultivation of dryland crops, opening up new fields on higher land where they grew groundnuts, garlic, chili and maize. But in order to free enough household labour for such enterprises they too started using machinery for certain rice-growing operations (Bruneau 1980: 426).

Fields that can be drained can be used for other crops. An early

Chinese description of drainage techniques is given in the *Wang Zhen nongshu*:

High fields are tilled early. In the eighth month they are ploughed dry [that is, without waiting for rain or irrigation as is usual before ploughing] to parch the soil and then sown with wheat or barley. The method of ploughing is as follows: they throw up a ridge to make lynchets, and the area between two lynchets forms a drain. Once the section has been tilled they split the lynchets crosswise and let the water drain from the ditches; this is known as a 'waist drain'. Once the wheat or barley has been harvested they level the lynchets and drains to accumulate the water in the field which they then plough deeply. This is vulgarly called a twice-tipe field. (*Wang Zhen nongshu*: 2/5b, tr. Bray 1984: 111)

The climate in China's Yangzi valley was sufficiently warm to allow the alternation of summer rice with winter barley or wheat, and this double-cropping system spread rapidly after the fall of the Northern Song dynasty to the Mongols in 1127. A twelfth-century work says:

After the fall of the Northern Song many refugees from the Northwest came to the Yangzi area, the Delta, the region of the Dongting Lake and the Southeast coast, and at the beginning of the Shaoxing reign (1131-63) the price of a bushel of wheat reached 12,000 cash. The farmers benefited greatly, for the profits were double those of growing rice. Furthermore, tenants paid rent only on the autumn crop, so that all the profits from growing wheat went to the tenant household. Everyone competed to grow the spring-ripening crop, which could be seen everywhere in no less profusion than to the north of the Huai River. (*Yi le bin*, tr. Bray 1984: 465)

Further south in China barley was preferred to wheat as it matured earlier and was better adapted to humid conditions and poorly drained land (Shen 1951: 208). In South Japan wheat, barley and naked barley (collectively known as *sambaku*) were the most common second crops in drained rice-fields. The incentive to convert undrained fields, *shisuden*, into drained fields, *kanden*, was provided by access to the commercial markets which developed during the Tokugawa and Meiji periods (Francks 1983: 59, 108), and later *kanden* expanded further as the development of pumping equipment made it possible to drain low-lying fields (Isikawa 1981: 43).

Uniformity and systemic change

The constraints of efficient labour use and water control impose a degree of technical uniformity and cohesion on rice-farmers, as well as requiring cooperation between them. All the farmers within a single irrigation unit will have to fill and empty their fields at the same time, which means they

will have to plant varieties with a similar ripening period. They will usually cooperate on the maintenance of their joint irrigation channels, and will also be obliged to cooperate in order to fulfil their labour requirements during the periods of peak demand.

It has been pointed out that if rice-farmers had restricted their farm size to the area which they could manage with family labour alone, they would often not have been able to produce enough for their own subsistence (Wong 1971). To some extent such problems could be mitigated by spreading one's efforts over several different plots and by planting a number of rice varieties. Lewis (1971: 49) describes the tactics of Filipino farmers in the lowland *barrio* of Bayon, all of whom grew early and late, glutinous and non-glutinous rices in the same season, in order to split up fields and the timing of operations and so spread out their labour requirements; thus one household could cope alone with several plots amounting to over an acre where it would have been unable to manage a single field of the same area. In most rice-growing societies, however, farmers supplemented their family labour through labour exchange or, much less frequently, labour hire.

Labour exchange systems have been found in almost every society where rice is grown. Some regions have formal, permanent labour-exchange societies, in others arrangements may be *ad hoc*, or several kinds of arrangement may co-exist. In Kelantan, Malaysia, for instance, two systems of communal labour co-existed until very recently. For *berderau*, exchange labour proper, a group of friends, relatives or neighbours would get together to plant rice on a rota basis, 10 or 12 families in a group. These groups were of long duration, as the advantages of having one's field planted first had to be rotated among the members of the group over several years. *Pinjaman*, literally 'borrowing', was a system more akin to hiring labour: a farmer would provide a good meal for a day's work, and was under no obligation to work in the other farmers' fields (Bray and Robertson 1980). In Japanese villages exchange labour for transplanting was called *kattari* or *yui*; there too the *kattari* group was formed of about a dozen families on a permanent basis. There were also a number of other types of cooperative group, covering activities from repairing irrigation channels to organising funerals (Embrece 1946: 99); a similar range of cooperative groups was to be found in Korean villages (Reed 1977: 19).

Many exchange organisations are based on simple proximity, but in Southwest China, far from being confined to the village, the exchange of labour is commonly practised among different localities. Since such transactions, based as they are on reciprocity, really constitute a credit system, some form of security is needed, and this is provided by ties of

kinship. Thus we find that exchange of services among relatives is considered most desirable' (Fei and Chang 1948: 64). It is perhaps not surprising that in a strongly patrilineal society like that of China cooperation between kin is preferred, whereas in Malaya, where descent groups are bilateral and the word for 'kinsman' and 'friend' is the same, the choice is not so obvious. In other cultures still other criteria may apply. In the Madras area of India exchange labour is confined to members of the same caste (Nakamura 1972: 161).

It is important to bear in mind that exchanging labour does not increase the amount of labour available, but redistributes it so that it can be deployed to best effect. It seems that labour exchange is usually confined to rice farming alone, and does not extend to cash crops, for which extra labour is hired if necessary (e.g. Potter 1976: 42). In Tokugawa Japan the institution of labour hire developed as the rural economy expanded and diversified, but was in large part confined to commercial crops and rural manufactures (Smith 1959: ch. 8). But in Tonkin labour hire had a completely different nature and origins. French colonial rule put paid to what few rural industries there were and laid a heavy stress on rice monoculture. The introduction of monetary taxes (which as usual laid a far heavier burden on the poor than on the rich), together with rapid population growth, had led by the 1930s to the development of a landless labouring class, who found their only employment in rice-farming, and consequently to the disappearance of cooperative organisations (Popkin 1979: 155; Fforde 1983: 56).

Another almost ubiquitous form of cooperation in rice-growing areas, at least where water control of any sophistication is practised, is represented by the various irrigation groups and associations referred to in chapter 3. Irrigation associations are not necessarily egalitarian, although it has been alleged that the communal nature of water control in rice-growing societies counteracts the tendency towards economic polarisation inherent in the private ownership of land (see Kelly 1982b: 12). But although hierarchies do exist in irrigation societies and the least powerful members are often unashamedly exploited (see chapter 6), all the farmers however humble do belong to the group.

Communal organisations such as labour-exchange groups and irrigation societies greatly reinforce the technical uniformity and cohesion imposed on rice-growing societies by the physical demands of rice cultivation. They often prove a highly effective, rapid and acceptable channel for popularising innovations and standardising techniques. The sharing and reinforcement of skills and resources is especially important where a single technical change entails a transformation of the whole system, as is frequently the case in rice cultivation. Changes in rice

cultivation come not singly but in 'packages'; in fact one might characterise such change as systemic: new varieties allow double-cropping but require more water and fertilisers, as well as an intensification of labour use which transforms previous patterns of organisation. Let us take as an instance what happened in Kelantan, Malaysia when an irrigation scheme was constructed by the Kemubu Agricultural Development Authority (KADA) to permit double-cropping of rice.³

Each irrigation unit serves over 20 ha. The water is supplied by KADA for a charge of M\$25 per hectare per annum, according to a very strict timetable calculated for each district every season. Sufficient water has to be supplied to soften the soil for ploughing, and after transplanting there must be 15 cm of water standing in the fields during the period of maximum growth. It is also advisable to change the water in the padi-fields every week or so.

Every season KADA issues a timetable to each district prescribing the exact day on which each operation is to begin and finish (figure 4.1). It is necessary to follow this timetable almost without deviation if two crops are to be grown successfully. In particular, if transplanting is not completed on time, then the crop is likely to fail through lack of water. If the timetable is to be adhered to, then the farmers must set to ploughing and sowing almost as soon as they have finished harvesting. In the old days the month or two after the harvest was a time of rest and celebration, with feasts, plays, dancing, kite-flying and other amusements, and even now the farmers feel they deserve a rest after the harvest. But there is no time allowed for resting under the new system, and so it happens that the farmers begin to lag behind the new timetable, one season by only a few days, the next by a few days more, until eventually they have to forfeit a whole season. In Bunut Susu, the village I was studying, half the farmers lost the monsoon season of 1976-7.

It is essentially the presence or absence of water which determines which land can or must be used for rice, and over which period of the year. It is instructive to see what happens when the water-level changes as it did in Kelantan. Before the construction of the KADA irrigation scheme permitting the double-cropping of rice (see chapter 3), poorly drained land, although it produced the highest yields of rice, was usually left idle in the dry season; slightly higher land, especially where soils were sandy, would produce good crops of vegetables or tobacco.

The old varieties of rice cannot be grown in double-cropped fields because their growth period is too long. Over the past five years a number of new, high-yielding varieties have been introduced, mostly by KADA, though some of the most popular varieties were in fact found by

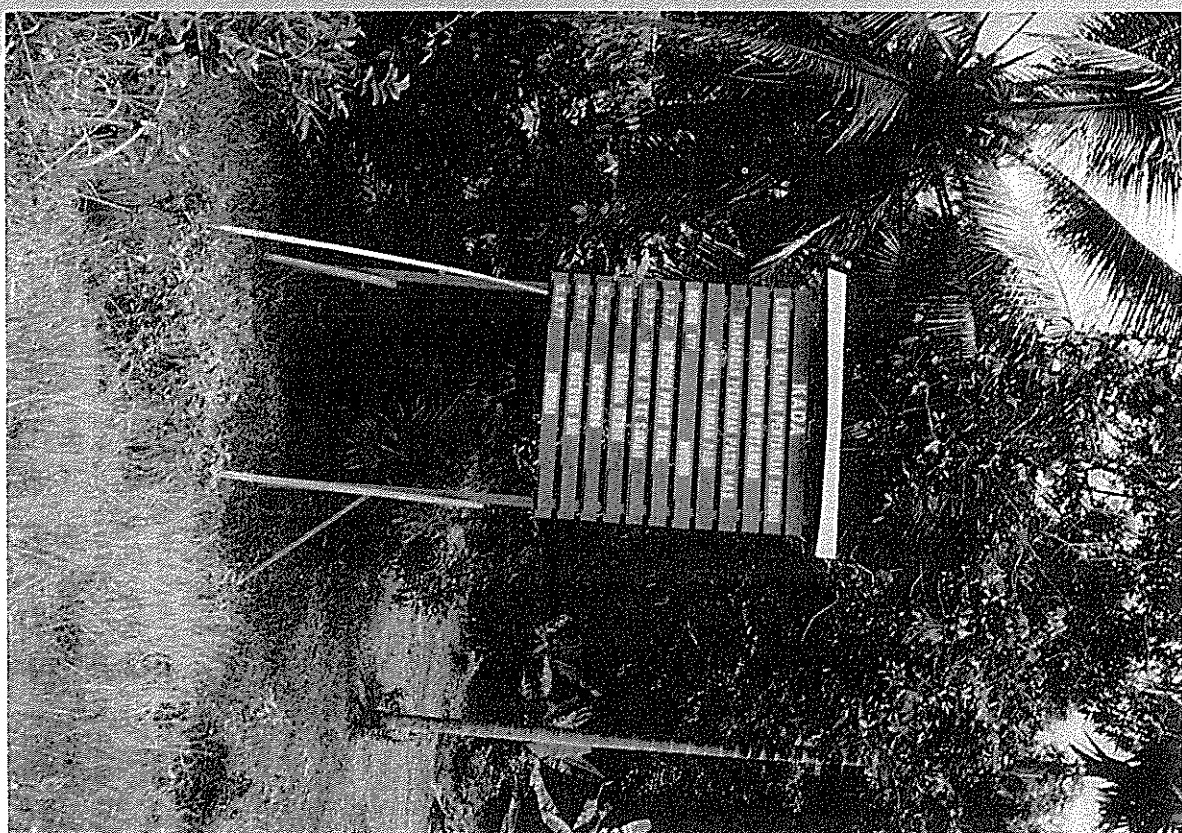


Figure 4.1 KADA timetable for rice cultivation

(photo courtesy A. F. Robertson)

the farmers themselves. Under favourable conditions the new varieties give much higher yields than the old. In some parts of the KADA area the average yield is as much as 5 t/ha, but the highest yields reported for Bunut Susu, which had problems with its water supply, were 3.75 t/ha, and on poorly drained or dry soils yields of less than 2 t/ha were usual.

KADA recommends the use of 7.5 bags of chemical fertiliser per hectare each season, and almost invariably the farmers comply. In 1977 it cost M\$135 to fertilise one hectare. A disadvantage of chemical fertilisers is that they encourage the growth of weeds, and regular weeding of the standing crop is now often necessary.

The new varieties ripen at five months. As soon as double-cropping and the new, looser-grained varieties were introduced, the farmers of Bunut Susu gave up the use of the reaping-knife and started harvesting with sickles. Instead of cutting the stems halfway down and storing the rice in bundles to be threshed as required, the farmers now cut the stems at ground-level and thresh the grain immediately into wooden tubs. The new method of harvesting means that all the rice, ripe, over-ripe and under-ripe, is cut at once, but the sickle is much quicker than the reaping-knife. Previously it might have taken a month to harvest all the rice grown on one farm, and reaping was all done with family labour. Now most farmers hire three or four men to help, and five men can easily harvest a hectare in five or six days. Most farmers also hire tractors now to prepare their fields in the short time available between the two crops.

This has led to a transformation in the organisation of labour. In the old days borrowing and exchanging labour were possible because, although the tasks had to be carried out quickly on individual farms, they could be staggered throughout the village. But now the irrigation timetable requires that the same tasks be completed throughout a large area in a short space of time, and so the peak demands for labour are much more intense. In the old days nobody hired labour, but now many people hire themselves out at transplanting and harvesting time for the equivalent of about M\$38 per hectare of work. Many elderly people who no longer farm, or women or young men who do not own padi land, hire themselves out at these times, as do poorer farmers who otherwise would find it difficult to meet the expense of purchasing inputs. The owners of larger padi farms now usually work only on their own land.

Monoculture and markets

Rice-land can be cropped extremely intensively, producing higher total outputs than any other type of grain-land. In a commune in Central

China a rotation of two crops of rice followed by one of wheat produced a total of 20 t/ha (Wertheim and Stiefel 1982: 28); in the central islands of Indonesia it is also common to grow two crops of rice followed by some other crop, and the annual output of rice may reach 8 to 10 t/ha (e.g. Gerdin 1982: 66). The output of rice has been enhanced by recent improvements in technology, but the intensive use of rice-land is nothing new. A late seventeenth-century Chinese work, *New Descriptions of Guangdong Province*, says:

[The inhabitants of Southern Guangdong and Annam] produce more grain than they can eat, so they carry it in great wains to the fairs of Hengzhou [modern Nanning, on the border of Guangxi and Vietnam], where it is bought by merchants who ship it down the Wu, Man and Tan rivers to Canton... The reason for the abundance of grain is that the climate in these southern regions is so warm that the land produces three crops in a single year... They grow two crops of rice in the early fields and then plant brassicas to make oil or indigo for dyeing, or grow turmeric or barley, rape or sweet potatoes. Once the main-field crops have been harvested they soak the straw in sea-water and burn it for the salt. On flat hills and ridges reeds, sugar cane, cotton, hemp, beans, aromatic herbs, fruits and melons are grown in profusion. The people are all extremely industrious and devote themselves so diligently to their farming that truly no patch of land is wasted and no hands are ever idle. (*Guangdong xinyu*: 371, tr. Bray 1984: 509)

But despite its great potential productivity, too heavy a dependence upon rice cultivation alone is not advisable. Expounding his concept of 'agricultural involution', based on a historical study of Indonesia, Geertz (1963) suggested that it was possible to absorb extra labour generated by population growth through the intensification of rice cultivation, thus providing the whole community with a small, if often inadequate, livelihood. In fact, despite its potential for responding positively to increases in labour inputs, the intensification of rice monoculture is a far less efficacious way of absorbing labour and generating extra income than is economic diversification.⁴ There are a number of possible improvements which eliminate bottlenecks and spread the labour requirements for rice cultivation more evenly over the year (figure 4.2), yet underemployment in areas of rice monoculture tends to be high (table 4.2) even though there may still be acute labour shortages at peak periods (e.g. Shand and Mohd. Ariff 1983: 102). While it is possible to relieve such shortages through mechanisation, this only exacerbates the problem of overall employment in rice cultivation, and tends to cause economic inequalities by depriving the poorer farmers and the landless of opportunities to hire out their labour.⁵ Only where circumstances are particularly favourable to rice-farmers, for example in postwar Japan

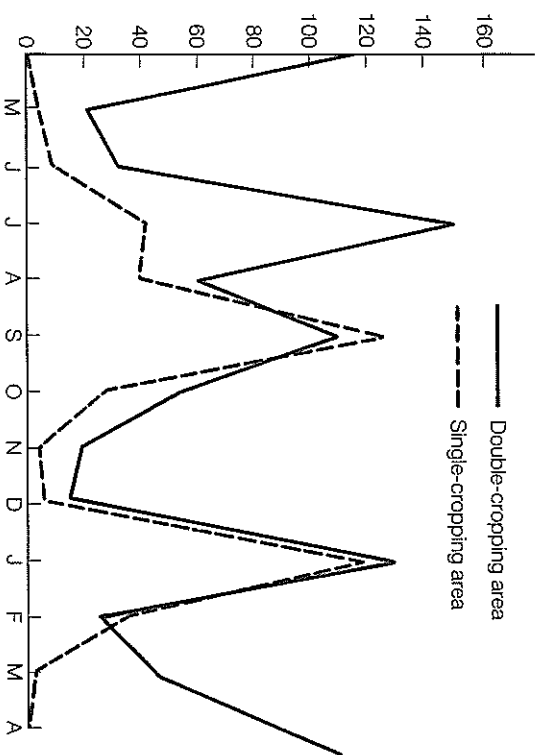


Figure 4.2 Labour inputs in single- and double-cropping areas in Province Wellesley, Malaysia
(after Purcal 1972: 22, 71)

Table 4.2 Underemployment in single- and double-cropping rice areas in Province Wellesley, Malaysia

	Months:												Average (%)
	M	J	J	A	S	O	N	D	J	F	M	A	
Double-cropping area	52	38	2	23	35	27	33	44	7	52	43	43	33
Single-cropping area	64	40	8	8	24	36	37	45	-3	50	60	61	36

Source: Purcal 1972: 26, 76

where rice prices have been high and input costs low, is specialisation in rice monoculture profitable and relatively secure from fluctuations in world grain and oil prices. Where rice monoculture is imposed upon farmers despite relatively unfavourable conditions, acute problems frequently result.

Grain markets depend upon adequate means of bulk transport, and especially of water transport. In the Mediterranean, where every city had

easy access to the sea, control of the grain trade had become the key to political power by the time of the Greeks and Phoenicians. The vast land-mass of East Asia, with its tangles of mountain ranges, is not so easy of access; even today one of the chief obstacles to China's economic development remains the lack of adequate transport networks. If Asian states have always taken such an active interest in encouraging agricultural production within their territories, this must be due in part to the difficulties of supplementing local food supplies from abroad.

By the tenth or eleventh century Song China already had a huge volume of inter-regional trade in rice, concentrated mainly along the Grand Canal, the Yangzi and other large southern rivers, and the east coast.⁶ Private grain-ships plying the Grand Canal could often carry 1,000 piculs (approximately 7,000 hectolitres), while certain ocean-going junks had double that capacity (Shiba 1970: 73). The main centres of the regional rice-trade were the great Yangzi river-ports, Hangzhou, Nanjing and Wuchang. Rice was commercially produced in almost every southern province of China, and was sold not only to the cities but also to rural areas which had difficulty in meeting their own needs, either because they were unsuited to rice production, or because of a poor harvest, or because they had turned to the production of more lucrative commercial crops. In the twelfth century the mountainous district of Huizhou in Fujian sold tea, lacquer, paper and wood to the Yangzi Delta in exchange for rice. The Song long-distance rice-trade was expensive, and was an important factor in encouraging the expansion of rice production in many areas such as the Canton region, which by the thirteenth century was exporting rice to Champa and other foreign parts (ibid.: 63).

But this lively response to markets was only possible where water transport was available, and Shiba makes the point that 'at the periphery of the commercialised system, there remained a number of localised, discrete and self-sufficient marketing systems' (ibid.: 67). This has been true of China throughout her history. Rawski's (1972) study of Fujian and Hunan in the sixteenth to eighteenth centuries clearly demonstrates the ready response of Chinese farmers to market stimuli such as price rises, but this was conditional on access to transport, so that it was not uncommon, as indeed it still is not today, to find flourishing trade centres separated from self-sufficient backwaters by a single ridge of mountains.

It has often been said that the growth of commerce, and of the rice-trade, in Tokugawa Japan was largely due to the *sankin kōtai* system whereby feudal lords were required to spend six months of every year in the capital and the other six months in their fiefs. The passage of the lords and their many retainers from distant parts of the country led to

improvements in the road system and to the development of commercial facilities for them along the way, while keeping the more remote parts of the country in communication with the capital and other urban centres' (Francis 1983: 50).

But easy access to transport and markets often tempted farmers into more profitable ventures than rice production, to the disapproval of officials concerned with forestalling food shortages. A thirteenth-century Chinese official, Fang Dazong, complained that certain districts in Fujian had almost given up cultivating ordinary rice in favour of sugar-cane or glutinous rice for wine-making, whereas in the most productive regions of the province '[the authorities] have forbidden the cultivation of glutinous rice, the manufacture of wine from it, the growing of oranges, and the excavation of ponds for the rearing of fish. The reason for this ban is the desire that no inch of land should be uncultivated, and no grain of rice uneaten. If regions which produce a surplus of rice take such precautions, how much more should those whose harvests cannot supply half their needs' (Shiba 1970: 54).

Governments were not easily able to restrict a farmer's choice, however, even by obliging him to pay taxes in kind. Even in Song China many farmers chose or found it necessary to purchase rice in order to pay their taxes (*ibid.*: 56).

The principal rice-producing region of China in Song times was Jiangsu in the Yangzi Delta, but by the 1720s it had become a net importer of rice, buying it not only from the provinces of the Central Yangzi but also from Shandong and Taiwan. By that time the Canton region too had switched from exporting rice abroad to importing it from the neighbouring province of Guangxi (Chuan and Kraus 1975: 59, 65, 71). Areas of intensive rice cultivation tended, if they had access to other markets, to diversify into the production of more profitable commodities, while hitherto underdeveloped areas found an incentive to step up their rice production in order to fill the gap.

In a stimulating article on the indirect effects of colonial capitalism on monsoon Asia, Baker (1981) describes the resulting shift in inter-regional economic links. At first it was the long-settled, densely populated areas of intensive agriculture which supplied food to the new areas of colonial industrial or semi-industrial production, most of which were in sparsely populated regions where there were few obstacles to claiming land and establishing plantations or factories:

The planters moved into the hills of central Ceylon, upper Malaya, outer Indonesia and Annam, and spread out estates of tea, rubber, coffee, and spices. The peasants were pushed out into the hitherto relatively vacant parts of India,

Malaya, and Indochina to grow cotton, sugar, indigo, tobacco, and oilseeds, and onto the marginal lands of Java in order to accommodate sugar... Initially [the demand for food] was satisfied by the established agricultural systems in the long-settled densely populated areas. Tonkin sent food into Annam; India exported rice to Ceylon and to the Straits; Java exported to the Outer Islands. But before the end of the nineteenth century, this situation had substantially changed. The west also helped to open up new areas of food production within the southeast Asian region... the most important and spectacular expansion came through the opening up of the lower reaches of the Irrawaddy, Chao Phraya, and Mekong river basins... Roughly fourteen million acres were newly planted with rice in mainland southeast Asia in little over half a century. (Baker 1981: 332)

The colonial powers played an important role in providing infrastructure for the opening up of new land, constructing canals which served the dual purpose of draining marshy areas so that they became cultivable and providing easy access by water so that the produce could be shipped out. But much of the labour force for this expansion of food production came from the 'ancient' areas (East India, South China, Tonkin, Java), as did the technical skills and a great deal of the capital. In return the 'ancient' areas received an inflow of remittance money and, eventually, large quantities of grain. 'In the late 1920s, Burma, Thailand, and Indochina were producing about 9.4 million metric tons of cleaned rice (or equivalent) a year, and exporting about 5.4 million tons of this total. Indonesia, Malaya, and Ceylon together produced 3.9 million tons and imported another 1.6 million, while China and India were importing about a million tons apiece' (*ibid.*: 338).

These new areas of rice monoculture were, however, extremely vulnerable, as were the rice regions of Taiwan and Korea developed by the Japanese in the early decades of this century to supply their home market with cheap rice. Farmers in such areas had not developed any alternative sources of income. When the Depression hit Asia and the demand for rice suddenly contracted, in Southeast Asia the resulting surpluses of rice made for a devastating fall in prices, severe impoverishment, communal strife, and a stagnation of the rural economy which in Burma and Thailand lasted until well into the 1950s (*ibid.*: 341, 346). Japan had made a particular effort to step up rice production in her colonies as well as in Japan after the urban Rice Riots of 1918, but unfortunately the rise in production coincided with the Depression and a consequent decline in per capita rice consumption in Japan. In 1931 exports to Japan accounted for about half the total rice production in both Korea and Taiwan, and for 15% of Japan's total consumption, but from 1933 Japan introduced strict import controls (Ogura 1980: 167).

However the situation of Taiwanese and Korean rice-farmers soon picked up as Japan launched into full-scale war (Wade 1982: 25).

The problems associated with over-reliance on rice monoculture were amply demonstrated in China during the 1960s and early 1970s, when everyone was urged to 'take grain as the key link'. To encourage self-sufficiency government grain supplies to areas which had formerly specialised in cash crops such as cotton were cut off. Not only did this policy have a drastic effect on the output of non-cereal crops, but the use of unsuitable land for the intensive production of irrigated rice and other grains was often quite counterproductive (Lardy 1984a). The recent trends towards agricultural specialisation and renewed government efforts to redistribute grain between provinces have led both to increases in grain yields and to improved levels of consumption (Lardy 1984b).

In Malaysia too the government has in effect forced rice monoculture on farmers in certain areas, most notably in the Kemubu and Muda regions. The construction and extension of irrigation networks in these areas, together with the introduction of double-cropping, is part of an effort to achieve national self-sufficiency in rice. But new patterns of land use and the more intensive labour requirements of double-cropping have effectively precluded economic diversification in these regions. In 1974-5 Malaysia succeeded in supplying 93% of its national rice requirements (Mokhtar 1978: 119), but the demand for rice is relatively inelastic, particularly as many better-off Malaysians are now turning to wheat products, and so a rice-farmer's potential for increasing his income by selling more rice is limited.

Considering the Muda region, traditionally a monoculture area, where holdings are relatively large, mechanisation is advanced and the labour force is fully commercialised, Bell (1978) saw few opportunities for improving rice-farmers' incomes. The intense economic specialisation of the region meant that there were few opportunities for off-farm employment, and the technical demands imposed by the irrigation scheme allowed no possibility of switching from rice to high-value crops. Recent increases in government support prices have benefited large farmers more than small, for profit elasticity is very high with respect to land, for which the factor coefficient is nearly 1.0 (Mokhtar 1978: 125). The outcome foreseen by Bell was a rural exodus and the concentration of landholding accompanied by increasing mechanisation of rice production, and more recent evidence tends to support his predictions (Muhd. Ikmal 1985).

The situation in the Kemubu region is somewhat different, for Kelantan has a long tradition of economic diversification (table 4.3). Rice-farmers supplemented their incomes by growing vegetables,

Table 4.3 Non-padi income as proportion of net padi income in KADA and MADA (1979/80)

Tenurial group	Full tenants (%)	Part tenants (%)	Owner-operators (%)
KADA	144	77	60
MADA	49	25	26

Source: From official sources.

tobacco, rubber or coconuts, by local and long-distance trade and, of especial importance, by seasonal migration. The transformation of much good dry-crop land into mediocre irrigated land has considerably restricted opportunities for non-rice cropping. Since the income from dry land is frequently double or triple that from double-cropped rice-land, the prices of the remaining dry land have shot up and much wooded land has recently been cleared for vegetable gardens or orchards (Bray and Robertson 1980: 237). Perhaps more serious than the encroachment of irrigated on dry land are the new patterns of labour inputs demanded by double-cropping, which often require a farmer to make a choice between growing rice and supplementing his income through other activities. Shand and Mohd. Ariff (1983: 171) suggest that in Kelantan the introduction of double-cropping has restricted the freedom of farmers and their families to take up sustained off-farm employment, while its positive impact on agricultural underemployment has been modest, since this still amounts to over 25%. While Shand and Ariff (*ibid.*: 253) see mechanisation as a possible solution enabling farmers to earn more off-farm income while still producing padi for sale, other official sources point out that the labour absorption consequent upon the introduction of double-cropping in Kemubu, although low, is still higher than it has been in Muda; they say that for reasons of equity further mechanisation in Kelantan would be very undesirable. At the same time they severely criticise the emphasis on monoculture, blaming the Malaysian government for sacrificing Kelantan's regional needs to national objectives.

Economic diversification

The possibilities for increasing employment and incomes and for generating wealth lie not so much in maximising the production of rice as

in using intensive rice cultivation as a basis for economic diversification. The resource and management requirements of rice cultivation generally mesh extremely well both with commercial cropping and with small-scale manufacturing activities.

Rice lends itself to productive combinations, such as the centuries-old system of rice, fish and silk production typical of certain regions of East China and South Japan, which is in fact a self-sustaining ecosystem (Fei 1939; Ishikawa 1981: 46): mulberry trees are grown on high land, often along the banks of the rice-fields (figure 4.3); silkworm droppings are used as powerful fertilisers for the rice; fish live in the irrigation channels as well as the rice-fields, nibbling away the water-weeds and eating the larvae of insect pests as well as being fed with the silkworm moultings. Often the farmers raise ducks in the rice-fields too, in which case some of the fish will enliven the diet of the ducks rather than that of the farmers.

The importance of vegetable gardens and orchards in the Kelantan rural economy has already been mentioned. Since almost every household, however poor, owns a house-plot, the income from garden produce plays an important role in poorer households, especially those with no other agricultural land to their name. In a study carried out in Java in 1972/3, Stoler (1981) found that poor households cultivated their garden plots far more intensively than households with access to other land, but tended to concentrate on production for their own consumption rather than for sale. Wealthier households had a much more entrepreneurial attitude towards their gardens.

In another Javanese village, Mizuno (1985) found that half of all the farmers and one-third of the labourers were engaged in part-time production of coconut sugar. Even though the adoption of rice double-cropping has increased opportunities for labour hire, many households prefer sugar to rice production: although it requires an initial cash outlay to lease the trees and several hours' labour daily to tap the trees and boil down the sap, sugar production 'has the great advantage of providing a secure daily cash income' (*ibid.*: 32).

In Java, as in Malaysia, rice cultivation is not in itself a profitable occupation. It provides a degree of security, but all farming households, whether they own land, rent it, or hire out their labour, derive the major part of their income not from rice but from other part-time occupations. This is not entirely surprising in regions where the pressure on land is so acute that very few households have large enough rice-farms even to supply their domestic needs. Since the population in Java averages 660 per sq. km,⁷ this is true of the majority of Javanese households (Mizuno 1985: 1, 34), and almost all of them resort to what White (1976: 280)

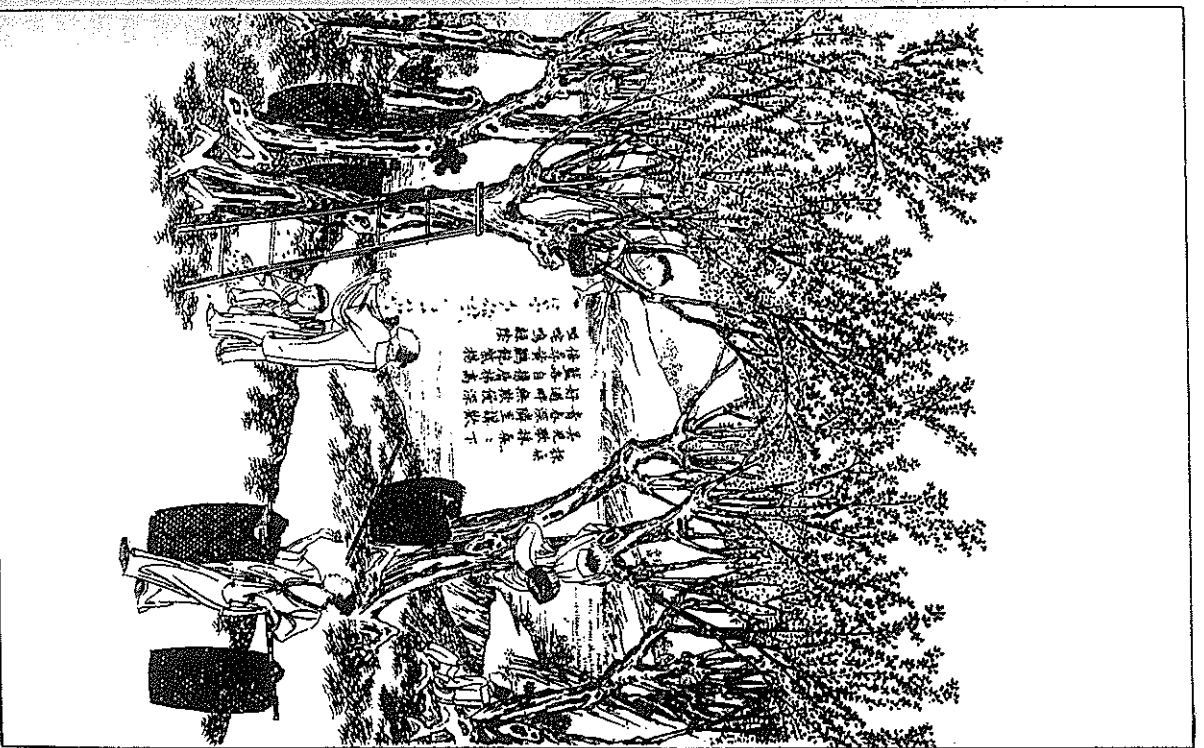


Figure 4.3 Picking mulberry leaves to feed silkworms, illustrated in the Song work

Gengzhi tu

(Agriculture and sericulture illustrated) (Qing edition of 1886)

calls 'occupational multiplicity' simply to survive (see also, for example, Mantra 1981; Montgomery 1981).

Even in more prosperous economies it is rare to find that rice production is profitable in itself (see chapter 5); nevertheless it still serves as a basis for more profitable diversification. Taiwanese rice-farmers realise little or no profit on double-cropped rice, yet they continue to cultivate their rice-land, apparently because: '(1) "it is a resource that must be used", (2) it [is] a source of food, specifically rice, (3) taxes levied on it [have] to be paid, and (4) additional taxes [are] imposed if it [is] not cultivated' (Gallin and Gallin 1982: 218). Interviews with part-time farmers in Northeast Japan indicated that their refusal to give up rice cultivation stemmed from (1) a sense of responsibility, both spiritual and proprietorial, (2) their emotional attachment to the land, and (3) a need for security. As a consequence the men often took full-time work in the vicinity but left the farm in charge of the women, who diversified their incomes by growing fruit and vegetables, and especially a highly profitable species of mushroom, as well as rice (Shimpo 1976: 45, 72).

Petty commodity production and rural industrialisation

In the 'skill-oriented' technology of wet-rice cultivation increases in agricultural production are generally achieved through an intensification of land productivity rather than an expansion of the cultivated area, and it is the skilled application of large amounts of labour that counts rather than capital investment or the introduction of machinery. The required equipment is simple, and labour is most frequently supplied by the household or community involved. The technical requirements of wet-rice cultivation have consistently placed a high premium on the application of skilled labour, and given only low returns on investment in capital equipment or the expansion of production units (see chapter 5).

Wet-rice agriculture can support higher population densities than most other agricultural systems, and this has been extremely important in shaping more general patterns of economic development. Before the Industrial Revolution such countries as China could be considered technically and economically in advance of Europe. Boserup points out that for reasons of transport facilities, markets, access to labour and so on, it was only in densely populated areas that commercialisation and manufactures were feasible at that time, and 'the main advantage of a dense population, i.e., the better possibilities to create infrastructure, seems to have outbalanced the disadvantage of a less favourable ratio between population and natural resources' (1981: 129). Changes in the

medieval Yangzi Delta (see appendix B) show clearly how density of population and economic advance may go hand in hand. Nevertheless, the generalised economic growth of medieval China did not lead to capitalism and industrialisation as in Europe, partly because the demands of intensive rice cultivation and multi-cropping placed heavy constraints on the availability of labour.

In industrialising Northern Europe (see appendix A) agricultural development led to a polarisation of rural society into large farmers and a landless labour force. Although much manufacturing in the early stages was rural - rather than urban-based, even those who combined the occupations, eking out their agricultural wages with Smith's famous 'pin-money', belonged to a potentially mobile labour force, for as labourers rather than tenants they had no direct stake in the land they farmed. If higher wages could be had elsewhere, or in another form of employment, then there was nothing to tie them to the land. It was the existence of this type of labour force that provided a basis for increasing occupational specialisation, the development of more concentrated production and eventually the large-scale mechanisation of industry. On the other hand the experience of medieval China, as of early modern Japan (see appendices B and C), strongly suggests a link between the intensification of wet-rice production and the growth and entrenchment of part-time petty commodity production, which continues to flourish even today.

The organisation of resources typical of a 'skill-oriented' technology such as intensive rice-farming dovetails very neatly with petty commodity production, which requires very little capital to set up a family enterprise, and absorbs surplus labour without depriving the farm of workers at times of peak demand. It can be expanded, diversified or contracted to meet market demands, but the combination with the rice-farm guarantees the family's subsistence. The products can be conveniently conveyed to local or national markets by merchants, who pay the villagers for their labour and often provide raw materials as well as information on the state of the market. Since the owners of the enterprise also supply the labour, rural manufactures of this type sometimes prove more competitive than larger urban industries: the case of the silk industry in eighteenth-century Japan comes to mind. Japanese entrepreneurs turned increasingly to the countryside for cheap labour, and highly developed putting-out systems were evolved, taking advantage of household labour that was only partly absorbed by the demands of agriculture. By the late Tokugawa period a large proportion of households in the more advanced regions of Japan were engaged in some form of commercial manufacturing (Francks 1983: 51).

In Song and Ming China, as in Tokugawa and early Meiji Japan, there was almost no centrally organised, large-scale, capital-intensive industry. The market was supplied by petty commodity producers, and visitors from early capitalist Europe were generally impressed by the high levels of consumption that they found at all social levels. But the successful and durable system of intensive rice-farming combined with petty commodity production effectively inhibited indigenous technical and social changes of the type prerequisite for mechanisation and industrialisation.

As capitalist industry flourished in the West, it rapidly outstripped the manufactures of Asia in efficiency and levels of production. Most Asian nations, as soon as the opportunity arose, endeavoured to develop their own capitalist industries; Japan is the first and to date the most successful example. Yet it is striking how deeply Japanese industry has been and remains rooted in the countryside. The improvements in rice agriculture during the Meiji period spread labour requirements more evenly over the year and thus did not prevent younger sons or daughters from taking up by-employment or working at home (Francks 1983: 57). In 1884, 77% of Japanese factories were situated in rural areas, and more than half in 1892 (Umemura 1970). Much of the rural industrial labour force consisted of village women, often young girls on short-term contracts of three or four years, whose families received their wages while they themselves were given only board and lodging and a little pocket-money (Boserup 1981: 167). While the chemical and machine industries were concentrated in the towns, textile and ceramics manufactures and metal-working factories were mostly to be found in rural areas, and the majority of these establishments employed fewer than 20 people (Francks 1983: 53, table 3.1).

In Japan today, centralised capitalist industry still relies heavily on the putting-out system, and many farming families are involved in the production of components for large companies such as Mitsubishi or Sony. Although they may need to use high-cost and sophisticated equipment, and although the product is an element in capitalist industry, the workers are still part-time farmers who control their own labour, not industrial proletarians. Of course an increasing number of rural Japanese now work full-time in industrial jobs, but they still belong to households whose patterns of economic organisation are determined to a large extent by the family farm (Shimpo 1976).

In Southeast Asia, where recent development policies have resulted in a widespread intensification of rice production, again rural petty commodity production has accompanied the expansion and commercialisation of agriculture. The nature of such enterprises varies widely, but usually reflects the prevailing level of national prosperity. The goods

produced may require almost no investment of skills, material or technology, or (as in the case of Japan) they may be almost as sophisticated as urban manufactures. In Central Luzon village women weave straw hats for sale (Takahashi 1970), and in Sumatra men produce iron hoes and other tools for the national market while their wives run the rice-farms and work as dress-makers (Kahn 1980).

In the Sumatran village studied by Kahn, the villagers produced rice only for consumption and relied on the sale of cash-crops and locally produced goods for all their other needs. Their village speciality was steelware, sold locally to pedlars and small merchants who redistributed it throughout the province. The small steel workshops relied entirely for raw materials on scrap steel, and the more expensive equipment like anvils was usually purchased second-hand. Most workshop-owners employed two, or sometimes three, hired labourers. The running costs and profits were divided into equal shares, one going to each worker and one to the workshop. The owner of the workshop thus extracted a small surplus from his workers (Kahn 1980: ch. 5).

Kahn demonstrates clearly the symbiotic relationship between petty commodity production and rice cultivation in Indonesia. While the economic enterprises typical of rural commodity production in monsoon Asia cannot be classed as capitalist, they are highly dependent on fluctuations in the world as well as in the national economy. Thus increased demand for peasant-produced commodities during Indonesia's period of economic isolation from 1958 to 1965 led to a rapid expansion of steel-smithing; enterprises increased both in number and in scale. But the subsequent opening up of the economy and the crippling inflation of the mid-1960s, epitomised in rocketing rice prices (600 *rupiahs* for 10 litres in Jakarta in 1963, 48,000 *rupiahs* in 1966), led to the temporary collapse of rural manufacturing enterprises. Farmers stopped engaging in commodity production and turned back to cultivating their rice-land in order to secure their subsistence. When the economy began to recover, petty commodity production expanded again, and since it was so much more profitable than rice-farming, many farmers no longer cared to produce enough rice even for their own subsistence (*ibid.*: 195-8).

At a higher level of economic reward, the spectacular expansion of rural-based industry in Taiwan over the last two decades is based in large part on family enterprises: in 1971 three-quarters of the industrial and commercial establishments located in the rural areas of Taiwan were small family businesses with fewer than ten workers (Gallin and Gallin 1982). Again the development of rural industries has been closely meshed with rice cultivation. In 1956 the only factory in the village of Xin

Xing studied by the Gallins was a brickworks. Most of the farmers devoted themselves principally to intensive rice cultivation. The lack of agricultural machinery and of rural industries meant that there were very few opportunities for local off-farm employment, and those who succumbed to the lure of higher manufacturing wages (some 15% of the local population) were obliged to migrate to distant cities. 95% of local incomes came from farming and agricultural labour.

By 1979 the situation had completely changed. Farmers had been able to adopt new technology enabling them to overcome labour shortages and change their patterns of land use. They either diversified into profitable cash-crops or worked part-time in remunerative off-farm activities, although they did not give up cultivating their rice fields. Over 30 labour-intensive manufactures had been established locally, ranging in size from large textile or furniture factories to family workshops doing piece-work. 85% of local incomes was now derived from off-farm activities, although about 83% of the local households still farmed. Significantly the growth of local industry had led a number of former migrants to return.

In Taiwan in the 1960s and 1970s large numbers of industries moved to the countryside in search of cheaper labour and raw materials. By 1971, 50% of industrial and commercial establishments and 55% of manufacturing establishments were located in rural areas. As a result, between 1952 and 1972 the average real income of farming households doubled, although remaining significantly lower than urban incomes (Gallin and Gallin 1982: 239).

In China a significant increase in rural incomes has been achieved since 1978 through the simple expedient of raising agricultural prices (see chapter 5), and the introduction of the 'responsibility system' led to a spurt in overall agricultural production. But many economists doubt that there is much potential for further growth in agricultural output (e.g. Lardy 1984b: 864). The fostering of rural manufactures, even at the level of petty commodity production, seems vital if differentials between urban and rural incomes are to be reduced, as present economic policies recognise:

[The] historical 'scissors' gap between agricultural and industrial prices cannot be closed overnight and its existence has provided a way of concentrating agricultural accumulation in the hands of the state. The major mechanism has been the high profit made on light industrial products manufactured using agricultural raw materials. (Dong Furen 1982, quoted Watson 1984: 86)

Since about two-thirds of China's light industrial products are sold in rural areas (Watson 1984: 86), it is only by involving the rural labour

force in their production that the 'scissors' effect can be counteracted. Although many brigades set up small factories in the 1960s and 1970s, it was acknowledged that there were serious problems involved in management, providing incentives, responding to market needs, acquiring plant and raw materials, and distributing the goods efficiently. The new economic policies expressly encourage economic diversification and decentralisation, but as yet figures on public and private investment in rural-based industries, their production levels and profits, are hard to come by. In an initial burst of post-Maoist euphoria, the authorities in Chen Village in Guangdong simply parcelled out all the brigade factories to the highest bidders, regardless of their antecedents or qualifications (Chan et al. 1984: 273). If such excesses and carelessness can be avoided in the future, given the abundance of labour and raw materials and the new levels of rural accumulation, there seems no reason why local industrialisation should not go hand-in-hand with overall rural growth in China as it has in Taiwan and Japan.