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LEADERS IN CHANGING RURAL SRI LANKA — A TYPOLOGY *

BY

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ABSTRACT

This paper suggests a typology of leaders—traditional, elected and politically appointed—to facilitate the study of changing patterns of rural leadership in Sri Lanka. It is argued that changes in the sources of rural leadership during the last half century were mainly an outcome of the expansion of state activities into rural areas and its concomitant process of politicisation of rural communities.

INTRODUCTION

The study of leadership in small communities is often concerned with the identification of leaders, relations between leaders and non-leaders, and with the ways in which power is distributed between these two categories. Leaders are those who exercise power or influence in social collectivities; in other words, they 'make things happen' through others. Thus, a leader of a community plays several roles—he may coordinate, control, direct, guide or mobilise the efforts of others. Quite often, a leader is considered to be a person who can clearly be distinguished from others in terms of power, status and a number of personality traits such as courage, honesty and intelligence. This approach is dominant in studies of rural leadership in Sri Lanka which tend to focus attention on the socio-economic characteristics of leaders and their role in promoting the well-being of those whom they lead (Gooneratne *et al.* 1974; Robinson 1975; Weerakoon 1976; Krause and Perera 1977; Lebbe *et al.* 1977; Wanigaratne 1977; Narayanasamy *et al.* 1977; and Uphoff 1979).

In this paper I shall discuss a different aspect of leadership. By examining the recent political history of Sri Lanka I shall bring attention to bear upon the changing bases of rural leadership. My contention is that during the last three decades, traditional leadership in Sri Lanka, which is characterised by ascriptive and generalised authority, has changed into one which de-emphasises ascription, stresses achievement and merit, and encompasses a more precisely defined range of activities. I shall also argue that changes in the bases of rural leadership are mainly an outcome of the changes in the wider society, i.e. the rapid expansion of state activities into rural areas and a concomitant process of politicisation of rural communities. This paper comprises three sections: an attempt to define the concept of 'leader' in the context of rural Sri Lanka, a typology of rural leadership and conclusions.

Leaders in Rural Sri Lanka—A Definition

Leadership connotes politics, that is, how power and influence are distributed in public life. In any community, two categories of people can be identified—leaders (those who wield power) and non-leaders (those who do not wield power). Sources

* I thank P. J. Gunawardena, Jacob Black-Michaud, and Ariyapala Siriwardena for their valuable comments on an earlier draft of this paper.

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of power are numerous and tend to change with time. For example, in traditional Sri Lankan village, land ownership was the main source of power. During the last half century government activities penetrated rural areas rapidly. In this process the need for 'qualified' leaders who could handle various development and bureaucratic activities also increased. Education and acquired skills were more emphasised than caste, family links and land ownership in selecting such leaders. This has brought the hitherto powerless to compete for leadership provided they possess suitable qualification.

In the study of leadership in rural Sri Lanka, the most difficult question is 'who is a leader'. For many students of leadership in rural Sri Lanka, all the government officials who work at village level and office bearers of both statutory and informal rural organisations are rural leaders. Weerakoon (1976) for example, uses the term 'officers' to mean leaders. He lists four categories of 'officers' (leaders) in rural Sri Lanka:

(*a*) the bureaucracy proper whose members are appointed and paid by the state;

(*b*) the office bearers of various rural organisations—the Cultivation Committees, the Village Council and the Cooperative Societies. They do not receive salaries from the state, but hold office in organisations set up as a result of Ordinances and Acts of Parliament;

(*c*) Persons who hold honorary positions in voluntary organisations which are set up under the patronage and, in some instances, under direct control of government departments such as Rural Development Societies, Funeral Aid and Temple Societies; and

(*d*) other persons of influence such as the Buddhist Priest, ayurvedic (indigenous) physician and retired school teachers (Weerakoon, 1976:11).

In this approach to identify rural leaders, an important aspect, namely, the relationship between leaders and non-leaders is omitted. This relationship can be posed as the question of legitimacy: how far do the latter accept the former as 'legitimate' leaders? In other words, what sort of social approval and confidence do the followers bestow upon their leaders? This question does not arise in traditional agrarian communities "where the superior in one sphere of life is the superior in all...the dominance of man over man tends to most complete" (Dore, 1975:11). For example, in traditional Sri Lanka, the Village Headman and the Village Irrigation Headman were hereditary leaders. They were of highest caste status and were the biggest landlords in their villages. They in addition controlled different routes of access to the outside world (Robinson 1975; Perera 1981).

With the process of political modernisation, particularistic criteria of legitimacy of leaders, e.g. land ownership and high social status, tend to give way to the universalistic criteria such as academic qualifications and other acquired abilities. But the former erodes very slowly compared with the advancement of the latter. Thus these two sets of criteria exist side by side in a given community and may clash with each other. Robinson (1975) vividly describes this conflict between the professed universalistic values of the state and bureaucracy and the traditional values and sentiments in a Sri Lankan village.

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In 1963, the colonial hereditary post of Village Headman was abolished by the state and a new post called *Grama Sevake* (village servant) was established in its place. The *Grama Sevake* has better defined powers and duties than his predecessor and is selected through a competitive examination. However, *Grama Sevake* has never been regarded by the villagers as their leader, nor does he wish them to consider him so. Quite often he is an outsider in the village and is liable to be transferred. Property, high social standing in the village and experience in village administration were not considered in his selection, as was the case for the Village Headman. Thus from the villagers' viewpoint, the *Grama Sevake* could not represent the village to the outside world the way in which the Village Headman did in the past.

But this uncertainty over the status of the *Grama Sevake* was a temporary phenomenon. In 1971, the competitive examination held to select the *Grama Sevake* was abolished. Government Agents[1] were empowered to select suitable candidates for the posts mainly on the strength of an interview. The interview was supplemented by an official requirement for the candidate to produce a certificate from the Member of Parliament (MP) of the electorate, in which the candidate lived certifying his suitability for appointment as a *Grama Sevake*. "One important change that has been introduced is that the Member of Parliament is now consulted by the G.A. before the vacancy is filled so that a person whose loyalties are beyond reproach, and who can be relied upon to implement government policies to the full if chosen..." (Weerakoon 1976:14). The MP's choice of *Grama Sevake* was not influenced by the factors that influenced the Government Agent in selecting the Village Headman. The MP is concerned about the ability of the candidate as an organiser of voters loyal to him and as a supporter of his action in the area. As the government became the largest employer and the universal dispenser of various benefits, such recruiting criteria of leaders became acceptable to the villagers as they had to depend on such new leaders to obtain some state benefits for themselves. Thus the *Grama Sevake* gained the confidence and approval of the villagers as a leader which "the Village Headman of old would have carried with him as part of his hereditary apparatus" (Weerakoon 1976:15).

A Typology of Rural Leaders in Sri Lanka

In post-independent rural Sri Lanka, it is possible to identify three successive periods, each of which is characterised by a distinct type of leadership. The first is the period before the 1956 general elections, the second is between the 1956 and the 1970 general elections and the third starts after those of 1970.

The first period was characterised by the traditional leaders whose higher social status and family links and ownership of land allowed them to exercise power over others. In the second period, the leaders of the villages were the rural intelligensia, office bearers of rural organisations, vernacular school teachers, Buddhist monks and indigenous physicians. The third period is dominated by those who maintain links with national politicians and act as the agents of those politicians at the village level.

In formulating this typology more emphasis is placed on the differences between the three categories than on their common denominators. Such commonalities might to some extent permit the regrouping of all three categories into one. For

1 The chief administrative officer in charge of a district.

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example, it could well be argued that high caste land owners as a class have remained dominant despite the ebb and flow of various changes during the last three decades. But such an analysis would ignore the main trends of social change in rural Sri Lanka. Moreover, it would not help to understand the varying emphases successive governments have placed on different sources of leadership, in recruiting leaders to oversee and direct rural development programmes. The merit of this typology is that it helps to identify several types of rural leadership which seem to be applicable to a variety of situations, thus allowing to generalise.

Type I Leaders

Type I leaders were landlords who occupied the top position in the traditional status system and held important offices such as that of Village Headman or Village Irrigation Headman. Generally, within a traditional village the same individuals occupied positions more or less of similar rank in the economic, social and political stratification systems. Thus, the bulk of the tenants and labourers were economically subject to the domination of a small group of their better off landlord neighbours. Landlords' domination often extended to the social and political fields as well. They had several things in their favour: experience in administrative affairs which assured confidence in the exercise of aurhority in the village; generally they were better educated and better off than others. Traditional attitudes of loyalty and respect led others to accept landlords' leadership as right and proper. The range of social connections they had outside the village tended also to be greater through contacts and marriage alliances.

This group effectively controlled the few offices in the village—Village Headman, Village Irrigation Headman, and chief lay incumbent of the temple. Such posts were not salaried but honorary. Those who held these posts derived their authority and honour both from the traditional status system and the powers they received from the state. As long as they kept good relations with higher officialdom at supra village level their positions were secure. Being of higher social standing and representatives of the state in rural areas, they often became very powerful in their villages. They could not be criticised openly as they had more resources with which to protect themselves when accused of bad conduct. Long histories of their families as the rulers of the villages enabled them to maintain such behaviour. The dependence of the higher officials upon them to do anything including the investigation of alleged misdemeanours perpetrated by the latter in the villages, placed them in a very secure and powerful position. Even if they were found guilty of an act of misconduct they had enough influence and prestige already accumulated to neutralise the guilt incurred.

Type II Leaders

The 1930s witnessed a rapid expansion of government activities in rural areas as a result of the devolution of legislative and executive powers on the local politicians elected on universal franchise. This was reflected in the establishment of new government departments as the functions coming within the ambit of the central government continued to grow. The gradual development of the administration, communications, the school system and new market networks from the 1930s onward, gave rise to a new elite group consisting of vernacular teachers, lower grade government officials, ayurvedic physicians and *mudalalis* (rural entrepreneurs). They

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were mainly those who were successful in new economic pursuits, entrepreneurial skills and educational attainment. They were more ambitious and mobile than the Type I leaders and looked for their power positions beyond their native villages. But they were not recognised by the national level politicians as an important group who could take part in administration. Soon after independence, the Type I leaders became the core supporters of the ruling United National Party(UNP) and thereby the political leaders in their villages leaving the new elite weak in terms of power on the look out for an occasion to assert itself in national and village level politics.

> In Ceylon, the leadership was English-speaking, often English educated, similar to the liberal nationalist leadership in India in the late nineteenth century. The second ranking, vernacular-speaking politician who played such an important part in the nationalist movement in India,.....did not emerge in Ceylon until the 1950s. In fact, not until the 1956 elections was the monopoly of the English-speaking, higher income classes broken in Ceylon (Weiner 1970:204).

The late S. W. R. D. Bandaranaike, leader of Sri Lanka Freedom Party (SLFP), understood this antagonism between the land-based traditional elite and the new rural elite and exploited it to his political advantage. His political promises such as the revival of Sinhala as the official language led the latter to support him. The coalition headed by the SLFP defeated the UNP in the 1956 general elections.

> The Sri Lanka Freedom Party, led by the late S. W. R. D. Bandaranaike, successfully appealed to a developing Sinhalese-speaking, rural-based leadership. Some members of the Buddhist Sangha, or priesthood, teachers in Sinhalese Schools, Ayurvedic doctors, minor officials, shopkeepers, and in general, members of the lower middle classes rallied behind the Sri Lanka Freedom Party (Weiner 1970:204).

The year 1956 was a landmark in political history of Sri Lanka as it marked a popular reaction against the westernised upper middle class with which the UNP had come to be identified in the public mind. The SLFP victory expressed the triumph of the rural intelligensia who had suffered from a sense of deprivation and felt independence has brought little change for them (Leitan 1979). The victory of the SLFP enhanced villagers' interest in national politics in two ways. Firstly, it demonstrated that powerful governments could be toppled by the secret ballot. Secondly, it gave them a first taste of participation in the national political system (Farmer 1963).

The switch of general development policies from a near *laissez-faire* economic system to direct intervention in agricultural development under the new government increased state activity in rural areas and demonstrated to villagers that involvement in national politics could be a means of obtaining concrete benefits for themselves (Wilson 1975). Thus, post-1956 Sri Lanka witnessed the rapid integration of traditional village communities into the wider national political and administrative system.

The acceleration of state activity in rural areas after 1956 was combined with a policy of giving respectable status and more responsibilities in government machinery to the new rural elite. The most important avenue for providing them with responsibilities and power was the establishment of rural organisations and

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political branches at the village level through which the government distributed various benefits. The government encouraged the rural intelligensia to contest for various positions in these organisations. The colonial village level offices such as the Village Headman and the Village Irrigation Headman were abolished. The Village Headman was replaced by the *Grama Sevake* selected on educational qualifications (see p. 3). The newly established Cultivation Committee took over the duties of the Village Irrigation Headman.

The 1950s and 1960s witnessed the gradual increase of the inflow of government benefits to the villages through various rural organisations. Resources coming through these organisations to the village provided office bearers with a new source of patronage: the latter were placed in charge of the distribution of benefits. The rural intelligensia was thus motivated to aspire to the higher positions in the rural organisations.

The area of operation of each rural organisation was demarcated to include several villages. This allowed in some instances the disadvantaged groups to elect their own candidates to rural organisations by using their numerical strength (see Perera 1981). The importance of numerical strength in the procedure of electing office bearers by secret ballot radically challenged the power of the Type I leadership.

Several other factors were also to the disadvantage of the Type I leaders. Fragmentation of land due to rapid population growth in the mid 20th century reduced the ability of landlords to continue as land-based patrons in villages. Furthermore, some of them sold out their land to educate their children. The enactment of the Paddy Lands Act of 1958 (Ceylon 1958) created a feeling among them that the government would be more sympathetic towards the tenants and labourers than to landlords in carrying out its development policies. The abolition of the Village Headman and the Village Irrigation Headman posts, through which the Type I leaders exhibited their power in administrative matters, crushed their hereditary claims for village leadership. The political rhetoric of the time such as the depiction of the post-1956 as the "era of common man" boosted the morale of the new rural elite who were supposed to assume a role of leadership in the countryside. This environment allowed members of the new power group to organise their followers against the UNP hierarchy at the national level and the pro-UNP traditional leaders at the village level.

Although the office bearers of new rural organisations enjoyed a measure of popular support, they were faced with several difficulties as village leaders. They lacked experience in rural administration and had difficulty in interpreting various complicated legislative enactments of the government which began to influence village level activities. For example, the complicated clauses of the Paddy Lands Act of 1958 under which the Cultivation Committee system was established were not easily comprehensible to most of the Committee members. In fact, a Sinhalese translation of the Act was not available until 1969. The persistence of traditional caste ideology which awarded higher status to *goigama* (farmers) people was also the source of major hindrance met with by the non-*goigama* office bearers who had come to occupy leadership positions mainly by sheer numerical strength during the elections. Type I leaders often completely withdrew from participation in the new organisations and, in several places, they attempted to sabotage activi-

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ties. Both Gold (1977) and Perera (1981) reported how the ex-Village Irrigation Headmen persuaded farmers not to pay the 'acreage levy' stipulated in the Paddy Lands Act of 1958 by claiming that it was a new government tax.

Type III Leaders

The victory of the United Left Front (ULF) led by the SLFP in the 1970 general elections marked a new era of rural leadership in Sri Lanka. The post-1970 period was characterised by increasing party political intervention in rural organisations. A clear indication of this process was the preference given to the nominative principle over the elective principle in choosing office bearers for various rural organisations. The old Cultivation Committee system established under the Paddy Lands Act of 1958 was abolished in 1972. In its place a new system was established. Agricultural Productivity Committees were set up in each administrative division to organise farming activities. The office bearers of these organisations were nominated by the Member of Parliament of the electorate and appointed by the Minister of Agriculture and Lands (Sri Lanka 1973).

The link-up between party politics and the public service increased as the public sector became the largest employer in the island. The gradual articulation of the demands of electorates through the Members of Parliament for a share in state benefits increased the political control of the public administration.[2] The Member of Parliament became the intermediary between the state and the electorate which transformed his role into a universal dispenser of favours. This process of politicisation of public service altered radically the criteria by which the government decides who should receive its benefits, away from universalistic principles of need, merit, or developmental potential to particularistic criteria of factional loyalty.

In the early 1970s, the amount of state benefits distributed through rural organisations increased rapidly as the government decided to use such organisations as official channels for this purpose. This in turn increased the importance of such organisations and the powers of their office bearers. Villagers now had to develop close relations with village level political leaders in order to satisfy their need for fertilizer, agro-chemicals and agricultural equipments. In the early 1970s, access to employment opportunities in the public sector became fully politicised and this completed the ascendency of political power over land-based power in the countryside.

This modification in the power base gave rise to a new type of leaders (Type III). The ability to deliver votes to higher level politicians and the amount of state benefits controlled at the village level have become the most important source of power and authority in the village. As new leaders are appointed by the politicians they are not responsible to their fellow villagers. Their power remains legitimate as long as their political patrons wish to keep them as their agents. By 1977, these new leaders had acquired their own autonomy and new levels of manipulative ability,

2 The abortive insurrection of 1971 also hastened the politicisation of public administration. It provided the ruling political party with a legitimate excuse to scrutinise the political loyalties of all state employees as well as that of new job applicants. In rural areas, SLFP organisers not only screened the "undesirable" elements but also used this opportunity to harass their political and personal opponents (Perera 1981).

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i. e. skills that are specific to the emerging political system. The characteristics of representative politics, e.g. the dependence of the Members of Parliament on their village political agents for winning elections made the latter very powerful in their own environment. The UNP government, which came into power in 1977, drastically reduced the number of rural organisations which overlapped with each other in functions, composition, jurisdiction and powers. These reforms have led to concentrating powers in the hands of those individuals who contributed significantly in the 1977 general elections to the victory of the UNP.

The new village leadership is deeply politicised. The leaders come from different socio-economic backgrounds. New leaders include the sons of old traditional land-based leaders, members of the new elite families, outsiders who moved into villages in recent times and showed their organisational abilities as solicitors of votes for the MP, and those who are known as interesting speakers or sometimes as hard core thugs who used to extort *kappan* (protection money) from traders in the bazaars. Their power in the village is temporary and unstable as they are vulnerable to national level political changes, to their rivals' intrigues and to their own colleagues' cut-throat competition for power.

CONCLUSIONS

The proliferation of special purpose rural organisations, each with its own leaders elected by secret ballot or appointed by the politicians, has destroyed the generalised authority of traditional leaders who constituted a narrowly defined group of people in their villages. The appointment of office bearers to rural organisations on party political lines, especially after 1971, has changed the character of rural leadership in Sri Lanka in several ways:

(*a*) The increasing role of rural organisations at the village level and the intensification of political conflict between rival political groups have thrown up a new stratum of rural leaders. Their ability to gain nomination to offices rests more on their links with outside political leaders and on their role as purveyors of votes than on factors which made traditional leaders popular and accepted. This shows the rapid integration of the village into wider society.

(*b*) Jurisdictions of rural organisations are often divisional (i.e. extend over a collection of several villages). This provides the leaders with wider reference groups and makes it easy for them to find excuses for not performing specific services for their own villages or granting favours to their friends and supporters—they have to look after a whole division, not a village.

(*c*) The politically appointed leaders fall with defeat of the political party they support. Since independence, in every general election the ruling party has been defeated by the opposition. Instability of the base of power often encourages the leaders to gain maximum benefits for themselves from the organisations they control during the short period they are in office. The combination of unstable authority, scarce resources, circumvention of rules and a lack of sanctioned control often gives rise to corruption.

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A cynical view of contemporary village leaders might be that they exploit village resources through their control over various administrative and political links the villages have with the outside world. Politics at the village level is at present a paying job. Office bearers of rural organisations can divert a proportion of the funds and grants of the organisations they control for their personal use. Discretionary powers in the distribution of such benefits allow some measure of freedom in getting those benefits to themselves. On the other hand, they have to distribute most of the benefits coming from outside among the villagers, especially among their followers, in order to obtain their support to win the next election. Furthermore, many of the benefits that come in the form of community facilities such as public wells, roads and weaving mills are to be distributed among the villagers, irrespective of the criteria used by the leaders in favouring some and harming others in such distribution. All such benefits ultimately add to the gross village income.

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AGRARIAN CHANGE AND THE ROLE OF THE ENTREPRENEURIAL FARMER *

BY

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ABSTRACT

This paper outlines the role played by entrepreneurial farmers in changing the agrarian structure of a Sinhalese village. The concentration of land and other forms of productive wealth in the hands of a few have led to a skewed distribution of income in the village and to the emergence of two clearly demarcated classes of peasants—the entreprenurial farmers and the landless wage labourers.

INTRODUCTION

The main objective of this paper is to examine the role played by entrepreneurial farmers[1] in the process of agrarian change with special reference to a Sinhalese village in North-Central Sri Lanka which has changed from a small, relatively isolated subsistence producing peasant hamlet at the turn of this century to a market oriented, clearly stratified agrarian community in the recent years. The changes were induced by a multitude of forces (i.e. historical, political, socio-economic, demographic, etc). But, as mentioned above, I seek to focus attention upon a category of entrepreneurial farmers for their presence in the local milieu which appears to affect the process of agrarian change in general and the distribution of fruits of economic growth in particular.

The following discussion is divided into several sections. First I will attempt to outline the historical background of the region and the village of Niltanne.[2] Secondly, an attempt will be made to examine the recent socio-economic changes in the locality. Finally, I will focus attention on the role of the entrepreneurial farmers mentioned above in the process of agrarian change.

Historical Background of the Region and the Village of Niltanne

When the Europeans first arrived in the country in the 16th century, the North-Central region of Sri Lanka (see Map 1) virtually remained a thick jungle containing some small peasant hamlets dependent on individual village irrigation tanks. This pattern of settlements persisted through the Portuguese and the Dutch periods (from early 16th century to late 18th century). Despite isolated attempts by the British (1796-1948), who were preoccupied with the promotion of commercial plantations in the central and the south-western province, to reconstruct some of the dilapidated tanks and encourage human resettlement in the area, except in the administrative and market centres, the inhabitants in the hinterland perpetuated their old life style in their traditional habitats.

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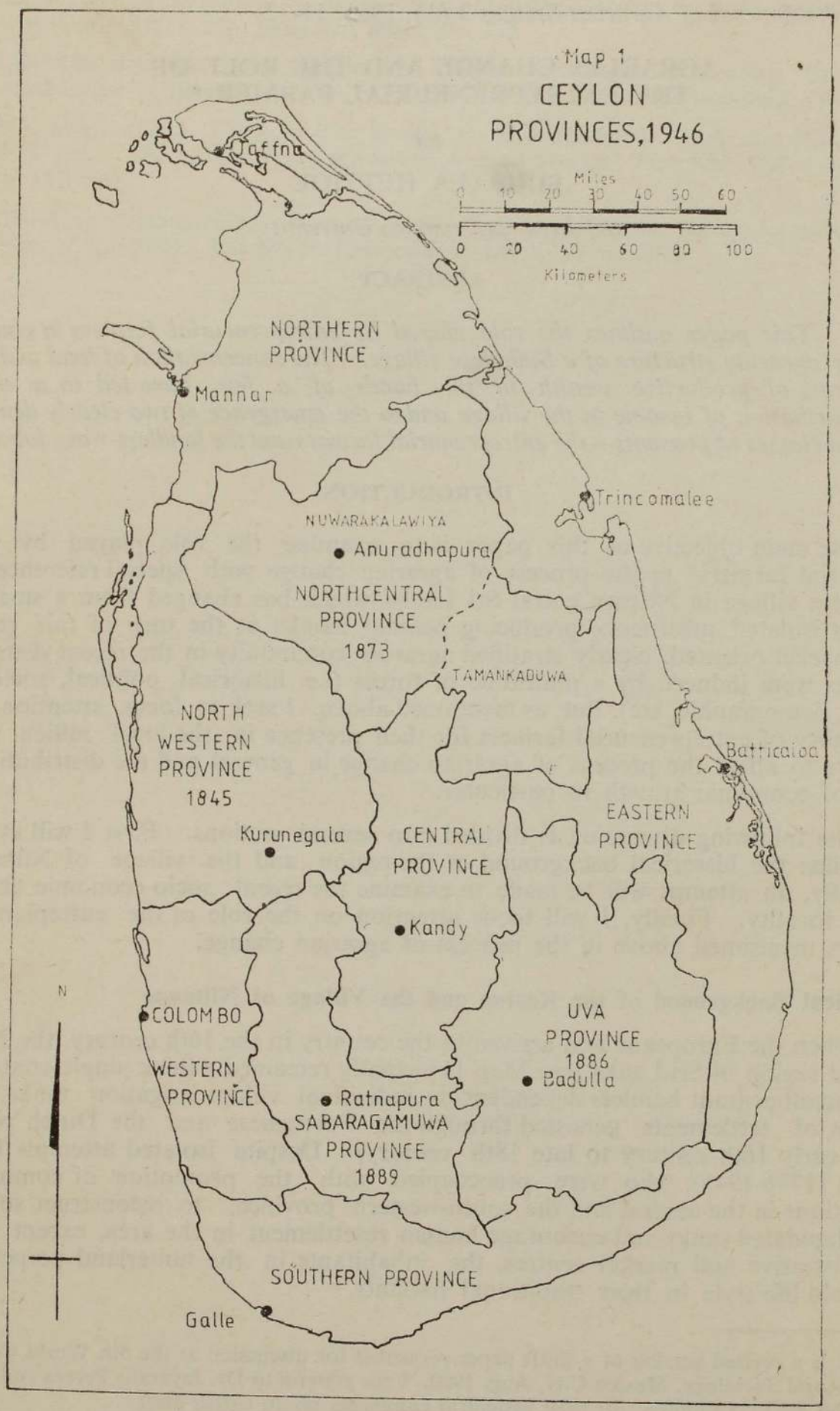

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The first half of this century however witnessed some changes in the administrative centres and townships, e.g. extension of railways into the area, anti-malaria work, provision of some basic amenities such as schools and dispensaries, which made the hitherto remote region more accessible to outsiders. On the other hand, the population pressure caused particularly by the absorption of peasant land into the newly developed plantations squeezed many peasants out of their traditional villages in the plantation districts. Many of these landless peasants were gradually pushed into the remote north-central province where there were large stretches of unoccupied lands; some migrated permanently with their families and others became itinerant workers migrating seasonally into the area for wage employment.

The implementation of British land and tax policies was responsible for many changes in the native land tenure practices. On the one hand, land laws such as the Crown Lands Encroachment Ordinance imposed restrictions on the use of crown and communal land (Obeyesekere 1967). For instance, it was customary for the peasants to use the bush land surrounding their homesteads for slash and burn or chena cultivation, but when the legislation declared such land as crown property, the peasants were required to obtain official permission to use such land paying a prescribed fee. On the other hand, various taxes, particularly the grain tax, forced the peasants to convert at least a portion of their produce into cash. Those who failed to meet their tax commitments were forced to sell their land either to well-to-do fellow villagers or to absentee landlords. This process brought land into the open market and eventually gave rise to a class of land owners who began to control a substantial proportion of peasant land which still continued to be tilled by poor peasants either as tenants or agricultural labourers.

The country's political independence in 1948 was followed by more changes in the region, particularly due to the special emphasis placed by the independent regimes on the modernisation of peasant agriculture and the establishment of planned human settlements known as "colonization schemes" in this part of the island (Farmer 1957:10). Multi-faceted development programmes sponsored by succesive governments involved the provision of further infrastructural facilities such as irrigation, transportation, schools and hospitals. A package of agricultural development aid — supply of high yielding seed varieties, agro-chemicals, agricultural machinery, credit, etc. at subsidised rates and the provision of market facilities and minimum prices for agricultural produce—attracted more and more people into the hitherto sparsely populated dry zone districts.[3] The process of migration brought in people belonging to two broad categories:

1. The poor peasants who lost or did not possess cultivatable land in the plantation districts where peasant land was enclosed continually into large estates of commercial production,

2. Indigenous businessmen who began to treat peasant agriculture as a profitable area of investment of their capital.

The above two groups of people began to play two different roles at their destination. The primary objective of the poor landless peasants was to regain the plots of land they lost in their natal villages. Some of them cleared new land and became small-holding farmers; they did not possess capital and therefore, cleared small plots which could be brought under cultivation with the use of family labour. Some

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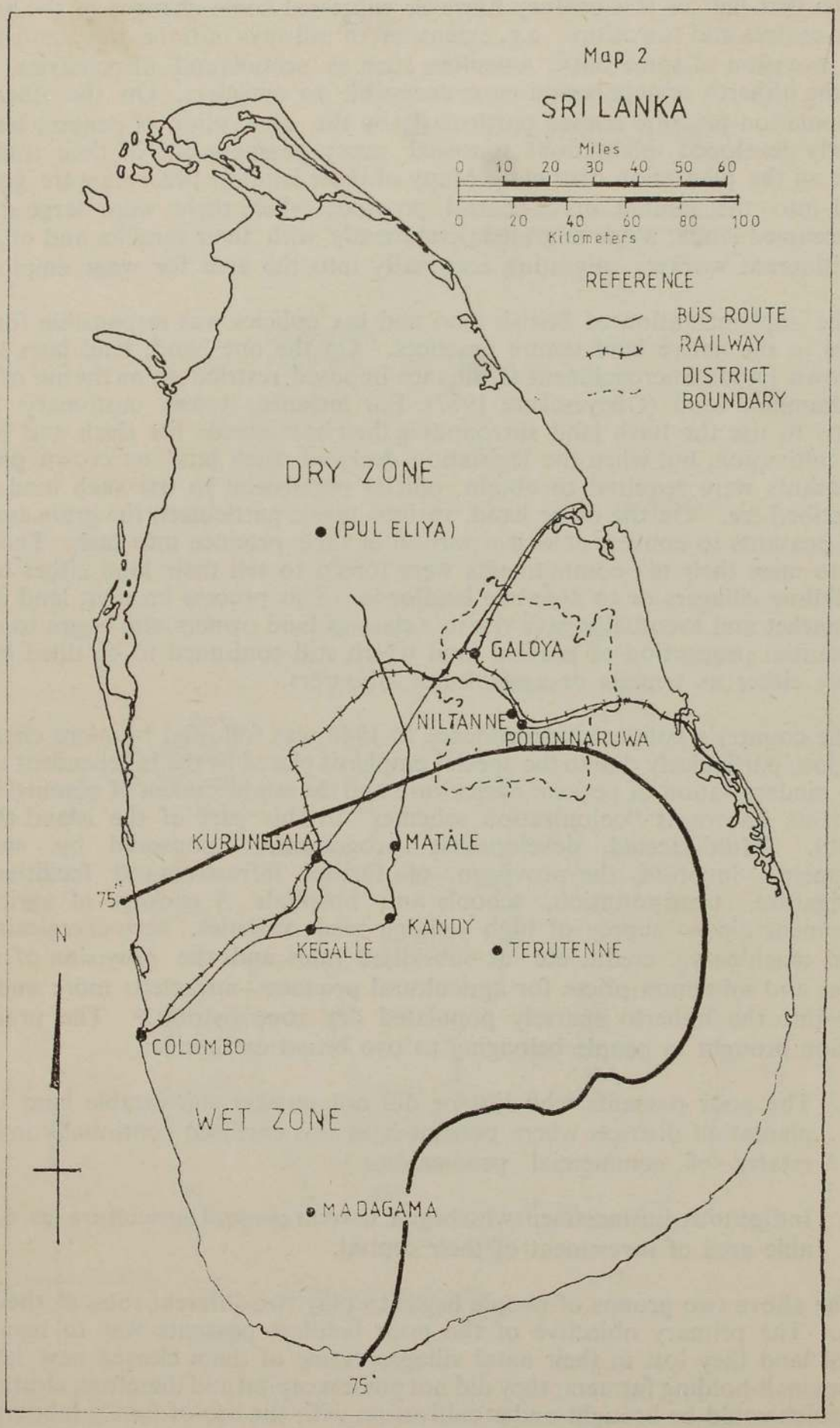

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peasants became share-croppers working the land owned by well-to-do villagers or absentee landlords. Those who failed to acquire land, or sufficient land, became agricultural labourers.

The motives of the incoming capitalist entrepreneurs were however different. The purpose of their involvement in peasant agriculture is to produce for the market for profit. Thus, the subsistence and other needs of their families do not set limits for their production. While continuing to expand their farms as the circumstances permit, they helped transform subsistence agriculture into a commercial enterprise oriented toward an outside market. Before attempting to elaborate the way they play their role, I will sketch the historical background of Niltanne (see Map 2).

The recent history of Niltanne conforms broadly to the historical sketch of the region outlined above. The small peasant hamlet which depended entirely on its irrigation tank for the supply of water for cultivation and domestic purposes had been virtually isolated from the centres of administration and mass culture due to physical barriers during the early British period. The available documentary evidence points to the fact that its inhabitants perpetuated a precarious existence in almost isolation (Ievers 1899:40). Around the turn of the century, they, however, began to feel the impact of the outside world. Roads were extended into the area; bureaucratic authority penetrated the remote countryside in the form of revenue collection, enforcement of rules and regulations, maintenance of law and order and so on; traders began to arrive more frequently for both selling and buying goods; villagers began to travel out of their hamlets for religious, official and other purposes; outsiders moved in to buy land from those who were forced to sell their land due to economic hardships thereby giving rise to new land owner/tenant relationships extending well beyond the village boundaries. By the end of the British rule, many peasant hamlets in the area like Niltanne were well integrated into the macro-structure of the national economy, polity and culture.

When the village tank was renovated by the newly established Department of Irrigation under the British in the first decade of the present century, the land area that could be fed by it expanded substantially. But, until the early 1940s, less than half of the cultivatable village land was brought under cultivation. The village population was small (about 12 families around 1940) and those outsiders who bought village land gave it back to local residents on a share-cropping basis. These transactions, therefore, did not lead to a considerable expansion of village fields. In the mid 1940s, this situation began to change.

The process of migration of landless peasants from the commercial plantation regions into the sparsely populated, newly developing non-plantation areas was well under way towards the end of the British rule. In the late 1940s and the early 1950s, landless peasant families migrated in large numbers into the colonization schemes in the dry zone (Farmer 1957:15). Some peasants moved into already existing peasant hamlets which are known as *purana gam* (lit. ancient villages).

The first wave of new settlers arrived in Niltanne in the early 1940s. Few of them cleared small plots of village land and became small-holding peasants. Most of them became share-croppers to *purana* villagers and absentee landlords.

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As late as the early 20th century, Niltanne was surrounded by the wild animal infested bush land. It was connected with a few similar settlements in the area by foot paths running through the jungle. By mid-1950s, most of such bush land which bordered the village was cleared by new settlers who moved into the two newly established colonization schemes to the north-east of Niltanne. The growth of local population meant increased and diversified economic activity which in turn led to widespread commercial activity. Import of a host of consumer and other items from, and export of agricultural produce to external markets, became a profitable area of investment for the newly arrived entrepreneurs who either possessed or were able to raise finance.

Agrarian Planning and New Opportunities

Successive governments in independent Sri Lanka seemed to have treated the modernisation of peasant agriculture as perhaps the most important element of their overall development strategy. The reasons for this policy have been many. The usual practice of the British was to import food items in large quantities including rice which is the staple food in the country and no specific attempt was made by them to boost local food production. Their main concern was to encourage export crops such as tea and rubber. Even after independence, the import of food items that could be locally produced continued. With the worsening balance of payment problems in the 1960s there was no other viable option but to turn at least to partial import substitution. In order to increase the production of rice and other subsidiary food crops, every government, irrespective of their ideological differences, not only took various steps to facilitate agricultural modernization, i.e. supply of inputs and credit at subsidised rates and introduction of new farming techniques, but also offered numerous incentives e.g. market facilities and guaranteed prices for farm produce.

Growing of food crops thus became a profitable area of investment. Those who owned agricultural land but did not so far take an active interest in it began to evict their tenants and turn their land into commercial holdings. The class of agricultural labourers began to grow partly as a result of the new tenurial arrangements. Those who owned or acquired land and finance began to play a multiple role of providing commodity or cash loans to needy peasants, collecting and transporting agricultural products, hiring out agricultural machinery, farming and shop-keeping.

The changes that have been taking place in the rural economy in response to agrarian planning and the market forces clearly amount to what is popularly called the green revolution. Now I return to Niltanne and attempt to outline such changes as they are taking place there.

Before the first wave of new settlers arrived in Niltanne in the early 1940s, its inhabitants were mere subsistence producers. Population was small and, therefore, only a part of the village land was brought under cultivation. Since crop failures were common due to natural causes such as pests, wild animals and droughts, peasants also relied on the cultivation of secondary crops by slash and burn method. Farming techniques were very simple and less efficient. Land preparation was done by driving pairs of buffaloes on the wet field without using a plough. No effective

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measures were taken to control either pests or weeds. Manure, either organic or chemical, was hardly used. In other words, peasants had little to do between sowing and harvesting. They devoted most of their free time for chena cultivation.

Hard environmental conditions in turn encouraged peasants to adopt suitable work sharing arrangements. They could not cope with the natural forces individually. Instead, they had to co-operate in many spheres of life. Their co-operation was expressed in two different forms, namely work sharing and social insurance against starvation of individual peasants.

Niltanne peasants, instead of working on their fields individually, formed work teams in order to exchange their labour. The exchange of labour was based on the principle of mutual help and, therefore, they were not concerned with the accuracy of labour units exchanged. Furthermore, giving material assistance to those who were in need was a highly valued practice among the local peasants. While it was customary for them to store their little surplus production in grain containers belonging to individual families, peasants felt obliged to share it with the others as the need arose.

It the late 1940s, physical and social organisation of production and exchange began to change steadily. With the growth of population due to the influx of new settlers and natural increase, (by the late 1940s, the number of families had risen to 50; in 1976 there were 169 households), more and more land had to be cleared for farming and settlement purposes. Under the influence of the wider market economy, peasants became increasingly market-oriented; they sought to produce more and more by adopting new farming technology. When the peasants ceased to be near subsistence producers, they also began to do away with co-operation in favour of competition.

By early 1960s, the expansion of the village (wetland used for rice cultivation) reached its optimum limits. The scrub which was hitherto used as grazing fields for their cattle was also cleared for rice farming by commercial producers. Some peasants were forced to sell their cattle for want of open land. Others began to kee theirs far away from the village and drive them into the fields when needed.

Despite the fact that there was no more new land to be cleared in the village, the inflow of landless peasants, particularly from the plantation districts continued. Since most land owners had already abandoned share-cropping in favour of commercial farming, the newcomers had no prospect of at least becoming tenants. They had no option but to become wage labourers. Landlessness was further aggravated by the tenurial changes that followed the tenancy legislation enacted by the central government in the late 1950s (cf. Joshi 1974:329). For example, the Paddy Lands Act of 1958 was intended to protect the tenants and safeguard their interests. Land owners reacted negatively to this piece of legislation by evicting their tenants (Peiris 1976:24). They began to cultivate their land either by employing wage labourers or through unofficial tenants on a short-term/seasonal basis. The second mode effectively denied the tenants their rights defined by legislation.

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In the early 1960s, Niltanne became segmented into distinct agrarian classes (See Table I). The capitalist entrepreneurs engaged in commercial farming continued to acquire more and more land through diverse means (Hettige 1980). Poor peasants who were dependent on the above entrepreneurs for various needs such as credit and agricultural machinery lost some of their land to the latter either through mortgage or sale. In the mid 1970s three such land owners controlled nearly half of the total area of cultivated village land (See Table II).

Table I—LAND OWNERSHIP PATTERNS

Size of Holding (acres)	*Agricultural Families*			*All Families*		
	%	*No.*	*Persons*	%	*No.*	*Persons*
25 and over	1.7	2	9	1.1	2	9
10 and over	2.5	3	18	1.7	3	18
5 and over	11.2	13	66	10.1	14	88
1 and over	14.7	17	101	12.5	21	118
Less than 1	10.3	12	78	8.9	18	92
Landless	59.0	69	370	65.4	110	607
Total	99.4	116	642	99.7	168	932

Table II—DISTRIBUTION OF PRODUCTIVE RESOURCES IN NILTANNE

Capitalist	Agricultural Land %	Tractors (4 wheel) %	Tractors (2 wheel) %	Plough cattle %	Pump Sets %	Sprayers %	Rice Mills %	Lorries %	Cars %	of the total agricultural families %
Land owners ...	45.5	66.6	33.33	—	66.6	50	33.3	100	60	2.50
Rich peasants ...	34.5	33.3	66.6	55.5	33.3	25	16.6	...	20	12.93
Poor peasants ...	16.0	—	—	44.5	—	—	—	—	—	25.0
Agricultural labourers ...	0	—	—	—	—	—	—	—	—	41.37
Others ...	6.0	—	—	—	—	25	50.0	—	20	—

Since tenants were not treated here as land owners, they have been deliberately excluded from the above Table.

A few peasant families made use of the new opportunities and became well-to-do peasants enjoying better living conditions, but the overwhelming majority of the peasants remained poor struggling to survive in the face of strong competition from the capitalist farmers for more land and more profit. The size of their holdings is becoming smaller day by day through fragmentation in the process of inheritance of property by family members. Some family holdings are too small to be partitioned among its members. Those who do not inherit land often become landless labourers.

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The tendency for commercial farming encourages the land owners to do away with share-cropping. When the actual tiller of land is a tenant, the land owner does little or nothing to raise the productivity of his land but receives a fixed share of the production. On the other hand, the tenant has little inducement to increase production because more productivity means more expenditure in terms of costs and land rent. When the owner cultivates his land himself, he controls the entire process of production; for him increased productivity means increased profit.

The traditional practice of share-cropping (*ande*) was replaced partly by a new land-leasing system. The main feature of the new mode is that it is a short-term commercial transaction between the owner of a parcel of land and its lessee. Unlike the traditional tenant, the new lessee is often a well-to-do villager who could raise sufficient finance not only to pay the land rent in advance but also to meet the cultivation expenses. On the other hand, the new lessor is usually a poor peasant who is either unable to cultivate his land for one reason or the other or in need of a lump sum of money to cope with an emergency. When a peasant surrenders a part or whole of his holding in return for a lump sum of money, the lessee makes use of the land during the prescribed period.

Having done away with share-cropping and co-operative labour, land-owning peasants and capitalist farmers began to rely heavily on agricultural labourers. These entrepreneurs worked entirely by wage labourers: peasants employ workers in varying numbers depending on the extent of additional labour required to run their family farms. Many poor peasants who own small plots employ no paid workers.

As mentioned before, along with the changing tenurial practices and production relations, the physical process of production has also been changing dramatically over the last few decades. Niltanne peasants, largely following the footsteps of the entrepreneurial farmers, have incorporated new methods into the cultivation process. Instead of buffaloes, most of them now use tractors, either four or two wheel, for land preparation. Instead of sowing broadcast, many of them transplant seedlings. Peasants no longer use traditional varieties of seed (see Tables III, IV, V and VI). Unlike in the past fertilizers, pesticides and weedicides are commonly used in the village. All these have helped increase paddy yields to all island record levels.[4] While productivity increases have induced many of these practices, the adoption of some practices is also required to avoid unpleasant consequences of conflicting usages. For instance, when one field is sprayed with pesticide, the adjacent fields are often required to be sprayed in order to avoid the latter being affected by the pests leaving the former. Since the water for all plots are released from the same outlet (sluice) according to a fixed time table, peasants have to carry out their tasks in keeping with the general irrigation schedule.

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Table III—WEEDING PRACTICES BY ACREAGE

	By Hand	*Mech. Weeder*	*Chemicals*	*Total*
Maha 75/76	20	10	90	120
Yala 1976	15	05	90	120

Table IV—USE OF HIGH YIELDING VARIETIES BY ACREAGE

Modern HYVV Type			*Traditional Non-HYVV Type*	*Total*
BG 11 3*LL*	*BG*34/8	*BG*34/6		
Maha 75/76 140	32	—	—	172
Yala 1976 30	130	12	—	172

Table V—FIELD PREPARATION FOR PADDY BY ACREAGE

	Buffaloes (ploughing)	*Tractors*	*Mamoty*	*Total*
Maha 75/76	30	140	2	172*
Yala 1976	32	140	0	172

Table VI—SOWING AND TRANSPLANTING BY ACREAGE

	Sowing Broadcast	*Transplanting (normal)* +	*Transplanting (in rows)* +	*Total*
Maha 75/76 ...	2	162	8	172
Yala 1976 ...	65	107	—	172

The adoption of modern farming practices involves substantial cash expenses. Poor peasants whose families subsist on their small parcels of land find it almost impossible to meet these expenses without resorting to financial assistance from either private or institutional sources. Their holdings are uneconomical and, therefore, they produce little surplus which is often not sufficient to settle loans and meet the subsistence requirements of the family. Many of them depend on private money lenders who charge very high interest rates because they are not eligible for institutional credit due to their failure to settle previous loans owing to financial hardships. Most of them derive no income from any other source. Even though they now produce more owing to new farming practices, increased production means very little to them because of higher costs of production and living, and the burden of usury.

Except for a few well-to-do peasants, the capitalist farmers are the only category of farmers who could adopt new farming technology conveniently. Not surprisingly, they are the first to go for latest techniques because they not only could afford them but also could take financial risks. They possess largest farms (see Table VII), agricultural machinery and substantial finance and, therefore, rising charges for equipment work in their favour. In addition to their agro-business, they also make use of almost every other means of economic advancement available in the countryside such as rice

* Figures were available only for 172 acres of village fields. Since this figure is not substantially less than the total given in the registers (188 acres), the distribution of data can be treated as reasonably representative.

\+ normal transplanting.

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processing, transport, shop-keeping, supply of agricultural equipment and credit, and purchase and distribution of agricultural produce. In short, these rural capitalists who were encouraged by the signs of a coming green revolution now play a leading role in the continuing process of agrarian change. The important fact is that their involvement in the process has been responsible for the direction in which many changes are taking place.

Table VII—FARM SIZES (in acres)

	Average	*Largest*	*Smallest*
Rich peasants	4.6	10	3
Poor peasants	1.1	2.5	.125
Capitalist land owners	29	45	12
Tenants	1.4	3.5	.125

Their power is substantial so much so that most villagers depend on them in varying degrees for various needs. Most dependent among them are the landless labourers. The entrepreneurial farmers employ the largest number of paid workers at a time because their business activities are diverse. They also employ migrant workers in large numbers for such activities as transplanting of paddy. There is a tendency among the entrepreneurial farmers to prefer itinerant workers for a number of reasons. Migrants stay away from their families and work longer hours for less pay. For instance, they were paid R. 4.00 per day as against Rs. 5.00 paid to a village labourer in 1976/77. Since migrants have no routine family involvements and stay in temporary huts in close proximity to the fields, they spend more hours at work. When the seasonal workers are brought in to the village in large numbers, the work available to the local worker is automatically reduced and the latter's claim, despite rising costs of living, their earnings have been stagnant for many years.

In Niltanne, capitalist farmers have also taken over the cultivation of other subsidiary food crops such as chillies, lentils and other vegetables which fetch higher prices in the outside market. When the nearby bush was cleared for cultivation and settlement purposes the local peasants had to give up chena cultivation and depend entirely on rice farming. Those who want to cultivate these crops have not only to travel far away from the village but also to invest substantial capital. This is feasible only for the well-to-do farmer. They grow these crops in large quantities and transport them to outside markets where they fetch very high prices.

CONCLUSION

So far I have attempted to outline the recent changes in the agrarian structure of a Sinhalese village in the North-Central Sri Lanka. I sought to focus attention upon entrepreneurial farmers who began to occupy a dominant position in the village economy. In short, their role since then has been to transform peasant agriculture which was basically subsistence-oriented into a source of economic power and social dominance. This role is evident in the spheres of physical and social organisation of production and the distribution of fruits of economic growth at the local level.

The increasing participation of entrepreneurial farmers in paddy production and related activities has led to a concentration of land and other productive resources including finance in the hands of a few. This has in turn resulted in a polarisation of the village into distinct agrarian classes based on differential property rela-

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tions. The resultant commercialisation of paddy production has helped not only to replace old agricultural practices with modern ones but also to disintegrate traditional relations of production.

The concentration of land and other forms of production wealth in the hands of a few has led to a skewed distribution of income in the village. This is clearly reflected in the patterns of consumption among different segments of the village community. Furthermore, these divergent patterns of consumption have led to the formation of distinct status groups in Niltanne.

The concentration of land in few hands has meant the rapid growth of landlessness among villagers. The rising cost of production and the burden of usury have brought many peasants down to the level of absolute poverty. Apart from a few rich peasants and those who rely on non-agricultural incomes, the villagers in general depend on the few entreprenurial farmers for various needs such as employment, credit, agricultural machinery. The dependent relationship is so significant that a majority of the villagers whose destinies are now in the hands of the few entrepreneurs forsee no prospect of being independent in the near future.

Notes

1. The entreprenurial farmers are distinguished from the other categories of peasants in that they (1) do not engage in the process of physical production themselves, and (2) produce solely for an external market. Furthermore, commercial farming is one among many areas of their investment in the rural sector. Their land is worked by wage labourers.

2. Niltanne is a pseudonym for the village under study. This is a tank-based *purana* village in the Polonnaruwa district.

3. Administration Report, Assistant Government Agent, N.C.P. (1947.)

4. Highest yield recorded in Niltanne is nearly 100 bushels per acre in 1976.

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INSTITUTIONAL ADAPTIVENESS AND SUCCESSION: THE CASE OF IRRIGATION IN SRI LANKA

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ABSTRACT

Large organisations exhibit a natural conservatism; a tendency to continue doing the same things in the same way. Yet the external demands placed on an organisation may change. Failure to respond positively may result in an organisation becomimg redundant or even disappearing completely and giving way to new organisations attuned to the contemporary situation. Recent institutional changes in the sphere of irrigation water management in Sri Lanka illustrate this choice between adaptiveness and redundancy. It is not yet clear whether the institutions traditionally concerned with the construction of irrigation potential will be able to adjust to current pressures to make better use of that potential already in place.

I

It is a fundamental axiom of the theory of organisations that, once established, any organisation will tend to develop and pursue its own collective interests independently of the purposes for which it was created. The ultimate objective of any organisation lies in its own continued existence: in maintaining the opportunities for its staff to continue to hold their jobs, draw their salaries, and interact with one another and the outside worlds in familiar ways. This axiom does not however tell one anything about how an organisation will attempt to achieve its goal of immortality. For this there are, conceptually, two broad alternative strategies. On the one hand, an organisation will tend to argue that there is a continuing need for it to perform its original function. This is in many ways the easiest and most likely outcome, for it corresponds to natural conservatism: people, especially the senior people who control organisations, find very attractive the prospect of continuing to do familiar things in familiar ways. Reorganisation and reorientation are threatening and costly processes. On the other hand, expansion into new areas of activity has many attractions. And if the external environment has changed so much that the organisation's original function is no longer defensible, then the organisation may be willing to redefine its purpose and perform a new function as the price of survival. One general principle which does emerge is that an organisation will tend to totally reorient itself—rather than simply expand its area of activities—only under external pressure which appears to pose an ultimate threat to its existence.

This paper is an attempt to understand, in the light of these elementary principles or tendencies derived from organisation theory, the current process of institutional reorganisation in the sphere of irrigation in Sri Lanka. The main focus is on the Irrigation Department. The context for this study is a gradual evolution

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Footnotes numbered 1 to 21 appear at the end of the text preceding REFERENCES

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in the nature of the demands made upon the government agencies responsible for irrigation development. In the latter half of the nineteenth century and the first half of the twentieth century the dominant function of these agencies was to open up new lands under combined irrigation and settlement schemes in the sparsely populated Dry Zone.[2] Settlement—the provision of agricultural livelihoods for households from the densely-populated Wet Zone—was the major aim. Neither water nor land were particularly scarce resources; the capacity to undertake settlement-cum-irrigation projects was. The varieties of paddy—virtually the sole irrigated Dry Zone crop—were relatively low yielding and not very sensitive to differences in moisture regimes. Around the middle of this century it became increasingly evident that crop yields on and economic returns to these schemes were low. Attention shifted to attempting to increase per acre crop yields i.e. to making better use of *land*.[3] New higher-yielding paddy varieties increased the potential benefits of such a strategy. Only in the last few years has the focus been shifted yet again to the efficient use of irrigation *water*. It is now widely accepted that this is the scarce resource.[4] The Irrigation Department finds itself faced with a changing external environment and a different set of pressures. Rather than constructing new irrigation capacity, it is increasingly being asked to do a better job of managing the water on existing schemes, and, in some cases, to physically rehabilitate these schemes to make that goal feasible. The institutional response to these changing demands is the theme of this paper.

II

Established in 1900, the Irrigation Department ranks among the oldest of Sri Lankan government departments. It also has a record of achievement, especially in the construction of large scale irrigation schemes, as proud as that of any other. Leaving aside the small scale schemes with which the Irrigation Department has been only intermittently involved, one could be forgiven for thinking that 'irrigation' and the department are almost synonymous. There is however at least one important historical sense in which this is not true. A very substantial programme of small and medium scale irrigation development was undertaken in the second half of the nineteenth century[5] without the benefit of a specialist irrigation engineering cadre or organisation, but under the aegis of the all purpose Public Works Department.[6] This arrangement was however not found to be totally satisfactory. Justifying the creation of a separate Irrigation Department, the Governor, Sir West Ridgeway claimed that "the irrigation works that they (the Public Works Department) were called upon to perform constituted an irksome additional burden and were undertaken therefore with little enthusiasm and a corresponding loss of efficiency".[7] The circumstances of the birth of the Irrigation Department are very relevant to the argument below: it was created not simply because there were irrigation works to be constructed, but partly at least[8] because an existing organisation was unwilling to give irrigation the attention which it devoted to what it saw as its original and prime area of concern—the construction of roads and buildings.

III

After 1900 and until recently irrigation in Sri Lanka—leaving aside very small scale village irrigation—was almost synonymous with the Irrigation Department. True that in 1949 the Gal Oya Development Board was created to manage the construction of the Gal Oya Project and that later, under the name of the River Valleys

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Development Board, it went on to do the same thing for the Uda Walawe Project. These were however very special schemes, covering a far larger area than any previously developed for irrigation in Sri Lanka, including major hydro-power components, and involving major foreign inputs in design and construction. More importantly, the bulk of the irrigation construction work at Gal Oya was undertaken by the Irrigation Department. The Board was established to manage the settlement programme. Once completed the Gal Oya scheme was handed back to the Irrigation Department; the Uda Walawe scheme remains formally incomplete.

When in the 1960s the Irrigation Department began to plan the Mahaweli Programme it was an organisation to be reckoned with. It had since the 1930s completed many new large scale irrigation schemes in the Dry Zone, and the quality of its staff and work were internationally recognised. Along with its sister organisations, the Survey Department and the Land Development Department, it was the cutting edge of post–1931 agricultural policy—a tool for the opening up of the Dry Zone for cultivation and settlement.

In large part bacause of the continual increases in the scale of new irrigation schemes, professional knowledge and work standards had changed out of all recognition since the later part of the nineteenth century.[9] In that earlier period much of the initiative and direction for irrigation schemes had come from the Revenue Department—from the Government Agents and Assistant Government Agents. Such professional direction as had been given had come, rather reluctantly (see above), from the all purpose civil engineers of the Public Works Department. This may not have been inappropriate for the time. Since land, rainfall run-off and potential dam sites had been relatively abundant in the Dry Zone, and labour and directing organisation scarce, there had been little urgent need for professional supervision of small scale works. Irrigation was largely a matter of organising people to throw an earthen bund across a watercourse, or to repair one already in existence. Thereafter arrangements were required to repair the breaches which inevitably occurred and to ensure that all cultivators in each tank adhered as closely as possible to a common cultivation calendar in order to make the best use of the stored water. On the smaller schemes the physical structures were neither elaborate nor necessarily very permanent. The sheer abundance of traces of disused tanks in the Dry Zone seems to support the view that they were readily deserted, or used as paddy fields, once they became silted to a certain level or otherwise lost their usefulness.[10] The physical investment was small and did not need to be conserved. Irrigation was correspondingly a subject which could mainly be handled by the village or the Government Agent without the help of an engineer.

IV

The gradual increase in the size of new irrigation projects brought the professional irrigation engineer to the fore and led to the exclusion of the non-professional from planning and construction. There was however no sudden break with the past, and some very substantial continuities in design and management practices from the nineteenth century through to recent or present times.

The physical design of the large schemes constructed in the 1930s, 1940s, 1950s and 1960s reflected a conception of the purpose and character of irrigation similar to that embodied in smaller schemes in earlier decades. The main emphasis was

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on impounding the maximum feasible quantity of water by placing a bund across a natural watercourse, and spreading this water over a large area in order to maximise the number of settler families served. All this was to be achieved at the minimum cost per settler. Complaints about the expense and lavishness of the earlier schemes (especially) were directed against the housing, physical infrastructure, and land development facilities provided free to the settlers, not against the cost of the irrigation channel network.[11] For this was neither elaborate or especially expensive. The demand that large areas be provided irrigation facilities at low cost led to the construction of a relatively sparse irrigation infrastructure. Irrigation channels were long. Channels nominally of the same category—i.e. field channels or distributary channels—were of grossly unequal length in total and in relation to the acreage they served.[12] Physical structures for controlling water flow—gates, cross-regulators and drop structures—were sparse. Water flow measurement structures—weirs and flumes—were almost unknown.

The physical design of the large schemes was in certain respects very like that of the village tanks writ large. It is barely an exaggeration to say that they were not designed to *manage* water, but simply to distribute it under continuous flow conditions once it left the tank sluice. It was perhaps almost inevitable that water should end up being distributed between farmers very unequally and inequitably.[13] It was similarly inevitable that the main sufferers should be allottees on the 'tail-ends' of schemes—i.e. furthest from the tank sluice—and that the magnitude of their plight should grow as the size of the schemes expanded. 'Tail-end' land lots were often abandoned or never even claimed by the legal allottees, and left uncultivated or encroached by those desperate for land of any kind.[14]

The water management procedures on these new large schemes also exhibited continuity with practices developed on small scale tanks. The convention of seasonal water meetings to 'decide' the cultivation calendar was perpetuated. This was so even on large schemes like Gal Oya and Uda Walawe where a dozen or more separate meetings had to be held over the whole scheme, thus making nonsense of the idea that the assembled farmers could independently 'decide' on the cultivation calendar. Water management is—or should be—mainly a matter of a cumulative mass of small individual daily decisions taken in the light of crop conditions, the weather, and a host of other variable and unpredictable factors. The once-per-season water meeting could have little to say on these issues. The fact that it continued to hold the stage was in itself an indicator that water was actually being controlled and managed only in the most rudimentary way.[15]

Continued formal adherence to the notion of democratic decision taking in the water meeting was in part the outcome of the persisting role in tank management of the Revenue Department—the Government Agent and the Assistant Government Agent. The GA or the AGA, both busy people with wide ranging responsibilities, continue to chair the water meetings on larger schemes and to have formal responsibility for the enforcement of the Irrigation Ordinance—i.e. the prosecution of offenders. The 'human relations' side of tank management thus remains in their hands, formally at least. At no stage was tank management formally or fully handed over to the Irrigation Department. The Department saw itself as responsible for maintaining the physical structures and impounding water in the tank. It was reluctant to assume responsibility for the flow of water beyond the tank sluice and certainly not beyond the turnout to the field channel.

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In practice the Irrigation Department became drawn more and more into opening and closing gates on the main and distributary channels, but it was not a duty enthusiastically embraced. Its field level labouring staff nominally responsible for the physical opening and closing of gates were rarely noted for zeal or initiative. The Department had generally attempted to focus its activities on construction and to keep clear of responsibilities which would get it deeply involved with cultivators and with problems of agriculture. For example, although in 1942 it created a separate Land Development Branch to undertake land clearing and levelling in the new large scale schemes, this activity was in 1947 handed over to the Land Commissioner, and a separate Land Development Department established. The work of land clearing and preparation "had reached such proportions that it was found to be interfering with the *legitimate* (present author's emphasis) work of the (Irrigation) Department".[16]

V

As has now been documented and repeated many times over, the standards of irrigation efficiency on large scale schemes turned out to be very low. Water was delivered in unpredictable quantities and at unpredictable times, and was shared very inequitably between different farmers.

Pressure for remedial action has gradually increased. Precisely why this has happened one cannot say, but the following factors apear to have played a major role:–

(i) Awareness by irrigation staff themselves of the unsatisfactory nature of the situation.

(ii) Increased economic and political pressure to make more efficient use of irrigation water once the best dam sites had been exploited and new schemes became increasingly expensive.

(iii) The very evident and extreme 'tail-end' problems on the two very large schemes, Gal Oya and Uda Walawe, undertaken in the pre-Mahaweli period.

(iv) The increasing involvement of foreign aid donors in the financing and planning of new irrigation schemes, especially after the decision in 1977 to accelerate the Mahaweli Programme. Compared to other Asian countries, but above all to Taiwan and Japan, water management practices in Sri Lanka appear surprisingly crude and wasteful. It may be argued that expatriate consultants and researchers are unnecessarily impatient and pushful, forgetting that the 'model' Asian countries have only attained present high standards of water management after decades of experience and experiment.[17] There can however be little doubt about the role of expatriate stimulus in placing water management issues high on the current policy agenda.

VI

The main immediate target of this growing concern about water management has been the Irrigation Department iself, although the story has been much the same with the River Valleys Development Board, until recently in charge of the incom-

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plete Uda Walawe scheme. Demands and suggestions as to exactly what the Irrigation Department might do about the problem vary, and it is not part of our purpose here to examine or appraise these demands. They can however in large part be reduced to a common core comprising three elements. The first is that much more detailed *control* be exercised over the flow of water in irrigation channels. The second is that much more attention be paid to *agricultural* matters—the condition of crops in the fields, availability of agricultural inputs, etc—in planning and implementing water deliveries. The third, following on from the previous two, is that irrigation staff become much more involved in the *human relations* side of irrigation—in organising farmer groups, responding to their requests, enforcing rotational schedules, etc.

Such demands ultimately require that the Irrigation Department change its entire character. It would cease to be a construction--oriented agency concerned with the capture of water, and would instead give equal emphasis to the use of that water. Among other things, this would entail:–

(i) A partial shift in the professional disciplinary base away from civil engineering towards agronomy.

(ii) A change in the style and content of work, with much more interaction with farmers, and all the problems to which this gives rise.

(iii) A change in the focus of the work of the field level professionals—the Irrigation Engineers and the Technical Assistants. Rather than controlling construction and maintenance work, they would be more engaged in supervising the enlarged cadre of junior staff who would be required to exercise closer control over water flows.[18]

VII

It cannot be said that the Irrigation Department has been unresponsive to the demands that it does something about improving the efficiency of water use. As early as 1969 a special research unit was located at Maha Illuppallama, the main agricultural research station, to investigate links between agricultural practices, irrigation designs and water use. More recently a special Water Management Unit has been established in the Colombo head office, and provision made on some scheme to take on extra labourers to control water issues. In 1976 a special task force achieved considerable success in planning and enforcing a very 'tight' programme of water issues on the Rajangane scheme.[19] More recently, a promising experiment in farmer participation in water management has been initiated by the engineer in charge of the Minipe scheme.[20] Consciousness of the need to improve water management has been spreading among the staff. A joint experimental programme has been undertaken between the Irrigation Department and the Agrarian Research and Training Institute in the use of Institutional Organisers to stimulate farmers to take an active role in water management on the Gal Oya scheme. However, partly, for reasons suggested above, the Irrigation Department has limited capacity to respond positively and quickly to demands that it reform itself and its working procedures.

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In the first place, the physical design of schemes in some cases makes difficult the exercise of effective control over water flows. Control structures are few. Fair and feasible rotational schedules may be difficult to design, while in some cases channels intended for continuous water flow cannot easily cope with the larger volumes of water issued under rotations and required in order that water may reach 'tail-enders'. The physical deterioration of many facilities—silted canals, broken banks, and damaged gates and concrete structures—exacerbates the problem.

In the second place, and perhaps of equal or greater importance, the staff of the Irrigation Department exhibit a natural conservatism and unwillingness to change the scope, style and content of their work in the way set out above.

VIII

There has then in recent years been an increasing dichotomy or tension between the social and economic need and political demands for better water management and the Irrigation Department's response to these demands. That it has been unable to respond more quickly and satisfactorily was in no sense inevitable. There are plenty of examples of institutions which have changed in form and function to meet new demands. Indeed there is a whole tradition in management science of studying 'institutional imperialism'—the tendency of orgnisations to expand into new activities in order to obtain new powers and resources (see above). That the Irrigation Department has not thus expanded into water management may perhaps be explained by the conditions it has faced over the past decade or so. Experience suggests that institutional adaptiveness is more likely when resources to make the change are available and morale is high. Two features of recent Sri Lankan history have conspired to make conditions unfavourable rather than favourable to change.

The first factor is the 'brain drain' of engineers to overseas posts. This has very recently accelerated, leaving the Irrigation Department very short of engineers, especially the kind of experienced middle level engineers who would be required to re-orient the work of the field engineer. The fact that overseas job opportunities are mainly in construction and maintenance may also have discouraged young engineers from taking an interest in water management.

The second factor is the decision taken in 1977 to accelerate the Mahaweli Programme, with the consequent diversion of engineers, resources, senior administrators, foreign assistance and sense of challenge and endeavour to the Mahaweli area and institutions. The relative ranking of the Irrigation Department and the Mahaweli agencies (the Mahaweli Development Board, the Mahaweli Authority) has been reversed in the last decade. The Mahaweli Development Board was established in 1970 as an offshoot of the Irrigation Department. Its first Chairman was also a Deputy Director of the Department.[21] A decade later the Irrigation Department was loosing Directors who went on to occupy more senior posts in the Ministry of Mahaweli Development. Having conceded major new construction projects to the Mahaweli agencies or to private sector contractors, the Irrigation Department is left with mainly supervisory duties in the field which it considers its own. Yet it has been unable to move firmly into the newly important areas of water management and physical rehabilitation of existing systems.

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IX

To conclude at this point would apparently be to offer a rather pessimistic assessment of the prospects for improving water management. That would however be unjustified. For recent events appear to confirm the existence of a more encouraging trend—and one which, with hindsight, one can trace back several years.

Perhaps one of the earliest indications of this trend is to be found in a design innovation which emerged in the early 1960s from the newly-created Mahaweli Development Board. Mention has been made above of the obstacles to effective water management posed by the sparseness and excessive and variable lengths of distributary and field channels on older irrigation schemes. The new thinking stimulated by the creation of the Mahaweli Development Board led to the evolution of a new channel and field layout. The core idea was short and relatively uniform field channels each designed to deliver one cusec of water and to serve an area of thirty to forty acres. The fact that these new turnout areas each included about a dozen to fifteen farmers proved to be an advantage in later years when it became conventional wisdom that farmers needed to be organised into 'turnout groups' to manage inter-farm water distribution and maintain field channels. At the time the concern was to make it physically possible to deliver water to every field.

This new design has since been adopted by the Irrigation Department for its own new schemes. A precedent has been established: that innovations in or related to water management should come from outside the Irrigation Department. Recalling the way in which the Irrigation Department had been created because of the conservatism of the Public Works Department (see above), one might begin to detect a pattern of institutional succession. In recent years the pattern seems to have become clearer. The main internal pressure for improved water management now comes from officials working on the Mahaweli Programme. It has recently been decided to put the newly-completed H area of the Mahaweli Scheme under the management of a new Mahaweli Economic Agency, which will pay special attention to water management. The Uda Walawe scheme, dogged by severe water management problems, was at the beginning of 1981 taken under the umbrella of the Mahaweli Authority. Further, agencies affiliated to the Ministry of Agriculture have developed an independent interest in water management. The Agrarian Services Department, which in 1978 assumed responsibility for minor irrigation schemes, has appointed its own water management specialist and become involved in promoting better water management in village tanks. The Cropping Systems Research Project at Maha Illuppallama Research Station has developed an integrated set of agronomic and water management practices for small tanks based on the preparation of land using the pre-*Maha* monsoon rains, early sowing, and the saving of the tank water for a *Yala* crop. The Tank Irrigation Modernisation Project has been promoting the same concept in five large tanks in the North Central and Northern Provinces. It has also brought agriculture and irrigation closer together by organising work teams comprising members of all field departments—Agriculture, Irrigation, Agrarian Services and Land Commissioner's Department—to promote and supervise early sowing and a tight water rotation system at the tract level.

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X

It is too early to claim either that there is much firm progress in implementing water management or that progress will definitely come from outside the Irrigation Department.There is however a level of interest in doing something about water management which did not exist before, and this interest is coming from institutions which are either completely new or new to irrigation.

Although one could not begin to predict the future, we can suggest two changes which may come about if present trends continue. The first is that those existing irrigation schemes which have either recently begun to receive Mahaweli water (e.g. Minneriya, Kaudulla, Kantalai) or are scheduled to do so in future—will come under the control of one of the Mahaweli agencies. Cropping on, for example, the Kaudulla scheme is currently determined in large part by the volume and timing of water releases from Mahaweli via Minneriya tank. It seems unlikely that the two systems can be managed separately in an efficient way.

The second potential change, perhaps less likely in the shorter term, is that large-scale schemes outside the Mahaweli system will be brought under some kind of integrated management, similar perhaps to that practised on the Mahaweli areas. Such a form of management would give equal emphasis to agriculture and to water management, aiming ultimately at the dissolution of the distinction between these two disciplines. A prototype may be the joint 'planning teams' each comprising an Agricultural Instructor and a Technical Assistant (i.e. junior engineer), which are being established in the Agrarian Services Department to draw up water management procedures for minor tanks.

Whether or not such scenarios are realised, there will certainly be pressures in this general direction arising from the objective situation. The structure and character of Sri Lanka's irrigation organisation still largely reflect a situation in which the main problem and thrust of public activity lay in impounding rainfall to create an irrigation potential. The pressures now are (*a*) to manage water so that this potential may be realised; and (*b*) to undertake the physical rehabilitation of existing systems in order to make it physically easier to manage water. If existing irrigation organisations are unable to meet the challenge, then new ones may arise to take their place.

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FOOTNOTES

1. The author was stimulated to put these ideas on paper by a conversation with Gil Levine. He hopes that in the process Gil's ideas have not been unduly plagiarised. Useful information was provided by C. M. Wijayaratne; supportive comments on an earlier draft by Mr. J. Alwis and Dr. C. Panabokke; and useful comments by Robert Wade and Doug Merry. They are however not responsible for the opinions expressed here. For the purposes of writing this paper it was felt unnecessary to footnote in detail points about irrigation and water management which the author and others have made elsewhere. For general background see Chambers 1975; Moore 1979 and 1980 and the papers presented to the seminar on Land Settlement Experiences in Sri Lanka held in Colombo in April 1981.
2. The classic account of this process remains Farmer 1957.
3. This concern was concretised in the designation of certain Dry Zone schemes as Special Projects in the 1960s.
4. Perhaps the first publicly–available written statement of this point is Chambers 1975.
5. Roberts 1972.
6. Perera 1975: 13–14.
7. Quoted in Perera 1975: 14.
8. One might note that the creation of a separate Irrigation Department immdiately preceded a shift of emphasis to larger scale new irrigation schemes (Farmer 1957: 106). The causal connection between these two events is unknown.
9. Some idea of this is conveyed by Perera 1975. See also the list of important events in the history of the Irrigation Department in pp. 86–96 of the same volume.
10. See Manamperi 1975: 36. The author is grateful to Mr. P. Ganewatte for this reference.
11. See for example the Report of the Gal Oya Project Evaluation Committee.
12. For example, it was found on part of the Mahakanadarawa scheme that the largest field channel was fifty-one times the length of the shortest. For distributary channels the figure was thirteen times. More importantly, the area served per foot of field channel was nearly six times as great in one case as in another. In the case of distributary channels it was almost thirty times as great (see Irrigation Department, Sri Lanka and Tropical Agriculture Research Centre, Japan, 1975: 44).
13. For example, in the study referred to above, relating to the 1973–74 *Maha* season, the farmers on one distributary channel received four times as much water per acre as those on another (ibid: 56).
14. The causes and extent of this inequality between top-enders and tail-enders are discussed in Moore *et al.*, forthcoming.
15. These points about seasonal water meetings are discussed and documented in case studies in Murray–Rust and Moore, forthcoming.
16. The quotation is from p. 88 of the brief history of the Irrigation Department quoted in footnote 9 above.
17. See, for example, on the Taiwan case, Bottrall 1977.
18. This presumes that improved water management would require a denser ratio of staff to irrigated area in line with other Asian countries. It is however possible that farmers' organisations could provide effective substitutes.
19. See Shanmugarajah and Atukorale 1976.
20. See De Silva 1981.
21. Source as in footnote 16, p. 95.

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CHENA-PADDY INTERRELATIONSHIP AND DRY SOWING: THE EXPERIENCE IN AN IRRIGATION SCHEME IN SRI LANKA

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ABSTRACT

Two of the main problems which limit agricultural production in most of the major colonisation irrigation schemes in Sri Lanka seem to be the insufficient use of rainfall and wasteful use of stored water. Several reports point out that the main reasons for these problems are the priority given to chena cultivation and inadequate farm power for land preparation, and recommend land preparation with mechanical power within a short time, preferably a significant portion of it while dry or following the first monsoon rains and practice of dry sowing (**kekulan**) *with paddy. The results indicate that the annual net farm income is considerably higher if mud sowing is carried out as at present in December, when compared with dry sowing in September and the continuing of chena would not impede the development of paddy cultivation.*

INTRODUCTION

Appraisal reports of the Tank Irrigation Modernization Project (World Bank 1976), Kurunegala Rural Development Project (World Bank 1979), and Dewahuwa Rural Development Project (Japan International Co-opeation Agency 1970) point out that because of inadequate farm power for land preparation and the priority given to chena cultivation, the *Maha* [1] paddy sowing is extended into late January and insufficient use is made of rainfall. Also as a result little, if any, water is available in the tanks for the *Yala*[2] crop.

According to these appraisal reports a contributory reason for the extended *Maha* and *Yala* sowing periods is the practice of chena cultivation in nearby jungle areas. To make maximum use of the *Maha* rainfall and to enbale the crop to keep ahead of the regenerating weeds, planting of the chena lands takes place as soon as it begins to rain. Under present conditions, farmers consider chena cultivation as more dependable than their irrigated agriculture and they are reluctant to do anything that would interfere with its success. Only when the chena lands are secured is attention transferred to paddy lands where, in the meantime, much of the rainfall and often a significant amount of the irrigation water released from the storage for those who sowed earlier has been wasted. *Yala* plantings are delayed partly by the delays in starting the *Maha* crop and partly by the need to harvest and replant the chena lands, before starting the *Yala* crop on the irrigated lands.

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1 Maha : great North - East monsoon season

2 Yala : little, South - West monsoon season

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Appraisal reports of the Tank Irrigation Modernization Project and Kurunegala Rural Development Project envisage dry sowing (*kekulan*)from late September through October for harvesting in January through early February with the *Maha* crop. Early plantings of the *Maha* crop would permit taking advantage of the early monsoon rains so as to reduce the need for irrigation. *Yala* dry sowing would be from February to early March for harvesting in late May and June. The seedbed for the entire service area would be prepared with mechanical power within a shorter time than at present, preferably a significant portion of it while dry or following the first monsoon rains. This would decrease the demands on tank storage for pre-irrigation to soften the soil.

Using linear programming and representative farm techniques, this paper attempts to examine whether there are any possibilities of increasing farm income by starting *Maha* cultivation in September to make use of early *Maha* rains instead of mid December to early January, and to ascertain the impact of increase in water availability for *Yala* cultivation through better use of *Maha* rainfall and better management of water in the tank on farm income, employment and cultivation of subsidiary food crops in lowland during the *Yala* season.

This paper is based on the Mahavillachchiya irrigation colonisation scheme (MvCS), which is in the Tank Irrigation Modernization Project and the first tank in which modernisation has been completed. The data on the MvCS have been obtained from two field surveys conducted during the period October 1976 to June 1977 and in May 1980, using a stratified random sample.

Specification of the Analytical Linear Programming Model

A linear programming problem has an objective function to be maximised or minimised, alternative processes or activities none of which can enter at negative values and a set of constraints. Fundamental assumptions like linearity, the additivity of activities, the infinite divisibility of resources and products, finiteness in the number of alternative activities, fixed input-output coefficients and resource supply limit the usefulness of the technique to a certain extent. But, modifications to the basic linear programming model provide the means of overcoming many of these problems as amply demonstrated by various research workers (Giaver and Seagreaves 1960; McFarquhar 1961; McInerney 1965, etc.).

a. Objective function

The peasant in Sri Lanka has basically two closely inter-related common goals, namely, expanded family security and maximisation of farm income. There are various means for achieving these objectives such as increased land productivity, increased labour productivity and the establishment of congenial relations with other members of the community etc.

According to the field investigations in 1980, it is evident that 90 percent of surveyed farmers are interested primarily in maximising cash income after they have secured their subsistence level requirements with a high level of certainty. Six and four percent of farmers said that the main objective of farming is to maximise cash income only and to produce necessary food only, respectively. None of the farmers selected options such as to maximise land productivity, to maximise labour

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productivity or to maximise farm production. Farm production was found to be semi-subsistence in nature with approximately 40 to 50 percent of the farm produce being retained for domestic consumption.

Taking into account the above facts, maximisation of net farm income (gross income minus cash expenditure for production) is used as the objective function, subject to minimum paddy acreage being planted to ensure the attainment of farmers' subsistence level requirements with a high level of certainty and extended family security.

b. Resource and other constraints

Besides the categorisation of land into three groups, i.e. lowland, highland and chena, the availability of land during the two cropping seasons is included in the models. Within these land groups soil characteristics—fertility, past land use and land improvements—cannot be taken into account since data are not availabe to link such variations with corresponding input-output coefficients.

It is assumed that there is no difference in the level of efficiency of family and hired labour, and that hired labour can be used to supplement family labour at current wage rates, its use being constrained by the availability of working capital. It seems reasonable to assume that adequate wage labour is available to be hired by the settler farmers, as there are 200 squatters, who depend primarily on hiring out their labour for living, compared with 880 settler farmers in the MvCS. In computing the labour resources available, children between 12 and 15 years of age and women are considered as only 50 and 80 percent respectively as effective as men in chena and highland preparation. These weights are calculated on the basis of prevailing wage rates. Women are considered as effective as men in harvesting. Only women are engaged in paddy transplanting and only men are engaged in lowland preparation. The active population is considered to be all those between twelve and sixty five years of age. Labour periods based on seasonal peak requirements are defined and the labour availability and input coefficients computed accordingly rather than using monthly time periods. The specification of labour on a monthly basis implies that farm tasks can be performed at any time within the course of the month and it cannot be wholly accepted as satisfactory due to the other uncertainties operative in the production environment. The potential family labour force is computed on the basis of 250 working days per year, based on observations made during the field study. The total labour potential for each farm is considered as the product of total work days for the respective peak and the adult equivalents available for farming.

The need for working capital has become more important with the increased use of modern inputs in production. If there is adequate working capital, the fixed capital limitations such as the lack of draught power, whether tractors or buffaloes, can be overcome as these services can be hired. The capital available for production is assumed to be 70 percent of the cash income received by the farmers, based on observations made during the field study. This level is considered more useful than a measure of the ability of the farmer to borrow beyond his usual borrowing for paddy cultivation.

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The availability of irrigation water is an important factor determining the success of farming in these schemes. The feasibility of cultivation in the *Yala* season generally depends on the water stored in the tanks during the *Maha* season. Irrigation water is introduced in the model as a constraint in order to investigate the size of the increased farm incomes and production obtainable when more water is made available. It is assumed that farmers will invariably cultivate all three acres[3] of lowland in *Maha*. The quality of irrigation water can be ignored as the source of water is common to all the farmers in the scheme.

Consumption requirements will enter the production model as a 'minimum bundle of goods' required per settler family during a cropping year. The only food constraint specified is a minimum paddy acreage put at one acre per household, which ensures the attainment of farmers' subsistence level requirements with a high level of certainty and extended family security.

To avert risk, most surveyed farmers cultivated not more than one acre of chillies. Paddy grown on chenas has also been limited to a maximum extent of one acre. The maximum area under chillies and paddy in chena did not exceed one acre per holding during *Maha* 1976/77. A maximum constraint of one acre under these crops has been included in the matrix.

No technological constraints in terms of rotational husbandry practice are incorporated as farmers practise a system of continuous cropping of paddy under conditions of improved water supply. In highland cultivation there is no systematic rotation and a pastoral fallow is not customary due to the lack of a systematic livestock industry in the locality.

c. Crop activities

Lowland paddy cultivation is sub-divided into a number of activities considering the duration of variety, kind of draught power and method of planting. The impact of these practices will be analysed by studying their impacts on the gross margin per unit activity and their impact on the input-output coefficients of the model. The culitvation of pulses and chillies is included as a probable activity in lowland during *Yala* season. Gingelly (sesame) cultivation is restricted to *Yala* while the crops which may be grown in the highland and chena areas in *Maha* are cowpea, green gram, upland rice, maize, finger millet and chillies (Annex 1). The period over which income is to be maximised is one cropping year.

Use of Representative Farms

If inadequate consideration is given to the variations in land, water and human resources, it will restrict the making of valid recommendations for farms which show a variation from the mean in resource endowments. The use of an average farm, therefore, aggregates non-homogeneous groups together and results in aggregation bias. Aggregative analysis assumes conditions of homogeneity within the groups of farms, resources and products. In such analysis consequently, the research worker continually weighs the convenience of aggregation at a higher level against the loss of relevant data. Details are significant when they represent differences in economic attributes.

3. Generally each settler is alienated three acres of lowland and two acres of highland

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The average farm's caharacteristics may not exist in a single farm or it may represent only one group of the population. The analysis of income distribution and yield distribution of paddy shows a considerable variation among farmers in the MvCS (ARTI 1976; Vithanage 1982). Although there is an equivalent of 2.6 full-time adult equivalents per household, 32.6 percent of the farm households have less than two full-time adult equivalents in the MvCS. The paddy lands served by the left bank canal have a better water supply than those served by the right bank canal since the sluice at the head of the former is six feet lower than that of the latter. It is incorrect to include all these non-homogeneous factors together and to produce an average farm. The average input-output coefficients based on data from different farmers and fields, even if they are not completely infeasible, may not be used by any one farmer in practice. Farmers may in fact alter their strategies or technical inputs under environmental conditions and there is no theoretical reason to believe that average inputs will give rise to average outputs. Use of a single average farm or modal farm in non-homogeneous conditions is likely to lead to substantial errors in predictions.

One way of avoiding aggregation bias would be to construct a farm model for each individual farm and to solve these models taking into account various interdependencies between farms such as the movement of intermediate goods of production and competition for common scarce resources. As mentioned ealier, there are 880 farms at MvCS and in practice it is not possible to programme all the individual farms.

To make more appropriate projections, several modal farms are used rather than one. This involves classifying the universe of farmers into a smaller number of homogeneous groups constructing a model for a representative farm for each group. In the first stage of categorisation the MvCS was divided into the two banks, so as to examine certain features of relevance to the availability of water. In the MvCS, land availability per household mainly depends on labour availability which determines the chena extent; labour has been chosen as the prime determinant of the farms representative of each bank. Two and three farms from the left bank and right bank, respectively, were chosen from different labour availability groups as representative farms for this study (see Tables 2 to 7).

Results

With the objective of achieving maximum economic efficiency, the analyses explore production and resource use possibility by modifying the 'state of arts' that is with improved water management and selective mechanisation, given the resource endowments of the farms.

Irrational or economically inefficient production can be defined as it relates to profit maximisation if resources can be used differently from the present in any manner whatsoever to either (i) give a greater product from the same collection of resources or (ii) give the same product with a smaller outlay of fixed and variable resources (Heady 1952). Therefore as far as the present problem is concerned the difference between the optimum income obtained by reorganising the cultivation calendar and product combinations to maximise farm incomes, given present resource endowments and the income obtained at present by famers, should indicate the level of allocative efficiency.

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A linear programming run was carried out assuming farmers will prepare lowland for dry sowing during September and another run, assuming the lowland preparation for mud sowing will be done in December and January as at present. It is not practicable to have a combined programme of dry sowing in September and mud sowing in December due to the unwillingness of farmers to dry sow and the administrative infeasibility of dividing water for one area for dry sowing and for another area for mud sowing within the same scheme. Dry sowing in September leads to a saving of 7.6 inches per acre on net irrigation requirements (Table 1) with 44 percent on-farm and 70 percent transmission efficiencies. This will increase the water available in the tank for *Yala* from 4.4 acre feet per farm to 11.0 acre feet. The optimal farm incomes generated by linear programming under these two conditions for the five representative farms will be compared.

The results indicate that farm incomes are not improved by dry sowing in September in any farm group with the given level of resources and state of technology (See Tables 2 to 7, Annexes 1 and 2). It is evident that the net farm income (after subtracting costs of material inputs and hired labour from gross income), is considerably higher under present conditions. In fact, 17 to 23 percent higher income is possible for all representative farms, if mud sowing is carried out in December with 4.4 acre feet per farm of water available in the tank for *Yala*, when compared with dry sowing in September. In any case, this type of situation might not have been expected as the cultivated lowland area in *Yala* would be increased with greater availability of *Yala* water with dry sowing, (from 4.4 to 11.0 acre feet per farm). In fact, other than the fourth representative farm, which would cultivate 2.2 acres of lowland, all other farms would cultivate all three acres of lowland in *Yala* with dry sowing in September (Table 2). But out of all paddy activities, only the broadcast paddy activity and tractor ploughing can be adopted in lowland under dry sowing, and the yield of broadcast paddy is 13 percent lower than that transplanted, and tractor ploughing would reduce the gross margin of the A4, A8, AA4 and AA8 activities still further (see Annexes 1 and 2 for a description of abbreviations). The representative farms with the lowest amount of labour available would cultivate a smaller area of lowland in *Maha* and all representative farms would cultivate reduced areas of chena and highland in *Yala* season with dry sowing in September. This is primarily due to the competition for labour as chena and highland have to be cultivated with first *Maha* rains. In contrast to the appraisal report assumptions, farmers would concentrate more on lowland than chena. This implies that continuing of chena cultivation would not impede the development of paddy cultivation.

The Tank Irrigation Modernization Project appraisal report assumes that net farm income as well as labour requirements for agriculture would increase with dry sowing in September. It is evident according to Tables 2 and 3 that due to the exhaustion of family labour, more hired labour has been used in the December plan as against that with September dry sowing. This type of result should be expected as although the cultivated area of lowland in *Yala* would be increased with dry sowing, the cultivated area of highland and chena would be reduced, and buffalo ploughed and transplanted paddy required about 19 man days per acre more than with tractor ploughed and broadcast paddy.

Looking at the activities in the optimal plans, the results are quite consistent with the farming systems followed at present. A paddy dominant farming system with a few other crop enterprises emerging in the optimal plans, under the *ceteris paribus* assumptions. According to the December plans farmers would cultivate

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all three acres of lowland, an extent of 0.7 acres of highland and 2 to 3 acres of chena per farm in a *Maha* season. These figures are compatible with 1976/77 *Maha* season (ARTI 1979). The results indicate that although labour can be supplied by the farm family itself, labour has to be hired particularly on the representative farms with only low amounts of labour available. The need to accomplish farm operations on time and consequently the need for hired labour exists. It should be pointed out that the farmers would prefer high yielding long duration paddy varieties and land preparation with buffaloes rather than tractors as at present (A1, A2, AA1, and AA2 activities shown in Tables 3 to 6). Tables 2 to 6 show the marginal value products of constraints. From Tables 2 to 6 it can be seen that almost all the lowland and chena acreages have been utilised in *Maha*. This has resulted in higher marginal value products of lowland and chena in *Maha* with December plans when compared with September plans. A similar interpretation can be given to the family labour and availability of water in *Yala*.

Of importance for farm planning are the excluded activities, i. e. activities which did not enter the programmes. The plans show how much the gross margin of each enterprise should rise before it could enter the programme. If this rise is added to the existing gross margin, a 'shadow gross margin' or marginal opportunity cost can be obtained. This marginal opportunity cost, therefore, shows the level which the existing gross margins would have to attain before the excluded activities come into the programme. These marginal opportunity costs for three different plans are given in Table 8. Apart from showing possible areas of expansion on farms, the changes in gross margin, needed to bring alternative solutions, are an indication of the stability of the present solution. Barnard and Nix (1973) state that where large changes in net revenues are needed to induce new plans, there can be greater confidence that even if the values were uncertain in the first place the solution will nevertheless be the same as that obtaining if the true values had been known and incorporated. For instance, other than for chena chillies and maize, the changes needed in the present plans are high and so one might assume stability in the solution (Table 8).

In the above analysis, farms are assumed to be profit maximising enterprises. In reality they include farm business and household activities in combination. For incorporating the behavioural aspect of the settlement farms consumption constraints were also considered. A minimum paddy acreage (1 acre) in *Maha* with a minimum level of living constraint based on the field investigations was specified. It was, however, found that it was not necessary to re-run the model without the minimum paddy acreage as only two representative farms with a low amount of labour available would cultivate the minimum paddy acreage with dry sowing in September. This indicates that the objective of profit maximisation does not in most cases conflict with the consumption needs of the settlement farmers and that the optimal solutions are congruent with farmers' needs.

A primary objective of the modernization is to increase water availability for *Yala* cultivation through better use of *Maha* rainfall and better management of water in the tank. It was, therefore, necessary to re-run the model only changing the water available in the tank per farm during *Yala* with the relevant ex-sluice water duty per acre. Optimal plans with mud sowing in December and with 4.4, 7.0, 9.4, and 23.1 acre feet per farm water available in the tank for *Yala* cultivation are given in Tables

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3 to 6. It is observed that all representative farms would cultivate all three lowland acres when the *Yala* water availability is increased to 23.1 acre feet per farm. Dramatic changes in net farm incomes, production possibilities and resource use can also be observed. The increase in net farm income of representative farms with a low amount of labour available is 6.5 percent and of representative farms with medium and high amounts of labour available is about 15 to 20 percent. But it is observed that farmers would prefer to cultivate paddy in lowland when there is more water available. Farmers would cultivate subsidiary food crops on all cultivable lowland area (1.6 acres) when there is only 4.4 acre feet per farm water availability. Other than the representative farms with a low amount of labour available in the left bank all other farms would cultivate 0.4 acres of subsidiary food crops and 2.6 acres of paddy in lowland when there is 23.1 acre feet per farm water availability. These results are quite consistent with the present situation at MvCS. Tail end farmers at MvCS, who face water shortages cultivated subsidiary food crops in lowland in 1980 *Yala* when all other farmers cultivated paddy. Farmers at MvCS were reluctant to cultivate subsidiary food crops in 1978 and 1979 *Yala,* and they cultivated paddy on about 93 percent of lowland in these seasons. It was evident again that farmers would concentrate more on lowland rather than chena or highland when there is adequate water to cultivate lowland. Farmers would cultivate smaller areas of chena and highland in *Yala* with 23.1 acre feet per farm water availability when compared with 4.4 acre feet per farm.

However, the analyses indicate that the net farm income does not increase substantially when there is more than 9.4 acre feet per farm water availability under present resource endowments and assumptions (Tables 5, 6 and 7). The increase in net farm income is only about 0 to 1.2 percent for representative farms with a low amount of labour available and is about 3 to 7 percent for other representative farms. When there is 9.4 acre feet per farm water availability, representative farms with low amount of labour would cultivate all three lowland acres and others would cultivate about two acres of lowland. As discussed earlier there is a shift from subsidiary food crops to paddy in lowland and a smaller area of highland is cultivated when water availability in *Yala* is increased from 9.4 to 23.1 acre feet per farm.

CONCLUSIONS

The primary concern of the project is to conform to the rainfall pattern in timing of primary tillage and planting. Although dry sowing in September will increase the availability of water in the Mahavillachchiya tank from 4.4 acre feet per farm to 11.0 acre feet, the annual net farm income is considerably higher if mud sowing is carried out as at present in December, when compared with dry sowing in September. Dry sowing could only make a negative contribution toward easing unemployment and under-employment in settlement schemes. It therefore, seems unlikely that dry sowing could be forced on farmers in the major irrigation schemes.

In contrast to common assumptions, farmers would concentrate more on lowland than chena cultivation when there is adequate water to cultivate lowland. This implies that the continuing of chena cultivation would not impede the development of paddy cultivation.

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Although the government insists on subsidiary food crops cultivation in lowland during the *Yala* season, farmers would prefer to cultivate paddy in lowland when there is more water available. There is a shift from subsidiary food crops to paddy in lowland, and a smaller area of highland is cultivated when water availability in *Yala* is increased. On the other hand, the net farm income does not increase substantially when there is more than 9.4 acre feet per farm (3.1 acre feet per acre) water availability in *Yala* under present resource edowments and assumptions. This implies that emphasis should be given to the supply of an optimum amount of water rather than to the provision of water to all cultivable lowlands.

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Table 1—CROP WATER DEMAND PER ACRE FOR PADDY

	September dry sowing						*December mud sowing*					
	Sept.	Oct.	Nov.	Dec.	Jan.	Total	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Evapo-transpiration (in.)	6.7	5.2	4.1	4.3	4.5		4.3	4.5	5.5	6.7	6.5	
Crop factor		1.00	1.15	1.20	0.9			1.00	1.15	1.20	0.9	
Consumptive use (in.) ...		5.2	4.7	5.2	4.1	19.2		4.5	6.3	8.0	5.9	24.7
Land- preparation (in.)	4.0	2.0				6.0	4.0	2.0				6.0
Total water requirements (in.) ...	4.0	7.2	4.7	5.2	4.1	25.2	4.0	6.5	6.3	8.0	5.9	30.7
Effective rainfall [a] (in.) ...	0.5	3.5	3.4	3.0	0.8	11.2	3.0	0.8	0.6	1.7	2.5	8.6
Net irrigation requirements (in.) ...	3.5	3.7	1.3	2.2	3.3	14.0	1.0	5.7	5.7	6.3	3.4	22.1
Field water requirements [b] (in.) ...						31.8						50.2
Ex-sluice water duty [c] (in.) ...						45.5						71.8

Note: *a.* *A* 75% rainfall exceedance expectancy; *b.* with 44% on-farm efficiency; *c.* with 70% transmission efficiency.

Source: *World Bank Appraisal Report* (1976).

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Table 2—OPTIMUM PLAN WITH DRY SOWING IN SEPTEMBER

		Left Bank		*Right Bank*		
		Low Labour (1) *Amount*	*High Labour* (2) *Amount*	*Low Labour* (3) *Amount*	*Medium Labour* (4) *Amount*	*High Labour* (5) *Amount*
Net farm income (Rs.)	...	7152	8896	6487	8468	8775
Activities Basis A 4	...	1.0	3.0	1.0	3.0	3.0
H 2	...	1.1				
C 2	...	1.9	3.0	1.8		0.1
C 3	...	0.1				
C 4	...			0.2		
C 5	...				3.0	3.9
AA 4	...		0.3		1.0	0.3
AB 2	...	2.1	1.7	2.0	0.2	1.7
AB 3	...	0.9	1.0	1.0	1.0	1.0
CC 1	...	2.0	2.3	0.4	0.1	
HL 2M	...		44.6			
HL 4M	...	6.9	45.5	4.8	31.5	48.6
HL 6M	...	75.5	92.0	63.8	7.6	40.3
HL 8	...	29.0	36.8	20.2		12.5
E	...	1556	1924	951	2135	1278
Resources: ML	...	0	410	0	412	446
MH	...	0	0	0	0	0
MC	...	120	33	53	41	207
YL	...	322	204	211	0	226
YH	...	0	0	0	0	0
YC	...	48	0	0	0	0
FL2M	...	4.4	10.0	7.4	7.8	4.9
FL 3	...	0	0	0	0	0
FL4	...	10.0	10.0	10.0	10.0	10.0
FL6M	...	10.0	10.0	10.0	10.0	10.0
FL7	...	8.6	0.6	5.8	0	0
FL8	...	10.0	10.0	10.0	6.4	10.0
YW	...	0	31.58	0	65.88	16.32

Note: a. Low, medium and high labour, means that representative farms have been chosen after stratifying farm household according to farm labour availability; b. Col. 1–amount used in acres by crops, man days, for hired labour, borrowing in rupees for credit; c. description of abbreviations; see annex 1.

Note: a. Col. 1–marginal value product of resources in rupees; b. description of abbreviations, see annex 2.

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Table 3—OPTIMUM PLAN WITH DECEMBER LOWLAND PREPARATION AND 4.4 ACRE FEET PER FARM WATER AVAILABLE IN THE TANK FOR *YALA* CULTIVATION

		Left Bank		*Right Bank*		
		Low Labour (1) *Amount*	*High Labour* (2) *Amount*	*Low Labour* (3) *Amount*	*Medium Labour* (4) *Amount*	*High Labour* (5) *Amount*
Net farm income (Rs.)	...	8621	10433	7952	10017	10266
Activities-basic A1	...	3.0	2.3	3.0	3.0	2.3
A2	...		0.7			0.7
H2	...			1.7		1.9
H3	...	0.6				
C1	...	1.0				
C2	...		2.0			
C3	...	1.0	1.0	1.0	1.0	1.0
C4	...			1.0		2.0
C5	...				2.0	1.0
AB2	...	1.6	1.6	1.6	1.6	1.6
HH1	...	0.4		2.0	2.0	2.0
CC1	...	2.0	3.0	2.0	3.0	4.0
HL1	...		3.8		3.9	
HL2M	...	22.9	13.2	25.9	13.7	14.2
HL2F	...	14.5		13.5	14.5	
HL3	...				3.0	
HL4	...	24.2	24.1	24.2	25.2	28.2
HL5M	...	13. 2	28.0	38.0	59.0	85.0
HL6M	...			12.0		
HL7	...		10.0	12.0	21.0	
E	... ...	1740	302	1867	1564	614
Note: See note on activities in basis in Table 2						
Resources: ML	... ...	183	660	229	697	582
MH	... ...	0	0	0	0	0
MC	... ...	89	73	74	11.4	86
YL	... ...	0	0	0	0	0
YH	...	0	0	20	15.0	30
YC	... ...	156	52	39.4	14.4	52
FLI	...	8.2	10	9.4	10.0	6.1
FL2M	...	10.0	10	10.0	10.0	10.0
FL2F	...	8.0	7.0	8.0	8.0	5.3
FL3	...	0	0	0	10.0	0
FL4	...	10.0	10.0	10.0	10.0	10.0
FL5	...	10.0	10.0	10.0	10.0	10.0
FL6M	...	0	0	10.0	0	0
FL6F	...	0	0	0	0	0
FL7	...	5.9	10.0	10.0	10.0	0
FL8	...	0	0	0	0	0
YW	...	264	285	126	200	285

Note: See note on resources in Table 2.

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Table 4—OPTIMUM PLAN WITH DECEMBER LOWLAND PREPARATION AND 7.0 ACRE FEET PER FARM WATER AVAILABLE IN THE TANK FOR *YALA* CULTIVATION

		Left Bank			*Right Bank*	
		Low Labour (1)	*High Labour* (2)	(*Low Labour* (3)	*Medium Labour* (4)	*High Labour* (5
		Amount	*Amount*	*Amount*	*Amount*	*Amount*
Net farm income (Rs.)	...	9044	10925	8163	10500	10683
Activities–Basis: A1	... ...	3.0	2.3	3.0	3.0	2.3
A2	... ...		0.7			0.7
H2	... ...			1.7		1.9
H3	... ...	0.6				
	... ...	1.0				
C1	... ...		2.0			
C2	... ...	1.0	1.0	1.0	1.0	1.0
C 3	... ...			1.0		3.0
C5	... ...				2.0	
AA1	...		0.2		0.5	0.3
AB2	...	2.6	2.0	2.6	1.4	1.9
HH1	...			2.0	2.0	
CC1	...	2.0	3.0	2.0	2.2	4.0
HL1	... ...		3.8			
HL2M	...	22.9	13.2	25.9	13.7	14.2
HL2F	...	14.5	0	13.5	14.5	
HL3	... ...		0		3.0	
HL4	... ...	24.2	24.1	24.2	25.2	28.1
HL5	... ...	8.0	28.0	38.0	43.4	51.0
HL6M	...	19.4	9.3	38.0		7.4
HL7	... ...	5.7	10.0	12.0	13.2	
HL8	... ...	5.7		11.7		
E	... ...	2552	747	2705	1763	806
Note: See note on activities in basis in Table 2						
Resources: ML	... ...	183	660	229	697	582
MH	... ...	0	0	0	0	0
MC	... ...	89	73	74	21	86
YL	...	0	0	0	0	0
YH	...	0	0	20	1	0
YC	... ...	174	22	39	0	22
FL1	...	8.2	10.0	9.4	5.7	6.1
FL2M	...	10.0	10.0	10.0	10.0	10.0
FL2F	...	8.0	7.0	8.0	8.0	5.3
FL3	...	0	0	0	10.0	0
FL4	... ...	10.0	10.0	10.0	10.0	10.0
FL5	... ...	10.0	10.0	10.0	10.0	10.0
FL6M	...	10.0	10.0	10.0	4.8	10.0
FL6F	...	0	0	0	0	0
FL7	... ...	0	10.0	10.0	10.0	
FL8	... ...	10.0	6.9	10.0	0	9.5
YW	...	119	126	78	174	103

Note: See note on resources in Table 2

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Table 5--OPTIMUM PLAN WITH DECEMBER LOWLAND PREPARATION AND 9.4 ACRE FEET PER FARM WATER AVAILABLE IN THE TANK FOR *YALA* CULTIVATION

		Left Bank		*Right Bank*		
		Low Labour (1)	*High Labour (2)*	*Low Labour (3)*	*Medium labour (4)*	*High Labour (5)*
		Amount	*Amount*	*Amount*	*Amount*	*Amount*
Net Farm income (Rs.)		9175	11444	8306	11200	11143
Activities–Basis	A1	3.0	2.3	3.0	3.0	2.3
	A2		0.7			0.7
	H2			1.7		1.9
	H3	0.6				
	C1	1.0				
	C2		2.0		1.6	
	C3	1.0	1.0	1.0	1.0	1.0
	C4			1.0		3.0
	C5				0.4	
	AA1 ...		1.4	0.5	1.8	1.6
	AA2					
	AB2 ...	3.0	0.8	2.5		0.4
	HH1			2.0	2.0	2.0
	CC1 ...	2.0	3.0	2.0	3.0	4.0
	HL1		3.8			
	HL2M ...	22.9	13.2	25.9	13.0	14.2
	HL2F ...	14.5		13.5	14.5	
	HL3				9.4	
	HL4	24.2	24.1	24.2	25.2	28.1
	HL5		28.0	38.0	59.0	85.0
	HL6M ...	8.0		45.8		
	HL7		10.0	12.0	21.0	
	HL8	11.0	4.0	8.2	2.1	3.7
	E ...	2917	769	3163	2280	924
Note: See note on activities in basis in Table 2						
Resources:	ML ...	183	660	229	697	582
	MH ...	0	0	0	0	0
	MC ...	89	73	74	21	86
	YL ...	322	0	92	0	0
	YH ...	0	0	20	15	11.7
	YC ...	174	38	39.4	14.4	33.7
	FL1 ...	8.2	10.0	9.4	2.7	6.1
	FL2M ...	10.0	10.0	10.0	10.0	10.0
	FL2F ...	8.0	7.0	8.0	8.0	5.3
	FL3 ...	0	0	0	10.0	0
	FL4 ...	10.0	10.0	10.0	10.0	10.0
	FL5 ...	10.0	10.0	10.0	10.0	10.0
	FL6M ...	10.0	4.5	10.0	0	6.1
	FL6F ...	0	0	0	0	0
	FL7 ...	0	10.0	10.0	10.0	0
	FL8 ...	10.0	10.0	10.0	0	10.0
	YW ...	0	173	44	203	148

Note: See note on resources in Table 2

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Table 6—OPTIMUM PLAN WITH DECEMBER LOWLAND PREPARATION AND 23.1 ACRE FEET PER FARM WATER AVAILABLE IN THE TANK FOR *YALA* CULTIVATION

		Left Bank		*Right Bank*		
		Low Labour (1)	*High Labour* (2)	*Low Labour* (3)	*Medium Labour* (4)	*High Labour* (5)
		Amount	*Amount*	*Amount*	*Amount*	*Amount*
Net Farm Income (Rs.)	...	9175	12218	8465	11983	11787
Activities-Basis A1	...	3.0	2.3	3.0	3.0	2.3
A2	...		0.7			0.7
H2	...			1.7		1.9
H3	...	0.6				
C1	...	1.0				
C2	...		2.0		1.6	
C3	...	1.0	1.0	1.0	1.0	1.0
C4	...		1.0			3.0
C5	...			0.4		
AA1	...		2.3	2.6	2.8	2.28
AA2	...		0.3		0.2	0.35
AB2	...	3.0	0.4	0.4		.37
HH1	...			2.0		
CC1	...	2.0	3.0	2.0	2.1	4.0
HL1	...		3.8			
HL2M	...	22.9	13.2	25.9	12.9	14.2
HL2F	...	14.5		13.5	14.5	
HL3	...				9.4	
HL4	...	24.2	24.1	24.2	25.2	28.1
HL5	...	8.0	28.0	38.0	11.0	51.0
HLM	...	30.0	19.2	32.9	7.8	21.8
HL6F	...			9.3	11.1	
HL7	...		10.0	12.0		
HL8	...	11.0	22.5	23.3	20.4	26.2
E	...	2917	1372	3585	2863	1382
Notes: See note on activities in basis in Table 2						
Resources: ML ...	...	183	660	229	697	582
MH ...	...	0	0	0	0	0
MC ...	...	89	73	74	27	86
YL	...	322	115	202	0	122
YH	...	0	0	20	0	0
YC ...	...	174	22	39	0	22
FL1 ...	...	8.2	10.0	9.4	2.7	6.1
FL2M	...	8	10.0	10.0	10.0	10.0
FL2F	...	8.0	7.0	8.0	8.0	5.3
FL3	...	0	0	0	10.0	
FL4 ...	...	10.0	10.0	10.0	10.0	10.0
FL5 ...	...	10.0	10.0	10.0	10.0	10.0
FL6M	...	10.0	10.0	10.0	10.0	10.0
FL6F	...	0	7.0	8.0	8.0	5.3
FL7	...	0	10.0	10.0	8.4	0
FL8 ...	...	10.0	10.0	10.0	10.0	10.0
YW	...	0	64.9	3.16	82.98	54.74

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Table 7—SUMMARY TABLE OF DRY SOWING IN SEPTEMBER AND MUD SOWING IN DECEMBER PLANS

	Left Bank [a]						*Right Babk* [a]								
	Low Labour (1) 1*st* *Representative Farm*			*High Labour* (2) 2*nd* *Representative Farm*			*Low Labour* (3) 3*rd* *Representative Farm*			*Medium Labour* (4) 4*th* *Representative Farm*			*High Labour* (5) 5*th* *Representative Farm*		
	September dry sowing	*December plans with* 4.4[d] *ac. ft.*	*with* 23.1[d] *ac. ft.*	*September dry sowing*	*December plans with* 4.4 *ac. ft.*	*with* 23.1 *ac, ft.*	*September dry sowing*	*December plans with* 4.4 *ac. ft.*	*with* 23.1 *ac. ft.*	*September dry sowing*	*December plans with* 4.4 *ac. ft.*	*with* 23.1 *ac. ft.*	*September dry sowing*	*December plans with* 4.4 *ac. ft.*	*with* 23.1 *ac. ft.*
Net farm income (Rs.)	7152	8621	9175	8896	10433	12218	6487	7952	8465	8468	10017	11983	8775	10266	11787
A. *Maha* cultivated area (ac.)–															
(a) Lowland	1.0	3.0	3.0	3.0	3.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
(b) Highland	1.1	0.6	0.6	0.0	0.0	0.0	0.0	1.7	1.7		0.0	0.0	0.0	1.9	1.9
(c) Chena	2.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0	4.0	4.0
B. *Yala* cultivated area (ac.)–															
(a) Lowland	3.0	1.6	3.0	3.0	1.6	3.0	3.0	1.6	3.0	2.2	1.6	3.0	3.0	1.6	3.0
(i) Paddy	0.0	0.0	0.0	0.3	0.0	2.6	0.0	0.0	2.6	1.0	0.0	3.0	0.3	0.0	2.6
(ii) Other crops	3.0	1.6	3.0	2.7	1.6	0.4	3.0	1.6	0.4	1.2	1.6	0.0	2.7	1.6	0.4
(b) Highland	0.0	0.4	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0
(c) Chena	2.0	2.0	2.0	2.3	3.0	3.0	0.4	2.0	2.0	0.1	3.0	2.1	0.0	4.0	4.0
Borrowings (Rs.)	1556	1740	2917	1924	302	1372	951	1867	3585	2135	1564	2863	1278	614	1382

Note: a. for situation of representative farms, see Table 7.5 and section 7.3.

b. 4.4 and 23.1 ac. ft. per farm are water available in the tank for *Yala* cultivation

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Table 8—SHADOW GROSS MARGINS [a] OF THE EXCLUDED ACTIVITIES

Activities	*Left Bank* Low Labour (1)			High Labour (2)			Low Labour (3)			*Right Bank* Medium Labour (4)			High Labour (5)		
	Sep-plan	*December plans*		*Sep-plan*	*December plans*		*Sep-plan*	*December plans*		*Sep-plan*	*December plans*		*Sep-plan*	*December plans*	
	with dry sowing (Rs.)	*with* 4.4 [b] *ac. ft. (Rs.)*	*with* 23.1 [c] *ac. ft. (Rs.)*	*with dry sowing (Rs.)*	*with* 4.4 *ac. ft. (Rs.)*	*with* 23.1 *ac. ft. (Rs.)*	*with dry sowing (Rs.)*	*with* 4.4 *ac. ft. (Rs.)*	*with* 23.1 *ac. ft. (Rs.)*	*with dry sowing (Rs.)*	*with* 4.4 *ac. ft. (Rs.)*	*with* 23.1 *ac. ft. (Rs.)*	*with dry sowing (Rs.)*	*with* 4.4 *ac. ft. (Rs.)*	*with* 23.1 *ac. ft. (Rs.)*
A2	21	33	33				21	22	22	73	74	74			
A3	271	279	279	271	279	279	257	279	279		100	100	231	279	279
A6	236	247	247	132	149	149	146	198	198	320	338	338	62	28	28
H2	64	8	8	116	52	52	95			122	106	19	90		
H3	224			230	58	58	261	23	23	226	186	59	201	2	2
C2	76	12	12	71			155	41	41	133	107		118	39	
C4		4	4	8	16	16	27			151	90	85			
C5	22	7	7		9	9	28	1	1				2		13
AA1	284	1039	39	39	637		279	346			52		442	692	
AA2	296	1176	172	38	725		301	461	22	74	228	74	684	763	
AA6	422	1318	386	144	794	116	446	620	196	295	446	297	536	811	101
AB1	183	183	183	195	195	195	136	136	136	210	10	144	216	195	195
AB2										200		10			
HH1	84			77	107							6			0
CC2	394	438	385	432	543	636	303	547	547	397	440	494	386	239	342

Note: a. Amount of change necessary in the gross margin of excluded activities for them to merit inclusion in the solution.

b. and c. with 4.4 and 23.1 ac.ft. per farm water available in the tank for *Yala* cultivation.

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Annex 1

Description of Abbreviations used for Resources and Other Constraints in the Linear Programming Model Tableau

	December Plans	September Plans
ML and YL	Maha and Yala lowland area respectively	Maha and Yala lowland area respectively
MH and YH	Maha and Yala highland area respectively	Maha and Yala highland area respectively
MC and YC	Maha and Yala chena area respectively	Maha and Yala chena area respectively
FL1 and HL1	Family and hired labour for chena and highland preparation (Maha)	
FL2 M and HL 2 M	Family and hired male labour for lowland preparation (Maha)	Family and hired male labour for land preparation (Maha)
FL2 F and HL2F	Family and hired female labour for paddy transplanting (Maha)	Family and hired female labour for paddy transplanting (Maha)
FL3 and HL3	Family and hired labour for chena and highland harvesting (Maha)	Family and hired labour for chena and highland weed control (Maha)
FL4 and HL4	Family and hired labour for paddy harvesting (Maha)	Family and hired labour for harvesting (Maha)
FL5 and HL5	Family and hired labour for chena and highland preparation (Yala)	
FL6 M and HL6M	Family and hired male labour for lowland preparation (Yala)	Family and hired female labour for land preparation (Yala)
FL6 F and HL6F	Family and hired female labour for paddy transplanting (Yala)	Family and hired female labour for paddy transplanting (Yala)
FL7 and HL7	Family and hired labour for chena and highland harvesting (Yala)	Family and hired labour for chena and highland weed control (Yala)
FL8 and HL8	Family and hired labour for lowland harvesting (Yala)	Family and hired labour for harvesting (Yala)
Min.	minimum paddy cultivation area	minimum paddy cultivation area
Max.	maximum chillie and chena paddy area	maximum chillie and chena paddy area
Cap.	own working capital	own working capital
Cr.	credit available	credit available
YW	water available in the tank per farm during Yala	water available in the tank per farm during Yala

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Annex 2

Descriptions of Abbreviations used in the Linear Programming Model Tableau for Activities and Yields of the Crop Activities

Abbreviations	Description	Yield per acre
A1 and AA1	Maha and Yala 4–4 1/2 months paddy, buffalo ploughing transplanted	78.8 bu.
A2 and AA2	,, ,, ,, ,, broadcast	68.0 bu.
A3 and AA3	,, ,, ,, tractor ploughing, transplanted	78.8 bu.
A4 and AA4	,, ,, ,, ,, ,, broadcast	68.0 bu.
A5 and AA5	,, ,, 3–3 1/2 months paddy, buffalo ploughing, transplanted	62.0 bu.
A6 and AA6	,, ,, ,, ,, ,, broadcast	54.0 bu.
A7 and AA7	,, ,, ,, tractor ploughing transplanted	62.0 bu.
A8 and AA8	,, ,, ,, ,, broadcast	54.0 bu.
AB1	Yala lowland cowpea	800 lbs.
AB2	Yala lowland greengram	842 lbs.
AB3	,, ,, chillies	287 lbs.
H1	Maha highland cowpea	129 lbs.
H2	,, ,, blakgram	120 lbs.
H3	,, ,, paddy	9.1 bu.
C1	Maha chena cowpea	141 lbs.
C2	,, ,, blackgram	160 lbs.
C3	,, ,, paddy	13.5 bu.
C4	,, ,, maize	4.5 bu.
C5	,, ,, finger millet	3.9 bu.
C6	,, ,, chillies	40 lbs.
HH1	Yala highland gingelly	3.3 bu.
CC1	Yala chena gingelly	4.5 bu.
CC2	,, ,, chillies	49 lbs.
HL1 to HL8	Hired labour	
E	Borrow Working Capital	

Note: See Section 6.7 for yields with mud sowing and dry sowing.

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BOOK REVIEW

Sri Lankan Fishermen: Rural Capitalism and Peasant Society.
by **Paul Alexander** (Australian National University Monographs on South Asia No. 7, 1982, 328+xiv pages).

It is said of architects, that very few are skilled or creative enough to design buildings concurrently from the outside and inside perspectives, to achieve a proper integration of form and function. The equivalent challenge for social scientists dealing with economic, social, political and cultural change is to achieve a melding of the "macro" and "micro" perspectives, to uderstand the dynamics of change at the societal and community level in terms of their mutual influence. (I would include under the heading of "macro", by extension, influences emanating from supra-national sources).

Quite apart from whether or not one is interested in Sri Lankan fishermen—in the comparative returns from beachseining versus mechanized boat fishing, the factional alignments and feuds in a village or the intricacies of the fish marketing structure, to give some examples of the extensive and detailed information Alexander gives us in this book—it is surely one of the best studies available of change processes where we can see and trace the interaction of "macro" and "micro" influences in an illuminating and satisfying way.

Because Alexander works as an anthropologist, the "micro" perspective is dominant in this book. Most of his data, including historical data, pertain to the fishing village of "Gahavalla". But in a consistent way, we are continually directed to look, in the past and present, at extra-village institutions, relationships, policies, migrations, interests, resources, and so forth. The result, when capped with more general, theoretically-oriented discussions of "rural capitalism and peasant society", makes this much more than the monographic treatment of a fishing village which it appears to be.

Alexander's methodological approach appears at first to be excessively casual, coming into this village without even a knowledge of Sinhala and with no plan at all for systematic data collection. He spent several months "wandering around the village talking with whomever was available, an unemployed youth who spoke a few words of English appointed himself my companion and eventually I paid him a small wage". Subsequent efforts to hire an interpreter were (he thinks fortunately) unsuccessful, so eventually he undertook to learn Sinhala for at least conversational use. He hired a clerk to gather written data from official records With such an unpromising start and strategy, extensive data were nevertheless ultimately gathered and are well analyzed, probably, more insightfully for the inductiveness of the methodology.

Theoretically, Alexander follows a modified Marxian path of analysis. "In my view the major value of the Marxian problematic at this early stage is not as an encompassing explanation, and still less as a set of axioms to be manipulated like a mathematical or logical system. Its major value is as a source of significant problems for research and as a guide, both udercertain and partial to their analysis" (p. 6)

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He turns away from others' pre-occupation with changes in technology and the forces of production, in favour of treating the *relations* of production as more than just derivative from the former, as having some crucial formative influence of their own. "While the introduction of new strains of rice, chemical fertilizers or mechanised fishing craft often does have a considerable impact on peasant societies, to see the subsequent changes as inevitable consequences of the technology is misplaced materialism" (p.1).

If technology is not in itself determinant, however, neither is class, in Alexander's views. Class relations in Gahavalla are evolving and emerging, having changed substantially at least twice in the past hundred years. The most powerful figures in Gahavalla now are relative newcomers, reminding the reviewer very much of the "big men" whom Joan Vincent analyzed in her study of an agricultural community in Uganda (*African Elite: The Big Men of a Small Town*. Columbia University Press, 1971) or even the power wielders described by Mary Hollnsteiner in a Philippines community (*The Dynamics of Power in a Philippine Municipality*. Community Development Research Council, University of the Philippines, 1963). Power rests not just on control over means of production (at first land and then capital) but to some extent idependently on access to government decision-making through the bureaucracy and through the ability to build and control social groupings in near-classic patron-client networks. Social relations, interacting with the advantages which political influence outside the village can provide, prove as important as relations of porduction seen in standard Marxian terms, once one looks concretely at how power and privilege are actually established.

Perhaps one of Alexander's most valuable contributions comes from his documenting the workings of what he calls "new or modified social institutions which have subordinated localized rural production to the interests of regional, national or international markets. In most cases, technological innovations should be regarded as by-products of the new social relationships within the village which have made it possible for extra-village agencies to determine the logic of village production" (p.1). We can see in his analysis how the development of the bureaucracy, of roads and urban markets, of an electoral system with competitive parties, even of an ice factory has specific ramifications for the way of life and life chances of fisher families far removed from the persons deciding to extend these institutions or facilities.

Fishing technology actually changed relatively little over almost a century in Gahavalla, so the forces of production within the village were not responsible for the changes in the village economy or for the radical transformation of relations of production. Alexander shows how we need to understand the *ways* in which the functions of social institutions at the local levels which govern the allocation of labour and capital, change when the balance among resources, aspirations and opportunities alters. But the effect is not direct. Rather it is mediated by a changing set of actors who through their roles as local officials, as merchants or middlemen, or as political brokers are able to keep a disproportionate share of these resources for themselves while serving as channels between villagers and outsiders. Thus the mechanisms whereby "surplus value" is acquired by others than its producers are more complex and more subject to flux than conceived in conventional Marxian analysis.

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While it is clear that Alexander started off with such concerns, the precise problem which centered his inquiry and analysis was, appropriately for Sri Lanka, serendipitous. This is a good example of how being open and intelligently inductive in the field, rather than "testing" fixedly a predetermined hypothesis, can lead to greater insight. Very soon after beginning his discussions with fishermen, it became apparent that there were clearly "too many" beachseine nets in the village. Fishermen said this, and Alexander subsequently calculated that there were five times as many nets in operation as were required for the maximum catch. This halved the net profits (no pun intended) from beachseining, reduced average household income by 20 percent (given the cost of purchasing and maintaining the nets) and led to gross maldistribution of the catch. Was this a dramatic case of "peasant irrationality"?

Unravelling the reasons for such a misallocation of resources provides the central theme for Alexander's study. Why should households continue to invest in a technology that promises negative returns *on average?* It turns out that the logic of political as well as economic markets leads to such decisions. Small producers will get squeezed out unless they can do better than average, so they have incentives to take risks which pay off for a few but not for most. Economic decision-making is complicated by a system of political factions that organize economic and social life beyond the household and that use the beachseines "to recruit and maintain political following" (p. 212). Traditional institutions of "shares" and "turns" govern the purchase and use of nets. But these "operating procedures derived from an explicitly equalitarian ideology result in gross inequalities in the distribution of the catch. The key to this situation is the excessive number of nets" (p.159). Alexander's argument, however, is that the current situation in Gahavalla "cannot reasonably be represented as an inevitable outcome of the relationship between environment and forces of production" (p. 140).

The driving force behind this dynamic of substantive "irrationality" is a system of political and economic entrepreneurship represented by factional leaders, *mudalalis* (businessmen) who parlay advantage in one realm—land, office, transportation facilities, political connections, marriage ties—into gains in other realms, in what Joan Vincent calls "spiralism", drawing on Francis Bacon's observation that "all rising to a high place is by a winding stair". What distinguishes the patronage system in Gahavalla from that in Vincent's Gondo or Hollnsteiner's Hulo is the extensive use of violence. Anyone seeking confirmation of the stereotype among Sri Lankans that the people along the south western coast are more violent than others will find pages full of support. One cannot know how representative this situation is, but life in Gahavalla appears much more Hobbesian than Buddhist. Unfortunately, Alexander does not try to explain this pattern of behaviour but just reports it.

The *mudalalis,* interestingly enough, conduct their relations in an egalitarian atmosphere, exchanging gifts with members of their faction, attending ceremonies at each other's houses, even having marriages between children of patrons and clients. The patrons are colloquial and egalitarian in their speech, but they are all "formidable men", who entered into their dominant role in fishing from other roles—landowning, transport, manufacturing coconut products, etc. Inflation in the number of nets was initiated not by beachseiners but by this emerging group of capitalists (p. 216). Of special note, they have engaged in considerable violence, forcing some compe-

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titors out and keeping each other in check. The prevalence of violence indeed forces some persons who would like to remain neutral to join a faction in order to have some protection.

The pervasiveness of partisanship in Sri Lankan villages has been well documented already (e.g. Marguerite Robinson, *Political Structure in a Changing Sinhalese Village*. Cambridge University Press, 1975), but the opportunism of partisanship has perhaps not been detailed so well before. Political competition is conducted by unstable coalitions, Alexander says, which means that present victories make future defeats inevitable (p.37). As Mary Hollnsteiner showed for Philippine village life, a patron-client system makes for endemic instability. The idea that "minimum winning coalitions" will be the most stable (William Riker, *The Theory of Political Coalitions*. Yale University Press, 1965) finds some support here. Powerful faction leaders become threats both to their patrons (who fear defection) and their clients (who lose their leverage with such leaders).

One consideration noted by Alexander is that the attractiveness of a patron depends in large measure on his control over access to employment outside the village through his political and administrative linkages. This is consistent with the studies by Robinson, Obeyesekere, Moore and others. Already when Alexander was conducting his field research some ten years ago, such jobs were becoming much scarcer, and it was not clear what "glue" would hold the coalitions together over the longer run if not able to provide jobs. This is of course an unresolved question.

The rising rate of unemployment is only one way in which population growth has an impact on a village like Gahavalla. One of the strongest points of Alexander's analysis is his continuous attention to demographic factors where relevant. Increased population outside the village affects the people *in* the village, and this is one area in which Alexander nicely connects "macro" and "micro" considerations.

This is a very rich book, as should be clear by now, and I cannot go into the many ways in which Alexander's analysis of ecology, technology, economics, kinship, rural markets and enterprises, social norms, etc. serve as a model for inquiry even if the reader is not interested in the details of a specific coastal fishing village in Sri Lanka. I should specifically call attention to his data and analysis of division of labour by gender. Gahavalla is a decidely male-dominated community, and Alexander documents the extent to which there is greater poverty in female-headed households. Whereas none of the rich households are female-headed, 10 percent and 19 percent, respectively, of middle and poor households are (p.49). He does show how women control the money in most households, giving them some power otherwise invisible. But on balance, women are at a real disadvantage in Gahavalla. The detailed income data for the village show that simply redistributing existing income equally would be no solution to poverty since this would still leave the average household income 30–35 percent below the official "poverty line".

Students of Sri Lankan anthropology will be interested to compare Alexander's data and interpretations with other anthropological studies. Differences can of course arise because researchers are working in different communities. It is instructive that although Gahavalla has a different occupational and caste base from Madagama studied by Obeyesekere (*Land Tenure in Village Ceylon*. Cambridge University Press, 1967), Alexander found the same process whereby a new village elite arose

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in the late 19th–early 20th century Control over minor offices given out by the British colonial administration, e.g. village headman or registrar, gave cash income to purchase land once it became freehold and opportunity to manipulate deeds to gain ownership of land by fraud. On the other hand, Alexander a number of times finds his observations at variance with those of Yalman (*Under the Bo Tree*, University of California Press, 1967) even when they are both dealing with fishing villages (see pp. 25, 65, 70 and 75).

Some might object to Alexander's treatment of fishermen as "peasants" and wonder whether a review of the book belongs in a journal of "agrarian studies". Teodor Shanin, for example (*Journal of Peasant Studies*, 1973), has explicitly excluded them from this category. Alexander asserts, however, that "in some respects at least, fishermen are the quintessential peasants" (p. 255). He undertakes no systematic defence of this proposition, and it is true that the higher risks and capitalization involved in fishing distinguish it significantly from most common forms of agriculture. But his position seems essentially correct, and despite my own initial skepticism on this point, I was satisfied that persons interested in "peasants" would do well to know more about fishermen.

What differences there are can indeed be instructive. When cooperatives were set up to manage motorized fishing boats, provided with government subsidy, the same accounting practices were used that had beed used for agricultural coops. Since boats and gear usually wore out within three to five years, failure to establish and enforce funds set aside for depreciation led fairly quickly to insolvency of the coops, and gave *mudalalis* an opportunity to acquire boats cheaply, even if illicitly. The chief asset of agricultural cooperatives (land) appreciated rather than depreciated, so their practices were unsuitable for fishing coops.

One note of criticism is that I am not entirely satisfied with Alexander's treatment of the "impoverishment" attributed to the penetration of capitalist market forms into the village economy. Certainly inequality and exploitation preceded this penetration, having been established under colonial rule when a form of bureaucratic feudalism, not the prototypical agrarian feudalism, prevailed.* Alexander's data clearly support the argument that there has been a concentration of capital (in the form of net ownership) in recent years, with increasing numbers of fishermen becoming wage labourers. There has been undoubtedly an increase in their vulnerability to fluctuations in income due to variations in fish catches, prices paid and employment available as ecological and economic conditions vary over time. But the relative losses do not necessarily translate into absolute declines, as is implied by the thesis of "impoverishment", especially if public services are considered. Certainly one would like to have absolute as well as relative gains. But more care—and historical perspective—is probably needed when addressing this subject.

The major objection which a reader might raise is how representative is this community and how broadly can one generalize from its experience? Alexander says at the outset that Gahavalla "is by no means a 'typical Sinhalese village'—it is unusual even among Sinhalese fishing villages—but the development of capitalist relations in Gahavalla is a graphic, at times almost grotesque, illustration of a social process occurring throughout Sri Lanka" (p.1). That such a process is generally occurring is probably true. But in what *ways*, at what *rate*, and with what *implications* for further economic, social, political and cultural evolution, one cannot

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say from this case. Alexander has done us a service by raising the level of analysis and inference well above that of a typical case study. But the extent of generalization from the case may be questioned.

A second objection—perhaps best stated as a great regret—is that the book, published in 1982, is based exclusively on 1970–71 data. There are a number of trends and predictions presented in the book which should have been confirmable, or disconfirmable, with relatively little additional field work, assuming Alexander can still return to the village. Has the trend toward concentration of ownership of net shares, for example, continued? If so, how fast? What have been the political and economic consequences? Answers to such questions are important for his general argument. Yet we are left thinking about a village which displayed great and rapid change over at least a preceding century, well documented by Alexander, which is now "frozen" in our minds some ten years ago. Somehow, some way it would have been a great service if ANU could have gotten Alexander back to Gahavalla before the book was published. It would still be a great service if ANU or someone can get him back there for at least an update or, even better, a sequel.

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* This distinction is offered by the reviewer and R. D. Wanigaratne in "Local Organization and Rural Development in Sri Lanka" in Volume 1 of *Rural Development and Local Organization in Asia*, ed. N. Uphoff, Macmillan (New Delhi), 1982.

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