A STUDY OF

FIVE SETTLEMENT SCHEMES PRIOR TO IRRIGATION MODERNIZATION

Vol. III - Pavatkulam

AGRARIAN RESEARCH AND TRAINING INSTITUTE
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PRIOR TO

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Volume III - Pavatkulam Scheme

Research Study No. 38

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AGRARIAN RESEARCH & TRAINING INSTITUTE
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SRI LANKA

FOREWORD

This presentation forms the third of a series of bench mark studies undertaken by the Agrarian Research & Training Institute on a major irrigation investment project involving the modernization of five irrigation schemes in the North Central Dry Zone of Sri Lanka. The first two studies completed refer to Mahawilachchiya and Mahakandarawa settlement schemes in the Anuradhapura District. The remaining two reports are under preparation at present and cover the settlement schemes of Vavunikulam and Padaviya.

The Research Team for this Study consisted of Mrs. J.Ranmutugala, Mr. W.A.T. Abeysekera, Mr. A.S. Ranatunga and Mrs. S. Abeyratne, Research and Training Officers of the Institute. Mr. A.S.Ranatunga functioned as the Co-ordinator of the study.

Mrs. Ranmutugala was responsible for field data collection and the preparation of the first draft of the report. Her efforts in this connection were commendable but unfortunately she had to leave the Institute for an appointment in an international agency at this stage. With her departure from the Institute before the finalization of the report, Mr. Abeysekera and Mr. Ranatunga had to take responsibility for revising and preparing the final report. In this process they had to make considerable changes particularly in the Chapters on Labour Utilization, Costs and Returns and Farm Supporting Services. Mrs. S. Abeyratne concentrated her efforts on sociological aspects of the study and Miss. T. Sanmugam, Research & Training Officer (Statistics) helped the study team in designing the sample frame. A team of investigators helped in field data collection as well as data tabulation. Several other officers from within and outside the Institute made valuable contributions for the completion of this assignment.

It is hoped that this study would prove useful as a bench mark of Pavatkulam Settlement Scheme, particularly for the purpose of assessing the impact of the irrigation modernization programme. I also wish to record my appreciation for the assistance given by officers of other departments, particularly Agriculture, Irrigation and Land Commissioners to make this study possible.

T.B. Subasinghe
DIRECTOR.

26th May 1980.

A C K N O W L E D G E M E N T S

The authors wish to record the assistance rendered in this effort by a number of personnel both within and outside the Institute. Among them, Dr. Kingsley Alwis, Messrs. Sunil Fernando, Jayasinghe and Balasubramaniam of the Irrigation Department deserves special mention. Messrs. A. Sanmugaraja, (D.L.O), S.T. Pathmanathan (D.A.E.O), N. Alfred, S.Selvarajah and S.R. Pathmanathan, (Colonization Officers) and their field staff were closely associated with field work.

Mrs. Shirani Weeratunga, Mrs. N.N. Bawa and Mrs.W.P.S. Wijewardene were responsible for typing of earlier drafts and handling correspondence relating to this study. The final typing of this document was accomplished by Mrs. Indrani Perera and Miss. Punyakanthi perera. Thanks are also due to all other members of the Institute who assisted in numerous ways to make this publication possible.

Authors.

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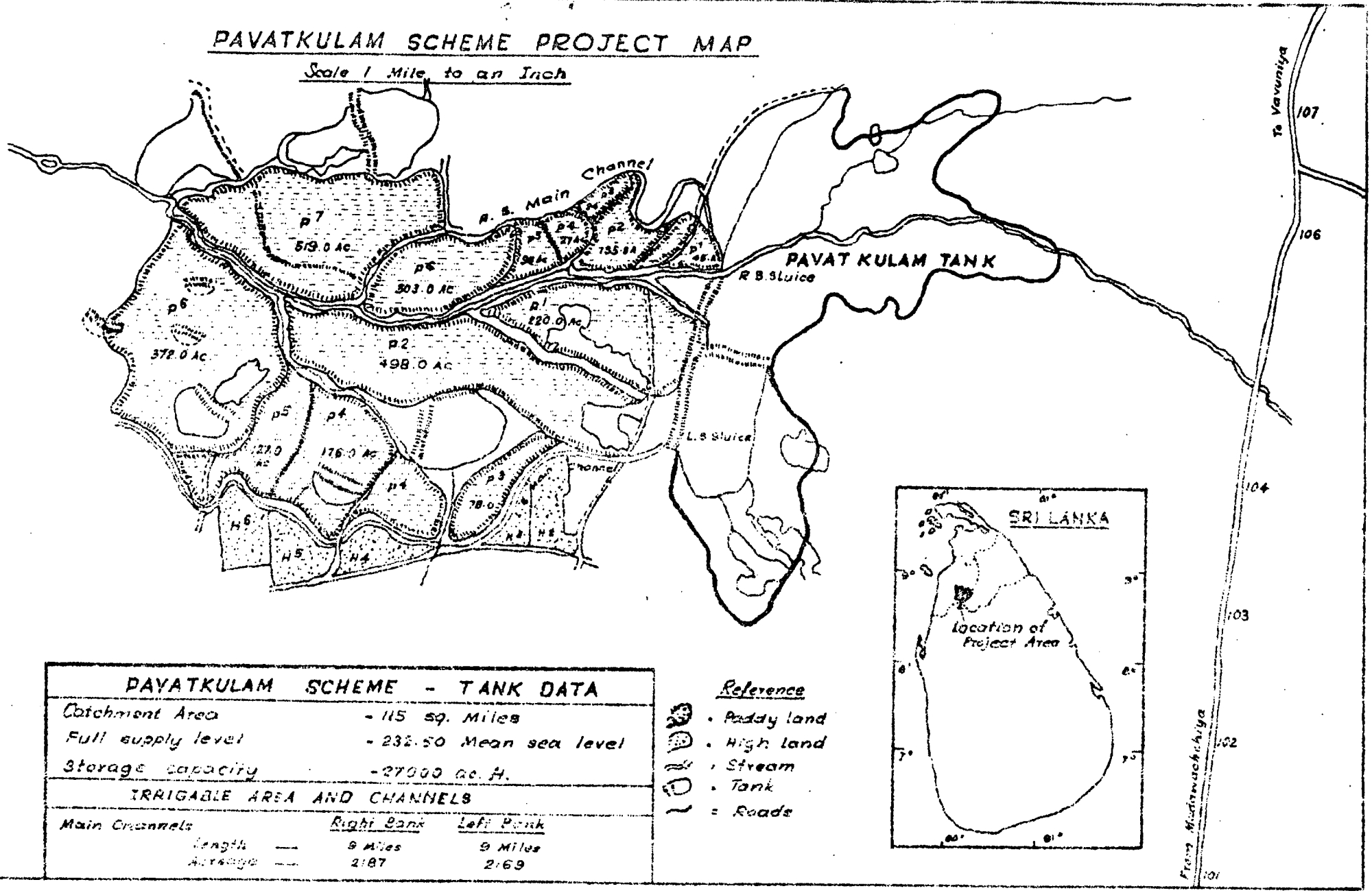
Scale 1 Mile to an Inch



PAVATKULAM SCHEME - TANK DATA	
Catchment Area	- 115 sq. Miles
Full supply level	- 232.50 Mean sea level
Storage capacity	- 27000 ac. ft.

IRRIGABLE AREA AND CHANNELS			
Main Channels		Right Bank	Left Bank
	Length —	9 Miles	9 Miles
	Acreage —	2187	2169

Reference

- Paddy land
- High land
- Stream
- Tank
- Roads

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Volume III - Pavatkulam Scheme

I. INTRODUCTION

1.1. THE SETTING

This report is the third of five bench mark studies designed for evaluating the impact of a proposed irrigation modernization in five existing colonization schemes in the dry zone of Sri Lanka.[1] The scope of this study covers agronomic, economic as well as social conditions prevalent in the scheme. This was undertaken by the Agrarian Research & Training Institute in response to a request from the Ministry of Irrigation, Power and Highways on a suggestion of the World Bank.

The Pavatkulam Settlement Scheme is located about 6 miles West of Vavuniya, which is a major town in the Northern Province of Sri Lanka. Historically, the tank is believed to be of very ancient origin may even be pre-Christian.[2] It had been breached and over grown for several centuries. The tank impounds the waters of two rivers, the Kal Aru and Kallukundamadu Aru. The total capacity of the tank is 27,000 acre feet with a catchment area covering around 115 square miles. (297.85 sq. kilo metres).

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[1] A summary account of the proposed modernization project is given in Volume I as an annex.

[2] Arumugam S. - 1969 - "Water Resources of Ceylon, their Utilization and Development"
Water Resources Board Publication
Colombo. p.326

The data on Pavatkulam Tank obtained from the Irrigation Ministry is as follows :

	Right Bank	Left Bank
Sill level	218.16 ft.	214.8 ft.
Full supply depth	17.50 ft.	18.32 ft.
Command acreage	2500 acres	3500 acres
Discharge under head of 5 ft.	69 cusecs	97 cusecs
Length of main channel	9 miles	9 miles 20.9 chains.

This tank after centuries of disuse had been renovated during 1955-1958. Resettlement of the Pavatkulam Colony commenced in 1956. Prior to restoration of the tank, the project area had been under forests for several centuries, and chena (shifting) cultivation had been practiced on a limited scale by the villagers in the surrounding areas.

This Settlement Scheme covers an area approximately of 6534 acres of which about 4356 acres are classified as lowland suitable for paddy, and about 2187 acres are classified as highland. The reservoir serving this area has two sluices, one servicing the right bank and the other the left bank. The land alienation pattern in the scheme generally comprises of 3 acres of irrigable lowland and 1.5 acres of unirrigable highland per farm holding. The details are given below :

Table 1.1. Pavatkulam Colonization Scheme

Total Acreage

	Paddy land (in acres)	High land (in acres)	Total (in acres)
Right Bank	2187	1093.5	3280.5
Left Bank	2169	1084.5	3253.5
Total	4356	2178.	6534.

However the entire area has not been alienated. Around 3180 acres of irrigable land and 1590 acres of highland had been alienated at the time of survey. The details are tabled below.

Table 1.2. Number of allottees, land alienated and unalienated

	Number of allottees	Land alienated		Land unalienated	
		Paddy land (Ac.)	high land (Ac.)	paddy land (Ac.)	high land (Ac.)
Right Bank	697	2091	1045.5	96	48
Left Bank	363	1089	544.5	1080	540
Total	1060	3180	1590.	1176	588

The table shows that around 1176 acres of irrigable paddy land and around 588 acres of highland remain unalienated. Such unalienated land is seen more in the left bank primarily due to lack of water and according to project officers, these lands are in excess of the irrigable extent. (the tank can irrigate only about 3777 acres including private lands).

As common to all the irrigation schemes included in the modernization project, Pavatkulam is located in the drier North Central region of the country, where rainfall is highly seasonal and is often erratic. The recorded average annual rainfall is 59.39". The tank has a conveyance system of channels which are presently geared to providing supplementary irrigation for paddy farming mainly during the Maha season. The critical problems that are common to all the irrigation schemes included in the modernization project, have been identified in the proposal[1]. They are ;

i. Insufficient use of Maha rainfall and wasteful use of stored water in the tanks.

ii. Inequitable irrigation water distribution.

iii. Lack of adequate farm power for timely land preparation.

iv. Poor access roads.

v. Ineffectiveness of the current agricultural extension services.

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[1] Appraisal of the Tank Irrigation Modernization Project, Report No.951 - CE World Bank.

The proposed modernization programme envisages the improvement of living standards of the farming community primarily through more intensive use of paddy land. In this regard, a number of remedial measures have been proposed for implementation which mainly involve ;

i. Physical improvements to the present irrigation conveyance system.

ii. Adoption of better water management practices and the enforcement of rotational issues of irrigation water.

iii. Provision of farm equipment for timely field operations.

iv. Cultivation of field crops other than paddy in the lowlands during Yala.

v. Strengthening the currently existing agricultural extension services.

1.2. OBJECTIVES OF THE STUDY

The present investigation is designed to serve as a baseline study for the evaluation of changes in farming and levels of living of the Pavatkulam project households. The main aims of this study are;

i. To ascertain the current status of the project inhabitants with special reference to such criteria as social amenities, employment structure, labour application, agronomic practices, costs, incomes, credit, marketing and other services.

ii. To identify available institutional support and infrastructural facilities for farming in the project area.

iii. To ascertain the major obstacles that may hinder the future expansion of farm production envisaged under the proposed project.

iv. To examine the existing patterns of settlement, social organisations and community living in the project area.

1.3. METHODOLOGY

SAMPLING

The selection of farm households for the investigation was based on a stratified random sample. The left and right bank areas of the project as well as the three stages were treated as the sampling strata[1]. A sample of 160 farms was selected for the questionnaire survey which was conducted in September, 1978. The breakdown of the sample according to the stratification is as follows :

Table 1.3. Sample Size

		No. of households	Sample size	Percentage
Right Bank	Stage I	381	59	15%
	Stage II	316	48	15%
Left Bank	Stage III	366	53	14.5%
Total		1063	160	15%

The total sample amounted to 15% of the entire project household. Although the original ARTI Study Proposal recommended that a sub sample be selected for detail record maintenance, studies undertaken at Mahawilachchiya and Mahakandarawa indicate that not only the costs, but also the supervisory effort needed to obtain satisfactory results from a record keeping exercise are substantially higher in relation to that of a single interview questionnaire survey, and that a properly executed single interview survey would be equally reliable except in very specific instances where close monitoring of input use is needed.[2]

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[1] The stages refer to the stage of development. Stage I was the first area to be settled and was closest to the tank, Stage II came next and lastly Stage III which was the last to be settled and is furthest from the tank. The stages were settled from 1956 to 1968.

[2] A Study of Five Settlement Schemes prior to Irrigation Modernization - Volume I - Mahawilachchiya. ARTI, Colombo. p.6 (1979)

REFERENCE PERIOD

The study data covers two cropping seasons or a single cropping year prior to modernization and includes Maha[1] 77/78 and Yala[2] 1978.

During the survey, the colonization officers pointed out that for a period of about 12 years there was continuous drought during Yala. Infact for the last 12 years only one Yala cultivation had been recorded and that too prior to 1971.

As for the Maha season, as seen in Table 3.9 there had been little or no cultivation during the period from 1973 to about 1977, mainly due to the lack of rain and irrigation water. Therefore much of the data pertains only to Maha 77/78 season and the shortness of the reference period could be pointed out as a weakness in this study. However, due to the reasons cited above this was unavoidable.

DATA COLLECTION

The data collection procedure involved a single questionnaire interview, covering the Maha 1977/78 and Yala 1978. As Yala is an agriculturally inactive season in the project, the single inverview survey served mainly for the purpose of assessing the situation during Maha 1977/78. As mentioned earlier, the record keeping exercise was not undertaken here. Supplementary information was obtained from the local irrigation office, the Project Office, the District Land Office and the District Agricultural Extension Office. A section of the questionnaire was limited to the gathering of sociological data, as well as data pertaining to Extension Services.

A pretested structured questionnaire was utilised for collecting Maha 77/78 and Yala 1978 data. This questionnaire was administered in September, 1978. The farm interviews were undertaken by 16 trained investigators whose work was carefully supervised and checked personally by the researchers. Both qualitative as well as well as quantitative data were collected.

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[1] Rainy season extending from September to April

[2] A relatively drier season normally extending from May to August.

The Assistant Government Agent, Vavuniya, assisted the researchers by sending out letters addressed to individual farmers explaining the study purpose, etc. This approach was found to be extremely helpful in dealing with the farmers. This was shown by an almost 100 percent response in the questionnaire survey.

DATA PROCESSING

Data Processing was undertaken during the period January 1979 to April, 1979.

II. FARM FACILITIES, SETTLEMENT FEATURES & LABOUR FORCE

This chapter briefly examines the sociological background characteristics such as the origin of the settlers, family size, settlement, etc. and goes on to an analysis of the labour force and employment. In the latter section, the infrastructure and basic amenities available to the settlers are examined.

2.1. SOCIAL ASPECTS

2.1.1. ORIGIN

The Pavatkulam Settlement Scheme covers an estimated area of 6534 acres on which are settled 1060 farm families. These settlers are of diverse origins and comprise of 3 ethnic groups; the Tamils, the Sinhalese and the Muslims. The *Purana*[1] villagers included in the scheme are Tamils and comprise of less than 5% of the population. The rest of the Tamils comprise about 55% of the project population while the Sinhalese constitute 35% of the population and the Muslims who are largely Tamil speaking constitute approximately 10% of the project population.

The Tamil settlers are mainly from Jaffna (including Delft) and Vavuniya and to a lesser extent, from Anuradhapura, Batticaloa and Trincomalee districts. The Muslims are mainly from Batticaloa, Mannar and Galle districts while the Sinhalese settlers are mainly from the *Purana* villages boardering the project and from Anuradhapura. A few Sinhalese families are from Kegalle and one family in the sample reported it's origin as Matara.

A majority of the chief of households in the project area belong still to the first generation of settlers though 62% of the sample respondents said that they became resident only since the period 1961-65 and only 14% claimed residence since the inception of the settlement.

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[1] *Purana* village is the old, traditional village which centered around the village tank.

2.1.2. SETTLEMENT

From the two tables below one can see the distribution of the population by ethnicity and the clear demarcation of both paddy tracts and highland units into the 3 ethnic groups, Tamil, Sinhalese and Muslims. Some intermarriage has taken place according to the sample respondents but this has been the exception.

Table 2.1. Breakdown of ethnic groups by paddy tracts

	Tracts	
Left Bank	1	Sinhala
	2	-do-
	3	-do-
	4	Tamil
	5	Tamil and Muslim
	6	Tamil and Muslim
Right Bank	7	Sinhala
	8	Sinhala
	10	Tamil
	11	Tamil

Table 2.2. Breakdown of ethnic groups according to highland allotments

	Highland	Ethnic groups
Right Bank (697 families)	Unit I	Entirely Tamil
	Unit II	Sinhala, Tamil & Muslims,
	Unit III	Entirely Sinhala
	Unit IV	26 Sinhala families, rest Tamils
	Unit V	20 Sinhala Families, rest Tamils.
	Unit VI	Entirely Tamils
Left Bank (366 families)	Unit VIII	Sinhala
	Unit IX	Tamil
	Unit X	Tamil

Apart from the ethnic diversity just described, allottees, have also been selected with different backgrounds. A large number had been selected from nearby *purana* villages when their lands went under

irrigation and other works construction. In these instances, the entire village was translocated and re-settled in a designated part of the project. Settlers in such cases were found to limit all social interaction to those who moved with them, facilitated by the fact that they were given adjacent holdings. Despite this, many yearn for the life in the original *purana* villages which according to them were totally undisturbed by the infiltration of other people and other ways of living, which have introduced disruptive elements such as drinking and gambling especially to their youth.

Other allottees who were not necessarily translocated en masse were able to settle down in the project with some of their kin as neighbour. In fact 47% of the sample farmers said that their neighbours in the project were kin from their original villages while 50% of the settlers said that they associated most closely with their neighbours or immediate relatives. Those from nearby *purana* villages maintain in addition a pervasive network of relationships within their parent villages and reported at least bi-weekly visits to these places.

Those settlers from further destinations such as Jaffna however, reported hardly any ties with their parent villages. While only 20% of all respondents said that they had invested in cultivable land or houses in their original villages, the percentage of such cases who are from distant villages is even smaller which is indicative of their closer ties with the project area.

It was also interesting to note that within the project, irrespective of the distance of their original villages, allottees appeared to establish their identity first and foremost in terms of their villages of origin which moreover had established connotations within the Settlement Scheme, certain areas invoking more respect/contempt than others. In addition some *purana* villages were incorporated into the project while other villages within the boundaries were not included in the project jurisdiction. While the overall consensus of all is that the homogeneity in the background of the *purana* villages is something desirable and that its pristine life style should be main tained at all costs, the other settlers feel that their contact with the *purana* villagers was beneficial to the latter. Many respondents

pointed out that their advent "educated" the *purana* villagers and showed them a more "decent" standard of living - eg. having chairs in the house and other such "modern" amenities. Conflicts in any event have been rife between these two groups over rights to land and water.

The question of land is in fact a central issue in the interaction process in the project. 85% of the respondents said that they owned their allotment while 10% claimed that their parents who were mostly resident with them owned the allotments. 68% stated that they would have to sub-divide the allotment through lack of other alternatives so as to provide for their children. 10% of the respondents already had children who were employed elsewhere and were not interested in agriculture in the project. However, the problem of land for the second generation appears from all accounts to be one of great magnitude and many settlers voiced their fears for the future. Figures given in Table 2.4 show the youthful nature of the current population that will have to seek a livelihood in the very near future. The Sinhalese community was especially vociferous over this issue as they felt physically and culturally isolated from the surrounding population and in a sense hemmed into a designated area with no room for expansion. On a minor scale this land hunger problem led it to communal disharmony in Unit 9, where in fact the army was called into resolve the conflict. Certain areas in this Unit are still uncultivated as both communities fear the other's entry and occupation. Because of the poor education facilities afforded, the project farmers feel that this closes up yet another avenue of advancement for the younger generation.

2.1.3. COMMUNITY CHARACTERISTICS

The oft-stated goal of settlement policy is to establish stable and cohesive communities in the newly settled areas. An integral part of such an aim should be therefore the physical lay out of the community. Apart from an arrangement conducive to social interaction, services, training andso on would be largely affected by the patterning of the various components that make up the settlement. In Pavatkulam, although all original settlers were provided with project cottages, these were strung out in a haphazard fashion with

no social focal point, further aggravated by the physical segregation of different ethnic groups into pockets. This, may be a major contributory factor for the very apparent lack of community-wide activities in the project area.

Social interaction on any appreciable scale is limited, as mentioned earlier, to social relations with people especially kin, in the immediate vicinity. On a wider-level, *shramadana*[1] activities for the development of the community were reported as being adequate by about 42% of the respondents while 76% felt that there was room for much more activities of this nature within the community. In fact many respondents pointed out the higher rate of *shramadana* development activities in the neighbouring *purana* villages and indicated that this should be replicated in the project area but for the diversity in the backgrounds of the settlers. *Attan*[2] labour was found to be totally absent. Hired labour is generally provided from within the settlement but it was also mentioned by the Sinhala settlers that Tamil labour which was originally available to them, has after the communal disturbances in 1977, been replaced by Indian estate labour that comes in seasonally but has also often remained as permanent squatters. The settlers themselves do not hire out their labour outside the project as they are too busy with black gram/chillies/ onion cultivation.

A notable feature was the very high percentage of thefts reported in the colony. 80% of the respondents felt that thefts were common and frequent especially in terms of cattle and farm produce. In fact 52% said that cattle thefts (for slaughter) were the most frequent form of theft and 21% themselves claimed loss of cattle through theft. As some settlers owned cattle (for milk for home consumption especially) they felt this needed urgent government attention. A large number (44%) also cited the theft of agricultural produce (harvested and unharvested) and agricultural implements as being of frequent occurence so as to constitute a disincentive to cultivation especially of home garden produce.

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[1] *Shramadana* is local term for donation of labour.

[2] Exchange labour, where an individual helps others in their farm work without receiving any payment and these people in turn supply labour on his farm.

Other tensions in the community also were assessed by interviewing farmers as to how frequently they thought they occured. Drunken brawls appeared to be the most common disturbance with 75% citations followed by family and land disputes of various forms. Homicide appeared to be minimal while cases of suicide were mentioned by 14% of the respondents as being common especially among the younger generation.

2.1.4. RELIGION

51% of the sample population is Hindu, 29% Buddhists, 16% Muslims and 4% Christians. 89% stated that they had adequate places of worship closeby. 54% cited weekly visits and 24% monthly visits to these places. In addition a large percentage of respondents cited the importance attached to pilgrimages and consequently the expenditure incurred by them for such activities. Pilgrimage expenses were generally of a magnitude that more than half the population stated that they had to resort to borrowing money. 70% of the people who borrowed said that their source was friends and relatives, while 11% said that they had become indebted to traders in the area for this same reason. Since 52% stated that they went on at least annual pilgrimages to places of worship in Anuradhapura, Kataragama and so on, the extent of this expenditure can well be imagined.

2.2. POPULATION CHARACTERISTICS

2.2.1. FAMILY SIZE

The average family size for the total population is around 6.6 and size distribution of households is shown in Table 2.3. Most colonists selected for settlement were previously engaged in farming. Of the sample 59% said that they had been actively engaged in farming, 25% in non-agricultural activities and 16% unemployed before they came to this settlement.

The family is mainly of a nuclear type[1]. The extended family was found to be present only in 26% of the sample. With the second generation of settlers, the extended family may very soon prove to be of even more common occurance, especially due to lack of land for expansion.

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[1] Family consists of spouses and their children.

Table 2.3. Size distribution of households

Family Size	%
2 or less	7
3 - 4	15
5 - 6	28
7 - 8	27
9 - 10	17
11 - 12	3
13 - 14	2
15 -	1
All	100

An analysis of the composition of the population according to age and sex is indicated below. It reveals the predominance of the younger age groups. Around 40% are below 14 years, while around 60% are less than 21 years of age.

Table 2.4. Composition of population according to age and sex

Age group (years)	Male %	Female %	Total %
10	25	27	26
10 - 13	14	14	14
14 - 20	21	21	21
21 - 25	9	9	9
26 - 30	7	6	7
31 - 40	8	9	8
41 - 50	6	9	7
51 - 65	7	4	6
Over 65	3	1	2
Total	100	100	100

2.2.2. EDUCATIONAL ACHIEVEMENTS

As regards the educational achievement of heads of households, it appears to be somewhat unsatisfactory by today's standards. 19% have had no formal schooling, and only 27% have had schooling over grade 5 level. 10% have had up to grade 10 and only 1% has gone

above grade 10. Details regarding educational levels of heads of households as well as for other household members, are given below.

Table 2.5. Educational achievements of households heads and members[1]

School level	Head of household	All household members
	%	%
No schooling	19	14
Grade 1 - 5	54	56
Grade 6 - 8	16	20
Grade 9 -10	10	8
Grade 11 -12	1	2
		N=886

*All individuals above 6 years of age were included.

There does not appear to be much of a difference in the educational achievements of the heads of households, and that of the household members over 6 years of age, which shows that levels of education have not risen.

2.2.3. EDUCATIONAL ASPIRATIONS

It was also considered important to attempt to gauge the aspirations of project farmers for their sons and daughters in terms of basic and higher education. This would also perhaps be a reflection of the type of avenues open to second generation settlers from the point of view of the current adult generation of project farmers. 35% of the sample farmers wished for ordinary level standard of education if not to an advanced level standard for their sons. Only 6% explicitely showed a preference for university education. This perhaps is a reflection of the fact that they thought it as out of their reach. In terms of employment 59% declared a preference for their sons to be employed in agriculture, given the choice, while 30% were explicitely in favour of employment outside agriculture. These figures may be an indication then for a preference for a good basic education[1] but concommitantly a preference to remain in agriculture. However, as discussed earlier the reality of this choice depends on the possibility of agriculture supporting this population.

[1] Education is free in Sri Lanka and the literacy rate is as high as 82% (1977).

Unlike in the Mahakandarawa and Mahawilachchiya areas, settlers in Pavatkulam appeared to be more conservative in terms of education and employment aspirations for their daughters. 33% of the farmers showed a preference for education up to the ordinary level for their daughters and very notably no respondents indicated that they would like an university education for their daughters. However, only 13% said that they would want their daughters to engage in work outside the project while the majority (75%) wished them to get married and work within the home. Ethno-cultural differences may account for the differences in aspirations between this settlement scheme and the other two mentioned above.

2.3. LABOUR MIGRATION

The information collected while conducting the survey indicates a heavy seasonal movement of male labour during the Yala season seeking work outside the project. Usually the Yala season represents an almost stagnant agricultural activity in this area and infact it is found that for the last 12 years only one successful Yala cultivation has been possible due to lack of water. In this connection it may be also noted that in some allotments the households are essentially resident in their ancestral villages outside the project. Farmer operators in this instance move in to their allotments prior to Maha cultivation on a temporary basis to attend to their cultivation work and leave at end of the season. In most such cases farmers rely heavily on labour hired from outside the farm.

2.4. EMPLOYMENT OF LABOUR FORCE

Survey data relating to specific occupations of the labour force in the study area is summarised in the table below.

Table 2.6 Sexwise breakdown of available labour force[1] according to primary employment

Type of primary employment	Male %	Female %	All %
Self employed in agriculture	90	39	66
Hired labour in agriculture	3	2	2
Hired labour outside agriculture	-	-	-
Household work	-	53	26
State Services	2	-	1
Other Services	2	-	1
Unemployed (excluding housewives)	3	6	4
	100	100	100

Of the entire labour force in the area comprising of adults between the ages of 14 - 65, excluding students, disabled and the like, about 67% are engaged primarily in agriculture. Predominance of agricultural activities as a measure of providing employment is still clear among the males in the labour force. Hence almost all, 90% are dependent on farming as an avenue of self employment. Hiring labour as a means of primary occupation is undertaken only by 2%. The measure of unemployment given here is indicative of low unemployment situation. As a consequence of the seasonality factor measurement of this indicator posed many problems and its interpretation needs caution.

This study data also provided an indication of the secondary occupations of the individuals in the labour force.

Among males and females a majority reported farming as the sole means of occupation and a small proportion of them reported as having some form of secondary employment. About a third of the females reported helping in their own farm work as their secondary occupation. Of the males reporting secondary activities, nearly half are engaged in hiring their labour, mainly in agriculture.

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[1] Those within the age group 14 - 65 years excluding students, invalids, disabled.

Table 2.7 Sexwise breakdown of labour force Reporting secondary employment

Type of employment	Male %	Female %	All %
Self employment in agriculture	45	35	40
Hired labour in agriculture	40	29	35
Hired labour outside agriculture	12	--	6
Household work	--	36	17
Others	3	-	2
	100	100	100

2.5 FAMILY LABOUR COMPOSITION

With regard to the full time workers available per farm, data shows the following

	No.	%
Average farm family size	6.5[1]	100
No. of which engaged in full time own farm work :		
Males	1.8	27
Females	.5	8
	2.3	35

[1] The average family size according to the three stages of settlement in the project :

Stage I	- 7.1
Stage II	- 6
Stage III	- 6.7

Larger average family seen in Stage I, may be due to the presence of a number of muslim households with large families in that section of the Project.

2.6. ADMINISTRATIVE RESOURCE

The project administration is currently handled by the Land Commissioner's Department through the District Land Officer (DLO) who is stationed at the Vavuniya Kachcheri. He is assisted by three resident Colonization Officers, and village level officers. There is also an Agricultural Instructor from the extension division of the Department of Agriculture, who functions under the District Agricultural Extension officer stationed at the Vavuniya kachcheri. Repairs and maintenance of the Irrigation channel system and irrigation structures is handled by the Irrigation Engineer and the Technical Assistants of the Department of Irrigation.

2.7. PHYSICAL INFRASTRUCTURE AND FACILITIES

2.7.1. ROADS AND TRANSPORT

The public road network within the Pavatkulam settlement project area approximates to about 90 miles. There are no tarred roads within the project. Only about 20 miles is reported to be motorable. The rest could be considered to be cart tracts. The entire network of roads appear to be in a very poor state of repair and are virtually unusable during the rainy season.

During the time of survey, in September, 1978 there was no bus service to the project area. However, recently in early 1979, a public bus service has been started to Varikutiyur, which is a bazaar in the project area. The main mode of transport within the project area are bicycles and carts. It is estimated that bicycles are owned by about 48% and carts are owned by about 12% of the households. A few light vans (about 3 in the entire project area) are also hired out for longer distances, and in case of emergencies.

2.7.2. HOUSING

It was reported by the Administration (Colonization officers) that currently all settlers in the Pavatkulam Settlement Scheme live in standard colony cottages which were provided by the government at

the time of settlement. However, 11%, i.e. 17 out of 154 farmers reported that they did not reside in standard cottages as they were not given such a facility. Each dwelling typically consists of two rooms and a verandah with a tiled permanent roof, permanent walls, and cemented floor. 52% of the respondents reported as having made improvements to their cottages over their original condition. Some of the houses were seen to be in a very poor state due to want of repairs.

Around 38% of the respondents reported that they did not have any toilet facilities. The main type of toilets available were pit latrines. Only about 2% reported as having water sealed latrines.

2.7.3 WATER FOR DOMESTIC PURPOSES

In addition to the main tank and the smaller tanks that are fed by it, many of the settlers obtain water from wells for domestic use. 49% of the respondents reported using wells for domestic purposes. There are around 350 domestic wells in the project area, in addition to about 148 food production wells. About 22% of the respondents reported the use of common wells for domestic purposes. It was also reported that the water from the tank and channel too are utilized for domestic purposes.

During the Yala season, there appears to be a very acute shortage of water not only for bathing, but for drinking as well. During this time the tanks form the only source of water for a great majority of project farmers as well as for livestock.

2.7.4. HEALTH

The community Health Service available for the project population consists of an outdoor dispensary and a maternity home, located in the Stage I Area with one resident medical officer. At present some settlers have to travel about 12 - 15 miles from their place of residence in order to avail themselves of the medical facilities available at these government institutions.

In the Stage II area, there is one outdoor western Government dispensary which is visited by a medical officer once a week, while in Stage III there is no Government Medical Institution. The presence of a private Aryurvedic Practioner is reported.

Study Data shows that 94% obtain medical treatment from western Physicians at present. A change in favour of the Western Practioner is evident as 10 years ago only around 85% had relied on Western treatments.

Malaria appears to be the major disease in the area and 60% reported incidents of malaria in the family. 13% also cited cases of infant mortality in their families. This figure does not compare favourably with the national figure.[1]

2.7.5. EDUCATIONAL FACILITIES

The existing educational facilities in the scheme comprises of the following details.

Table 2.8 Existing formal education facilities in the settlement

	Staff Strength		Total enrollment
	Graduates	Others	
Stage 1 (Right Bank)			
Tamil Maha Vidyalaya (Grades 1 - 10)	2	9	200
Sinhala Maha Vidyalaya (Grades 1 - 10)	2	8	138
Muslim Vidyalaya (Grades 1 - 8)	-	7	123
Stage II			
Unit 4 Tamil Secondary School (Grades 1 - 10	1	6	182
Unit 4 Tamil Secondary School (Grades 1 - 10)	-	2	83
Stage III			
Unit 9 Tamil School (Grades 1 - 8)	-	5	about 120
Dharmapala Vidyalaya (Grades 1 - 10)	-	10	about 150
Unit 10 Tamil School	-	1	about 40

[1] Infant mortality rate - 43.7% for every 1,000 births (1976).

Many farmers indicated that the level of education imparted in schools in the project is not satisfactory and many of them have sent their children back to their parental homes for schooling.

2.7.6. OTHER AMENITIES

There are two sub post offices but neither of them possess telephone facilities. A branch of the Bank of Ceylon and a Rural Bank are available.

Pavatkulam is not supplied with electricity. Retailing of fuel for household and other purposes is undertaken by a number of retail shops or boutiques within the project.

There are four cooperative society stores within the project which handle the distribution of rationed food items. They also function as purchasing points for some of the farm products mainly paddy. However, due to the difficulties involved in having to transport the produce long distances over very bad roadways to the purchasing stores, the private traders or the more affluent farmers sometimes steps in and functions as middle men.

There are about 24 boutiques, and small scale retail shops in the project area. Only two bicycle repair shops are reported. This is rather insufficient considering the fact that the bicycle is the main form of transport. Three Hair Dressing Saloons are available.

Three rice mills are available in the project area. These are privately owned and cater only for domestic purposes.

Four paddy stores of the Paddy Marketing Board are located in the project, each with a capacity of storing about 20,000 bushels of paddy. One fertilizer store is available with a capacity of about 500 cwt.

On the whole, the basic amenities such as housing conditions, water availability for domestic purposes, road and transport facilities, health facilities, educational facilities for children, as well as the availability of other amenities, such as lighting facilities and shoppong centres etc. cannot be considered to be of desired quality

and adequate quantity for the efficient functioning of any community.[1] One commendable aspect with regard to amenities is the provision of 148 food production wells, and the availability of 42 four wheel tractors in the project area.

2.8. OWNERSHIP OF ASSETS

2.8.1. HOUSEHOLD GOODS

Apart from very basic household furniture the more common utility items of relatively high value found in the homes of the settlers are the radio, and sewing machine. The ownership percentages are given below.

Table 2.9. Ownership of household goods

Goods	% owned (N = 154)
Wall Clock	6
Petromax Lamp	14
Sewing Machine	17
Radio	48
Kerosene Cooker	Less than 1

The radio was the most common item with 48% reporting as owning a radio. As for the kerosene cooker, this was very rarely owned and were not in use at all. Another noteworthy feature is that despite the unavailability of electricity, only 17% owned petromax lamps. Therefore, the lighting facilities could be considered to be quite poor.

2.8.2. EQUIPMENT AND MACHINERY

The data shows that about 4% of the farmers have four wheel tractors. The colonization officers reported a total of 42 four wheel tractors and 5 two wheel tractors in the project area. Around 43% of tractor owners have reported that their machines are hired out. These tractors are also used as a mode of transport, and it was seen that the passengers perch on the machines in a rather dangerous fashion, in the absence of trailers. Only about 20% of tractor owners reported the ownership of trailers.

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[1] O'Brien, Schrag, Martin. "Sociology" P.59. difines community as a form of social organisation or a unit of social cohension that identifies a population living in an area and conducting a common independent life.

An equipment that is of high value in the project is the water pump used for pumping water mainly from food production wells The mammoty was owned by almost all the settlers, while the wooden plough was found to be owned by only 22%. Other equipment found in small numbers in the project area were the sprayer (5%) and Tyne Tiller (4%).

2.8.3. LIVESTOCK ASSETS

As regards livestock assets, 57% of the respondents reported owning of livestock. Only 4% owned buffaloes, and 20% reported owning neat cattle. Poultry rearing is more popular with a reported ownership of 48%. Goat rearing was rare with 4% ownership.

III. FARM COMPOSITION, LAND USE AND IRRIGATION

This chapter focuses attention on the composition of the farm land holding, systems of cultivation, nature of land utilization and role of irrigation. At the time of this survey, classification of soil types in the Pavatkulam Project area was not available and hence has not been included in this report.

3.1. OPERATIONAL LAND HOLDING

The basic farm unit in the Pavatkulam Project comprises of 3 acres lowland and 1.5 acres highland, which was allotted at the time of settlement.

Table 3.1. Average composition of Project farms - Maha 1977/78

Ownership status	Type of farming		
	Lowland (Ac.)	Highland (Ac.)	Chena (Ac.)
Allotted land	3.00	1.5	-
Purana Land[1]	0.03	0.01	-
Encroachments	0.02	0.13	0.43
Total	3.05	1.64	0.43

The encroachment of land reservations within the Project is not of much significance. Chena (shifting) cultivation which is often seen on encroached state lands is not common here.

3.2. SYSTEMS OF CULTIVATION

The systems of farming adopted in each farm unit was also examined. There was a variation with respect to seasons as well as farms.

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[1] *Purana* lands are lands located in the traditional village area.

Table 3.. Classification of farms according to systems of cultivation

Cultivation Systems	Yala 1978		Maha 1977/78	
	Farmers reporting (%)	Average extent per farm (Ac.)	Farmers reporting (%)	Average extent per farm (Ac.)
Only lowland	-	-	2	2.8
Only highland	4	.2	2	1.33
Only Chena*	3	1.2	-	-
Lowland + Highland	-	-	53	.3
Lowland + Chena	-	-	5	4.8
Highland + Chena	-	-	2	2.5
Lowland + Chena + Highland	-	-	31	.9
All farms	7	0.7	95	2.1

*The farmers who reported working only chena were Sinhala farmers.

YALA

Under the existing conditions, Yala season is almost totally inactive as far as farming is concerned. In most years due to lack of water, paddy cultivation is normally not attempted in Yala. Very limited cultivation is seen in Yala on isolated highland allotments that have access to well water from food production wells. Around 4% of the sample farmers had such cultivation in Yala 1978.

MAHA

The major cultivation season coincides with the Maha season. Around 95% of the farms surveyed had some form of cultivation during Maha. Almost all the farms had adopted more than one system of cultivation, the commonest being a combination of lowland with highland allotments. In the face of erratic rainfall and undependable

supply of irrigation water for lowlands, diversification of farming activities is common. The average extent of land cultivated per farm during the reference year is small being around 2.1 acres out of a total allotted extent of 4.5 acres. The under utilization of allotted land may partly be attributed to problems related to water supplies. However, the other production constraints operating in this project area deserves fuller attention.

CHENA

Chena cultivation does not form an integral part of the farming system operating in Pavatkulam. Only about a third of the farmers had engaged in some form of chena cultivation during the Maha season under reference. In contrast, about 90% of the cases studied both in Mahawilachchiya and Mahakandarawa reported chena cultivation during Maha season. The limited chena activities practised in the Project area also differ from the normal pattern of chena cultivation seen in the Anuradhapura District. At Pavatkulam, a single crop - Black Gram, dominates the chena in contrast to a mixture of cereals, pulses, grain legumes, chillies and vegetables etc. found in Anuradhapura chenas. Land preparation and sowing in chena is not done in the traditional way - slash and burn system. Tractors are also used for initial tillage, threshing and transport of chena produce here.

On further analysis of data on chena, it is observed that more of Sinhala settlers are actively engaged on chena work (Table 3.3) This is not surprising as their very background and previous experiences count years of work in chenas in their places of origin.

Table 3.3 Adoption of cultivation system including chena according to ethnic groups

Cultivation System	Sinhala settlers N = 47 (%)	Tamil[1] settlers N = 107 (%)	Total (%)
Including Chena	58	32	37
Excluding Chena	42	68	63
	100	100	100

[1]Tamil refers to Tamils and Muslims.

In fact most of them had originally come from *purana* (traditional) villages in Anuradhapura District where chena plays a dominant role in the traditional farming systems practiced even today. Perhaps due to the instability of irrigation water supplies even in their new environments, the settlers from Anuradhapura had adopted a modified version of chena farming in the scrub lands available in the project area. Even among tamil settlers, about a third had adopted some form of chena cultivation in Maha, despite their lack of previous experience or exposure to chena activities in their homelands - Jaffna. Again, the instability of irrigation water supplies for lowland paddy may be a contributory factor for their involvement with chena activities.

As mentioned previously, due to the small extent devoted for chena cultivation within the project, a detail discussion on different aspects of chena cultivation in the Project area as was done in Mahakandarawa and Mahawilachchiya is not attempted here.

The size distribution of chenas operated in Maha 1977/78 is given below.

Table 3.4. Size distribution of chena per farm - Maha 1977/78

Size Acres	Farmers reporting (%)
0	63
0.1 - 1.9	7
2.0 - 2.9	6
3.0 - 3.9	17
4.0 - 4.9	4
5.0 - 5.9	3
	100

3.3. LAND USE

i. HIGHLAND ALLOTMENTS

As indicated earlier the highland allotment per farm in the Pavatkulam Scheme is 1.5 acres. It is in this allotment that the farmer has his homestead, (which in the Pavatkulam Scheme was in most instances provided by the Government) as well as crops which

could be classified as permanent crops and seasonal crops. The table below illustrates this further.

Table 3.5 (a) Average extent cultivated on highland allotments per farm

	Yala		Maha		Total	
	Acreage	%	Acreage	%	Acreage	%
	(Ac.)		(Ac.)		(Ac.)	
Cultivated	0.25	17	1.4	93	.83	55
Uncultivated	1.25	83	.1	7	.67	45
	1.5	100	1.5	100	1.5	100

Table 3.5(b) Average extent under permanent and seasonal crops on highland allotments per farm

	Yala		Maha		Total	
	Acreage	%	Acreage	%	Acreage	%
	(Ac.)		(Ac.)		(Ac.)	
Permanent crop	0.25	17	0.25	17	0.25	17
Seasonal crop	-	-	1.15	76	0.58	38
Uncultivated	1.25	83	.1	7	.67	45
	1.5	100	1.5	100	1.5	100

During the reference year only 55% of the highland has been utilized by the farmers. Both permanent crops and seasonal crops are cultivated. However, percentage of land used for permanent crops annually is seen to be only 17%, while 38% is used for seasonal crops. 45% is left uncultivated.

The distribution of extent cultivated per farm too should help to show the extent to which the highland is utilized.

Table 3.6 Distribution of cultivated extents per farm in highland - Maha 1977/78

Extent cultivated per farm (Ac.)	Farmers reporting (%)
Nil	6
.1 - 0.5	7
.6 - 1.0	62
1.1 - 1.4	20
Over 1.5 (encroachers)	5
	100

Here it is seen that 6% of the farmers do not appear to make use of their highland allotment. However, the table shows that more than 62% of the farmers make reasonable use of their highland allotment cultivating around ½ to 1 acre, and a further 20% cultivate more than 1 acre of their allotments.

The permanent crops that were cultivated in the highland allotments were found to be coconut, jak, banana, mango, citrus (lime and orange) drumstick, etc. The seasonal crops are cultivavated only during the Maha, the principal crops being onions, (shallot) chillies, black gram, cowpea and green gram. Pavatkulam is within the black gram belt of Sri Lanka, and the major part of the land was reported to have been sown under black gram.

ii. LOWLAND ALLOTMENT

Lowland cultivation is restricted to Maha in most years. As seen in section 1.3 there had been only one season of cultivation in Yala during the past 12 years, for want of irrigation water in this Project. Irrigated paddy constitutes the only crop grown in the lowland allotments. The cropping intensity during the reference year is given below.

Table 3.7 Cropping intensity of lowland allotment

	Extent cultivated per farm	Cropping intensity
	(Ac.)	(%)
Yala 1978	-	-
Maha 1977/78	2.8	91
Annual	2.8	91

An examination of the size distribution of extent of lowland cultivated per farm would help to give a better understanding of the degree to which the lowland allotments are utilized.

Table 3.8. Size distribution of cultivated extents in lowland allotments - Maha 1977/78

Extent cultivated	Farmers reporting
(Ac.)	(%)
Nil	4
0.1 - 1.9	2
2 - 2.9	89
3 and over 3 acres (mainly encroachments)	5
All	100

This table shows that 89% of the farmers under study had utilized their lowland allotments reasonably well cultivating 2 - 3 acres during the Maha season. A very small percentage of farmers (4%) had not cultivated their lowland at all in Maha, mainly due to problems associated with irrigation water.

3.4. ROLE OF IRRIGATION IN LOWLAND CULTIVATION

According to survey information, the extent cultivable is about 95% of the total acreage. The main reason for the inability to cultivate the entire lowland allotment is associated with irrigation water problems. The extent of lowland that was irrigable during Maha was reported by the colonization officers to be around 78% of

the lowland allotments. Farms with irrigation problems in most instances were found to be located towards the tail end of the channels. Many reasons were given by the respondents for the insufficiency of water in their allotments. These are mentioned below in order of importance as reported.

Reasons*	No. of farmers reporting
1. Insufficient flow of water in the distributory channel	45
2. Entire allotment is at a higher elevation than the channel	38
3. Part of the allotment is at a higher elevation than the channel	32
4. Channels are not cleared or are damaged (not maintained)	32
5. Insufficient water in the tank	30
6. Illicit tapping of water by allottees upstream	25
7. No proper water control	4

*Multiple reasons were given by some farmers.

Some of the irrigation problems currently experienced at Pavatkulam appear to stem from some basic defects arising from the original lay out of allotments. Almost a fifth of the settlers investigated complained that at least a portion of their allotments were above the irrigation channel levels. This is a matter that deserves fuller investigation by technical officers. Unavailability of adequate water in the tank is another critical factor that about a fifth of the respondents stressed regarding their irrigation difficulties. Poor state of repair and maintenance of channels which was most evident at the time of survey, was the most important aspect that was highlighted by the settlers.

Table 3.9 Stability of paddy cultivation in Pavatkulam (1971 - 1978)

Maha Seasons

	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Percentage of farmers who cultivated paddy	24	23	8	4	2	5	98
Percentage of farmers who reported crop losses	16	15	5	2	3	3	49

Yala Seasons

	1971	1972	1973	1974	1975	1976	1977	1978
Percentage of farmers who cultivated paddy	2	6	2	3	4	3	3	6
Percentage of farmers who reported crop losses	2	4	2	2	3	2	3	6

The above data helps to pinpoint the instability of paddy cultivation at Pavatkulam under the existing conditions. It is of interest to record that during the period 1971-1977 less than a fourth of the settlers had attempted paddy cultivation even during the Maha season. Among those who had taken the risk of cultivating paddy in Maha some had suffered severe crop losses for want of water. In this regard it may be noted that the period 1971-1976 were generally years of low rainfall with 1975-1976 being particularly bad years. It was only in 1977-1978 Maha season - with well distributed rainfall that the settlers at Pavatkulam were able to raise a relatively successful paddy crop after nearly seven years of poor cropping. Even in this particular season, nearly half the farmers had experienced some form of crop losses for want of water at the ripening stage of paddy crops. Lack of water at the required time is the major reason attributed by farmers for the frequent crop losses experienced. Thus as far as paddy cultivation is concerned the well being of Pavatkulam settlers appear to rest rather heavily on timely arrival of monsoon rains in the Maha season, despite the fact that the project is located under a

major irrigation scheme.

3.5. FARMER PERCEPTION OF PROPOSED IRRIGATION SCHEMES

Survey data indicates that given sufficient irrigation water farmers showed a decided preference for cultivating paddy in their lowlands not only during Maha, but also in the Yala. The main reasons given were as follows :

Reasons for preferring paddy cultivation

Reasons	Farmers reporting* (%)
Require rice for home consumption	76
More profitable	61
Field not suitable for other crops	23
Requires less labour	21
Involves less expenses	19

*Multiple reasons were given by some farmers, therefore, total ≠ 100.

Rice being the staple food, cultivation of this crop receives highest priority when ever water is made available. Profitability ranks next. Poor soil conditions for cultivation of other crops of paddy was cited by about almost a fourth of the respondents.

The farmer response towards the introduction of non rice crops into paddy fields in Yala, showed that almost 100 percent of the farmers felt that there was no scope for the launching of such a programme. It was cited that a severe lack of water during Yala is a major constraint. The reasons given are as follows.

Major constraints for the cultivation of field crops in paddy fields during Yala

Constraints	Farmers reporting N = 154* (%)
Water shortage	84
Heavy cash outlay	6
Poor soil	4
Lack of technical know-how	3
Marketing problems	2

*Multiple responses were given by some farmers, therefore, Total ≠ 100

Project farmers lack experience in growing other field crops in paddy fields in Yala. The survey data hardly shows any past attempts to introduce other field crops onto paddy fields in the study area. A total lack of farmer interest in such programmes was evident during the survey, so much so that a majority of the farmers interviewed were even reluctant to respond to many of the questions posed on field crop production in lowlands in Yala. This dis-interest in field crop production in paddy fields may partly be an outcome arising from severe hardships that the settlers generally experience year after year during the Yala season, for want of water for cultivation purposes. As things stand a majority of the settlers are extremely pessimistic about the possibilities of obtaining adequate water for any form of systematic cultivation of field crops in Yala.

With the implementation of the irrigation modernization programme, the need for intensive farm level extension efforts is clearly seen here. Extension personnel will have to take note of the past experiences and skills of the settlers, their attitudes to new cropping systems, risk taking potentials and other limitations. Since production of field crops on uplands under rainfed conditions is quite common in the Vavuniya District, it should not be too difficult to induce farmers to accept new cropping programmes for lowlands in Yala provided an appropriate extension programme is launched. Changes in cropping patterns do not necessarily take place on the mere assurance of irrigation water. Changes are slow and gradual. Firstly, the farmers have to be convinced of economic benefits of the new cropping patterns. Secondly the necessary skills and knowledge about new practices (irrigated farming on well drained soils) have to be imparted. Thus the need for a concentrated extension effort backed up by other supporting services - material input supplies, credit and marketing cannot be overemphasised.

With regard to introduction of rotational issues of irrigation water for Maha paddy crops, a positive farmer response was seen. Almost three fourths of them agreed on the feasibility and desirability of rotational issues. They were quite emphatic about the

need for a well maintained irrigation conveyance system with rigid controls as a pre-requisite for successful rotational issues. Another aspect stressed by them was the need for flexibility in determining suitable irrigation intervals during different growth stages of paddy crops. Suitable irrigation intervals as perceived by the farmers are presented in table 3.10.

Table 3.10. Irrigation intervals desired by paddy farmers according to cultivation stage of paddy crop

Growth stage	Percentage of farmers				
	No responses	Continuous irrigation	2 - 3 days interval	4 - 6 days interval	7 day interval
Land preparation	23	29	23	20	5
Sowing/Planting	22	34	21	20	3
Seedling stage	22	9	27	25	17
Tillering stage	24	6	23	28	19
Flowering stage	24	51	21	4	-

The response distribution shows that most farmers seem to be aware that technically the paddy plant does not require standing water throughout its period of cultivation.

IV. FARM PRACTICES, CROPPING PATTERNS AND OUTPUT

The analysis here is mainly to present the crop husbandry practices as well as yield levels in the project. Some of the agronomic practices as well as the yield data are presented on the basis of left and right bank settlements and according to the stage of settlement.

A. CULTIVATION OF LOWLAND ALLOTMENT

As indicated already, paddy farming in the lowland allotments is restricted mainly to the Maha season. These lands remain generally fallow during the rest of the year serving mainly as grazing ground for cattle.

4.1 FARM POWER USE

Four wheel tractor is the principal source of farm power used in paddy cultivation in all stages of the project. Around 75% - 80% of the cultivators had relied solely on 4 wheel tractors for tillage as well as threshing. The balance one fifth or so had used both tractor as well as buffaloes for field work. Sole dependance on animal power for paddy field work is hardly seen here. The supply position of tractors is considered very satisfactory with around 42 four wheel and 5 two wheel tractors being available within the project. Around 4% of the settlers owned buffaloes and the ownership is generally limited to a pair of animals per individual household.

Farmer responses for draught power preferences are presented in Table 4.1.

Table 4.1. Type of farm power preferred by operation

Type	Preference indicated for	
	Land preparation	Threshing
	%	%
Buffaloes	14	5
4 wheel tractor	80	90
2 wheel tractor	1	2
No response	5	3
	100	100

The strong farmer preferance for tractors both for land preparation as well as threshing, stems mainly from the speediness of field operations. Better quality of work in ploughing as specified by farmers should be viewed more in the light of the physical conditions of paddy soils found at the commencement of Maha season. Normally, the project area experiences extremely dry conditions in Yala for almost four months (May - August) and at the commencement of Maha season, when first monsoon rains are received in October, the soils tend to be extremely hard and dry. Under such conditions, animal power is quite ineffective for land preparation particularly for first ploughing. Thus the four wheel tractor with 30-45 h.p. has a decided advantage over all other forms of power in field preparation.

Reasons for preferring tractor	Farmers reporting* %
Timeliness	87
Better quality of work	71
Cheaper than other forms	18
Tractors are easily available	4

* Multiple responses had been given by some farmers.

The hire rate of 4 wheel tractor for two ploughings ranged from about Rs.250-275 per acre during Maha 1977/78 season. For threshing it was around Rs.100/- for a good harvest of paddy - 60 bushels per one acre of land. In the case of buffaloes, the hire rate was around Rs.40/- per day per pair. However, hiring out of buffaloes was very rare. Generally, all payments for the hire of farm power is done on cash terms. Deferred payment or payment in kind is quite rare.

4.2. VARIETAL USE

The pattern of spread of paddy varieties shows hardly any variation in the left and right banks. The most popular varieties seen during Maha 1977/78 are H-4, Bg_{11-11}, Bg_{34-8}, Bg_{34-6}, Bg_{90-2}, An old high yielding variety notably H-4, is quite dominant in this project with around 60% of the farmers having cultivated them in Maha. This is quite in contrast to the situation one normally

Labour intensive practices such as transplanting is adopted on a very limited scale - 10% of the cases interviewed. Transplanting is seen more in stage one in the right bank. This area, lying closer to the tank has relatively better access to water and one fourth of the sample farmers here had transplanted their paddy crops in Maha. Row sowing or dry sowing of paddy is hardly seen. In view of the heavy emphasis placed on dry sowing of paddy crops under the Irrigation Modernization Programme, farmer preferences for different types of planting methods was also investigated. Responses recorded are summarised in table 4.4.

Table 4.4 Method of planting preferred for paddy

	Farmers reporting %
Transplanting	29
Broadcast sowing (wet)	61
Row sowing (wet)	-
Dry sowing	3
No response	7
	100

Given a choice the number of farmers preferring to adopt transplanting had increased some what - by 19 percent. However, the overall preferance is for broadcast sowing of germinated seeds under wet conditions. Infact nearly two thirds of the farmers interviewed preferred wet sowing, even though a substantial proportion of them had reservations about the availability of adequate water for wet sowing under the existing conditions. Though dry sowing is associated with much less water requirements for land preparation, farmers at Pavatkulam are not very enthusiastic about the adoption of this sowing method.

Problems of dry sowing	Farmers reporting %*
Needs good weather	69
After care difficult	47
Needs timely land preparation	41
Low yield	34

* Not additive due to multiple responses.

Farmers here, percieve dry sowing as a difficult proposition under uncertain rainfall conditions. After care of dry sown crops - particularly weed control was cited as a major problem. The timely land preparation - capacity to prepare fields rapidly with the outbreak of monsoon was another problem stressed by them. Generally, the respondents feel that the yields of paddy crops sown dry are relatively low as weed growth is extremely heavy in fields rapidly prepared under dry conditions.

4.4. FERTILIZER USE

Nearly one half of the sample farmers (49%) had applied some kind of fertilizer to paddy during Maha season under reference. The nitrogenous fertilizer - Urea is the most common form used here and the quantity applied had averaged to 0.7 cwt. per acre. Basal Dressings have been applied only by a fraction of the farmers who had used nitrogenous fertilizer. Information regarding fertilizer applications is given in table 4.5.

Table 4.5. Level of application of fertilizer for lowland Maha 1977/78

	Fermers applying fertilizer % of total	Extent fertilized as a % of total cultivated	Quantities applied (cwt.)		
			Urea	V_1	Others
Stage I (right bank)	50	49	0.6	0.3	-
Stage II (right bank)	47	52	0.8	0.6	0.4
Stage III (left bank)	48	52	0.7	0.6	-
TOTAL	49	51	0.7	0.5	0.2

In all three stages of the project, about half the cultivated extent in Maha had been fertilized. Lack of assured water and weak financial position of farmers could be considered as over riding reasons for non application of fertilizer by almost half the settlers. Enquiries on farmer awareness of the fertilizer recommendations for paddy for this area revealed that about 44% of the settlers knew the

existence of official fertilizer recommendations, but only a handful was conversant with precise quantities and times of applications.

4.5. WEED CONTROL

A majority of settlers reported the adoption of some form of weed control in Maha season. The farmers in Pavatkulam faced with a rather precarious water supply are normally not in a position to submerge paddy weeds with liberal applications of irrigation water as is done in some of the other major irrigation schemes with more assured water supplies. The restrictions that operate currently on the supply of irrigation water in this project, compells farmers to resort to other methods of weed control. During the reference season, around 90% of the cultivated extent is reported to have been weeded at least partially.

Table 4.6 Extent weeded and methods of weeding - Maha 1977/78

	Extent weeded as a % of total cultivated	Extent under				
		Hand weeding	Chemical weeding	Both hand & chemical	Others*	TOTAL
		%	%	%	%	
Stage I (Right bank)	87	11	59	30	--	100
Stage II (Right bank)	86	13	58	27	2	100
Stage III (Left bank)	96	2	68	30	--	100
TOTAL	96	9	61	29	1	100

*Others indicate 3 acres by a weeder.

Use of weedicides in paddy is widely practiced here. Around 60% of the weeded acreage had depended entirely on weedicides. Another 29% of the area weeded had utilized chemicals along with hand weeding. The marked preferance for chemicals seen here may be primarily due to difficulties associated with pulling out weeds (hand weeding) in broadcast fields when standing water is not readily

available. Problems associated with water have made the use of weedicides a necessity even in a relatively cheap labour situation.

4.6 PESTS AND DISEASE CONTROL

Almost three fourths of the sample farmers (72%) had encountered pest problems during the Maha season under reference. The common paddy pests reported are paddy bug, paddy leaf hopper, stem boarer and gall midge. According to survey data, in almost all such cases chemical control measures had been adopted as a curative measure.

4.7 YIELDS

In general, paddy yields in the project are considered to be low. The overall average of paddy yields within the scheme in Maha 1977/78 was 43 bushels per acre. However the average yields in the right bank and the left banks showed considerable differences, the the respective figures being 46 and 35 bushels per acre respectively. In this connection it may be noted that the left bank of the project had been the last to settle. Further, being situated at the tail end it has the poorest water supply conditions. The highest reported yield within the scheme was 130 bushels per acre. The distribution of yield within the scheme in Maha is furnished in Table 4.7.

Table 4.7. Yield distribution of paddy - Maha 1977/78

Yield (Bu/acre)	Farmers reporting (%)
Less than 19	8
20 - 29	17
30 - 39	26
40 - 49	14
50 - 59	18
60 - 69	10
70 - 79	2
80 and above	5
	100

B. CULTIVATION OF HIGHLAND ALLOTMENT

The broad pattern of utilization of highland allotments was discussed earlier (section 3.3).

4.8 CROPPING PATTERNS

It was estimated that permanent tree crops occupy on an average about a fourth of an acre per farm. This amounts to about 17% of the highland allotment. The major permanent crops observed and reported were banana, coconut, mango, drumstick *(Murunga)*, jak and lime.

On an average around 38% of the highland allotment is made use of annually for seasonal crops.(Table 3.4b). The cropping pattern of seasonal crops on the highland is given below.

Table 4.8 Cropping pattern of highland allotment - Maha 77/78

Crops	Extent as a % of the total cultivated
Cowpea	1
Manioc	1
Paddy	1
Gingelly	1
Green gram	1
Chillies	3
Maize	1
Onions	1
Black Gram	90
Vegetables	1

It is seen that Black gram occupies the greater portion of the highland. Much of the produce from these crops are used for domestic consumption. Sale of Black gram was reported. In the case of onions and chillies intensive cultivation methods are practiced.

C. CHENA CULTIVATION

As discussed in section 3.2, the chena type of cultivation seen here is different from the traditional chena cultivation found in Anuradhapura.

The main crop grown in the cleared scrub lands at Pavatkulam is Black gram. A shortaged 2½ months variety appear to be popular. The system of planting is less systematic than in a traditional chena. Details of crops that are generally grown in chenas in the project area are given below.

Table 4.9 Chena - Extent cultivated and yields per acre

Name of crop	Extent cultivated as a % of the total chena extent	Yield per acre
Black gram	85	4.2 Bu/Ac.
Kurakkan	9	5.7 "
Paddy	3	--
Cowpea	2	4.2 Bu/Ac.
Maize	1	2.7 "
Chillies	1	4 cwt/Ac.
Gingelly	1	6 Bu./Ac.
Total	100	

The study data shows however that the chena is a minor part of the activities of the settlers (Table 3.3).

V. LABOUR UTILIZATION

Agricultural labour in the study area is associated mainly with paddy cultivation. Basic farm level data used in the present chapter was gathered from a single interview conducted at the end of the cropping year. The farm record maintenance programme for data collection undertaken at Mahawilachchiya and Mahakandarawa Settlement Schemes was not attempted here. This was mainly due to operational problems such as regular supervision of Field Investigators stationed in a distant and remote location as in the present case. Furthermore, the lesser degree of diversity on farming in this area also did not seem to warrent the maintenance of an elaborate farm records as was done in the earlier cases.

5.1. PATTERN OF LABOUR USE IN LOWLANDS

The total amount of labour applied for paddy cultivation in 1977/78 Maha season averaged to 98 man days per farm with a cultivated extent of 2.8 acres - around 35 man days per acre. Judging from a typical input of 50 - 60 labour days per acre associated with rainfed paddy cultivation in the dry zone, the reported labour use here is relatively low. Even if some allowance is made for any possible underestimation of data, this information is indicative of the labour extensive system of paddy cultivation practised in the area at present. A number of local factors relevant to this issue are - the lack of assured irrigation water in an area devoid of regular rainfall, extensive use of labour replacing inputs such as tractors for land preparation and threshing together with weedicides for weed control in paddy crops. Transplanting and hand weeding etc. that make considerable demands on labour are hardly seen in this Project. Majority of the farmers (60%) cultivate Old Improved Paddy Varieties under broadcast conditions.

Table 5.1 Composition of labour application for paddy

Man days per farm - Maha 1977/78

Type of labour	Total amount of labour applied per farm (mandays)	%
Family*	45	45
Hired	53	55
Total	98	100

*Includes exchange labour as well

The labour utilization data indicate a relatively high proportion of hired labour application in the case of paddy. Major role of hired labour observed in this instance may stem partly from the extensive use of tractors and weed-killers as seen earlier. For operation of both tractors as well as spraying of chemicals, labour from outside the farm family are invariably hired. The general practice is to hire in tractors along with the operators. For chemical applications too, necessary spraying equipment is hired together with skill persons. Consequently the hired labour component tend to rise with the increase use of machinery and other appliances in small family farms. Furthermore, the presence of farm units whose operators do not reside in the Scheme for part of the year also could enhance the application of hired labour.

An operation-wise distribution of labour used for paddy cultivation is presented in Table 5.2.

Table 5.2 Operationwise distribution of labour application According to source of labour for lowland allotment Maha 1977/78

Operation	Mandays per farm			Mandays per acre		
	Family	Hired	Total	Family	Hired	Total
Land preparation	14	8	22	5	3	8
Sowing/planting	8	6	14	3	2	5
Crop care	6	11	17	2	4	6
Harvesting	17	28	45	6	10	16
Total	45	53	98	16	19	35

Distribution of labour application on an operation wise basis indicates two distinct peaks - during land preparation and harvesting. Infact, nearly 70% of the total input of labour had been utilized for these two field operations alone. Of the two peak labour demand periods, the most crucial is the harvesting and processing time, when the highest amount of hired labour is used. In order to ensure, that the output is not seriously affected by weather, paddy processing operations are completed in a very short period by employing a large stock of hired labour. Land preparation too had used a high proportion of outside labour in order to complete sowing activities within the limited time available. The very small component of labour used for planting and after care of crops amply demonstrate the non adoption of intensive farming techniques at present.

The modal daily wage payments in the Pavatkulam Project area at the time of survey was around Rs.15/- for a male, Rs.12/- for a female and Rs.7.50 for a child, exclusive of meals. If in the event meals were provided a sum of Rs.5/- was deducted for a male and a proportionate amount in the case of females and children.

VI. COSTS AND RETURNS

This chapter deals with costs and returns associated with project farms with special emphasis on cash receipts and expenses.

A. PRODUCTION COSTS

Production costs presented here include both expenses incurred for purchase of inputs as well as the imputed values of farmer's own resources used in production activities during the Maha 1977/78 season. Since there was no cultivation in Yala in the project area, only Maha data is used in the analysis. Due to difficulties experienced in gathering adequate cost data in respect of chena cultivation, this enterprise is not considered in the discussion here.

6.1. GROSS PRODUCTION COSTS

The gross production costs incurred in the cultivation of allotted paddy land as well as the highland in the study area, averaged to Rs.3747 per farm in Maha season. Bulk of the cost (89%) is made in respect of paddy cultivation in the lowland allotment.

Table 6.1 Average production costs per farm, classified by cash and non cash costs - Maha 1977/78

	Cash (Rs.)	Non cash (Rs.)	Total (Rs.)
Lowland	2608	710	3318
Highland	420	9	429
Chena	400	*	*

*Data not collected.

6.2 CASH PRODUCTION COSTS

The cost data presented above shows a markedly high proportion of cash expenses in the cost of production structure of the farm. Almost all production expenses incurred in farming relates to paddy cultivation in the allotted land. Of about Rs.3400 incurred on this, nearly 75% (Rs.2608 per farm) is in terms of cash expens

for purchasing materials and services outside the farm. The cultivation of paddy land, highland allotment along with chena is seen to have involved a cash input of around Rs.3400 during this season.

The principal component of cash production expenses are presented in Table 6.3.

Table 6.2 Percentage distribution of cash production expenses per farm classified by inputs

Maha 1977/78

Input	Paddy land %	Highland %	Chena %
Hired labour	30	51	83
Tractor hire charges	38	37	6
Buffaloe hire charges	1	-	-
Seed & planting material	13	9	9
Fertilizer & agro chemicals	12	3	2
Other incidentals	6	-	-
Total	100	100	100
Rs. per farm	(2608)	(420)	(400)

High cash use intensity seen in this area is mainly associated with expenses incurred on hired labour and tractors. In the case of paddy, draught power hire charges refer to nearly 40% of total cash costs and payments to hired labour ranks next in importance - 30%. Relatively low cash costs incurred on purchased inputs such as fertilizer and agro chemicals is a feature worthy of note. The low usage of fertilizer seen earlier explains the low cost incurred on this item.

In cultivating the highland allotment as well as chena, the wage payments for hired labour form the single most important item of cash costs. Such costs together with tractor hire payments account for around 90% of the total cash costs reported here. In this regard it may also be noted that the chena activities practised here differ considerably from the chenas generally seen elsewhere in the North Central Province. The chenas cultivated at Pavatkulam invlove very little fallowing period and hence cultivated in extremely short cycles. Continuous cultivation on such lands is often seen.

The dominance of hired labour use, the deployment of some tractor power for land preparation as well as exclusive cultivation of black gram are marked features associated with such 'chena' lands. The high component of family labour normally associated with seasonal crop production, the cultivation of multiplicity of subsistance crops found in chenas elsewhere in the Dry Zone is hardly seen here.

6.3. COMPOSITION OF HIRED LABOUR

Expenses on hired labour incurred in connection with the cultivation of lowland, highland and chena are classified according to field operations are presented in Table 6.4.

Table 6. 3 Composition of hired labour payments classified by farm operations

Maha 1977/78

Operation	Lowland %	Highland %	Chena %
Pre-sowing operations	15	17	33
Sowing/planting	11	6	16
Crop care	21	12	5
Harvesting	34	44	23
Post harvest operations	21	21	23
	100	100	100
Rs. per farm	(795)	(214)	(332)

Bulk of hired labour is utilized for harvesting and post-harvest operations in all three cases. The time specificity of operations such as land preparation and harvesting do not permit the adoption of exclusive family labour here. The labour demand reaches a peak during these operations and consequently the settlers rely rather heavily on wage labour to tide over labour supply bottlenecks.

6.4. NON CASH PRODUCTION COSTS

The costs given here cover exclusively the input of farmer's own resources valued at market prices. Here, the family labour utilized accounts for 95% of the total value of farmer's own resources.

Non cash production costs in respect of lowland cultivation in Maha 1977/78 are summarised in table 6.5.

Table 6.4 Composition of non cash production costs for lowland cultivation-Maha 77/78

Type of input	Lowland %
Family labour*	95
Own seed/planting material	
Own buffaloe services	1
Own tractor services	4
	100
Rs. per farm	(710)

*Valued at Rs.15/- per man day equivalent.

B. INCOMES

6.5 GROSS INCOME

The average gross income per farm during the reference year was around Rs.7100, which amounts to a per capita gross income of about Rs.1080 per annum. This figure is substantially lower than the national figure of Rs.2084 in 1977[1].

Table 6. 5 Annual Gross income per farm classified by Season and Source

Source	Yala 1978		Maha 1977/78		Annual	
	Rs.	%	Rs.	%	Rs.	%
Agriculture	63	17	6278	93	6341	89
Non-Agriculture	316	83	456	7	772	11
All	379	100	6734	100	7113	100

[1] Central Bank Annual Report, 1977.

Marked seasonal variation of farm income is a key feature in the data, worthy of note, Almost, the entire annual (99%) farm income is derived in Maha. The gross incomes per farm reported in Yala season is remarkably low, Rs.379 per farm. The absence of paddy farming in lowlands during this season due to lack of irrigation facilities as well as the restricted cultivation of the highland holdings accounts for the low income during this season.

The incomes derived from non-agricultural work is relatively small, Rs.772 per farm per annum. Around 40% (Rs.379 per farm) of this, is earned during Yala season. Non farm work which mainly involves work such as hiring of labour, often outside the area accounts for nearly 80% of the seasonal income. With the proposed improvements of water availability along with the introduction of other field crops which constitute two of the key elements of tank irrigation modernization programme, the settler income from farming in the future should improve substantially both in terms of quantity and distribution.

The detail breakdown of agricultural income of the farmer is as follows.

Table 6.6 Composition of gross income per farm from agriculture

	Yala 1978		Maha 1977/78		Annual	
	Rs.	%	Rs.	%	Rs.	%
Lowland	-	-	4840	77	4840	76
Highland	53	84	893	14	946	15
Chena	-	-	501	8	501	8
Livestock	10	16	44	1	54	1
	63	100	6278	100	6341	100

Nearly three fourths of the agricultural income is contributed by cultivation of paddy in the lowland holdings. The balance one fourth of the income from agriculture has come from crops grown on highland allotment and chena. Hence, under existing conditions at Pavatkulam, the economic stability is almost fully dependent on the successful cultivation of lowland allotments during the Maha season. In this connection, particular attention should be focused on the extremely low incomes generated by the highland holdings.

As production of subsidiary food crops such as black gram, cowpea, green gram, chillies and onions is successfully undertaken on a commercial scale in many parts of the Vavuniya district, the potential for introduction of such cash crops in the highland cropping systems seem to be great.

The data on agricultural income was next re-examined on the basis of cash incomes from sale of agricultural produce.

Table 6.7 Annual cash income per farm classified by season and source

Source	Yala 1978		Maha 1977/78		Annual	
	Rs.	%	Rs.	%	Rs.	%
Lowland	-	-	3160	67	3160	63
Highland	15	5	711	15	726	15
Chena	-	-	370	8	370	7
Livestock	-	-	21	*	21	*
Wage labour	266	80	393	8	659	13
Others[1]	50	15	63	2	113	2
	331	100	4718	100	5049	100

*Less than 1 percent;

1. Indicates cash income from self employment avenues or employment income from government or private sector.

The level of annual cash income per farm is about Rs.5050. As was observed earlier in the case of gross income, the cash income too show a marked seasonal variation. The average monthly cash receipts in Yala season is extremely low - Rs.55 per farm, while in Maha this is substantially higher - Rs.786 per farm. The low level of cash income reported in Yala is a direct outcome of the subdued farming activity during this season, mainly due to lack of irrigation. Of the small cash incomes reported in Yala, 80% had infact come from wage labour, indicating that the settlers are reduced virtually to a state of hired labourers during the dry season.

The table also show that cash income in Maha - Rs.4718 had largely come from sale of paddy from the lowland holdings which accounts for nearly two thirds of the total income. Cash receipts from highland accounts for nearly 15% of the annual income.

6.6 COMPOSITION OF CASH INCOME DERIVED FROM HIGHLAND & CHENA

The data on agricultural incomes was next re-examined on the basis of cash receipts generated by sale of produce.

Table 6.8 Cash Income from highland and chena

	Highland				Chena	
	Yala 1978		Maha 1977/78		Maha 1978	
	No.of farmers report-ing	Cash Income per farm report-ing	No.of farmers report-ing	Cash Income per farm report-ing	No.of farmers report-ing	Cash Income per farm report-ing
		Rs.		Rs.		Rs.
Black Gram	-	-	98	936	37	1720
Cowpea	-	-	1	1200	-	-
Green Gram	-	-	5	257	-	-
Onion	2	1075	5	1031	1	320
Chillies	-	-	2	99	1	675
Manioc	-	-	1	500	-	-
Vegetables	1	33	-	-	-	-
Gingelly	-	-	-	-	1	150
Tree Crops	3	478	8	126		

*No Yala cultivation

A variety of seasonal crops grown on highland allotments as well as in chena in Maha provide supplementary cash income to settlers, among which black gram forms the most important. Income realised from this crop is quite high - Rs.936 per farm reporting in highland allotments and Rs.1720 in the case of chena. Other crops such as onions and cowpea too have recorded high incomes, but the total number of farms reporting cash incomes from such crops is quite small. In Yala, a few allottees with irrigation wells had been successful in onion cultivation on a commercial scale. The income figures in respect of pulse crops as well as chillies and onions indicate the potential for intensifying such crops on highlands.

6.7 NET RETURNS TO FARMING

The net income, representing the difference between the gross income and the total production costs in farming is indicated in the table below.

Table 6.9 Net returns per farm - Lowland and Highland allotments - Maha 77/78

	Lowland (Rs./Farm)	Highland (Rs./Farm)
Gross Income	4840	893
Gross Production Expenses	3318	429
Net returns	1522	464

The net returns from the cultivation of lowland holdings amount to about Rs.1522 per farm while in the case of highland allotment the relevant figure is Rs.464. The net cash returns per farm (Net cash return = Cash Income - Cash cost) is given below.

Table 6.10 Net cash returns per farm - Maha 1977/78

	Lowland (Rs./Farm)	Highland (Rs./Farm)
Cash income	3160	711
Cash expenses	2608	420
Net cash income	552	291

As seen from above, the net cash return from Paddy and highland allotments amount to Rs.552 and 291 per farm respectively. In the case of paddy this figure is relatively low since a substantial portion of the farm production is consumed by the family.

6.8. INCOME DISTRIBUTION

The pattern of annual income distribution among the sample farmers at Pavatkulam was examined using total cash income per farm.

Table 6.11 Distribution of cash income* among farmers in 77/78

Annual cash income per farm (Rs.)	% of farmers	Cumulative percentage	% of income	Cululative percentage
0 - 1000	9	9	1	1
1001 - 2000	13	22	5	6
2001 - 3000	23	45	14	20
3001 - 4000	12	57	10	30
4001 - 5000	14	71	14	44
5001 - 6000	7	78	8	52
6001 - 7000	3	81	4	56
7001 - 8000	7	88	13	69
8001 - 9000	6	94	13	82
9001 - 10000	6	100	18	100

*Includes total cash incomes from farming as well as non farm incomes.

The above data shows that nearly half(45%) farm households earn a cash income of Rs.3000 or less per annum. Only about 12% of the farmers have reported high incomes ranging from Rs.8000 - 10000 (See Lorenz Curve, figure 2 annex 2).

The cash flow analysis presented in Mahawilachchiya and Mahakandarawa reports was not attempted here due to the absence of the farm record maintenance programme in this project as indicated earlier.

In concluding the discussion on costs and returns, it is striking to note that paddy forms the main income generating activity in this project and the highland allotment is greatly under utilized at present. Lack of farming activities both in lowlands and highlands in Yala had depressed farm incomes considerably during this season. The improvement of irrigation system should help to intensify highland cropping during both seasons provided such infrastructural improvements are backed up by appropriate extension programmes and other supporting services such as supply credit, material inputs and marketing etc. Chena cultivation here, is reletively less important compared to either Mahawilachchiya or Mahakandarawa.

VII. FARM SUPPORTING SERVICES AND INSTITUTIONS

The primary intention of this chapter is to record the present state of functioning of the major institutions supporting farm production. The aspects concerned are procurement of inputs, credit and savings, extension services, produce marketing and irrigation distribution.

7.1 PROCUREMENT OF INPUTS

The supply of seed, fertilizer, agro-chemicals, etc. for paddy cultivation is mainly undertaken by the four cooperative societies in the project. As for other seasonal crops, the extension officers play a more important part in the supply of inputs, mainly seed material.

One fertilizer store is available in the area with a capacity of 500 cwts. Farmers generally purchase their fertilizer requirements through the cooperative societies. However many respondents stated that one of the major draw backs in the fertilizer distribution system is it's unavailability in the area at the required time. Delayed arrival of fertilizer to the village cooperatives in the area is not uncommon, which also could reduce the use of fertilizer.

Dusters and sprayers were owned by only 5% of the sample farmers. In view of the widespread use of agro chemicals here, there appears to be a considerable demand for hiring of sprayers. The limited number of sprayers available with the Agricultural Service Centre is hardly adequate to meet this demand.

7.2 SAVINGS AND CREDIT

7.2.1 SAVINGS

In terms of the number of accounts, saving habit is relatively well established with a little over one half (59%) of the farmers reporting as operating savings accounts either in a bank or post office. Bulk of such accounts are in the rural banks partly as a means of facilitating the transaction of credit needs.[1]

[1] The Rural Bank is affiliated to the Peoples Bank and functions through the cooperativess.

Table 7.1 Savings accounts of farmers

Savings accounts at -	Farmers %
Rural Bank	38
Peoples Bank	9
Bank of Ceylon	8
Post Office	4
Total	59

7.2.2 CREDIT

The main source of channelling cultivation loans to the farmers is the primary cooperatives[1]. 89% of those who obtained loans had done so from cooperative societies. The next most important being the private sources (21%). 66% of the sample farmers had reported that they have defaulted repayment of cultivation loans taken earlier. The major reason given by two thirds of these defaulters being crop failures resulting from water shortages.

Table 7.2 Loans taken by farmers according to source and purpose

Maha 1977/78

Source	For Paddy		For other crops		For non-agricultural purposes	
	borrowers %	Average amount per borrower (Rs.)	borrowers %	Average amount per borrower (Rs.)	borrowers %	Average amount per borrower (Rs.)
Cooperative	89	2092	2	1816	-	-
Bank of Ceylon & Rural Bank	2-3	1750	1	1612	-	-
Private	21	1267	4	1437	6	850

During the Yala season, the cultivation loans taken were negligible and are not presented here. However, in Maha 77/78, 89% of the farmers had obtained loans for agricultural purposes, mainly for paddy, from the cooperatives. On an average, loans amounting to Rs.2092 per farmer had been obtained from the cooperative.

[1] 93% of the sample respondents reported membership in the cooperatives

As mentioned earlier about 21% of the farmers borrowed from private lenders, in preferance to the Government Banks. From private lenders, loans per farm amounted to about Rs. 1267.

7.3 FARM ADVISORY SERVICES

The Agricultural Instructor (A.I) and the village level extension workers (KVS) stationed in the project are mainly concerned with extension activity relating to paddy production and their work is much less oriented towards development of other seasonal crops. An indication of the degree of extension worker-farmer contact as reported by farmers in the study is given below.

Percentage of farmers reporting as:	KVS	AI
Know extension worker personally	70	46
Closely associated with extension worker	41	21
Visited extension worker regarding farm problems	46	24
Able to contact extension worker when needed	52	35

9% of the sample farmers reported as being aware of demonstration plots laid out by extension staff, but only 2% of the farmers reported as having seen them. Some of the group extension activities organised by the extension personnel at which the rate of farmer participation is as follows :

	% of farmers
Having seen demonstration plots	2
Participated in Field day activities	4
Attended training classes	5

The extension activities at national level include a number of mass communication techniques. The more important ones are regular radio programmes, issues of advisory leaflets, and sales of farmer journals. The extent of utilization of these services by farmers in Pavatkulam is as follows :

	Farmers utilising %
Radio	48
Newspaper	51
Farm Journals	32
Agricultural leaflets	16

The information relating to communication media reveals that 48% of the farmers listen to radio, 51% have access to newspapers and 32% read magazines and leaflets.

7.4. RURAL INSTITUTIONS

7.4.1 RURAL DEVELOPMENT SOCIETIES (RDS)

The divisions caused by varying geographic and ethnic backgrounds intensified by divisions between those previously resident as opposed to the new settlers seem to act as major constraint for development of informal rural institutions. The apparent dearth of rural institutions, especially informal ones within the project is a noticeable feature. Most farmers attributed the apparent lack of social cohesion to the heterogeneity in their origins. Only the Rural Development Societies (RDS) showed some signs of viability in which 34% of the sample respondents stated that they were members of these societies. However, a large proportion of farmers including those who are members, felt the Rural Development Societies are doing hardly anything here. They attributed this situation mainly to poor coordination, motivation and the lack of cooperation among the members. Most respondents felt that the RDSs do have a constructive role to perform, particularly in terms of introducing and maintaining community services such as transport, community reading facilities, a dispensary etc. within the project area. However, considering the current inadequacies found in many of these facilities there appears a little attempt by settlers to get together and seek collective solutions to alleviate their hardships.

The study area currently has two Rural Development Societies, one each for the Sinhala and Tamil communities. Though there was no separate society for women, there were many women members in these two societies. On interviewing the office bearers/members of both societies, they were found to be doing some limited community service, generally along the lines of cleaning the community wells and foot paths. The Sinhala Rural Development Societies which reported 120 members, was also in the threshold of constructing a dispensary to be staffed by a nurse and a visiting doctor. The need for this was stressed as the nearest dispensary is more than 9 miles away. A temple also is planned for the near future.

7.4.2 MULTIPURPOSE COOPERATIVES

93% of the respondents in the survey stated as being members of their cooperative society. Most of them were very dissatisfied with it's services. These societies seem to operate on a very low key and their main function being to serve as distribution points for basic consumer items. The institutions are financially weak and their major source of income is the commission earned from paddy purchases under the guaranteed price scheme.

As the project is situated in a relatively isolated area where private retail outlets are not available nearby, their dependance on cooperatives for regular purchases of food items is even greater than usual. Many of them have to travel to Chettiyakulam (some 9 miles away) to get essential provisions or to Vavuniya to buy cloth and other durable items. The need for a pola (Bazaar) was also stressed.

7.4.3 CULTIVATION OFFICERS

Since the abolition of the Cultivation Committees (of which there had been 8 to serve the project) a Cultivation Officer has been appointed to serve the study area and attend to matters relating to cultivation. 80% of the farmers were unware of the functions assigned to this officer.

7.4.4 INFORMAL INSTITUTIONS

Informal institutions that are generally found in many rural areas show a total absence in this project. Though Death Relief Societies receive much support in other similar areas, not one such society was found in Pavatkulam. Pavatkulam as common to most settlement projects has been plauged by the problems of settlement, aggravated by divisions of ethinicity. The 'development' oriented institutions that exist in the colony area are few and have been unsuccessful in harnessing either the leadership or the participation of the settlers. While the Rural Development Societies have performed certain limited and individual tasks, the cooperatives have not been altogether successful in their designated tertairy activities such as buying paddy and selling consumer items. Many respondents indicated a desire for a community centre in the project since such facilities are lacking here.

7.5 IRRIGATION MANAGEMENT

Water issues from the tank and it's delivery from the headworks up to the field channels is a function of the Irrigation Department personnel Viz. the Engineer, Technical Assistant and the Field Overseers. They are responsible for the general repair and maintenance of the main channels as well as distributories. Maintenance of field channels however, is exclusively the farmer's responsibility.

Prior to 1977, one of the major functions of the Cultivation Committees in the area has been to attend to the maintenance of the field channels. Since the abolition of the Cultivation Committees in 1977, the sole responsibility of maintaining the irrigation system is vested in the project officer and the Irrigation Department.

A common complaint among farmers in tracts furthest from the tank was the inadequacy of irrigation water reaching their paddy lands. This was reported by 15% of the farmers. Lack of proper maintenance of channels and illicit tapping by farmers upstream were found to be the most important contributory factors for this situation as stated by many of the sample farmers.

In this project area, water disputes have been reported by 45% of the farmers in the sample. Farmers attributed water disputes mainly to the inequity of distribution of water resulting from ;

	Farmers %
Illicit tapping of water by allottees	31
Inefficient water control	12

With regard to water disputes 35% reported as having settled such problems amicably by themselves, 15% had sought police intervention. Water disputes are common and the absence of a single authority to settle such disputes is strongly felt by some farmers.

7.6. MARKETING OF FARM PRODUCE

The two main commodities that are marketed in the project are paddy and black gram. Small quantities of other commodities like green gram, gingelly and vegetables are also sold by the farmers to private traders. As for livestock produce, it has been reported that only 1% of the farmers' annual income comes from livestock produce, mainly milk.

7.6.1 MARKETING OF PADDY

On an average, the total production paddy per farm in the study area amounts to 121 bushels of which the quantity sold averaged to 79 bushels per farm. The pattern of paddy sales by the project farmers is given below.

Table 7.3 Pattern of paddy sales among farmers - Maha 77/78

Paddy sales as a percentage of the total farm output (%)	Percentage of farmers reporting (%)	Amount sold per farm reporting (Bushels)
Nil	16	-
1 - 19	1	15
20 - 29	2	23
30 - 39	6	40
40 - 49	2	38
50 - 59	5	73
60 - 69	17	84
70 - 79	13	72
80 - 89	18	179
90 - 99	6	155
100 -	14	119

One sixth of the farmers had no surplus paddy for sale during this Maha, while one quarter of the farmers sold less than half of their paddy output. 75% of the farmers sold more than half their produce. The data shows that 14% had sold their entire output. These farmers do not seem to reside in their allotments within the project on a regular basis. They, on the contrary primarily reside outside the project, but return to their allotment only during the Maha season for cultivation purposes. Such farmers tend to dispose their entire output at the end of the season.

Of the sample farmers only 28% had sold paddy to the cooperatives, and 38% to private traders.

Table 7.4 Mode of disposal of paddy

Sales :	Farmers reporting (%)
Cooperatives	28
Private traders	38
Payments in kind	37
Repayment of loans	16
Home retentions :	
Consumption	60
Seed paddy	19

66% of the sample farmers had reported some sales either to cooperatives or private traders. However a majority of them is seen to have used private marketing channels. Cooperatives as a marketing channel for paddy is not popular among the settlers. Some of the reasons are :

Table 7.5 Reasons for not selling paddy to cooperatives

	Farmers reporting (%)
The cooperative does not collect paddy from the farm.	27
Delays in payment	47
Irragularities in grading	23

In some instances it was noted that the cooperatives did not buy the paddy from the producers. In such instances farmers transport their paddy to Vavuniya and sell to private traders.

7.6.2. MARKETING OF OTHER PRODUCE

This refers mainly to black gram. Here again there is a preferance to sell to the private trader. Their reasons are similar to those cited under marketing of paddy. Green gram, vegetables, fruits etc. are generally sold in small quantities, to the private trader or direct to the consumer.

7.7. STORAGE AND PROCESSING OF FARM PRODUCE

Paddy and other grains are normally stored at farm level in wooden boxes or gunny bags. However, of the farmers who reported sales, 63% reported that they sell their produce immediately after harvest, keeping only what is necessary for consumption. There are four paddy stores of the Paddy Marketing Board in the project area. Each has a capacity of 20,000 bushels of paddy. For purposes of processing paddy, there are 3 rice mills in the project area, which caters mainly for domestic purposes.

The quantity of pulses produced at present is not sufficient to encounter storage problems within the project area. It has been reported that the Paddy Marketing Board had purchased a fair quantity of black gram produced. The major problem of storage of these pulses at the farm level appears to be weevil infestation.

S U M M A R Y

This study is a bench mark assessment of the Pavatkulam Settlement Scheme covering two seasons of cultivation, viz. Maha 1977/78 and Yala 1978 prior to the proposed Irrigation Modernization. The study involved basic data collection of 160 (15%) farm households. As the main cultivation season is Maha and little or no cultivation is undertaken during Yala, most of the findings relate to the Maha season.

1. The Pavatkulam Settlement Scheme covers an estimated area of 6530 acres on which are settled 1060 farm families. Three colonization officers resident in the Project assisted by their farm level workers handle routine administration matters. Each allotment consist of 3 acres of irrigable lowland and 1.5 acres of highland. The settlers here are of diverse origins and comprise of three ethnic groups ; Tamils (55%), Sinhalese (35%) and Muslims (10%).

2. Average family size is 6.6. A significant demographic feature is a distinctly prominent young population - 60% under 21 years of age. Educational achievements of the heads of households are not high. 19% have had no formal schooling, while 54% have studied up to Grade 5 level.

3. Employment opportunities are almost exclusively centred around agriculture and non-agricultural persuits are extremely limited. Nearly 90% of the males and 40% of the females are engaged in their own farm work as the principal means of occupation. Most of these personnel had not reported any secondary work. Within the male labour force, the kind of secondary employment of major importance is seen to be hiring labour, mainly as agricultural labourers due to lack of opportunities in the other sections of the economy in the area. Migration of male labour outside the project area is common, particularly in the Yala season when the agricultural activities come almost to a stand still. In view of the youthful nation of the current population, the problem of land for second generation is one of utmost importance.

4. The infrastructural facilities as well as other amenities available to the settlers are quite inadequate and of poor quality. The entire net work of roads is in a very poor state of repair and is hardly usable during the rainy weather. Bicycles and carts form the main mode of transport within the project. Electricity and telecommunication facilities are totally absent. Very acute shortages of water for drinking as well as bathing are experienced during Yala season despite the availability of 350 domestic wells and 140 food production wells in the project area. Around 38% of the sample farmers do not have any toilet facilities. Medical facilities available are inadequate, as some settlers have to travel about 12 - 15 miles to obtain medical treatment. Incidents of Malaria is quite common with 60% of the sample farmers reporting the occurence of this disease. Educational facilities available are reported as of poor quality and some of the settlers have sent their children back to their parental homes for schooling purposes.

5. The distribution of rationed food items and the supply of agricultural inputs are handled by four primary cooperatives. The settlers consider the services provided by these institutions as poor. These societies operate on a very low key and often fail to perform designated functions such as sale of consumer goods, purchase of paddy under guaranteed price scheme satisfactorily.

6. The annual cropping intensity of paddy allotments is low - 91%. In Yala, lowlands remain fallow for want of water. Highlands are greatly under utilized even during the rainy season - 45% left uncultivated and in Yala little or no cultivation is undertaken on these. Number of tree crops such coconut, Jak, banana and mango are seen around homesteads. The principal seasonal crops grown on highland allotments in the Maha season are black gram, cowpea, chillie and onions. Chena cultivation is not practiced on a wide scale. About a third of the settlers had cultivated black gram - a single crop in the scrub lands available in the vicinity of the project. This form of cropping

practiced on scrublands here differ from the traditional chena cultivation in Anuradhapura.

7. The extent of lowland irrigable is reported to be around 78% of the lowland allotments. Irrigation problems currently experienced stem partly from some of the basic problems arising from the original layout of the channels. Around one fifth of the settlers investigated complained that at least a portion of their allotment are above the irrigation channel. Unavailability of adequate water in the tank inmost years was another critical factor raised by allottees. Poor state of repair and maintenance of Irrigation channels was evident at the time of survey. With the abolition of cultivation committees in 1977, the maintenance of field channels had deterioted. Around half of the settlers interviewed reported water disputes. Such disputes had arisen mainly due to illicit tapping of water by fellow allottees and inefficient control excercised by officials in water distribution. The absence of a single authority to settle water disputes is felt by the settlers. Rigid enforcement of legal sanctions against those who misuse water was raised as a remedial measure by some of the settlers.

8. A strong farmer preferance for cultivation of paddy is seen even during Yala if irrigation water is made available. The main reason given for this preferance is the need for rice for home consumption.

Settlers at present have very little faith on the proposed programme for introduction of non rice crops on to paddy fields in Yala. A total lack of farmer interest in this proposal was evident during the survey. This disinterest in field crop production in paddy fields may partly be an outcome arising from severe hardships that the settlers experience year after year during the Yala season due to lack of irrigation facilities. Majority of the settlers are very pessimistic about the possibilities of obtaining adequate water for any form of systematic cultivation in Yala. The need for intensive farm level extension efforts on other field crops is clearly seen. Farmers will have to be convinced of both the feasibility and

economic benefits of other field crops in paddy fields in Yala. Well designed demonstration plots over a number of seasons could be helpful in this regard.

9. A positive response towards rotational issues of irrigation water for Maha paddy crops envisaged under modernization programme is seen. Nearly 75% of those investigated feel that rotational issues of water in Maha season would help to solve some of their current irrigation problems. In this regard, the distance to individual allotments from the source of water was posed as a problem.

10. Four wheel tractor is the principal source of farm power. Around 75% of the settlers use 4 wheel tractors for tillage as well as threshing. At present the supply of tractors appears to be adequate with 42 four wheel tractors being available within the project. The farmer preference for tractors stems mainly from the speediness of field operations - a distinct advantage in an arid environment. The hire rate of tractors for land preparation - ranged from Rs.252/- to Rs.275/- per acre in 1977/78 Maha season. For threshing, the rate was Rs.100/- per acre. In the case of buffalo the hire rate was Rs.40/- per day per pair.

11. The old high yielding varieties such as H-4 are dominant in the project in the Maha season. Wider adaptability of H-4 and it's ability to perform reasonably well under lower levels of management generally associated with poor water supply situations are the main reasons for the popularity of such varieties in Pavatkulam.

Sowing of germinated seed broadcast under wet conditions is most common. Labour intensive practices such as transplanting is adopted on a very limited scale - 10% of the cases interviewed. Dry sowing of paddy envisaged under the Tank Modernization Programme is perceived by farmers as a difficult proposition under the existing unstable water supply conditions. Aftercare of dry sown crops particularly weed control is considered as a major problem by farmers.

12. Nearly one half of the sample farmers had applied some kind of fertilizer to paddy in Maha. Urea is the most common form used and the quantity applied had averaged to 0.7 cwt. per acre. Basal dressings had been applied only by a fraction of the farmers who had used Urea. Lack of assured water and weak financial position of farmers are two of the main reasons for low levels of fertilizer use at present. Unavailability of fertilizer at cooperative societies at the required time is a serious draw back reported by farmers.

Use of weedicides for paddy is widely practiced here. Around 65% of the weeded acreage had depended entirely on weedicides. Lack of irrigation water makes hand weeding very laborious. The sprayers and dusters available within the project is inadequate to meet the existing demand.

13. In Maha, the average paddy yield computed on the basis of farmer responses was around 43 bushels per acre. The reported yields reflect low levels of land productivity at Pavatkulam at present. This is not surprising as crop management levels here are poor, primarily due to farmer reluctance to take risks under the existing unstable production conditions for want of irrigation water. The average yields in the right bank with relatively better water supply conditions are higher.

14. Relatively low levels of labour application is a marked feature in paddy cultivation - around 35 man days per acre, reflecting a labour extensive system of paddy cultivation practiced at present. Number of local factors relevant to this are - a lack of assured irrigation in an area devoid of regular rainfall, extensive use of labour replacing inputs such as tractors and weedicides. A high proportion of hired labour input - nearly half the total labour input is another aspect worthy of note. Some of the allottees do not seem to reside in the scheme itself and in such cases, they return to their allotment only in Maha season. These farmers are observed to use hired labour in larger proportions.

15. Relatively high levels of cash production costs are reported in this project - Rs. 3747 per farm. A very substantial proportion of cash costs had been spent on cultivation of lowland paddy - Rs.930 per acre. The extensive use of tractors for tillage and threshing, chemicals for weed control as well as adoption of relatively large proportions of hired labour for field work accounts for such high cash costs here.

In the case of paddy, draft power hire charges refer to 38% of total cash costs payments to hired labour ranks next with 30%. Relatively low cash costs (12%) are reported in respect of fertilizer.

16. The average gross income per farm during the reference year was Rs. 7100 which amounts to a per capita gross income of Rs.1080 per annum. This is around one half of the national average in 1977. Marked seasonality is seen in the income data as 99% of the annual income is derived during Maha season. Almost three fourths of the gross annual income is realised from lowland paddy. This demonstrates the pre-eminent position of the lowland allotment as a source of income at present. Under the existing conditions, the income stability of settlers at Pavatkulam is almost wholly dependent on successful cultivation of lowland allotments. Low cropping intensity in paddy lands for want of irrigation water and under utilization of highland allotments combined together have contributed to low agricultural incomes seen at present. In particular, the gross under utilization of highland allotments is an aspect that deserves closer attention of both agronomists as well as farm management specialists. As production of subsidiary food crops is successfully undertaken at present in many parts of Vavuniya district on a commercial scale, there appears to be a high potential for development of highland allotments in this direction.

17. Annual cash income generated per farm is Rs. 5049. During Yala monthly cash incomes are extremely low - Rs.55 per farm while in Maha the relevant figure is quite high - Rs.786. Of the

meager cash incomes reported in Yala, 80% had infact come from wage labour suggesting the weakness of the existing agricultural base of this project. In Maha, the paddy crop has accounted for nearly two thirds of the seasonal cash income. Lack of farming activities both in lowland and highland in Yala has depressed the overall farm incomes considerably. The improvement of irrigation system should help to intensify cropping both on lowlands as well as highlands during both seasons. If such infrastructural improvements are backed up by appropriate extension programmes and other supporting services in the way of supply of credit, material inputs and marketing etc. income level of settlers should get stabilised at a much higher level.

18. Primary cooperatives serve as the main source of channeling agricultural credit to farmers. In Maha 1977/78, around 89% of those who obtained cultivation loans had done so from the cooperative societies. The amount borrowed per farmer had amounted to Rs.2092 in Maha. The re-payment rate of loans taken during the reference season is low - 30%.

19. Paddy and Black gram are the main farm products that are marketed within the project area. The quantity of paddy sold averaged to 79 bushels per farm in Maha 1977/78. The cooperatives as a marketing channel for farm products is not popular among the settlers. Of the sample farmers only 28% had sold paddy to the cooperatives and 38% to private traders. Farmer reluctance to use cooperatives for disposal of paddy is attributed to difficulties associated with securing prompt cash payments for sales effected and irregularities in grading and weighing at the time of purchase.

20. A resident Agricultural Instructor assisted by a team of village level extension officers is responsible for farm advisory services in the project. So far, farmer participation in group extension activities has been low. Survey findings also reveal that in the past, extension activities had concentrated mostly on paddy. The expansion of other

seasonal crop production on highland allotments in Maha and in paddy fields during Yala as well as livestock rearing had not received much extension effort. The apparent neglect of other field crop programmes within the project is hard to reconcile as Pavatkulam is located centrally in a district, reputed for commercial scale cultivation of field crops. Lack of access to assured irrigation water can not be considered as the sole reason for the non-development of other field crops in this project. The high levels of farm incomes envisaged under the irrigation modernization programme could become a reality, provided a suitable stratergy for the promotion of other field crop production in the project area is implemented. In this regard, extension personnel have a key role to play and their efforts have to be supplemented by other supporting services - input supplies and marketing etc. Over concentration of extension efforts on a single crop - lowland paddy, particularly in a relatively unstable water supply situation is unlikely to be very fruitful in realising high farm incomes. There is a need for both qualitative upgrading as well as bringing in some diversity of efforts in the future extension programmes.

THE PROJECT

Details regarding the project are available in the appraisal report - No. 951 - CE of the World Bank on the Tank Irrigation Modernization Project. A very brief summary is presented in this volume.[1]

SUMMARY

The project is envisaged to increase cropping intensity through a better water supply system. To derive full benefit, however, it is recognised that efficient farm supporting services, like supply of Inputs, Marketing, Extension, etc. are essential.

The major elements included in the Cost estimates are civil workers (U.S. $ 8.7 Million) Construction equipment and vehicles (U.S. $ 7.0 Million), agricultural equipment and vehicles (U.S. $ 4.5 Million), technical assistance (U.S. $ 0.2 Million) and engineering and administration (U.S. $ 1.3 Million).

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[1] An extract is presented in the series of studies on Five Settlement Schemes, prior to Irrigation Modernization. Volume I - Mahawilachchiya, February 1979, Research Study No.28. Agrarian Research and Training Institute, Colombo.

Distribution of Annual Gross Income among Project Farmers - Yala 1978, Maha 1977/78

Annual Gross Income per farm (Rs.)	No. of farmers	% of farmers	Cumulative % of farmers	Total income	% of income	Cumulative % of income
0 - 1,000	5	3.3	3.3	1,711	0.2	0.2
1,001 - 2,000	8	5.2	8.5	13,278	1.8	2.0
2,001 - 3,000	12	7.8	16.3	30,977	2.8	4.8
3,001 - 4,000	23	14.9	31.2	82,824	8.0	12.8
4,001 - 5,000	20	12.9	44.1	86,758	8.3	21.1
5,001 - 6,000	29	18.8	62.9	157,334	15.0	36.1
6,001 - 7,000	10	6.5	69.4	164,153	15.8	51.9
7,001 - 8,000	11	7.1	76.5	81,214	7.7	59.6
8,001 - 9,000	7	4.6	81.1	59,233	5.5	65.1
9,001 - 10,000	3	1.9	83.0	28,458	2.7	67.8
10,001 - 11,000	10	6.5	89.5	105,825	10.2	78.0
11,001 - 12,000	5	3.3	92.8	57,334	5.5	83.5
12,001 - 13,000	2	1.3	94.1	24,880	2.4	85.9
13,001 - 14,000	1	0.7	94.8	13,662	1.3	87.2
14,001 - 15,000	2	1.3	96.1	29,075	2.8	90.0
Over 15,000	6	3.9	100.0	104,386	10.0	100.0

Annex 3

DISTRIBUTION OF ANNUAL GROSS INCOMES

PAVATKULAM - 77/78 MAHA AND 78 YALA.