A STUDY OF

FIVE SETTLEMENT SCHEMES PRIOR TO IRRIGATION MODERNIZATION

Vol. 1 - Mahawilachchiya

AGRARIAN RESEARCH AND TRAINING INSTITUTE
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Sri Lanka

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OF
FIVE SETTLEMENT SCHEMES
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Vol. I - Mahawilachchiya Scheme

Research Study No.28

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AGRARIAN RESEARCH & TRAINING INSTITUTE
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F O R E W O R D

On the recommendation of the World Bank the then Ministry of Irrigation, Power and Highways commissioned the Agrarian Research and Training Institute in May 1976 to undertake an in-depth evaluation of the impact of an Irrigation Modernization Project that covers five major tanks in the North Central dry zone of Sri Lanka. The tanks in question are: Mahawilachchiya, Mahakanadarawa and Padaviya in Anuradhapura district, Pavatkulam in the Vavuniya district and Vavunikulam in the Mannar district. The total command area of these tanks consist of 31,500 acres of paddy land. The estimated cost of modernization is US $ 30 million.

This study corresponds to a benchmark assessment of Mahawilachchiya settlement scheme and therefore forms a part of a broader investigation designed to measure the impact of the proposed development project. Similar reports on other tanks would be published as and when the field studies are completed.

The present evaluation study of the impact of the tank modernization project formed the first assignment to the Institute for monitoring and evaluation of large scale irrigation projects in this country. In accordance with its tradition, the Institute entrusted the study to an interdisciplinary team headed by Mr. A.S. Ranatunga, Research and Training Officer in Production Economics. The other members of the original research team consisted of Messrs. W.A.T. Abeysekera, N. Vithanadurage and Miss T. Sanmugam. Messrs. Georg Krause, Ishak Lebbe and Mrs. S. Abeyratne of this Institute covered the sociological aspects of the study. Messrs. Ranatunga and Abeysekera were responsible for the final analysis of data and the preparation of this report, and Mrs. S. Abeyratne was responsible for the chapter on 'Social Organisation'. As the coordinator of the study team, Mr. A.S. Ranatunga was responsible for liaison and coordination with other government agencies connected with this study.

It is hoped that the data in the present study would be found useful in the final assessment of the impact of the Tank Irrigation Modernization Project.

Finally, I wish to express my deep appreciation to all members of the Institute who made this publication possible.

T. B. Subasinghe
Director

AGRARIAN RESEARCH & TRAINING INSTITUTE
Colombo
28 February 1979

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

We wish to place on record our deep appreciation to all those who were instrumental in completing this study. Some of them in particular, deserve specific reference.

Our colleague in the Production Economics and Farm Management Unit, Mr. Nelson Vithanadurage, contributed substantially in the early phase of this study, prior to his departure on study leave. He was associated in designing the data collecting instruments, supervision of field data collection and the study data transference in office. The assistance rendered by Miss T. Sanmugam, Research Officer in Statistics for drawing the study sample as well as making valuable suggestions for improving the research design is thankfully acknowledged.

Messrs. George Krause and Ishak Lebbe of the Sociology Unit participated in the preparation of the questionnaire relating to sociological aspects. In their absence, these investigations were continued by Mrs. S. Abeyratne, Research Officer (Sociology) who prepared the chapter on Social Organisation in this report.

The Statistical Investigators of this Institute together with a few other recruits from outside assisted in collating data and tabulation. The bulk of the field data collection for the study was accomplished by Mr. U. Gunatilleke who was stationed in the project area for a period of 10 months. The services of this team of officers are deeply appreciated.

A number of other public officials outside the Institute also helped us in numerous ways in organising the field data collection. Among them, Messrs. M.J.F.R. Senaratne (Deputy Director, Irrigation), J.R.S. Gunaratne (DLO, Anuradhapura), B. Jinendradasa (DAEO, Anuradhapura), J.A. Fernando and S.K. Egalla (Colonisation Officers in charge) deserve special mention in this regard.

Helpful comments of Professor T. Jogaratnam, Agricultural Economics Department, University of Sri Lanka, Dr. Ernest Abeyratne, former Director of Agriculture and Professor Norman Uphoff, Political Economics Department of the Cornell University on the first draft are also gratefully acknoweldged. However, the authors themselves are responsible for any lapses, if any.

Mrs. S. Wiratunga, Secretary of this Unit rendered a valuable service in handling all correspondence relating to the study from its inception to completion. The organisation of this report in its present form and its typing is a reflection of her dedicated labour.

A.S. Ranatunga
W.A.T. Abeysekera

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Colombo

1 December 1978

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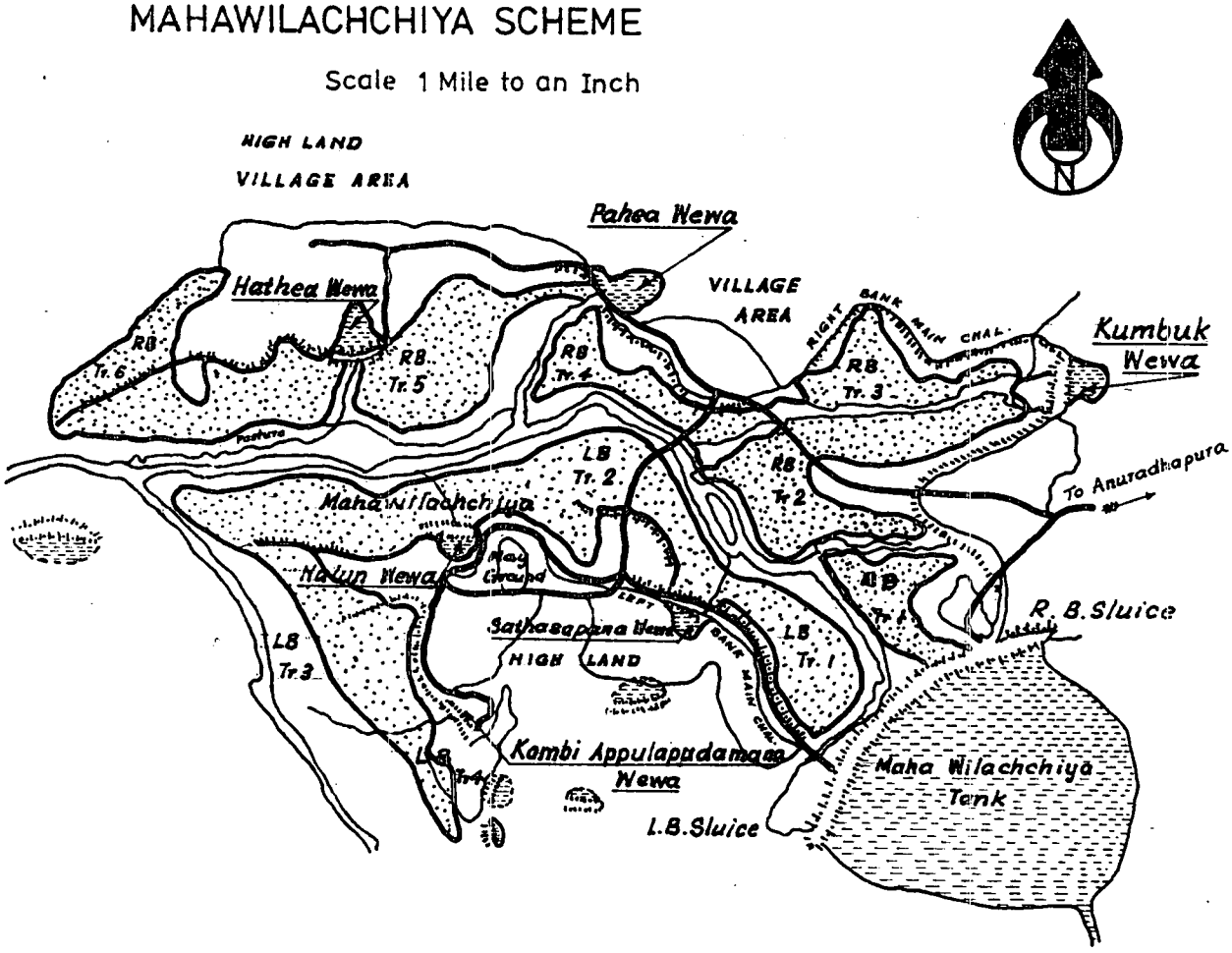
MAHAWILACHCHIYA SCHEME

Scale 1 Mile to an Inch



: Tanks and Weirs

: Development Areas (Paddy)

: Rivers

IRRIGABLE AREA		
NAME	ACREAGE	LENGTH
R.B. MAIN CHANNEL	1611	7.5 MILES
L.B. MAIN CHANNEL	1053	3.4 MILES

MAHAWILACHCHIYA SCHEME TANK DATA	
CATCHMENT AREA	141.75
CO-ORDINATE	F/3 (4.05 x 7.50)
F.S.L.	176.18
F.S.D.	22 FT.
CAPACITY	33,000 AC.FT.

A STUDY OF
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Volume I - Mahawilachchiya Scheme

I. INTRODUCTION

1.1 THE SETTING

This presentation is the first 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 study scope covers agronomic, economic as well as social conditions prevalent in the scheme. This was undertaken by the Agrarian Research and Training Institute in response to a request from the Ministry of Irrigation, Power and Highways on a suggestion of the World Bank.

The Mahawilachchiya colonization scheme which constitutes the project under consideration here covers an area approximating to 4,200 acres of which 2,600 are irrigable[2]. This scheme is located 18 miles north west of Anuradhapura, the principal town in the north central province of Sri Lanka (see map, Fig. 1). The tank is formed by damming *Tala Oya,* a non-perennial stream with a catchment in the dry zone itself.

The tank has a total capacity of 32,500 acre feet with a catchment area covering 142 sq. miles. The reservoir has two sluices,

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[1] A summary account of the proposed modernization project is given in Annex 1.

[2] Other irrigation schemes involved in the modernization project are Mahakanadarawa and Padaviya in Anuradhapura district, Pavatkulam in Vavuniya and Vavunikulam in Mannar districts. The total extent under this project amounts to 31,500 acres benefiting 10,500 farm households in all.

one servicing the right bank and the other the left bank. The total command area of this tank is 3,750 acres of which only 2,650 acres is considered as irrigable lowland. The land alienation pattern in the scheme generally comprises of 3 acres of irrigable and 2 acres of unirrigable land per farm holding. The details are given below:

	Paddy (Acreage)	Highland (Acreage)	No. of allottees
Left Bank	1,053	702	351
Right Bank	1,611	1,074	537
Total	2,664	1,776	888

Mahawilachchiya was included in the special projects programme of the Land Commissioner's Department in 1968. Under this programme, certain irrigation projects in the island were chosen for intensive development through a concentrated effort of the departments concerned with agricultural development. The main objectives of the special projects programme were to increase land productivity and economise the use of irrigation water. However, the results achieved here had not been impressive[1].

Historically, the tank formed a part of the irrigation network of the dry zone of Sri Lanka and after centuries of disuse had been renovated and resettled during the period 1955 - 58. Prior to restoration, the project area was mainly under forest where chena (shifting) cultivation had been practiced on a limited scale by the inhabitants.

As common to all irrigation schemes included in the modernization project, Mahawilachchiya too is located in the drier region of the country receiving a highly seasonal rainfall which is often erratic. Furthermore, in all cases concerned, the tanks and their

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[1] T. Jogaratnam, Summary Report of the Socio Economic Survey of Nine Colonization Schemes in Ceylon, 1967 - 68, Parts I and II.

conveyance systems are presently geared only for providing supplementary irrigation for paddy farming in Maha. This has resulted in low land use intensities. The critical problems in the reference area as identified in the modernization project proposal are[1] -

(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.

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 particularly during Yala;

(v) strengthening the currently existing agricultural extension services.

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[1] Appraisal of the Tank Irrigation Modernization Project, Report No.951-CE, World Bank. pp. 9.

1.2 STUDY OBJECTIVES

In broad terms, the present investigation is designed to serve as a baseline study for evaluating the changes in farming and levels of living of the Mahawilachchiya project farmers. In specific terms the study aims are:

(i) to ascertain the current status of the project beneficiaries with 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 areas;

(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 organisation 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 the right bank areas of the project were treated as the sampling strata[1]. A sample of 150 farms was selected for the questionnaire survey in Yala 76 consisting of 60 and 90 units from the left and right banks respectively. The total sample amounted to 16 per cent of the entire project households. From this, a sub-sample of 55 farms was selected for detail record maintenance during the Maha 76/77 season.

As a part of the evaluation strategy of this study, inclusion of a comparable area outside the project as a 'control' was envisaged earlier. Such a procedure was thought more desirable in making precise measurement of the impact of modernization 'with' and 'without' the project. For this purpose it was necessary to conduct

As a part of the evaluation strategy of this study, inclusion of a comparable area outside the project as a 'control' was envisaged earlier. Such a procedure was thought more desirable in making precise measurement of the impact of modernization 'with' and 'without' the project. For this purpose it was necessary to conduct a parallel study in a location with conditions similar to Maha-wilachchiya project. The major factors considered in this regard were, catchment characteristics, rainfall distribution, settlement patterns and others. The problems of selecting a suitable control area were many and even the settlement schemes with reasonable comparability were found to be earmarked for irrigation development in the near future. Hence this aspect of investigation was not pursued further.

Reference Period

The study data covers a single cropping year prior to modernization and includes both Yala[1]76 and Maha[2]76/77 cultivation seasons. Specifically, the period under reference extends from June 76 to May 77.

Data Collection

Information relating to economic and agronomic aspects of farming in the project area constitutes the bulk of the data collected. The main data collection procedure involved a single questionnaire interview, covering the Yala 76 data and a record keeping exercise in respect of Maha 76/77 farm data. Yala being an agriculturally inactive season in the project, the single interview survey served adequately for the purpose. In Maha season, the adoption of regular maintenance of farm records was thought particularly useful for purposes of studying the interaction of chena and paddy cultivation as well as to ascertain the details of labour application. This data was also supplemented from the information obtained from the local Irrigation Office, Project Office, District Land Office and District Agricultural Extension Office. The data collection also involved gathering sociological information.

[1] Dry season, normally extending from May to August.

[2] Rainy season, extending from September to April. However, in this particular year Maha rains were delayed by about a month.

The record maintenance in respect of each of the sample farmers assumed a prime importance in the data collection. The records were designed to ascertain the farm input-output data on a weekly basis during the Maha season commencing from October 76 and pursued until June 77. The task of visiting the selected farms was assigned to a resident investigator whose field work was closely supervised by the researchers themselves during their fortnightly visits to the area. Instruments of data collection in this instance comprised of a set of individually designed record books for entering cultivation data relating to lowland allotment, highland allotment and chena. An additional record was also kept in each of the sample households for monitoring the agricultural extension activities. This, however, proved little value due to extremely low intensity of extension activities in the area.

Recording of information at frequent intervals as in this study forms an innovative approach in farm data collection in this country. The main reason for adopting this technique of data collection would be to minimise the memory bias in data arising from recall lapses of the respondents often encountered in single interview farm surveys. Experience gained in this study indicates 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. In respect of data collection using farm records, the experience of this study suggested that a properly executed single interview survey would be equally reliable except in specific instances where close monitoring of input use is needed. The experience gained clearly indicates that rigorous checking and regular supervision of the farm records is a crucial aspect that cannot be over emphasised. The problems associated with data collection using records may become even greater if attempted in distant places where strict supervision is less feasible.

A pre-tested, structured questionnaire was utilised for collecting Yala 76 data which was administered in September. The farm interviews were undertaken by 10 trained investigators whose work was carefully supervised and checked personally by the researchers.

Field work for the sociological component of the study was conducted in two stages. The initial data collection was part of the overall questionnaire survey covering 150 sample households. The second phase was conducted by a trained investigator, resident for a period of three weeks in the project area and included the maintenance of comprehensive logs and indepth interviews with selected informants on specified topics. Data collection at this stage was consciously of a more qualitative nature.

A letter from the Government Agent, Anuradhapura addressed to individual farmers explaining the study purpose, etc., was used with a view to solicit their support for data collection. This approach was found to be extremely helpful in dealing with the project farmers in this regard. This is shown by 100 per cent response witnessed in the case of the questionnaire survey while in the farm record keeping exercise there were only 4 dropouts among the 55 selected.

Data Processing

Data processing was undertaken manually during the period from December 77 to May 78.

II. FARM FACILITIES, EMPLOYMENT & LABOUR FORCE

This chapter examines the existing infrastructural facilities, housing conditions and other basic amenities along with a detailed analysis of population, employment and labour force data in the study area.

2.1 ADMINISTRATIVE RESOURCES

The project administration is currently handled by the Land Commissioner's Department through a District Land Officer (DLO) who also functions as the Project Manager and is stationed at the Anuradhapura kachcheri. Two resident Colonization Officers assisted by 4 village level officers function under the DLO servicing the needs of the allottees. In addition, an Agricultural Instructor from the Extension Division of the Department of Agriculture together with 2 village level workers constitute the extension network within the project. These extension officers too, operate under the direction of the DLO. A Technical Assistant from the Irrigation Department resident in the project attends to repair and maintenance of the channel system and irrigation structures.

2.2 PHYSICAL INFRASTRUCTURE

The public road network within Mahawilachchiya project approximates to 30 miles, and only a third of this can be considered as all-weather roads. Apart from the main trunk road from Anuradhapura to the project, the remainder are gravel roads running mostly on irrigation channel bunds. They are in a very poor state of repair and are virtually unusable during the rainy season.

The community health services available for project population consist of an outdoor dispensary and a maternity home. These institutions are manned by an Assistant Medical Practitioner helped by a midwife. Currently there are 9 ayurvedic physicians and 2 western private medical practitioners at Mahawilachchiya. Malaria is reported

to be the most widely spread health problem in the project with periodic outbreaks resulting in occasional deaths.

The existing educational facilities in the project comprises of 4 government schools.

School		Staff strength	Total enrolment 1977
Siddhartha	(upto Grade 12)	20	725
Saliya	(upto Grade 10)	7	360
Thaxila	(upto Grade 10)	11	349
Gamini	(upto Grade 5)	5	172

There are two sub-post offices and neither of them possesses telephone facilities. The nearest telegraph office is located at Elayapaththuwa which is 15 miles from the Mahawilachchiya scheme proper. A branch of the Bank of Ceylon and a Peoples Bank (Rural Bank) are also available here.

Mahawilachchiya is not supplied with electricity and none of the households possess their own private electricity generators. Gasoline pumping stations are not available within or in close proximity to the project. Retailing of fuel for household and other uses is undertaken by two boutique keepers.

Five branch cooperative societies along with the primary society located within the scheme handle the distribution of rationed food items. Besides this, they also function as purchasing points for some of the farm produce, mainly paddy. Twelve small scale retail grocery shops and 17 tea kiosks operate in this area. Five bicycle repair shops, a smithy and 5 hair dressing saloons are also found.

Processing facilities for farm produce are limited to 8 privately owned small scale rice mills which primarily cater for the domestic needs of settlers. Four large paddy stores of the Paddy Marketing

Board are available with a total capacity of 32,500 bushels. Three of these having a capacity of 22,500 bushels are located in the right bank. Two fertiliser stores, each with a capacity of 5 tons are maintained by the Department of Agrarian Services.

The total availability of farm machinery and vehicles in the project consist of 3 four-wheel and 4 two-wheel tractors, 3 motor cars and 3 vans. The Ceylon Transport Board operates a bus service between the project and Anuradhapura. Though 8 round trips are scheduled per day, severe complaints were noted regarding this service.

2.3 HOUSING CONDITIONS & RELATED AMENITIES

Currently 84 per cent of the colonists in the left bank and 83 per cent in the right bank live in standard cottages provided by the government at the time of settlement. Each dwelling, typically consists of two rooms and a verandah, tiled roof, permanent wall and a cemented floor. The majority of these houses did not show any improvements over their original conditions. In fact, some of them were seen to be in a very poor state due to want of repairs. The survey revealed that 6 per cent of the allottees in the left bank and 9 per cent in the right bank live in houses with wattle and daub walls and thatched roofs.

Sixteen per cent of the households did not possess any toilet facilities. This situation is slightly more acute in the right bank than in the left. The only type of toilet found within the project is the pit latrine.

The main tank together with 5 - 6 small tanks fed by it form the exclusive sources of bathing water for the colonists. Nearly half the respondents reported as directly dependent on the main tank or the small tanks for drinking. Only 30% of the farmers had their private wells for domestic use and another 22% used community wells for this purpose. Apart from bathing, drinking water was found to be acutely short during Yala. Almost for half the year, the tanks form the only source of water for a great majority of project farmers as well as livestock

Only a very narrow range of utility items constitute the material assets of sample households. Apart from the basic household furniture, the common items found were bicycles and radios as reported by 45% and 32% of households respectively. Sewing machines and petromax lamps ranked next with nearly a fifth of the farms reporting. A kerosene cooker was found in one household.

Bullock cart which forms the principal means of farm transport was owned only by a tenth of the respondents. None of the 150 sample households possessed 4-wheel tractors, while a 2-wheel tractor was found in one instance. Equipment such as sprayers, dusters, rotary weeders, seeders and water pumps were not available among sample farmers. Wooden ploughs formed the common tillage implement with at least one per household. The light iron plough was found only in 4 per cent of sample farms

2.4 LIVESTOCK ASSETS

As regards livestock assets ownership only a fifth of the respondents had buffaloes averaging 5 animals per herd. Neat cattle raising was seen in 7% of the cases with about 10 animals per farm.[1] Other types of livestock production such as goats and poultry even for domestic consumption are not found.

2.5 POPULATION CHARACTERISTICS

The project population at the time of survey is estimated at 6,490, almost a tenth of which live on encroached lands. An analysis of the agewise composition of the population as indicated below reveals the predominance of younger age groups. Thirty seven per cent are below 14 years, while 60 per cent are less than 21 years of age.

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[1] According to Project Office records, the total buffalo and neat cattle population in the project is 9,500 and 6,800 animals respectively. However, this appears to be a gross over-estimation.

Table 2.1 Composition of the Population According to Age & Sex

Age Group (Years)	Males (%)	Females (%)	Total (%)
0 - 13	34	38	37
14 - 20	24	23	23
21 - 30	16	16	16
31 - 50	15	17	15
51 - 65	9	4	7
Over 65	2	2	2
Total	100	100	100

The levels of educational achievements of heads of households were next examined which showed about 17 per cent had received no formal education at all. Nearly a half (46 per cent) has had schooling up to Grade 5, whilst only a third (31 per cent) had attended up to Grade 10. Only 4 per cent had passed the GCE (OL) examination. In respect of all individuals in the colony above 6 years of age, the educational attainments are as follows:

	%
No schooling	25
Upto Grade 5	39
Upto Grade 10	29
Passed OL	7
Passed AL	-
All	100

The average family size is 6.9. In most instances it varies from 5 to 8 as given in Table 2.2.

Table 2.2 Size Distribution of Households

Family Size	%
2 and less	4
3 and 4	18
5 and 6	27
7 and 8	24
9 and 10	15
11 and 12	8
13 and 14	3
15	1
All	100

2.6 ORIGIN & MIGRATION PATTERNS

A majority of the chief of households in the project belongs to the first generation of settlers. They have diverse origins with 40% of them having come from nearby *purana* villages, the rest are from outside the district. Eighty per cent of the allottees prior to settlement in Mahawilachchiya had some association with farming.

The migration patterns of labour studied here, revealed a heavy seasonal movement of the male labour during the Yala season seeking work outside the project. Normally, this moving labour force returns to their households in the project well in time to commence work in chena during Maha season.

2.7 EMPLOYMENT & LABOUR FORCE

Survey data relating to specific occupations of the labour force in the study area is summarised in Table 2.3.

Table 2.3 Sexwise Breakdown of Available Labour Force[1] According to Primary Activity

Type of Primary Employment	Males (%)	Females (%)	All (%)
Self employed in agriculture	84	40	66
Hired labour in agriculture	5	*	2
Household work	-	54	24
Hired labour outside agriculture	3	*	2
Traders	1	-	*
State services	2	-	1
Unemployed (excluding housewives)	5	6	5
	100	100	100

[1]Refers to those in the age group 14 - 65 years excluding invalids, disabled, etc.

*Less than 1 per cent.

Of the total labour force available nearly two thirds cultivate own lands as their primary occupation. In this respect 84 per cent of the male labour are self employed in farming as their main preoccupation, whilst another 5 per cent hire their labour as their principal means of employment. The relatively low participation rate among females in their own farm work is due primarily to their involvement with house work. The above shows that in Mahawilachchiya employment opportunities are centred around agriculture. The State which is the only formal employer in the area provides a mere 1% of the labour force with regular salaried employment.

This data also reveals the lack of traditional village employment avenues in the non-farm sector such as carpenters, blacksmiths, masons, etc. This emanates from the selection procedures of the original settlers as well as the depressed demand for such services due to low economic activity in the project.

The rate of unemployment among the project labour force as reported by the respondents is 5%. However, the relatively low unemploy-

ment figures given here, particularly in the case of male labour, needs careful interpretation due to the marked seasonality of available employment.

In addition to the data on primary occupation of the labour force, this study also sought to establish their secondary occupations.

Table 2.4 Type of Secondary Employment Classified by Sex

Type of Employment	Male %	Female %	All %
Self employed in agriculture	23	63	40
Hired labour in agriculture	72	11	47
Hired labour outside agriculture	3	1	2
Traders	2	1	1
Household work	-	24	10
	100	100	100

Hired labour assumes the most important secondary employment among the males. This is particularly marked during the off-farm seasons, when they seek work outside as wage labour. In the case of females, helping in work on their own farm is seen as their major secondary activity.

2.8 FAMILY LABOUR COMPOSITION

In order to ascertain the number of full time workers per farm, data was classified accordingly and the results are as follows:

	No.	%
Average farm family size	6.9[a]	100
Of which engaged in full time own farm work:		
Males	1.8	27
Females	.8	12
All	2.6	39

a. The average family size in the left and right banks of the project are 6.2 and 7.4 respectively.

III. FARM COMPOSITION, LAND USE & IRRIGATION

Composition of the farm land holding, systems of cultivation, nature of land utilisation and role of irrigation form the principal areas of attention in this chapter. See Annex 2 for soils and other geographic features of farmland.

3.1 OPERATIONAL LAND HOLDING

In conformity with the standard colonisation schemes, the basic farm unit in Mahawilachchiya project comprises of 3 acres of lowland and 2 acres of highland allotted at the time of settlement. Generally almost all project farmers operated chena[1] plots in Maha. Encroachment of land reservations within the project is not significant as seen below:

Table 3.1 Average Composition of Project Farms - Maha 76/77

Ownership Status	Type of Farming		
	Lowland (Acres)	Highland (Acres)	Chena (Acres)
Allotted land	2.9	2.0	-
Purana land[2]	0.1	-	-
Encroachments	0.1	0.1	4.0
Total holding	3.1	2.1	4.0

The physical extent of land resource per farm averages to 3.1 acres of lowland, 2.1 acres of highland and 4.0 acres of chena. Encroachments of the lands reserved for channels and roads as well as some of the abandoned allotments were reported by 27% of the sample farmers. Fifty farmers out of the sample of 51 had operated chena plots and nearly 20% reported as owning *purana* lands.

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[1] Chena farming connotes shifting cultivation. In this instance chena is an encroachment of State forest lands in the vicinity of the project.

[2] Lands located in the traditional villages in the area.

3.2 SYSTEMS OF CULTIVATION

The systems of farming adopted in each farm unit was next examined. It varied markedly between farms as well as between seasons as seen below.

Table 3.2 Classification of Farms According to Systems of Cultivation Adopted

Farm Composition	Yala 76		Maha 76/77	
	Farmers reporting (%)	Average extent per farm reporting (Ac)	Farmers reporting (%)	Average extent per farm reporting (Ac)
Farmers operating:				
Only lowland	-	-	-	-
Only highland	29	.9	-	-
Only chena	41	2.8	-	-
Lowland+highland	-	-	2	4.0
Lowland+chena	-	-	8	10.8
Highland+chena	30	3.3	-	-
Lowland+chena+highland	-	-	90	7.4
All farms	100	2.73	100	8.2

In Yala seasons farm production is mainly based on cultivation of chena crops. In the Yala under reference chena had served as the sole form of cultivation for 40% of the farmers. Another 30% had reported as cultivating both chena and highland allotment in the project in this season. None of the project farmers had cultivated their lowland allotment in Yala.

During Maha 90% of project farmers had cultivated their lowland and highland allotments together with chena. In such cases, the average extent operated totals to 7.4 acres per farm unit. Only a twelfth of the project farmers had relied on cultivation of their lowland and chena which totals to 10.8 acres per unit. This data indicates that the proportion of farmers solely dependent on their allotted land is insignificant. Generally, in all cases, cultivation

3.3 LAND USE

i. Highland Allotments

Almost half the project farmers had cultivated less than 0.5 acre of their highland allotment with arable crops in Maha (Table 3.4). Another one fourth had utilised 0.5 - 1.0 acre of these lands. In Yala seasons the use of highland allotments for arable cropping is restricted to gingelly cultivation.

Table 3.4 Distribution of Cultivated Extents per Farm in Highland Allotments - Maha 76/77

Extent cultivated with arable crops per farm (Ac)	Farmers reporting (%)
0 - 0.5	43
0.6 - 1.0	28
1.1 - 1.5	26
1.6 - 2.0	3
2.1 - 2.5	-
All sizes	100

ii. Lowland Allotment

Currently, the lowland allotment is cultivated mainly during Maha except in some occasional Yala seasons. During Yala 76, there was no paddy cultivation in the project and the experience of project farmers over a considerable period of time indicates that there is a partial Yala crop once in about four years. Irrigated paddy constitutes the only crop grown in the lowland allotment. The cropping intensity which refers to the extent cultivated expressed as a percentage of total extent available are:

Period	Extent cultivated per farm (Ac)	Cropping intensity (%)
Yala 76	-	-
Maha 76/77	2.8	90
Annual	2.8	90

Table 3.5 Size Distribution of Cultivated Extents in Lowland Allotments - Maha 76/77

Extent cultivated per farm (Acs)	Farmers reporting %
1.0 - 1.9	20
2.0 - 2.9	70
3.0 - 3.9	6
4.0 - 4.9	-
5.0 - 5.9	4
All sizes	100

Nearly three quarters of the project farmers are seen to operate paddy land ranging from 2 to 3 acres. A fifth of the farmers had cultivated extents less than 2 acres.

iii. Chena

As indicated earlier, chena farming is undertaken on an extensive scale by the allottees. A marked variation of the sizes of individual chena blocks was observed.

Table 3.6 Size Distribution of Chena per Farm - Maha 76/77

Size (Acs)	Farmers reporting (%)
1.0 - 1.9	16
2.0 - 2.9	16
3.0 - 3.9	24
4.0 - 4.9	26
5.0 - 6.9	12
7.0 - 11.0	6
All sizes	100

In all cases, the extent of chena operations were more than one acre. Half the chenas cultivated ranged from 3 to 5 acres per operator and around one fifth varied between 5 - 11 acres per unit. In general farmers operated only one block of chena located mainly at the periphery of the project. The distance to chena from the farm house was examined which in most cases ranged from 4 - 7 miles (Table 3.7).

Table 3.7 Location of Chena Block in Relation to the Farm House

Distance (miles)	% of farmers
Less than 2	14
2.0 - 3.9	18
4.0 - 4.9	20
5.0 - 5.9	18
6.0 - 6.9	18
7 and over	12
	100

The investigations clearly indicate the importance placed by the project farmers on cultivation of chenas in forest lands outside the

project in preference to intensive cultivation of their highland allotments. This had contributed to a gross underutilisation of highland allotments in the project. For obvious reasons, it is not desirable to allow such a situation to continue long, and appropriate measures to remedy this problem need consideration. With regard to factors contributing to concentration of efforts on chena at the expense of cultivation of highland allotments, agronomic and economic issues are seen to play a key role. Evidence gathered from farmers indicate that among the important agronomic criteria favouring the chena cultivation are the difficulties associated with maintenance of soil fertility and other desirable soil properties along with the problems of controlling weed growth associated with regular highland cultivation in the dry zone. The economic issues involving labour utilisation, incomes and costs are connected with this issue and are discussed in detail in Chapters 5 and 6.

3.4 ROLE OF IRRIGATION IN LOWLAND CULTIVATION

Information collected on the cultivability and the irrigability status of the lowland paddy allotments indicates that the extent cultivable is about 94% of the total acreage. The main reasons given for this included the presence of rock outcrops and poor soil conditions. The fully irrigable extent was seen to be around 85% of the lowland acreage, according to farmer responses. Farms with irrigation problems in most instances, were found to be located closer to the tail end of the channels. The important reasons given by farmers for their irrigation problems were -

	as a % of total sample
Insufficient flow in distribution channel	14
Defects in the channel system	13

Farmers emphasised that wastage of water due to leaks and other defects in the channels is a common occurrence during the Maha season. Some of them even indicated that illicit tapping of water by farmers upstream also aggravated this problem.

The availability of adequate water stored in the tank forms a critical determinant of paddy cultivation in Mahawilachchiya. Paddy cultivation here, presents a remarkable instability even during the Maha seasons. Data collected in this respect is given below:

Table 3.8 Stability of Paddy Cultivation in Mahawilachchiya (71 - 76)

	Maha Seasons				
	71/72	72/73	73/74	74/75	75/76
Percentage of farmers who cultivated paddy	45	35	24	7	-
Percentage of farmers who reported crop losses	25	22	16	3	-

	Yala Seasons					
	71	72	73	74	75	76
Percentage of farmers who cultivated paddy	23	13	11	-	-	-
Percentage of farmers who reported crop losses	12	10	11	-	-	-

An examination of the above information shows that since 1971 less than half the project farmers had attempted paddy cultivation even during Maha seasons. Among them the proportion that had experienced crop losses are substantial. This indicates the vulnerability of paddy production in the project under the present circumstances. In this regard it may be noted that the period 71 - 76 were generally years of low rainfall with 75 and 76 being particularly bad years.

3.5 FARMER PERCEPTION OF PROPOSED IRRIGATION CHANGES

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

Reasons for Preferring Paddy Cultivation	Farmers reporting (%)
Require paddy for home consumption	76
Involves less cash expenses	13
Poor drainage inhibits other field crops	5
Requires less labour	4
Others	2
	100

Domestic consumption needs assume the highest priority in the choice of a crop for cultivation. Considerations of cash requirements for cropping rank second in the selection criteria, whilst drainage problems were cited by a few. In the latter case it was found that the lowland allotments of farmers concerned belonged to low humic gley and reddish brown (ill-drained) soils which are highly impervious and liable to get waterlogged with flooding.

On examining farmer response towards the introduction of non-rice crops to paddy fields in Yala, almost 60 per cent felt that there is scope for launching such a programme. However, the need for adequate and assured water supply in Yala was strongly emphasised by all. The crops suggested by these farmers for such a programme were:

Crop	Farmers reporting[1] (%)
Cowpea	64
Chillies	38
Green gram	29
Red onions	15
Ground nut	5
Black gram	2
Maize	2

N = 90

1. Some farmers had given multiple responses.

It is seen that cereal crops such as maize and sorghum considered as potential introductions to lowland as Yala crops in the modernization programme had evoked no interest among farmers. The same could be said of soya bean. Ready availability of wheat flour coupled with their experience in marketing these crops may have been the influencing factors. However, cowpea, chillies and green gram are acceptable to a majority for cultivating in paddy fields during Yala due to high prices resulting from import restrictions.

The 40% of the project farmers who expressed pessimism in expanding other field crop production in paddy fields in Yala had cited the following as major constraints:

Constraints	Farmers reporting[1] (%)
Poor drainage in lowland	21
Heavy cash outlay	13
Inadequate water supply	9
Lack of familiarity	7
Problems of marketing	6
Pest and disease problems	5

N = 60

1. Involves multiple responses

Information on previous experiences of the project farmers in growing field crops in paddy lands in Yala, reveals that only a negligible proportion (2%) had attempted such an exercise. This too had been undertaken entirely for domestic consumption, using only family labour. The crops given in these cases were cowpea, soya bean, chillies and tomato.

In pursuing the farmer response on the proposed rotational issues of irrigation water for Maha paddy, a third of them was found to be pessimistic. In a majority of these cases their lowland allotments belonged to the category of reddish brown well drained soils. These soils are best suited for upland crops rather than for paddy, primarily due to high infilteration rates[1]. Of the two thirds who responded positively to rotational issues, every one felt that for successful operation of this programme a perfect conveyance system along with rigid controls are basic necessities. Furthermore, the irrigation intervals should vary according to the growth stage of the paddy crop. The irrigation intervals indicated by them are summarised in Table 3.9.

Table 3.9 Irrigation Intervals Desired by Farmers According to Growth Stage of Paddy Crops (Number of Respondents = 90)

Stage of Growth	Percentage of farmers reporting		
	Continuous irrigation	2-4 days interval	4-6 days interval
Land preparation	82	18	-
Seedling stage	68	26	6
Tillering stage	33	40	27
Heenbandi[1] and flowering stage	60	40	-

1. Refers to panicle initiation stage.

The implications of farmer responses given above are that during land preparation, seedling and flowering stages of the crop, irrigation is critical and consequently continuous irrigation becomes a necessity. The scope for rotational issues is evident only in the period from the seedling to *heenbandi* (pannicle initiation) stage, particularly during tillering. This period approximates to about 2 months during which irrigation intervals ranging from 2-4 days were seen as the best for rotational issues.

The paddy plant does not require standing water throughout its growth period for satisfactory performance and it responds well to intermittent irrigation. However, under field conditions the successful adoption of an intermittent irrigation system and the determination of irrigation intervals would greatly depend on factors such as efficient water control devices, the soil type and the distances to which the irrigation water has to be conveyed.

[1] Classification of lowland allotment according to soil types is given in page 109.

IV. FARM PRACTICES, CROPPING PATTERNS & OUTPUT

The farming practices prevalent in the area, with specific emphasis on improved production techniques along with the crop output levels are discussed in this chapter. The analysis here, was also extended to ascertain the differences in crop husbandry practices and yields among the farmers engaged in the right and the left bank areas of the project.

A. CULTIVATION OF LOWLAND ALLOTMENT

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

4.1 FARM POWER USE

Traditionally, in Mahawilachchiya buffalo forms the principal source of farm power in paddy cultivation, tractors assuming a lesser role, particularly in land preparation. Here, 77% of the cultivators have relied only on animal power, while exclusive use of tractors for tillage is not found within the project. Only a fourth of the farmers had used tractors along with animal for this purpose. Almost all tractors used in this instance are 4 wheelers which are utilised only for the first ploughing with a tyne cultivator (tiller). Second ploughing and harrowing are done mostly with buffaloes. The commonest form of animal drawn tillage implements are wooden plough and wooden harrows. None of the farmers had used a light iron plough. The popularity of buffaloes as a source of farm power in the project area may be attributed to the large number of buffaloes available in the neighbourhood. In fact, a fifth of the allottees owned buffaloes whose herd size averaged 5 animals per farm. Buffalo rearing here, is mainly for draught.

Given a choice, the farmers were asked to indicate the type of draught power preferred and their responses were:

Type of Farm Power Preferred	Farm Operation	
	Land preparation (% of farms)	Threshing
Buffaloes	76	66
4-wheel tractors	22	34
2-wheel tractors	2	-
	100	100

It can be observed that farmers expressed a strong preference for buffalo in relation to tractors as a source of farm power for both land preparation and threshing. Quality of work output and the economic aspects are seen as major criteria guiding the decisions of these farmers.

Reasons for Preferring Buffaloes	Farmers reporting (%)
Better quality of work	53
Cheaper than other forms of draught power	28
Owns buffaloes	8
Tractors are not available at the required time	3
Buffaloes are the only available source	3
Others	5
	100

The data indicates that the hire rates of 4-wheel tractors for both ploughings ranged from Rs.150 - Rs.175 per acre if paid in cash. Hiring is common even in the case of buffaloes, the rate was seen to be Rs.10 per day per animal.

An interesting aspect in the payment system of hired draught power in the project constitutes the prevalence of a deferred payment

system. Under this, the hire charges for paddy land preparation are paid not in cash but in kind at the time of harvest. Such deferred payments are most common among tractor users in Mahawilachchiya. The rate of payment was observed to vary from 9 - 12 bushels of paddy per acre, the value of which would therefore vary from Rs.297 to Rs.396 per acre[1]. However, as mentioned earlier, if the due payment is made immediately in cash, the cost would be in the region of Rs.150 to Rs.175. Consequently, the system of deferred payment results in the farmers having to pay even twice the normal payment. This situation may be attributed partly to the heavy risk taken by owners of draught power in accommodating the rental services of a production situation characterising a high degree of uncertainty.

Data on the use of draught power for threshing paddy once again shows the dominance of buffalo in relation to tractors - 68% of the farmers had used animals exclusively while only 22% had solely relied on tractor power for threshing. A further 6% had used a combination of both tractors and buffaloes. The average size of paddy holding of those using tractors for threshing was significantly large (3.8 acres) in comparison to those using only buffaloes (2.5 acres).

4.2 VARIETAL USE

The rate of adoption of improved paddy varieties by project farmers is impressive - none had grown traditional rice varieties. Ninety per cent of the paddy extent is seen to be under new high yielding varieties represented only by BG 34-8, a 3 - 3½ month variety.

Table 4.1 Adoption of Rice Varieties - Maha 76/77

Area	Extent under			All varieties
	Traditional varieties (%)	Old high yielding varieties (%)	New high yielding varieties (%)	(%)
Left bank	-	12	88	100
Right bank	-	9	91	100
Total project	-	10	90	100

[1]Guaranteed price at the time of survey was Rs.33/bushel.

A tenth of the extent under project paddy farms had grown H-4, a more robust 4 month variety. In respect of varietal adoption among the paddy farms in the left and the right banks of the scheme there appears no appreciable difference.

It is observed that 94% of the project farmers had used certified seed paddy released through the Department of Agriculture. The unusually heavy dependence on certified seed supplies in this particular season arises from the depletion of farmers own paddy stocks consequent to non-cultivation during previous seasons.

4.3 PLANTING METHOD

Broadcast sowing of germinated seed under wet land conditions forms the standard sowing practice in paddy cultivation in the area. Transplanting is more an exception - as seen only in 3 per cent of the extent.

Survey findings reveal the total absence of the practice of dry sowing of seed (*kekulan*) among the project farmers. This involves broadcast sowing of ungerminated seed, in anticipation of Maha rains and is generally adopted under less stable water supply conditions, as a means of harnessing the early Maha rains. Since the modernization programme envisages the adoption of dry sowing on a wider scale, the farmer attitudes towards this practice was investigated.

Method of Planting Preferred	No. of farmers reporting (%)
Transplanting	58
Mud sowing (a) broadcasting	30
(b) row sowing	8
Dry sowing	4
	100

Given a choice, transplanting is preferred by a majority. However, more than 50% of the project farmers had not adopted this technique previously and were pessimistic of its success under the prevailing conditions. Dry sowing of seed *(kekulan)* is the least preferred method among the paddy operators in the area. The reasons given were:

Problems of Dry Sowing	No. of farmers reporting (%)
Erratic rainfall	50
Difficulties in weed control	46
Lower yields	2
Unavailability of tractors for dry ploughing	2
	100

Two major factors hindering the adoption of dry sowing as reported by farmers are - the first relates to uncertainty of rains - the onset of monsoon and the duration of the first showers. In fact, those who have attempted dry sowing in the area often suffer repeated losses due to erratic monsoons. The second involves the problems of heavy weed growth associated with *kekulan* sowing.

4.4 FERTILIZER USE

Use of chemical fertilizers even in small quantities, forms a standard practice in rice cultivation in Sri Lanka. This had been particularly so with the spread of new improved varieties. However, the study data on this aspect shows only 18 per cent of the farms had used some kind of fertilizer during Maha 76/77. Extentwise, this constituted only 17 per cent of the cultivated paddy land. The significantly lower rates of fertilizer use in this area is more a rule than an exception. This may be explained in terms of farmer reluctance to invest on this input under a highly vulnerable production

conditions. This situation may also be attributed partly to the occurrence of long fallows between cultivations. Here, the crop response to fertilizer may be relatively lower than one would normally expect. In fact, most farmers were of the view that under the currently experienced cultivation practices with long fallows, application of fertilizer is not a real necessity. Among the few farmers using fertilizers, application of Urea is predominant. The average quantity of Urea applied is as low as 10 pounds per acre. In all instances, application had been at the time of tillering.

Table 4.2 Levels of Application of Fertilizers - Maha 76/77

	Farmers applying fertilizers as % of total	Extent fertilised as a % of total cultivated	Amount applied per farm (Cwt)		
			Urea	V_1	Other
Left bank	10	6	.02	-	.02
Right bank	23	26	.25	.08	-
Total project	18	17	.11	.04	.01

As evident from the above table, the practice of fertilizer application among farmers in the right bank is slightly greater than those in the left bank.

In relation to fertiliser use, the survey also investigated the farmer awareness of the official fertilizer recommendations for paddy. Only a fifth of the project farmers were found to be aware of the recommended fertilizer practices.

4.5 WEED CONTROL

Nearly half the extent of paddy lands in the project was found to be weeded in this season. As seen from below the extent of adoption of these practices does not differ appreciably in the two banks.

Table 4.3 Extent and Methods of Weeding - Maha 76/77

	Extent weeded as a % of total cultivated	Extent under			Total
		Hand weeding	Chemical weeding	Other methods	
		(%)	(%)	(%)	(%)
Left bank	60	8	92	-	100
Right bank	50	23	72	5	100
Entire project	55	15	82	3	100

Hand weeding was reported only in 15% of the paddy extent, whereas chemicals had accounted for 82% of the total extent weeded. The marked preference shown for chemicals over manual weeding may arise primarily from the difficulties associated with pulling weeds in broadcast sown fields where standing water is not readily available.

4.6 PEST AND DISEASE CONTROL

Study data on the adoption of these measures show that agro-chemicals play a key role in pest and disease control. About half the respondents in the survey had encountered some pest/disease problem. Almost all of them, had referred to leaf roller caterpillar infestation and chemical spraying had been resorted to as a curative measure.

The high degree of adoption of pest control measures by farmers in Mahawilachchiya is of interest, particularly in the light of their remarkably low adoption rates of fertiliser use observed earlier. Such farmer behaviour may perhaps reflect their reluctance to invest on innovations with potentials for yield increase (e.g. fertiliser use) under uncertain production conditions. In readily adopting a measure (pesticide use) which at least would salvage the crop that has already come up in the field, they, however, have displayed a seemingly rational reaction.

4.7 YIELDS

Paddy yields in general are low in the project. During Maha under reference, yields averaged to 36 bushels per acre. The highest observed is 73 bushels, while in most cases it ranged from 30 to 39 bushels per acre as illustrated below.

Table 4.4 Yield Distribution of Paddy - Maha 76/77
(Bushels per Acre)

Yield Category (Bushels per acre)	Farmers reporting (%)
Less than 20	14
20 - 29	25
30 - 39	31
40 - 49	20
50 - 59	8
Over 60	2
All	100

The low paddy yields here may not be surprising in view of the adverse climatic conditions as well as the low standards of cultivation practices adopted.

A further analysis of yield data according to paddy holdings in the left and the right banks reveal remarkable differences. The average yields in the left and the right banks were observed to be 27 bushels and 42 bushels per acre respectively. An examination of the yield distribution among farmers in the two banks showed that 72% of those in the left bank had obtained yields less than 30 bushels per acre, while in the case of the right bank, 70% had harvested yields ranging from 30 - 50.

Substantial differences in yields per acre reported by the farmers in the two banks are of interest and hence its underlying agronomic and related causes were examined. As was observed earlier, the study data did not reveal any appreciable differences in vital

management practices adopted by the farmers in the left and the right banks. The only difference noted was in respect of fertiliser application. but even here, the quantities applied did not differ appreciably. However, with regard to the time of sowing - a critical factor associated with crop yields, the paddy farmers in the two banks were markedly different. The fields in the right bank had been sown at least 2 - 3 weeks clearly ahead of those in the left bank. These sowing times are mainly determined by the dates of water issues[1].

Table 4.5 Time of Paddy Sowing Classified by Farmers in Right and Left Banks - Maha 76/77

Sowing Time		Right bank farmers (%)	Left bank farmers (%)
1977 January	1- 7	45	-
	8- 14	35	10
	15- 22	20	30
	23- 31	-	-
February	1- 7	-	45
	8- 14	-	-
	15- 22	-	10
	23- 28	-	5
		100	100

Since under normal circumstances, sowing of Maha paddy in the dry zone is completed before the end of December, the above data suggests a considerable delay in Maha sowing in this instance. This is particularly marked in the farms in the left bank of the project. Perhaps this difference in the time of sowing in the two banks also would have contributed to the yield differences observed. In addition, several other aspects such as soil quality[2], topography, drainage, and the presence of small village tanks in the respective banks too should be considered in this regard.

[1] See page 79 also.

[2] See Annex 2 for soil classification.

B. CULTIVATION OF HIGHLAND ALLOTMENT

As shown earlier the utilisation of highland allotments by the project farmers was low except for planting a few tree crops. Only a third of the extent was under seasonal crops during Maha 76/77, most of which are for domestic consumption. Nearly 45% of the farmers had made some sales of seasonal crops from highland, mostly in small quantities. Cultivation here is limited mainly for home consumption and consequently adoption of improved farming practices was hardly noticed.

4.8 CROPPING PATTERNS

Permanent tree crops occupy at least a portion of all highland allotments of project farms. Their estimated extents average to 0.25 acre per farm. The tree crops of major economic importance are coconut, mango, *murunga*, lime and jak. *Murunga* is most common and is found in 65% of the farms with about 20 trees per allotment. Mango ranks next in importance with 60% of the holdings with about 2 - 3 trees per farm. Forty two per cent had planted coconut in their highland allotments, averaging to 8 trees per farm. Other tree crops of commercial significance are lime, jak, cashew and wood apple. Due to unprecedented drought conditions prevailing in the period prior to survey most tree crops including 15 - 20 year old coconut were seen to have perished.

The important seasonal crops grown on the highland allotments were:

Table 4.6 Cropping Pattern of Highland Allotments - Maha 76/77

Crop	Extent as a % of the total cultivated
Cowpea	23
Chillies	20
Maize	17
Vegetables	17
Manioc	10
Others[1]	13
All	100

[1]Includes a variety of crops such as sorghum, green gram, tobacco, black-gram, *kurakkan*, etc.

C. CHENA CULTIVATION

As known, the chena typically represents shifting cultivation practiced in the tropics. The data confirm that production techniques here are mostly traditional. Absence of systematic land preparation, non-adoption of soil conservation and fertility improvement practices being other salient features. Agronomic practices such as fertiliser application, pest and disease control measures are not generally adopted.

Study data, however, record a clear indication of improvement in respect of some practices under this system of farming. The choice of chena crops cultivated is a case in point.

Table 4.7 Cropping Pattern in Chena - Maha 76/77

Type of Crop Grown	Extent cultivated as a % of total chena extent
Chillies	48.6
Kurakkan	45.5
Maize	45.6
Cowpea	27.4
Vegetables	22.9
Tobacco	9.0
Black gram	3.0
Manioc	1.5
Green gram	1.0
Paddy	1.0
Total[1]	205.5

1. Does not add up to 100 due to mixed cropping in chenas.

The shift towards cash crops such as chillies, cowpea, tobacco and black gram in chena had replaced the conventional chena crops, pumpkin, cucumber, okra, etc. However, two of the traditional cereals, *kurakkan* and maize yet continue to dominate the chena crop mix. Being substitutes for rice, their dominance in chena farming is not surprising. This is particularly so in view of the vulnerability of the paddy crops in the project.

Information relating to chena cultivation by project farmers shows the use of improved seed varieties for crops such as chillies, cowpea, black gram and tobacco. However, some use of fertiliser and agro-chemicals was observed only in the case of chillies.

4.9 CHENA CROP YIELDS

The average yields reported by chena farmers for the principal crops were:

Crop		Yield per acre
Gingelly	(bushels)	5.9
Kurakkan	"	11.3
Cowpea	"	8.2
Black gram	"	8.2
Maize	"	20.3
Chillies	(dried) (pounds)	120

Since *chena* farming involves mixed cropping the above yields computed on a per acre basis would only be an approximation.

V. LABOUR UTILISATION

As already seen in the preceding discussion, agriculture constitutes the main form of labour utilisation in the project area with chena cultivation receiving heavy emphasis.

5.1 PATTERN OF LABOUR APPLICATION

Labour utilisation data in this study indicates that during Maha 76/77 season, the total amount of labour applied amounts to 502 man-days per farm[1]. An analysis of the total labour application shows the following.

Table 5.1 Labour Application per Farm Classified by Source of Labour and Type of Cultivation - Maha 76/77 Season

Production Unit	Source of Labour		
	Family* (Mandays)	Hired (Mandays)	Total (Mandays)
Chena	297 (59)	8 (2)	305 (61)
Highland	50 (10)	1 (-)	51 (10)
Lowland	121 (24)	25 (5)	146 (29)
	468 (93)	34 (7)	502 (100)

Figures in parenthesis indicated the percentages

*Includes exchange labour as well. However, among project farmers, the use of exchange labour is less than 5%.

From the above it is clear that the farming activities in the project area are centred almost entirely (93%) on family labour use. The use of hired labour during the reference season amounts to only 34 mandays of which 25 had been utilised for paddy cultivation in the lowland allotment.

[1] Woman-day is equivalent to .8 manday and one child day is equivalent to .5 man-day. This conversion was based on the prevailing wage rates.

In the overall allocation of labour input, chena production assumes the foremost importance. Here, around 300 mandays had been utilised during this particular season, nearly all comprising of family labour. Paddy ranks next with 146 mandays per farm - half that used in chena. Labour application for cultivation of highland allotments had been only 51 mandays per farm - a sixth of the amount used in chena.

An operationwise analysis of labour input was next pursued (see Table below). This indicates that the crop care activities in chenas makes the highest labour demand amounting to 134 mandays per farm. The activities are mostly crop watching and weeding which spans a period of at least 2 to 3 months during the season. The locational aspect of chena has a bearing on the large proportion of labour devoted to chena cultivation (see Table 3.7).

Table 5.2 Operationwise Distribution of Labour Application by Source of Labour - Maha 76/77 Season

Field Operation	Chena		Highland		Lowland	
	Family (Mandays)	Hired	Family (Mandays)	Hired	Family (Mandays)	Hired
Land preparation	84	3	17	-	33	9
Sowing/planting	38	3	11	-	14	4
Crop care	134	2	16	-	18	-
Harvesting	41	-	6	1	56	12
All	297	8	50	1	121	25

This data also shows that hired labour had been utilised in significant proportions for both land preparation and harvesting in paddy cultivation. Deployment of hired labour in substantial proportions for these operations suggests an inadequacy of family labour during these two periods. This could be interpreted in terms of the time specificity of these two operations. Information was then examined to ascertain the details of farm labour application within the season.

5.2 TIMEWISE DISTRIBUTION OF FARM LABOUR INPUT

Information relating to labour application in Maha (covering the period from August 76 to June 77) was analysed to examine the distribution of labour input used for cultivation purposes (See Table 5.3 and Figures 2 and 3).

In this instance, it is observed that nearly two thirds (68%) of the total farm labour input had been utilised during the period from September to January with a peak extending from October to November. However, in respect of individual production units, the times of labour application vary considerably with distinct peaks in each.

It is also evident that in terms of time sequence of farm operations, chena takes a distinct precedence over lowland cultivation. Chena work is resumed well in advance (at least 4 - 5 months) to preparatory tillage activities of paddy land. The commencement of paddy field work, in fact, had begun soon after the peak labour demands of chena cultivation are met. Furthermore, in paddy cultivation two distinct labour peaks are evident, the first being the time of land preparation while the other is associated with harvesting.

In chena, the highest labour application is seen in the month of October coinciding mostly with planting of crops with Maha rains. This implies that the paddy land preparation had commenced at least two months after the initial Maha rains. During this period, it is seen that the project farmers had accommodated chena labour input requirements. Further, it was observed that the farmers were reluctant to initiate paddy field work immediately after the onset of Maha rains. They generally postpone paddy cultivation until the tank storage reaches a minimum safety level that would ensure an adequate irrigation water for their crop.

Table 5.3 Monthly Labour Application for Farming Related to Maha 76/77 Season (Percentage Distribution)

Farm Operation	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Total
Chena												
Land preparation	5.8	9.4	1.5	0.3	-	-	-	-	0.2	-	-	17.2
Planting and sowing	0.2	1.1	6.3	0.3	0.2	-	-	-	0.1	-	-	8.2
Crop care	-	0.9	5.1	13.1	5.9	1.8	0.3	-	-	-	-	27.1
Harvesting and post harvesting	-	-	-	-	0.3	3.6	2.9	0.7	0.4	0.3	-	8.2
Sub-total (A)	6.0	11.4	12.9	13.7	6.4	5.4	3.2	0.7	0.7	0.3	-	60.7
Highland												
Land preparation	1.0	1.6	0.5	0.1	0.1	-	-	-	-	-	-	3.3
Planting and sowing	-	-	1.6	0.3	0.2	-	-	0.1	-	-	-	2.2
Crop care	-	-	0.7	0.8	0.9	0.5	0.4	-	-	-	-	3.3
Harvesting and post harvesting	-	-	-	-	0.1	0.6	0.5	0.1	0.1	-	-	1.4
Sub-total (B)	1.0	1.6	2.8	1.2	1.3	1.1	0.9	0.2	0.1	-	-	10.2
Lowland												
Land preparation	-	-	-	-	4.6	2.5	1.3	-	-	-	-	8.4
Planting and sowing	-	-	-	-	0.2	2.3	1.1	-	-	-	-	3.6
Crop care	-	-	-	-	0.1	0.2	1.4	1.4	0.5	-	-	3.6
Harvesting and post harvesting	-	-	-	-	-	-	-	-	2.8	8.6	2.1	13.5
Sub-total (C)	-	-	-	-	4.9	5.0	3.8	1.4	3.3	8.6	2.1	29.1
Total Labour Application (A+B+C)	7.0	13.0	15.7	14.9	12.6	11.5	7.9	2.3	4.1	8.9	2.1	100.0

(100 = 502 Mandays)

Fig: 2

Monthly Distribution of Labour for cultivating Chena, lowland and Highland allotments - 76/77 Maha Season

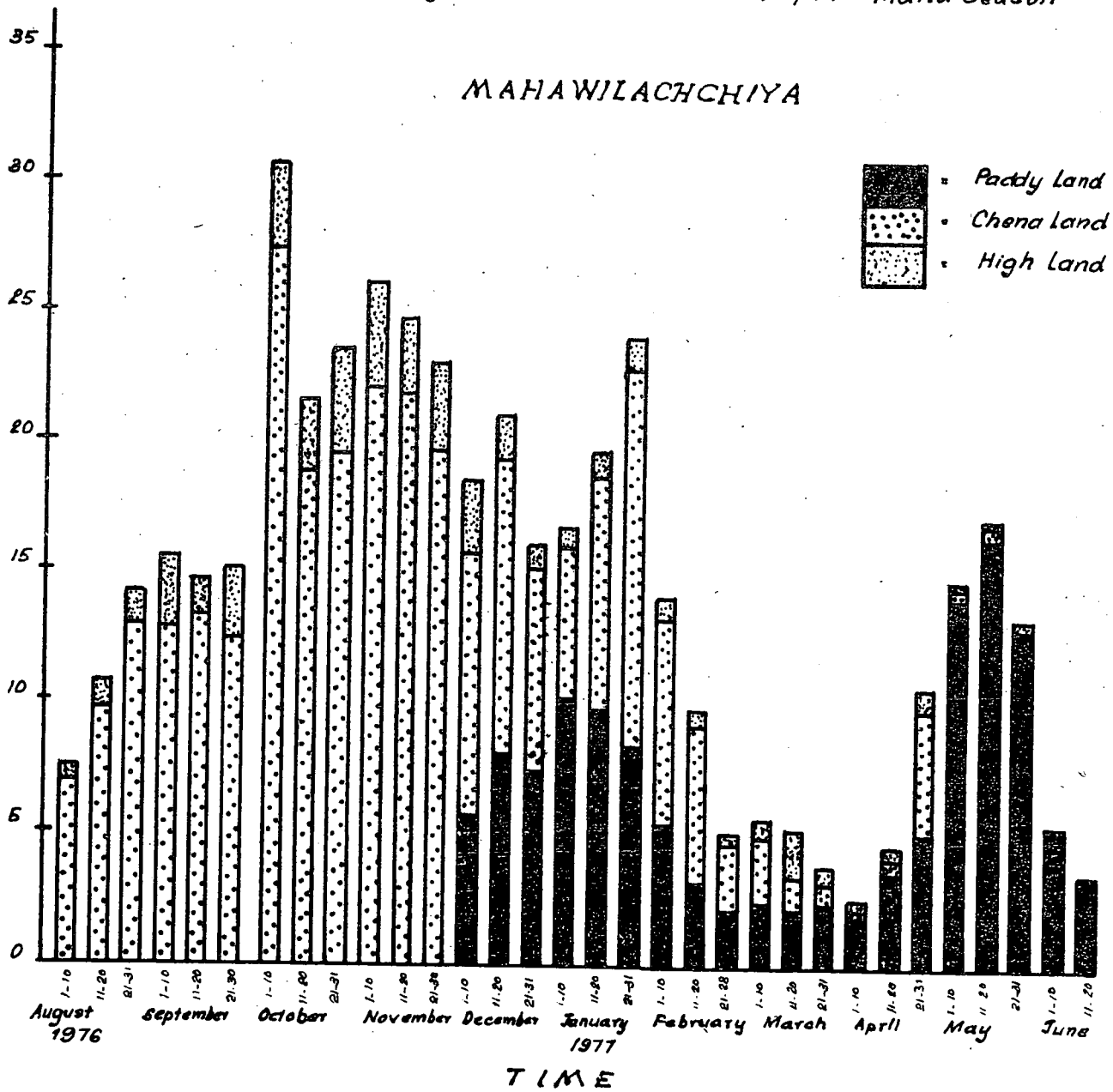
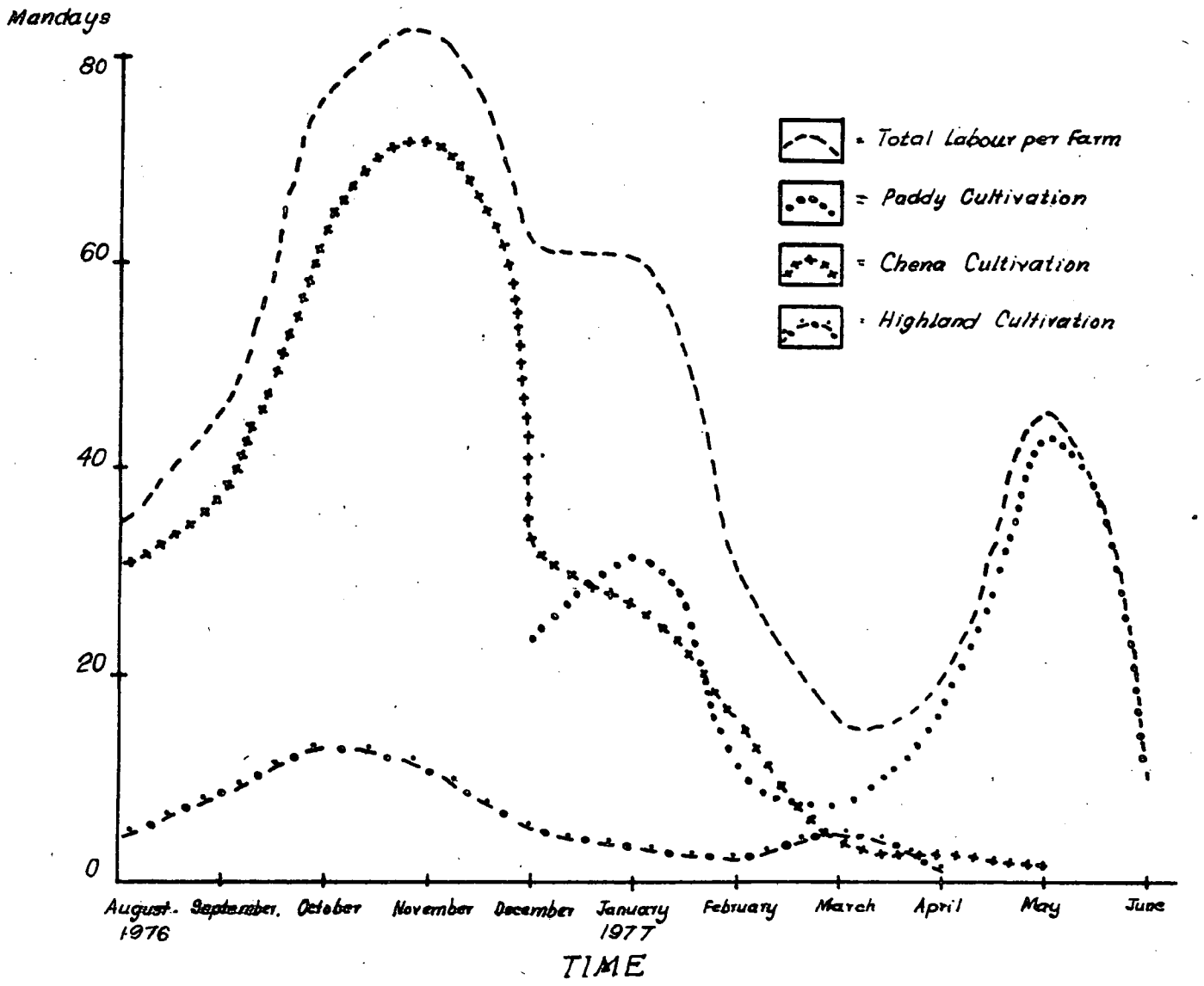


Fig: 3

Distribution Patterns of labour use in Farming - MAHAWILACHCHIYA, Maha - 76/77. Season (Mandays / Per farm by Months.)



VI. COSTS & INCOMES

This chapter intends to present the levels as well as the composition of costs and returns associated with project farms together with selected indicators of farm economy. Special emphasis will be given to the measures of cash receipts and expenses since such criteria can be used to understand the commercial orientation of the farmers.

A. PRODUCTION COSTS

Production costs per farm in respect of paddy, highland and chena cultivation for Maha 76/77 season are illustrated below. The average farm consists of 3.1 acres of paddy, 2.1 acres of highland and 4.0 acres of chena amounting to 9.2 acres in all.

Table 6.1 Average Production Costs per Farm Classified by Cash and Non-Cash Costs - Maha 76/77

	Cash (Rs)	Non-cash (Rs)	Total (Rs)
Lowland	1,084	781	1,865
Highland	19	329	348
Chena	140	1,895	2,035
Whole farm	1,243	3,005	4,248

In this instance, the discussion is confined only to Maha cost data. In view of very restricted cultivation in Yala 76 in the project area, Maha 76/77 cost data may be taken as an approximation to the annual costs as well. On an average the total production costs per farm in Maha amounts to Rs.4,200. However, only 30% of this is accounted for by direct cash payments, the remainder being imputed values of farmers owned production resources used. As far as the total production costs are concerned, it is seen that cultivation of paddy and chena assume equal importance.

6.1 CASH PRODUCTION COSTS

Attention was then focussed on direct cash costs of cultivating lowland, highland and chena lands.

Table 6.2 Cash Production Expenses per Farm Reporting Classified by Season and Production Unit

Production Unit	Average cost per farm cultivating	
	Yala 76	Maha 76/77
Paddy	-	1,084
Highland	33	19
Chena	123	140

As previously indicated, almost all farms in Mahawilachchiya in Maha undertake paddy as well as chena cultivation. The direct cash costs per farm in respect of these two enterprises differ markedly. Paddy had utilised as much as Rs.1,084 in liquid cash per farm, whereas in the case of chena cultivation it had amounted only to Rs.140. The data also show that the amount of money utilised for chena in Maha does not differ substantially from that in Yala. Expenses in cash for highland cropping is negligible in both seasons.

The cash use intensity is better observed in terms of cash utilised per acre of land. The highest amount is seen in paddy (Rs.366) while it is as low as Rs.29 per acre in chena production. However the cash expenses per acre of paddy in Mahawilachchiya is well below that in other irrigated areas auch as Polonnaruwa (Rs.1,162 per acre)[1]. The following table provides an input use breakdown of the cash production expenses during Maha 76/77.

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[1] Profitability and Resource Characteristics of Paddy Farming, Ranatunga, A.S. and Abeysekera, W.A.T., ARTI Research Study No.23, 1977.

Table 6.3 Percentage Distribution of Cash Production Expenses Classified by Inputs - Maha 76/77

Input	Paddy (%)	Highland (%)	Chena (%)
Hired labour	20	48	62
Tractor hire charges	11	24	-
Buffalo hire charges	25	-	-
Seed and planting material	25	14	21
Fertilizer and agro-chemicals	5	14	17
Others	14	-	-
Total expenses (%)	100	100	100
(Rs. per farm)	(1084)	(19)	(140)

Though in terms of percentages hired labour accounts for 62% of the total cash cost of chena farming,in Rupees it amounts to 87. The corresponding figure for paddy is Rs.217 per farm which is a fifth of its cash production costs. Buffalo hire charges along with cost of purchasing seed material is one half the cash costs in the case of paddy. Fertiliser and agro-chemicals for paddy production had constituted 5% (Rs.54) while in chenas the cost of this item had been only Rs.24 per farm.

6.2 COMPOSITION OF HIRED LABOUR COSTS

Hired labour costs classified according to field operations is as follows:

Table 6.4 Composition of Hired Labour Payments Classified by Farm Operation - Maha 76/77

Field Operation	Lowland cultivation (%)	Highland cultivation (%)	Chena cultivation (%)
Pre-sowing operations	33	29	48
Sowing/planting	13	14	24
Aftercare	-	57	28
Harvesting	23	-	-
Post harvest operations	31	-	-
All (%)	100	100	100
(Rs. per farm)	(216.80)	(9.12)	(86.80)

The bulk of wage payments for hired labour in paddy is made for land preparation and harvesting. The employment of hired labour during these periods is suggestive of an inadequate family labour supply to cope with the labour demands during these two peak periods. which are extremely time specific.

The information also indicates that the modal wage payments in Mahawilachchiya range from Rs.6 to Rs.7 for a male and Rs.5 to Rs.6 for female labour. This is exclusive of the value of lunch and other light refreshments provided which is estimated to cost around Rs.3

6.3 NON-CASH PRODUCTION COSTS

This involves the imputed value of owned production resources used. In this category family labour constitutes the most important.

Rable 6.5 Non-Cash Production Costs Classified by Type of Input and Production Unit - Maha 76/77

Type of input	Lowland (%)	Highland (%)	Chena (%)
Family labour[1]	92	92	94
Own seed/planting materials	1	8	6
Own buffalo services	5	-	-
Own tractor services	2	-	-
Total (%)	100	100	100
(Rs per farm)	782	33	1895

[1]Valued at Rs.6 per man day equivalent.

B. INCOMES

This section covers a number of aspects relating to incomes such as its composition and distribution. An examination of the returns to farmer's production inputs along with an analysis of the farm cash flow is also presented in the latter part.

6.4 GROSS INCOME

As seen below, the current level of gross income per farm in the area averages to Rs.7,300 per year with a monthly income of about Rs.600. Consequently, the per capita gross income of the project amounts to Rs.1,058[1] per annum which is substantially lower than the national average[2].

Table 6.6 Annual Gross Income per Farm Classified by Season and Source

Source	Yala 76		Maha 76/77		Annual	
	(Rs)	(%)	(Rs)	(%)	(Rs)	(%)
Agriculture	968	63	5,355	93	6,324	87
Non-agriculture	566	37	406	7	972	13
Total	1,534	100	5,761	100	7,296	100

The contribution to household income from agriculture varies from 63% in Yala to 93% in Maha. Income from the non-agricultural sources is relatively less significant in Maha than in Yala when it rises to 37%. Income from these sources in Yala and Maha amounted to Rs.566 and Rs.406 per farm respectively indicating a seasonal variability. The total monthly gross income per family in Yala is only a quarter (Rs.256) of that derived in Maha (Rs.960).

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[1] The average family size is 6.9.

[2] Per capita GNP at current prices in 1977 is Rs.2,084. See Central Bank Annual Report, 1977.

The sources of gross income from agriculture was next analysed and the results are as follows.

Table 6.7 Composition of Gross Income per Farm from Agriculture

Item	Yala 76 (Rs)	(%)	Maha 76/77 (Rs)	(%)	Annual (Rs)	(%)
Lowland	-	-	3,209	60	3,209	51
Highland	168	17	223	4	392	6
Chena	694	72	1,793	34	2,487	39
Livestock	106	11	130	2	236	4
	968	100	5,355	100	6,324	100

The significance of chena as a source of income to project farmers is most revealing. In Yala, nearly three quarters and in Maha around a third of the gross agricultural incomes are derived from chena. Production in lowland allotment had contributed nothing to farm income during Yala. Nevertheless it had yielded the highest income in Maha (Rs.3,200 per farm). The income from highland cultivation is insignificant. It is also seen that the gross income during the entire Yala season is less than Rs.1,000 per family which is only a fifth of that in Maha.

As a source of non-farm income of the project farmers, the wage earnings from hiring out their labour emerges as the most prominent. This is particularly so in Yala where nearly 80% of the non-agricultural incomes is accrued from this source. Such opportunities for wage labour are available only outside the project.

6.5 CASH INCOME

Apart from gross incomes, the criteria of cash receipts per farm constitutes one of the important elements of farm income. This represents the proceeds from sale of farm produce as well as cash receipts from other sources. It also serves as an indicator of the degree of

commercialisation of the farm. The cash income figures are free of imputed values for farm produce consumed and is therefore devoid of subjectivities generally associated with imputations.

The total cash income during the reference year amounts to Rs.4,437 per farm as given below. The difference in cash incomes per farm between the two seasons is remarkable. In Maha, the monthly cash income averages to Rs.517 per farm family. In Yala it corresponds to Rs.222 which is less than half that of Maha. Such seasonal variability in cash incomes is a recurring feature in the project area since its inception due to non-cultivation in Yala seasons.

Table 6.8 Composition of Cash Farm Income

Item	Yala 76 (Rs)	(%)	Maha 76/77 (Rs)	(%)	Annual (Rs)	(%)
Lowland	-	-	1,082	35	1,082	24
Highland	65	5	90	3	155	3
Chena	629	47	1,397	45	2,026	47
Livestock	71	6	130	4	201	4
Wage labour	325	24	226	7	551	12
Others[1]	241	18	181	6	422	10
	1,331	100	3,106	100	4,437	100

1. Includes the self employed and permanent employees elsewhere.

As evident from the above, chena provides half the total cash farm earnings in both Maha and Yala. Thus, chena in Mahawilachchiya presently constitutes a vital element of the farm economy. In this regard, paddy ranks next in importance and provides a third of the cash income in Maha. The cash receipts from the sale of highland crops is negligible and the meagre earnings from livestock pertains only to sale of cattle for slaughter purposes. Absence of milk and other livestock produce sales was a notable feature.

The significance of non-farm employment as a source of cash, is considerably important in Yala when 42% of the income is derived from this source compared to only 23% in Maha. Wage receipts for hiring labour assumes particular importance in Yala, which amounts to a quarter of the seasonal income.

6.6 COMPOSITION OF CASH INCOMES DERIVED FROM CHENA & HIGHLAND

The analysis of cash income was continued further on the basis of crops grown.

Table 6.9 Cash Incomes Derived from Chena Classified by Type of Crops and Seasons

Crop	Yala 76		Maha 76/77	
	Farms reporting (%)	Average income per farm reporting (Rs)	Farms reporting (%)	Average income per farm reporting (Rs)
Cowpea	2	150	55	278
Gingelly	97	1,065	10	156
Tobacco	-	-	16	2,206
Chillies	-	-	33	980
Maize	-	-	73	508
Blackgram	-	-	16	196
Vegetables	-	-	76	195
Groundnut	-	-	2	120
Mustard	-	-	2	90
Horsegram	-	-	2	75
Kurakkan	-	-	2	36
Meneri	-	-	2	42

Total No. of farmers reporting: Yala = 35
Maha = 50

Among the restricted range of chena crops grown in Yala, gingelly forms the exclusive cash crop. Almost all project farmers

had grown this crop in chena in Yala and received an average cash income of Rs.1,065 per farm. In Maha, the significant cash crops grown in chena in terms of cash generated are tobacco, chillies, maize, cowpea, vegetables and black gram. With an average income of Rs.2,200 per farm, tobacco stands out prominently among chena crops. Chillie ranks next with an income of about Rs.1,000 per farm. The remarkably high cash receipts from tobacco is due both to its higher sale price and absence of home retentions unlike other chena crops.

Table 6.10 Cash Income Derived from Highland Allotment Classified by Type of Crops and Seasons

	Yala 76		Maha 76/77	
	Farmers reporting (%)	Average cash income per farm reporting (Rs)	Farmers reporting (%)	Average cash income per farm reporting (Rs)
Tree crops	39	70	12	29
Cowpea	8	247	14	114
Vegetables	2	10	8	40
Gingelly	8	218	-	-
Onions	2	60	-	-
Chillies	-	-	8	445
Tobacco	-	-	4	399
Maize	-	-	18	60
Paddy	-	-	2	330

Total No. of farmers reporting: Yala = 28
Maha = 36

As already shown, the intensity of cropping on highland allotments in the project was extremely low. Particularly during Yala season the cultivation of seasonal crops is almost non-existent. However, the available data indicates the more important crops grown on highlands in this season as cowpea and gingelly. Even these two crops had been cultivated by less than a tenth of the households.

Among the crops providing cash income from highland during Maha chillies, tobacco and cowpea are significant. Production from tree crops assumes a more important role in Yala with regard to cash income and the crops concerned are mainly mango and drumstick *(Murunga)* which bear profusely in dry weather.

6.7 CASH GENERATING CAPABILITY OF CHENA, LOWLAND & HIGHLAND ALLOTMENTS

So far, the analysis of incomes were based on per farm criteria. In order to measure the relative income yielding capabilities of chena, lowland and highland allotments of the farm, computations on a per acre basis were undertaken.

Table 6.11 Gross and Cash Income Per Acre of Chena, Lowland and Highland

Period	Chena		Lowland		Highland	
	Gross Income (Rs/Ac)	Cash Income (Rs/Ac)	Gross Income (Rs/Ac)	Cash Income (Rs/Ac)	Gross Income (Rs/Ac)	Cash Income (Rs/Ac)
Yala 76	377	341	-	-	333	129
Maha 76/77	448	349	1,144	386	341	137
Annual	412	345	1,144	386	337	133

In terms of gross income per acre, paddy ranks first with Rs.1,144 which is almost three times that of chena in Maha. However, on the basis of cash realised per acre, chena production is equally important as lowland paddy. The markedly low cash incomes in paddy are due to the consumption of a high proportion of the produce.

6.8 NET RETURNS TO FARMING

The measure of net returns relates production cost to farm income and serves as a useful index of profitability in farm management analysis. The use of net farm returns criteria in such instances is conventional. This value is derived by netting out the total produc-

tion costs from the gross farm incomes. During Maha under reference the overall net farm returns from chena, lowland and highland cultivation amounted to Rs.777 per farm. In paddy alone the net returns amounted to Rs.1344 per farm whereas in chena and highland cultivation the relevant figures were Rs.242 and Rs.125 respectively[1].

NET CASH RETURNS

An attempt was then made to identify the net cash returns of farming in the project area (net cash returns = cash income - cash costs).

Table 6.12 Net Cash Returns from Farming - Maha 76/77 Mahawilachchiya, per Farm

Item	Chena (Rs/farm)	Lowland (Rs/farm)	Highland (Rs/farm)	Total (Rs/farm)
Cash income	1,397	1,082	90	2,569
Cash expenses	140	1,084	19	1,243
Net cash income	+1,257	-2	+71	+1,326

The above data shows that in Maha, which is the only agriculturally active season in the project, the net cash surplus obtained after deducting all cash production expenses from the total cash income amounts to Rs.1,326 per farm family. As regards individual enterprises, the net cash income varies considerably. Chena cultivation reports the highest net cash surplus amounting to Rs.1,257 per farm. This is understandable since chena is undertaken solely with family labour devoid of purchased inputs. Paddy cultivation on the other hand presents an extreme case. Here, the farm production costs in cash had just exceeded its income in cash indicating a typical subsistence production situation.

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[1] Family labour valued at Rs.6 per manday and Rs.5 per womanday. Both chena and highland production involves a heavy input of family labour.

6.9 PRODUCTIVITY OF FARM RESOURCES

The farm income analysis was also extended to examine the productivities of major farm inputs, namely, land, labour and working capital.

Table 6.13 Average Productivities of Inputs on Chena, Lowland and Highland Cultivation - Maha 76/77

Production Unit	Land		Labour[1]		Working capital	
	Gross returns per acre (Rs.)	Cash returns per acre (Rs.)	Gross returns per manday (Rs.)	Cash returns per manday (Rs.)	Gross returns per rupee spent (Rs.)	Cash returns per rupee spent (Rs.)
Chena	448.00	349.00	5.90	4.60	12.80	10.00
Lowland	1,141.00	386.00	22.20	7.50	3.00	1.00
Highland	341.00	137.00	4.30	2.10	1.10	4.00

1. Includes both family and hired labour.

On a per acre basis gross returns from paddy are seen to be nearly three times that of chena. However, in terms of cash realised the productivity difference is only marginal.

Average labour productivity in paddy cultivation is substantially higher than in the case of chena. This is particularly striking if gross returns from these two enterprises are compared. The lower average productivity figures in the case of chena primarily stems from its higher intensity of labour application. In fact, the labour input in chena production is twice that of paddy per unit of land[1]. Most of the labour used in chena comprises of family labour applied in slack periods during which no alternative employment opportunities are found. The opportunity cost of such labour would be very low and perhaps near zero.

The average productivity indicators as measured by gross returns per rupee as well as cash returns per rupee are remarkably high in chena than those in lowland and highland allotments. The average

[1] See Table 5.1

return per rupee of working capital in chena was found to be nearly Rs.13 as against Rs.3 in lowland cultivation. This arises from the cash extensiveness of chena farming.

6.10 INCOME DISTRIBUTION OF FARMS

The analysis of income distribution showed considerable variation among project farmers. The differences in incomes as already seen are primarily due to chena cultivation.

In order to measure the nature of income distribution, the criteria of total cash incomes per farm was used. The relevant data are presented below.

Table 6.14 Distribution of Annual Cash Income[1] Among Project Farmers - Yala 76 and Maha 76/77

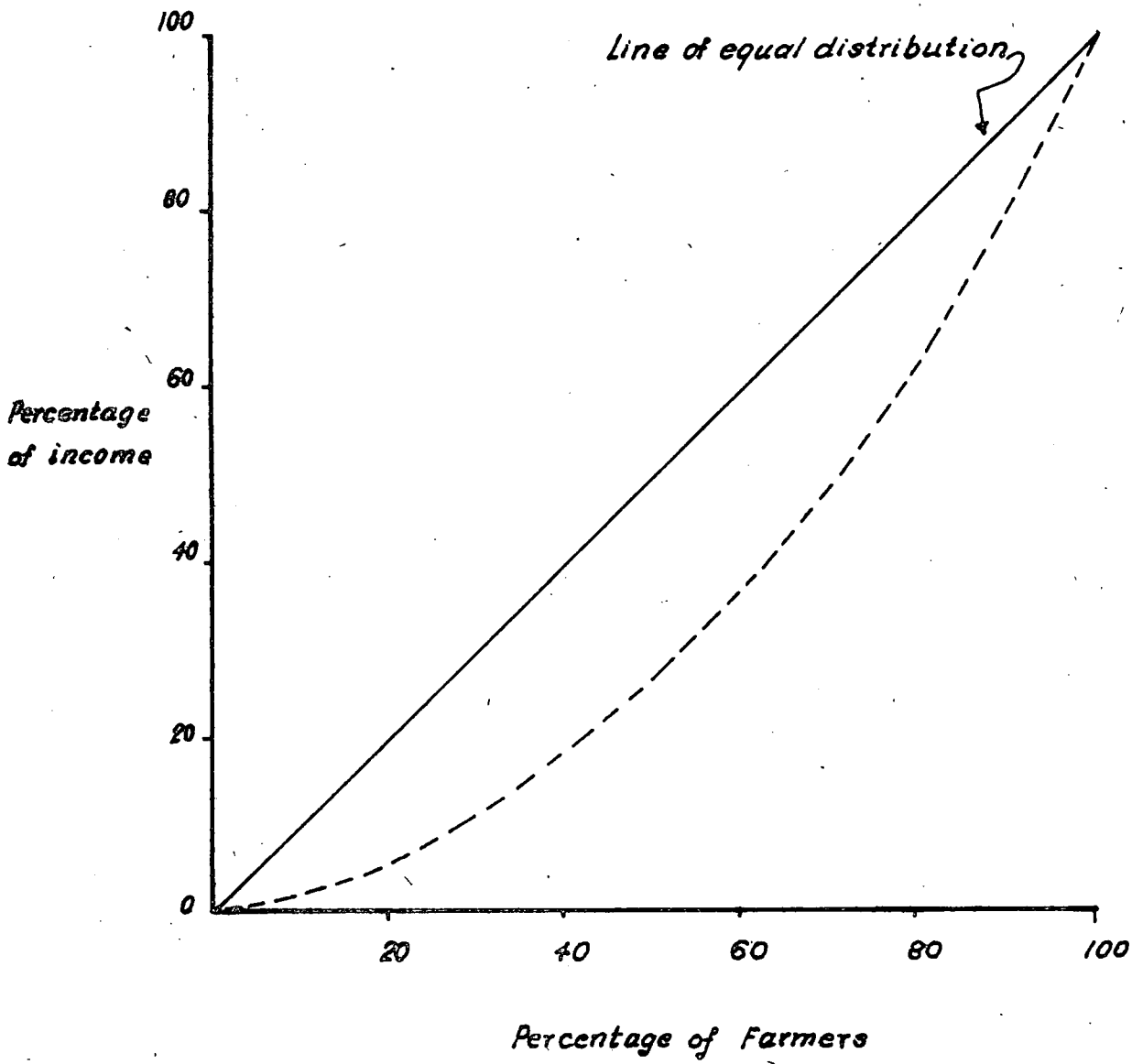
Annual Cash Income per farm (Rs)	% of farmers	Cumulative percentage	% of income	Cumulative percentage
0 - 1,000	6	6	0.86	0.86
1,001 - 2,000	17	23	5.93	6.79
2,001 - 3,000	6	29	3.41	10.20
3,001 - 4,000	18	47	14.18	24.38
4,001 - 5,000	14	61	13.99	38.37
5,001 - 6,000	9	70	9.47	47.84
6,001 - 7,000	12	82	19.79	67.63
7,001 - 8,000	8	90	13.09	80.72
8,001 - 9,000	8	98	15.12	95.84
9,001 - 10,000	2	100	4.16	100.00

1. Includes total cash income from farming as well as non-farm pursuits.

The above data show an uneven distribution of gross cash incomes per farm in the area. Thirty per cent of the household units earn a cash income of Rs.3,000 or less per annum. The upper 10% had

Fig. 4

Distribution of Annual Cash Incomes per Farm - MAHAWILACHCHIYA (Yala 76 and Maha 76/77)



reported incomes ranging from Rs.8,000 - Rs.10,000 per annum (see Lorensz curve in Fig. 4). In addition, the distribution of gross incomes per farm was also examined and is presented in Annexes 3 and 4.

In the analysis of incomes, the role of chena was further investigated. For this purpose, the income data of all farms operating chenas were reclassified into chena and non-chena income. The distribution of incomes from these two sources was then examined. (See Table 6.15 and Fig. 5). This analysis reveals that the distribution of incomes of the project farmers would have shown greater disparities, but for their income from chena cultivation. In other words chena farming in Mahawilachchiya had a desirable effect of evening out the income variability among the project farmers to an appreciable extent.

6.11 PATTERN OF CASH FLOW IN PROJECT FARMS

The cash flow analysis forms an important consideration in farm production investigations for ascertaining the characteristics of inflow and outflow of cash at different points of time during the season. The weekly data collection in the present study enabled the computation of farm cash flow statistics from November 76 through July 77. (See Table 6.16). The cash outflow represents the production expenses in cash while the inflow signifies the cash returns from sales of farm produce.

Table 6.15 Distribution of Income of Farmers With & Without Chena

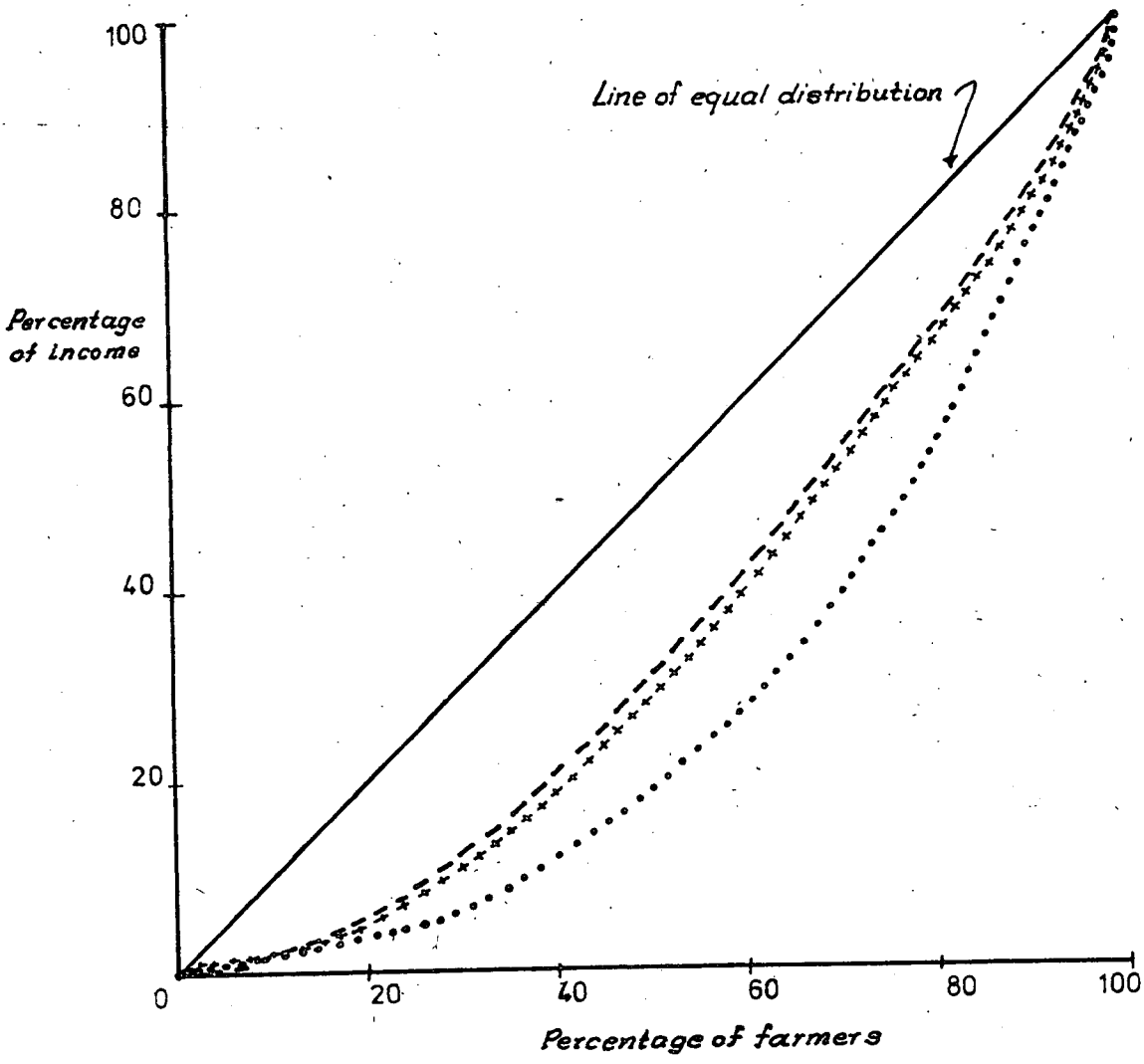
	Chena Income (i)				Non-Chena Income (ii)				Total Agricultural Income (i) + (ii)			
	% of farmers	Cumulative % of farmers	% of income	Cumulative % of income	% of farmers	Cumulative % of farmers	% of income	Cumulative % of income	% of farmers	Cumulative % of farmers	% of income	Cumulative % of income
0- 1000	36	36	8.37	8.37	6	6	0.59	0.59	2	2	0.07	0.07
1001- 2000	24	60	18.89	27.26	20	26	8.04	8.63	14	16	4.25	4.32
2001- 3000	14	74	18.89	46.15	12	38	8.71	17.34	8	24	3.63	7.95
3001- 4000	18	92	32.70	78.85	20	58	20.40	37.74	2	26	1.32	9.27
4001- 5000	4	96	8.47	87.32	24	82	30.34	68.08	18	44	15.09	24.36
5001- 6000	2	98	5.24	92.56	12	94	18.66	86.74	8	52	8.28	32.64
6001- 7000	0	98	-	92.56	2	96	3.56	90.30	20	72	24.01	56.65
7001- 8000	2	100	7.44	100	2	98	4.40	94.70	14	86	18.88	75.53
8001- 9000	-	-	-	-	0	98	-	94.70	8	94	12.68	88.21
9001-10000	-	-	-	-	2	100	5.30	100	4	98	7.14	95.35
Over 10000	-	-	-	-	-	-	-	-	2	100	4.65	100

Fig. 5

Distribution of income of farmers who cultivated Chena in Maha. 1976/77

MAHAWILACHCHIYA

N = 50



A consideration of cash outflow (expenses) and inflow (incomes) in respect of chena, lowland and highland cultivation reveal interesting aspects. In chenas, though cash expenses are incurred for a period of six months, the level of expenditure is extremely low, and is evenly distributed. Paddy cultivation in this respect differs remarkably. Here, the production expenses are incurred for longer periods (9 months) with relatively higher levels of investments. It characterises two distinct peaks, one in December-January and the other in June. These two peaks coincide with land preparation and harvesting.

Table 6.16 Cash Flow Pattern in Farming (Rupees per Farm) Mahawilachchiya (Maha 76/77 Season)

Item	Month							
	Nov. (Rs)	Dec. (Rs)	Jan. (Rs)	Feb. (Rs)	Mar. (Rs)	Apr. (Rs)	May (Rs)	June (Rs)
Outflow (A)								
Chena	19	6	8	4	15	2	-	-
Lowland	11	214	196	88	34	25	77	110
Highland	3	1	-	-	-	1	1	-
Sub-total	33	221	204	92	49	28	78	110
Inflow (B)								
Chena	-	1	121	330	362	195	150	57
Lowland	-	-	-	-	-	11	107	712
Highland	-	-	10	65	18	5	6	2
Sub-total	-	1	131	395	380	211	263	771
Netflow (B - A)								
Chena	-19	-5	+113	+326	+347	+193	+150	+57
Lowland	-11	-214	-196	-88	-34	-14	+30	+602
Highland	-3	-1	+10	+65	+18	+4	+5	+2
Total	-33	-220	-73	+303	+331	+183	+185	+661

As regards the cash inflow this data again highlights a number of important features. Chena production is seen to serve as a continuous stream of cash to the farmers almost throughout the season while yielding substantially high cash incomes monthly. Cash incomes from paddy present an extreme case in this regard.

In chena cultivation, the net flow is observed to be positive for as much as 7 of the 9 months considered here. Paddy cultivation on the other hand, reveals a negative net cash flow for 6 months which becomes positive only during the last three months of the season. The total net flow figures, which represent the cumulative effect of all production elements of the farm, namely lowland, chena and highland becomes negative only for three months of the season. This had been possible due to the contribution of cash sales of chena crops in the early part of the season. However, in relating these findings to farmers' overall credit needs it is necessary to consider his cash expenses for non farm activities as well.

As a concluding observation, the significance of chena cultivation in the economy of the project farmer cannot be underestimated. The common hypothesis that chena farming is a supplementary undertaking often distracting the settlers from intensive use of their allotted land does not hold good in this instance. In fact, chena is an integral part of the operational unit of all project farms and under the prevailing circumstances, this should not be surprising. The key determinants influencing the farmer in this regard are his poor liquidity position, subsistence level of production and lack of other alternative means of resource application overshadowed by a remarkably high rainfall uncertainty. Under these conditions the desirable features inherent in chena, from the farmer's standpoint are:

i. Chena production involves little or no cash input application;

ii. It enables fuller utilisation of family labour at a time when its opportunity cost is at its lowest possible;

iii. Chena can be considered as a flexible means of spreading production risk over time and location in a highly uncertain production system;

iv. Chena cultivation generates positive cash flows for a greater part of the year in substantial quantities unlike lowland paddy.

The proposed modernisation programme envisages economically viable farm units based mainly on intensive use of irrigated lowland in both seasons. On successful completion of the project it is expected that the farmer would rely solely on allotted land for his livelihood and be independent of chena cultivation. Under these circumstances it is pertinent to raise an important issue relating to the process of weaning settlers away from chena[1]. In the absence of complementary programmes for intensive use of highland allotments, could a farming system centred mainly on irrigated lowland be made viable in the long run? This question is particularly important, in a situation where water supply is unstable due to the catchment of the tank being located in the dry zone itself such as the present case.

Hence, as a means of strengthening the viability of farm units in the project, the need for intensive use of highland allotment also should receive priority considerations. As already mentioned allotted highland is greatly under-utilised even during the rainy season. Introduction of suitable crops and cropping systems for dry farming on highlands as well as devising suitable irrigation techniques deserve attention in this regard.

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[1] Chena cultivation is a widely adopted practice among most farmers in the north central dry zone. However in future, the opportunities for cultivating chena lands in this area would be drastically reduced with the development of the Mahaweli Project. Even here, the impact of removal of chena from the farm economy is bound to be an important consideration.

VII. FARM SUPPORTING SERVICES

This chapter deals with the availability and utilisation of supporting services associated with production and disposal of farm produce in the project area. The aspects covered are, procurement of material inputs, credit and savings, farm extension services, irrigation distribution and produce marketing.

7.1 PROCUREMENT OF MATERIAL INPUTS

The available mechanism for supplying farm production inputs such as seed, fertiliser, agro-chemicals, is geared mainly to paddy cultivation and is undertaken by 5 primary cooperative societies in the project. However, in other seasonal crops, the supply of seed material is the direct responsibility of the Extension Officer in the area. The quantities of seed issued through the Extension Officer in the project during the reference period were:

Table 7.1 Sale of Seed Material from the Extension Office in Mahawilachchiya Project[1]

Type	Quantity	
	Yala 76	Maha 76/77
Chillies (pounds)	-	50
Green gram "	-	54
Cowpea "	-	154
Black gram "	-	-
Maize "	-	29
Vegetables "	-	26
Gingelly "	129	-

[1]Information provided by District Agricultural Officer, ANURADHAPURA

The storage capacity of fertilisers has been increased recently with the installation of 2 storehouses one on each bank of the project, each with a capacity of 5 tons. However, the unavailability of fertilisers in cooperative stores at the required time was a common complaint among farmers. Records available at the Project Office regarding the application of fertilisers are suggestive of a low demand. The quantity applied during the last 6 Maha seasons were as follows:

Table 7.2 Fertiliser Application in the Project Area, 71/72 Maha - 76/77 Maha[1]

	Type of Fertiliser	
	Urea (Cwt.)	V_1 (Cwt.)
71/72 Maha	10	15
72/73 "	47	14
73/74 "	182	-
74/75 "	19	-
75/76 "	-	-
76/77 "	288	182

1. Records available at the Project Office.

Provision of sprayers and dusters on hire was observed to be another service on which most farmers are dependent on cooperatives and the Agricultural Productivity Centre. The entire project had only 4 sprayers at the time of the survey and inadequate supply of sprayers was a notable feature.

7.2 SAVINGS AND CREDIT

Apart from the non-formal sources of credit available in the area, the principal agencies providing institutional credit needs were the Bank of Ceylon and Rural Bank of the People's Bank located in the project. These branches were opened recently, prior to which the institutional lending was handled exclusively by the cooperative

societies. Twenty five per cent of the project farmers had savings accounts either in a bank or in the post office. Both banks provide credit for agriculture as well as non-agricultural pursuits with pawn brokering as an additional service exclusive to the Rural Bank. The banking position of the two banks was as follows:

	Savings A/c		Current A/c		Pawning A/c	
	No.	Amount (Rs)	No.	Amount (Rs)	No.	Amount (Rs)
Bank of Ceylon[1]	743	143,512	22	47,171	-	-
Rural Bank[2]	991	205,960	-	-	719	101,693

1. As at 31.12.1977
2. As at 31. 3.1978

In order to ascertain the degree of indebtedness and the sources of loans taken by the farms the survey results are presented below.

Table 7.3 Classification of Loans Taken by Farmers According to Source and Purpose - Yala 76 and Maha 76/77

Source	Cultivation of Paddy		Cultivation of other crops		Non Cultivation Purposes	
	% of borrow -ers	Amount per borrower (Rs)	% of borrow -ers	Amount per borrower (Rs)	% of borrow -ers	Amount per borrower (Rs)
Yala 76						
Cooperative	-	-	-	-	-	-
Bank of Ceylon/ Rural Bank	-	-	4	750	-	-
Tobacco Company	-	-	-	-	-	-
Other private sources	-	-	18	431	76	391
All	-	-	22	489	76	391
Maha 76/77						
Cooperative	64	899	-	-	-	-
Bank of Ceylon/ Rural Bank	2	770	-	-	-	-
Tobacco Company	-	-	20	257	-	-
Other private sources	-	-	-	-	24	110
All	66	896	20	257	24	110

The above data shows that in Maha season two thirds of the farmers had obtained cultivation loans from the cooperative amounting to Rs.899 per borrower. A fifth of the farmers had borrowed for tobacco cultivation from the Ceylon Tobacco Company averaging to Rs.257 per borrower. A quarter of the project farmers reported loans taken from money lenders, friends and relatives amounting to Rs.110 per individual.

In Yala, borrowings for crop cultivation refers only to non-paddy crops - mainly for growing gingelly in chenas. Almost three fourths of the farmers had reported borrowings for non-cultivation purposes, mainly for domestic consumption with an average of Rs.391 per farm reporting.

In analysing the indebtedness among project farmers in the study, an attempt was also made to measure their credit worthiness for raising a private loan for paddy cultivation in the form of a self assessment. This showed that as much as 83% of farmers had felt that they are incapable of raising such loans. Nine per cent felt that they could raise a loan for this purpose and even here the maximum indicated was less than Rs.500. This result is indicative of a very low credit rating of the project farmers under existing conditions. It also implies the necessity to have a more active role of institutional credit for cultivation in the area.

Almost three quarters of the farmers were seen to be loan defaulters to cooperatives at the time of the survey. The amount averaged to Rs.882 per borrower. In 95% of such cases, the loans were overdue from 6 months to as much as 4 years.

7.3 FARM ADVISORY SERVICES

The agricultural extension activities within the project are currently handled by a resident Agricultural Instructor assisted by 3 village level extension workers for covering about 2,600 acres of paddy and 1,800 acres of highland. So far, the extension work had

been concentrated only on crop production particularly paddy, and animal husbandry aspects had very little attention.

A principal responsibility of these extension workers is to operate in close contact with the project farmers. The information on extension worker-farmer contact collected in the study suggests a lower rate of contact as presented below.

	Extension Personnel	
	KVS[1]	AI[2]
Percentage of farmers reporting as:		
Knew extension worker personally	80	67
Closely associated with him	39	27
Visited him regarding farm problems	46	39
Able to contact him when in need	83	73

1. Village level extension worker
2. Agricultural Instructor

A third of the farmers had visited the Agriculture Extension Centre of the project in Maha 76/77. Most of these visits had been to purchase seed materials and the like. Only 6% of the farmers had been visited by the village level extension workers during the season.

Farmer exposure to the standard group extension techniques adopted by the agricultural extension workers, namely training classes, demonstration plots and field days was also examined. None of the sample farmers had participated in any of those programmes. However, 6% of the farmers had seen demonstration plots. These results suggest that the farmer participation in the agricultural extension activities of the project is almost non-existent.

Apart from the above strategies which involve a personal contact between advisory extension personnel and the farmer, the extension

activities at the national level include a number of mass communication techniques. Among them the important ones are regular radio programmes, issue of advisory leaflets and sale of farmers journals. The extent of utilisation of these services by farmers in Mahawilachchiya was examined and the results indicated extremely poor usage. Radios were not available in 68% of the houses. None of the sample households were in the habit of reading newpapers or any other form of journals on a regular basis. Only a handful of farmers (6%) was aware of the advisory leaflets of the Department of Agriculture.

From the above discussion it is evident that the utilisation of extension resources within the project is extremely limited and there is considerable scope for development. Being a special project where government extension efforts had been more intensive than in other areas this situation in Mahawilachchiya should cause more concern. The basic constraint hindering the intensification of extension activities in this area is the instability of cultivation arising from scarcity of irrigation water.

7.4 IRRIGATION MANAGEMENT

Water issues from the tank and delivery up to the field channels is a function of the Irrigation Department personnel stationed in the project comprising of a Technical Assistant supported by a field overseer. They are also responsible for general repair and maintenance of the main and distribution channels of the conveyance system. The maintenance of field channels is a specific function assigned to the Cultivation Committee of the area. The conveyance system as a whole is currently in a poor state of repair.

A common complaint among farmers in tracts furthest from the tank was the inadequacy of irrigation water reaching them, particularly at the tail end of the seasons. Tracts 5 and 6 of the right bank and 1 - 3 of the left bank were noteworthy in this regard. Farmers often face difficulties arising from the irrigation water distribution. This

is even apparent to a casual observer considering the extremely poor state of the channel system.

At the farm level the Cultivation Committee plays a vital role in irrigation management and in this regard more than half the farmers felt that these institutions could function much more effectively. In fact, some farmers had even suggested the re-introduction of the former *'Vel Vidane'*[1] system for this purpose. Discussion with Colonisation and Irrigation Officers indicated that disputes on water issues and damage to irrigation structures during the cultivation season are a frequent occurrence. In this respect, they were strongly in favour of rigid enforcement of provisions under the Irrigation Ordinance.

7.5 MARKETING

The marketable commodities currently available in the project are vegetables, pulses, dried grains, tobacco and paddy. Marketing of livestock products are almost non-existent except for occasional sales of cattle and buffaloes. Production of traditional cottage handicrafts for sale was not observed.

i. Marketing of Non-Paddy Crops

This involves mainly the chena produce and is handled entirely by the private traders. Despite government programmes for purchasing commodities such as cowpea, green gram and black gram, etc., through the cooperatives at predetermined prices, these arrangements were inoperative in Mahawilachchiya. All farmers interviewed had problems of marketing these items, the commonest being low prices and lack of ready marketing outlets. The weekly fair held at Pemaduwa forms the only main marketing outlet for such produce, the principal buyer being the traders from Anuradhapura. The volume of produce currently handled at the fair during the peak production time is estimated at about 5 - 6 lorry loads per week.[2]

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[1] Irrigation headmen.

[2] The farm gate prices of these crops are given in Annex

ii. Marketing of Paddy

Institutional intervention in marketing is seen only in the case of paddy which is purchased through the cooperatives. Paddy sales are confined to Maha harvesting. The pattern of paddy sales by the project farmers is given below.

Table 7.4 Pattern of Paddy Sales Among Farmers[1] - Maha 76/77

Paddy sales as a percentage of total farm output	Farmers reporting (%)	Amount sold per farm reporting (Bu)
No sales	19	-
1 - 19	12	6
20 - 29	20	22
30 - 39	22	35
40 - 49	13	60
50 - 59	9	78
60 - 69	5	97
	100	

1. Average gross output per farm = 97 bushels.
   Average quantity sold per farm = 35.4 bushels.

During Maha 76/77 about 20% of the project farms had no surplus paddy for sale while another 65% had sold less than half their produce. Only 14% of the farm population had disposed 50 - 70% of their total harvest. The pattern of disposal of total paddy output in the project is given below.

Table 7.5 Modes of Disposal of Paddy in the Project

	Farmers reporting (%)	Amount per farm reporting (Bu)
Sales:		
Cooperatives	60	28
Private traders	31	7
Payments in kind	81	13
Home retentions		
Consumption	100	17
Seed paddy	68	6

Cooperative Societies are the main marketing channel for paddy with private traders playing a minor role. Almost all farmers who had sold to private traders[1] had obtained prices lower than the government guaranteed price of Rs.33 a bushel. The average price received in these instances ranged from Rs.26 to Rs.28 per bushel. Despite such lower prices farmers prefered to sell to private traders. Among the reasons given for this preference, the more important was the settlement of consumption credit for purchase of food items from the village boutique. The other reasons were the less rigid quality specifications and the convenience of making direct sales from the threshing floor. Owing to farmer's willingness to accept relatively lower prices for sales made at the threshing floor may be explained in terms of poor roads and lack of transport. The commonest means of transporting farm produce within the project is the bullock cart.

The majority (90%) were satisfied with the paddy purchasing activities of the cooperative societies. A tenth of the respondents reported problems among which non-availability of cash for on the spot payments, irregularities in grading and weighing and general mismanagement of the stores were important.

In relation to marketing, an attempt was also made to assess

[1] Mainly the village boutique keeper.

the behaviour of the farmers to a given increase in paddy output and also to a given increase in price. Given an increase in paddy output by 15 - 20%, farmer responses in disposing of this extra output were as follows:

Response	% of farmers reporting
Consume all of it	32
Sell part and consume rest	30
Sell all of it	38

Thirty two per cent of the respondents indicated that the entire output increase would be needed for consumption while another 30% felt that they could sell only a part of the increased output. These results also confirm the greatly subsistence nature of current production in the paddy farms in the project.

In a similar manner, marketing responses were also sought in relation to a given price increase of Rs.5 per bushel of paddy. The results were as follows:

Responses	% of farmers reporting
Increase in sales	10
No change in sales	84
Decrease sales	6

An explanation of the above farmer responses shown in relation to price increase of paddy shows that a large majority (84%) had no intention of changing the current level of sales. Only 10% had expected to increase the current levels of sales. The apparent lack of responsiveness of the marketable surplus to price increases also characterises the production situation in Mahawilachchiya mainly catering to the basic home needs.

7.6 STORAGE

At the project level 4 paddy stores with a total capacity of 32,500 bushels are available. These storage facilities appear to be adequate at present. At the farm level, paddy is stored in gunny bags and no special structure such as a *"Bissa"*[1] is found. Two thirds of the farmers marketed their surplus paddy just after harvest.

However, in the case of pulse crops such as cowpea, black gram and green gram on-farm storage, even for a few weeks, was reported as a serious problem due to weevil infestations. At the project level, proper storage facilities for such commodities are lacking. Consequently, they are marketed soon after harvest which results in depressed farm prices with marked variations (See Annex 5).

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[1] *Bissa* is an outdoor structure for bulk storage of paddy available in certain parts of the dry zone.

VIII. SOCIAL ORGANIZATION

The concern here is primarily to describe social organisation in the project area as a point of comparison for the future, as the general contention is that higher standards of living inevitably lead to changes in social organisation, such as a transformation in family structure, functions and authority, levels of community living and so on. Usually also the popular contention is that economic development and higher standards of living will lead to a process of increased differentiation in the social sphere where either new structures will arise to assume new functions or to take on functions performed by other structures or where there will be differentiation occurring within existing social structures such as when newer complex institutions develop or new types of communities emerge. However, as the post-modernization study is to be undertaken only four years hence, it is not envisaged that social organisation will change dramatically especially with regard to family and kinship patterns which have universally displayed great stability and resistance to change.

The total population of colonists and encroachers in the Mahawilachchiya project area is 6,490 constituting 857 farm households. The average family size is 6.9 persons and typically a nuclear one, given the fact that the colonists were up-rooted from their original villages and settled here. In fact, only 18% of the respondents had their parents living with them in the same house. Today, however, the extended family is not altogether uncommon, as the second generation, often through lack of alternatives, must share both the dwelling and the allocated land with their parent generation. Moreover, though predominantly neo-local, many colonists from the *purana* villages and even others from more distant areas were able to settle alongside their kin, really constituting therefore modified extended families.

Eighty per cent (80%) of the allottees live in standard colony houses, consisting of 2 rooms, permanent walls, cement floor and tiled

roof. The rest typically live in wattle and daub constructions with very poor sanitary facilities, and a very small number have self-styled brick and cement houses. A noticeable physical feature, with consequences for social organisation, is the layout of the colony houses, which are constructed in a row with no forethought into an arrangement conducive to social interaction. This could be a factor in the lack of cooperation for social and economic purposes as evinced in other colonisation schemes[1].

8.1 SETTLEMENT PATTERNS

The population breakdown according to tracts for the Left Bank and Right Bank is as follows:

Tract	Left Bank		Right Bank	
	No. of allot-tees	No. of encroa-chers	No. of allot-tees	No. of encroa-chers
1	61	12	30	3
2	65	11	106	12
3	141	31	41	1
4	29	1	63	2
5			100	8
6			124	16

Left and Right Banks

Significant differences exist between the left bank and the right bank of the Mahawilachchiya project. The right bank is separated from the left bank by the Lunuella and is 5 ft. higher than the left bank in relation to the main drainage channel; the left bank thus gets a better supply of water for irrigation. However, as can be gathered from Table 8.1 discrepancies were evident for agricultural productivity for the two banks with the yield per acre for the right bank being 41.71 bushels while only 26.86 for the left bank.

[1] B.H. Farmer, Pioneer Peasant Colonisation Schemes in Sri Lanka, 1957, pp. 297 - 298.

Table 8.1 Mahawilachchiya - Maha 76/77

	Yield per acre (Bu)
Right bank	41.7
Left bank	26.9
Total	34.9

An explanation for this contradiction could perhaps be postulated along sociological lines[1]. The right bank colonists are from different parts of the island, with a majority from Kandy(35%) and Kurunegala (23%). Today approximately 90% of these pioneer colonists are still resident despite the harsh conditions which prevailed at the initial stages of settlement. By contrast the majority of the left bank colonists (69%) are from *purana* villages from the immediate area.

Basically the right bank colonists, given the nature of their background which divorced them socially from villagers in the area and separated them from their kith and kin, reacted to colony life in a manner different from that of the left bank settlers. The right bank colonists experienced a greater degree of anonymity and isolation on settling initially, and had to enter into relationships and situations not governed by previous norms of behaviour. This coupled by the fact that they had to rely on their own initiative and efforts, forced them to actively respond to their environment and thereby better their own situation.

By contrast, for the left bank colonists who are from *purana* villages in the area and comprise 40% of the total colony population, life in the colony was only a part of their total life experience, which was still inextricably linked to their original villages as they continued to adhere to the values and institutions of their former places of residence.

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[1] This may also be viewed in the context of the differences in time of water issue, soil factors, topography and other related factors. See p. 35 also.

This attachment also partly cocooned them from the exigencies of modern living and is to an extent consistent with the view that certain values such as family particularism are inimical to development and modern entrepreneurship. As often articulated by the settlers themselves, the right bank colonists, divorced as they are from their blood and affinal relatives, are found to be more enterprising than their fellow left bank colonists as they simultaneously have a greater proclivity to save for future contingencies. There is also visible indication of renovations and additions to the original colony cottage which are decidedly better and more extensive on the right bank than on the left bank.

The distinction between the right bank and the left bank is extended also to the rural institutions with the conspicuous situation of most of the institutions on the right bank. This is accompanied by the fact that most of the members of these institutions are from the right bank. For instance, a survey of membership of Rural Development Societies showed that while 30 per cent of the respondents of the right bank were members, only 14 per cent on the left stated that they belonged to a Rural Development Society. Similarly, the leadership has more often been provided from the ranks of the right bank rather than the left bank. Other services have also been concentrated on the right bank, e.g. the Maha Vidyalaya, most of the government offices, the police station, dispensary/maternity clinic, weekly pola, etc. The transport network is also more comprehensive on this bank.

Though for administrative purposes a tract is considered as a unit, socially this is not a viable entity and other factors such as kin group and caste take precedence as features in defining a group. Naturally, however, those in geographic proximity establish closer social ties and react together in response to any crisis or threat from without. Moreover, 35 per cent of the colonists in Mahawilachchiya had neighbours from the same village. Marriage contracts were found to be generally limited to this endogamous group as people feel secure in the knowledge that they are contracting with their 'own people'. This was especially true for those colonists from nearby

purana villages who look towards their village of origin (such as Kukulkada, Bogahawewa, Ittikulama, etc., which are 4 - 5 miles away) for marriage partners for their children.

Caste as a determinant of settlement is evinced on both the right and left bank, though people were not settled officially on this criterion. The Goigama caste people, who by far form the majority, are widely dispersed and a sprinkling of them are to be found in all parts of the colony, while the other castes have tended to conglomerate together. For instance, Padu caste people have settled in tracts 2 and 3 of the right bank and left bank and Durawe and Achchari castes in tract 1 of the right bank. These latter castes hire out their labour in agriculture to the *Goigama* castes and never vice versa. The hired labourers are given meals along with their wages but the meals are always served in the field and never in the home of the employer. Even though funerals are attended by all, the rules of commensality are practised even here. Similarly, the temple at Pemaduwa is socially ostracised by the *Goigama* castes as it is frequented by other caste groups. The former have constructed their own temple further away.

Relations between the *wanni* people[1] who are predominantly on the left bank and the others are often tenuous and interspersed with suspicion and fear, allowing social distance to be maintained between the two. The pervasive feeling is that the wanni people are more conservative and even to an extent more 'primitive'. The wanni people on their part believe in the purity of their ancestry and in the preservation of their *varige*[2]. Marriages are prescribed only within the same *varige*, though in turn the outsiders perpetuate the belief that the *wanni* people are waiting to apprehend the educated youth as marriage partners for their daughters. Nonetheless, the social boundaries established between the *wanni* people and the other settlers are now being vitiated and increasingly there is exchange of labour and in some instances even inter-marriage as the development process necessarily enmeshes these people in multifaceted social and economic relations with the outside and with each other.

[1] This refers to the people from the area immediately South of the Jaffna lagoon and North of Kurunegala.

[2] *Varige* is an endogamous group based on equal caste status and familiarity.

Religio-ethnically the colonists are Sinhalese Buddhists (90 per cent) with the exception of 5 colony families who are Tamil and 7 Sinhalese families who are Christian. Three of the Tamil families are clustered in tract 1 and two families in tract 3 of the left bank. They have hardly assimilated with the majority Sinhalese and are in fact oriented only towards each other and their parent villages in Vavuniya and Jaffna. Because of their small number, however, they have not contributed to much internal dissension within the colony. The 7 Christian families tend also to keep together and belong to a particular church in Anuradhapura.

Those people who have settled on the extremes of both the right bank and the left bank, no doubt due to the poor supplies of water for irrigation, are the most economically deprived with pernicious consequences of under and malnutrition, ill-health and so on. Their houses are in a bad state of repair and contain hardly any movable property. Home gardens too, are in a neglected state. Further, these colonists, probably because of their economically depressed state, aggravated by the fact that they migrated from different parts of the island and have few accepted norms of behaviour in common, are more prone to petty thieving than any other group in the colony, as was often remarked upon by both colonists within and outside the area. The theft of agricultural produce for instance, is very common in this particular part of the colony, resulting in even the home gardens being undeveloped for fear of theft of produce.

Second generation colonists due to the pressure on the land and the economic profitability of chena crops, especially due to poor irrigation facilities and the high incidence of failure of paddy crops in the recent past, have shifted more permanently to *chena* areas for a means of livelihood. In fact, apart from these youth, even the older colonists have begun to rely on chena cultivation for a substantial portion of their income (especially during Yala) with approximately 80 per cent on the left bank and 66 per cent on the right bank engaged in this form of cultivation. The difference

in rates of chena cultivation for the 2 banks can probably be explained both by the low yields and income generated from paddy and by the fact that the left bank farmers had a tradition of chena farming, having originated mostly from adjacent dry zone villages.

Also around the tank there are relatively permanent fishing settlements (approx. 60 huts) with about 150 Sinhala Catholics whose sole occupation is the catching and drying of fish to sell to lorries coming from Colombo. These people are considered outsiders, originating as they do from Chilaw and are left severely alone by the other settlers. While the colonists do not resent their exploitation of the tank resources, the *purana* villagers feel that it is an intrusion into their rights which have been traditionally rights to both water and fish in the tank.

8.2 THE COMMUNITY LEVEL DIMENSION

A community can be defined as a form of social organisation or a unit of social cohesion that identifies a population living in an area and conducting a common interdependent life[1]. In this particular area where the boundaries have to an extent been arbitrarily defined for purposes of study, we have attempted to gauge these shared associations by asking farmers to assess the extent of common activities, disputes and the level of tensions (e.g. in the form of crime) manifested within their community. The discussion in the previous section on associations based on caste, kinship and quasi-kinship ties, reinforced in turn by geographical propinquity and familiarity of those from nearby purana villagers as opposed to those with a more distant and heterogeneous origin, also has relevance here as factors determining a community.

While *shramadana* work in the strictest sense of the word implies voluntary self-help for village development and could be an important indicator of the extent of community-wide activity, *shramadana* work at the time of the survey was paid for by food incentives[2] and this

[1] O'Brien, Schrag, Martin "Sociology" p.59.

[2] These food incentives were from the World Food Programme of the United Nations and were to be used for 'drought relief'.

should be kept in mind while interpreting the data. However, in response to the question of how farmers themselves perceived the extent of such activities, 64% of the sample reported that participation was poor and 29% said it was adequate while none of those interviewed felt it was good. Fifty four per cent of those interviewed who themselves had participated, were from the immediate area. No significant differences could be noted for participation on the left bank as opposed to the right bank. All in all it appears that though common territorial interests should predictably maximise economic and social cooperation, solidarity as manifested in *shramadana* activity was not always evident.

The extent of disputes was assessed to determine the level of tension in community organisation. Water disputes were taken as a yardstick given the importance of this issue in the daily lives of those interviewed.

In Mahawilachchiya, while 14% on the left bank and 9% on the right bank said that there were water disputes in the last normal season in the area, 85% on the left bank and 90% on the right bank said that they knew of no such incident. Of those claiming to know of water disputes, the majority (62% on the left bank and 42% on the right bank) said that the main issue was a scarcity of water which in turn contributed to its maldistribution. It is interesting, however, to note the differences between the right bank and the left bank in settling disputes. While the right bank colonists appear to have settled their disputes through the Cultivation Committee (37%) or through agreement amongst themselves (37%), 55% of the left bank colonists resorted to outside agencies of social control such as the Colonisation Officer or even the police. Again, while 33% of those on the left bank reported at least one water dispute in the last 3 months and 67% reported at least two such instances, on the right bank no water disputes were reported for the last 3 months.

The problem of social order in a community is an important indicator of the discrepancy between individual behaviour and customary behaviour as upheld by the community as a whole. It could

perhaps be justifiably hypothesised that the wide diversity of backgrounds of the colonists did not initially enable them to establish social norms in common or to agree on methods of sanctioning rules and regulations. This would thus probably explain the high degree of crime and of non-conforming in the colony area initially, though the establishment of a police post in the area later (in 1975) has also contributed substantially to lowering crime, especially cattle thieving and forms of juvenile delinquency. Residents of the purana villages for instance, were found to experience relatively less deviant behaviour, regulated as they were by both informal expectations as well as formal prescriptions of law.

The general consensus, especially among the *purana* villagers vis-a-vis the colonists, is that while murders and major robberies are uncommon, the illicit sale of arrack and gambling are very prevalent and were undesirable elements introduced by the colonists to the area. This is true especially among those people who have no secure income or land to cultivate and are a part of a floating population of labour.

8.3 INSTITUTIONS

This section attempts to analyse the nature and role of rural institutions and other infrastructural support and the extent to which they facilitate life and farming in the area as articulated by the farmers interviewed in the project area. For this purpose, the rural institutions studied were the APC, the CC, the MPCS and the RDS, and to a lesser extent the informal institutions such as the Death Donation Society[1].

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[1] Many changes, including a change of government have been witnessed since the collection and writing up of data on rural institutions. The APCs and CCs have been abolished and replaced by a Cultivation Officer and new emphasis has been given to the RDSs. These changes are obviously independent of 'modernisation' and must be kept in mind during the comparative studies in 1980 - 82.

8.3.1 AGRICULTURAL PRODUCTIVITY COMMITTEE (APC)[1]

The Mahawilachchiya Agricultural Productivity Committee is situated at Pemaduwa with 6 Cultivation Committees under its jurisdiction. In Mahawilachchiya the generalised feeling was that the APC was not adequately serving those they were appointed to serve and that this was due to the fact that members were appointed and not elected by popular vote. In fact, the Chairman of the APC was particularly resented as were his decisions which were often made with neither the knowledge nor the approval of the others and resulting in him single handedly making decisions relating to production, management of common resources, and so on.[2] It was also often articulated that in some ways the APC had detracted from the original usefulness of the CCs which in earlier days had cleared water channels, built up culverts, anicuts and so on. Moreover, today it is felt that due to the unclear demarcation of the functional areas of each, the APC and the CC both shelve the responsibility on each other, often resulting in the farmers being left to their own devices to manage water, construct water channels, etc. It was further felt by many farmers that due to this negligence it was futile to pay taxes to the APC. In turn, on the part of the APC members interviewed, the predominant complaint was a lack of funds for its successful working especially with regard to overall planning and coordination for agriculture and related development.

To specifically ascertain farmer perception of the responsiveness of the APC to their needs, the farmers were asked what they would expect of the APC member to do if approached with a complaint that the CC had made a wrong decision on an important matter. Many respondents (43%) were of the opinion that the APC would inquire

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[1] The APCs were established under the Agricultural Productivity Law No.2 of 1972 to be responsible for the promotion, coordination and development of agriculture within its area of authority.

[2] The APC Chairman was also the President of the dominant political organisation in the area, formerly also the Cooperative Director and now the Secretary of the RDS. Likewise one of the CC Presidents is the VC Chairman and another the Vice President of the dominant political organisation.

into the problem and act suitably, though the oft-quoted complaints were the lethargy of the administration and the consequent delays in taking suitable action.

8.3.2 CULTIVATION COMMITTEE (CC)[1]

There are 5 Cultivation Committees in the Mahawilachchiya project area with 3 CCs on the left bank and 2 on the right bank. As discussed earlier in Section 7.4, the responsibility for water issues from the tank and for the repair and maintenance of the main channels in the project lies with the Irrigation Department personnel. The task of maintaining field channels on the other hand is allocated specifically to the CCs. Field channel maintenance however, is extremely poor, resulting in extensive losses of irrigation water.

Part of this negligence can be explained by the following. Though the CCs are operative at village level, the degree of proximity to the farmer can be said to differ according to the nature of irrigation, as predictably the CC would incite greater involvement where the water is externally controlled such as in a colonisation scheme. As Mahawilachchiya is a colonisation scheme and the CC's jurisdiction commences only at the field channel stage, this is probably a major contributor to the poor participation and involvement of the farmers in the CCs in the project area with the resultant negligence of field channels.

The CC members interviewed in turn felt that as a result of bad communication between the CC and the APC, compounded by the fact that the explicit duties of both had not been properly outlined, the CCs were left to idle. This was also aggravated by the fact that recent legislation had divested the CCs of many of its powers and that often it is unable to take immediate action over an issue such

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[1] The CC, a farmer organisation established originally under the Paddy Lands Act No. 1, of 1958, was the village-level appendage of the Agricultural Productivity Committee during the time of survey.

as the illicit tapping of water or damage to irrigation structures which are the major afflictions in the area[1]. The CC members feel that this inability to act promptly has greatly contributed to demeaning them in the eyes of the villagers.

Of the farmers who were interviewed, 46% of the respondents felt that the main function of the CC was to provide water management, renovate irrigation channels and provide adequate agricultural extension. While 21% of the farmers replied that they thought the CC was doing the abovementioned tasks to a great extent and 46% replied that it was somewhat doing its job, 21% reported that the CC was doing nothing. Some farmers in fact articulated a preference for the old *Vel Vidane* system as a means to more efficient and quick acting irrigation management[2].

Farmers were also interviewed to determine what the CC had done in the past 5 years. Twenty one per cent of the respondents replied that the CC had been involved in the reconstruction of water channels, while 31% reported that it settled farmer disputes and 9% said that it was involved in water management. In fairness, the low rate of responses can also be attributed to the prevailing condition of drought in the preceding 4 years which have contributed significantly to a lull in the CC's activities.

To a question of who benefited from the CC's activities, 38% felt that the CC benefited all farmers while 26% felt that only the members and their relatives derived any benefits. To test the responsiveness of the CC to farmer needs, as perceived by the farmers themselves, farmers were asked how long and in what manner they felt the CC would respond to their particular problems - in this case - if their crops had been damaged due to the negligence of another farmer. Most respondents stated that they expected a fair and equi-

[1] Certain issues can only be resolved at the APC level as statutory powers are available only to the APC which must decide on the nature of administrative or legal action that should be taken in respect of a particular complaint.

[2] *Vel Vidane* was an appointed official during colonial times, charged with the duties of water management and paid with a share of the crop,.

table settlement by the CC, especially through a just compensation. Only 6% felt that the CC would not attend to their problems. Most respondents stated that they expected the CC to take over a week, if not 2 - 4 weeks to act suitably.

A question was also asked to determine farmer views on what hindered the successful working of the CC in their particular community. Besides the obvious reasons that the lack of water rendered cultivation impossible and hence the very existence of the CC somewhat futile, the majority of the respondents (52%) felt that there were no serious obstacles to the successful working of the CC. A small minority however (11%) stated that both the lack of knowledge on the part of the farmers as well as on the part of the CC members of the actual functions of the CC, was a major impediment to its successful working.

8.3.3 MULTI PURPOSE COOPERATIVE SOCIETY (MPCS)[1]

From its inchoate inception in 1958/59, when it was situated on the left bank and it was difficult for most consumers to have access to it, the MPCS has now expanded into 2 new branch cooperative outlets. Of the three cooperatives, one is on the left bank and two are situated on the right bank and are managed by the main Cooperative Union at Anuradhapura.

Currently, the right bank KVS is the Chairman, a teacher is the Vice Chairman and together with the third supporter of the MP of the area, they constitute the Board. The pervasive feeling is that these appointments were unjust especially as all were outsiders and none of the villagers had been represented. It is also insinuated that the Board members lined their own pockets from their position.

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[1] The Multi Purpose Cooperative Society was established in 1957 as an organisation that would perform a multiplicity of services including the supply of consumer items and credit for cultivation.

The main services rendered by the MPCS are that of supplying consumer items and credit for cultivation. The MPCS has its main store and 3 other branch stores staffed by 29 people. They are also served by a Rural Bank, 3 paddy stores and 1 fertiliser store. For the transport of goods they have two lorries. In recent times services have been increasing steadily to include, besides distribution of consumer items, also agricultural inputs, loans, deposits and pawning facilities in the Rural Bank and marketing and transportation facilities for village products.

The Rural Bank which was started in 1973 and which is the main channel for the distribution of rural credit has provided loans to 77 members this year of Rs.770 per person for land preparation activities and approximately Rs.500 per person for buying seed paddy, pesticides and fertiliser. These particular farmers have been good clients with a 100% repayment history. Besides agricultural loans the Rural Bank has given loans to traders of Rs.500 each and upto Rs.3,000 for house repairs.

Bank sources stated the deposit amounts are increasing with the peak always at chena harvesting time. In February this year the deposits of Rural Bank members amounted to Rs.24,700 and increased in March to Rs.31,500. The rate of deposit for non-Bank members was Rs.49,100 in February 1977 and increased to Rs.91,828 by the end of March of the same year because of a good chena harvest. Pawning is generally resorted to during the land preparation period for chena and paddy. The overall rate is also increasing with time. For instance, while in November 1976 the pawning rate was Rs.74,151, by January it was Rs.92,819. Besides, the Rural Bank loan scheme, the MPCS had directly given loans for approximately Rs.870 per person to 503 farmers of the area. The cooperative has further distributed approximately 270 bushels of seed paddy for the 1977/78 Maha season.

But this is not to detract from its shortcomings. There were several complaints by farmers regarding the distribution of consumer items. One such irregularity cited was that the last New Year season

witnessed an acute shortage of certain items including many essentials which private dealers were able to provide at higher prices. Also, the feeling among many of the people was that certain articles, e.g. sarees, were not equitably distributed with the management acquiring more than its fair share.

8.3.4 RURAL DEVELOPMENT SOCIETY (RDS)[1]

The RDS is a voluntary multi-purpose organisation that operates at the village level. In the Mahawilachchiya project area there are 3 Rural Development Societies with two on the right bank and one on the left bank, which were set up on the instigation of the DRO and GA in 1960/61. In fact, at the initial stages there was an RDS for each tract and the government provided much assistance to get them off the ground. One of their major achievements had been the setting up of a school, with the building being constructed by the members and staffed by 8 teachers. In 1962, however, the school was transferred to the government and the RDS gave up all responsibility of running it.[2] Since then there has been a lull in its activities.

Today, of those interviewed, 14 per cent on the left bank and 30 per cent on the right bank were members of one of the RDSs. To a question as to what the RDS was doing in their particular area, 23 per cent said that it was doing nothing while 54 per cent said that to their knowledge a RDS was not yet established. A small minority responded that it conducted shramadana activities (2.7 per cent) religious work (2.2 per cent) road repairing and well digging (.1.5 per cent). Many respondents felt that what the RDS should be doing for the development of the area was to make roads or dig wells for cultivation purposes, while a few respondents stated that it should

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[1] The RDS is a village level multi-purpose organisation involved in providing public utilities, mobilising manpower for village development work and planning and coordinating village-level services.

[2] RDSS have no statutory functions so generally they are active only when there is a particular task at hand.

be involved in running schools such as a Montessori or in establishing a weaving centre. This latter they felt would generate much desired employment opportunities at village-level for women.

The most active off-shoot of the RDS is the Death Relief Society which was started by the youth in 1970 and enthusiastically supported by the elders of the area. They meet monthly, collect money and give assistance to a bereaved family to the sum of Rs.100 plus assistance in other ways such as providing food items. The youth also attempted to increase the society's finances by organising film shows at harvesting time.

SUMMARY

This study constitutes a bench mark assessment of Mahawilachchiya colonisation scheme prior to the proposed irrigation modernisation. The investigation refers to the single cropping year covering both Yala 76 and Maha 76/77.

Study Findings

1. The infrastructural and other facilities available to project farmers are poorly developed. The access roads within the project are almost impassable during rainy seasons. Electricity, telecommunication and telephone facilities are lacking. Educational needs are served by 4 schools in the area. A Community health problem of frequent occurrence is Malaria. Five branch cooperative societies along with the primary society located within the project handle the distribution of rationed food items as well as agricultural inputs.

2. Eighty six per cent of the settlers live in standard colony houses which are generally in a poor state of repair. Toilet facilities are reported only by 84%. Domestic water supply particularly for drinking is problematic during dry seasons. Farmers reported a narrow range of utility items in their possession. A tenth of the households had bullock carts.

3. Livestock rearing in the project is limited only to cattle, used mainly for draft purposes. Buffalo rearing is reported by 20% while 7% had neat cattle. The average herd size per farm reporting was around 5 and 10 respectively. Poultry keeping and goat rearing are hardly seen among settlers.

4. The project population estimated at 6,490 is predominantly Sinhala Buddhists. Thirty seven per cent of them are below 14 years of age, while 60% are less than 21 years of age.

5. A reasonably high educational level is noted among the farm population. Nearly half the heads of households had received education up to Grade 5 and a third had schooling up to Grade 10. A sixth had no formal schooling. Of all colony individuals above the minimum school-going age, a quarter had no schooling.

6. The average farm family constitutes 6.9 persons. Self-employment in agriculture formed the main employment avenue as 84% of the adult males are in this category. Five per cent had hired their labour as the principal occupation. Of the female labour force, 40% worked within their own farms whilst a further 54% devoted their time to domestic household work as the primary occupation. The absence of traditional village craftsmen is notable in the area surveyed. During the off farm season nearly three quarters of the adult males hire their labour as a secondary occupational means.

7. A typical land holding in the project consists of 2 acres of highland and 3 acres of lowland. In addition, the operation of a block of *chena* (shifting cultivation) in State forest reserves located outside the project is extremely common, particularly in the rainy season (Maha). The average extent of land operated in sample farms during the study period comprise of 3.1 acres of lowland, 2.1 acres of highland and 4.0 acres of *chena*. The size of *chena* varied from 1 - 10 acres per operator.

8. Currently, the cultivation of allotted land within the project is extremely limited mainly due to lack of irrigation water. The annual cropping intensity of the lowland is 90%. Cultivation of lowland as well as highland during Yala is rare. Highland is greatly under-utilised, one-third of its extent is cultivated with some permanent crops and another third is planted with a few arable crops for home consumption in the Maha season.

9. During Maha 76/77 the irrigable extent of lowland per farm amounted to 85% of the allotted lowland. Farmers reported irrigation problems mainly arising from defects in the conveyance system.

10. Given adequate water, Mahawilachchiya farmers show a decided preference for paddy cultivation in both seasons in their lowland allotments. As regards the introduction of non-rice crops to well drained paddy fields in Yala, about 60% of the respondents felt that there is scope for such a programme. Cowpea, chillie and green gram appeared as acceptable to the farmers provided sufficient irrigation water is assured. Maize, sorghum and soya bean received a very low rating in this respect.

11. A third of the respondents perceived the envisaged rotational issues of water for successful cultivation of paddy crops in Maha as impractical. Pervious soil conditions and the distance that the tank water has to be conveyed to reach the individual allotments were cited as main difficulties. A perfect conveyance system and rigid water control devices were mentioned by farmers as basic necessities for successful operation of the intermittent irrigation programme. An irrigation interval of 2 - 4 days was indicated as the best by a majority of the respondents.

12. Buffalo forms the principal source of farm power for paddy cultivation in Mahawilachchiya. The commonest form of tillage implements used are the wooden plough and wooden harrow. The exclusive use of tractor for preparatory tillage was not observed. As between the use of buffaloes and tractors for land preparation, the respondents expressed a strong preference for the former. This choice is found to be influenced by the quality of work output as well as cost considerations.

13. Tractor hire rates for tillage (2 ploughings) ranged from Rs.150 to Rs.175 per acre, whilst the rate for buffalo hiring is about Rs.10 per day per animal. A system of defered payment for hired draught power, mainly for tractors used for paddy cultivation is common in the project where the payment is made in kind, only at the time of harvesting. Such payment varies from 9 - 12 bushels per acre (based on paddy prices at the time of survey, the estimated value of payment in kind ranges from Rs.297 to Rs.396).

14. For threshing, buffalo is most popular (68%) while 22% had utilised tractors for this operation.

15. During Maha under reference 90% of the paddy extent was under new high yielding strains, mainly BG 34-8. Complete absence of the traditional, indigenous paddy varieties here is noteworthy. Boradcasting under mudland conditions is the standard sowing practice seen in the area and transplanting is absent. Dry sowing *(Kekulan)* of paddy in the lowland allotment is not adopted and was found to be the least prefered method of sowing. Uncertainty of rainfall and the resultant heavy weed growth is seen to be the major impediments for adopting the *kekulan* system.

16. The use of chemical fertilisers for paddy is extremely low with only about a sixth of the planted extent receiving some kind of fertiliser application. The main type of fertiliser used is Urea which averages to 10 lbs. per acre, the recommendation being about 140 lbs. per acre. Some weeding has been undertaken in nearly half the extent cultivated. The chemical weed control measures are most popular (82% of the extent weeded).

17. Project farmers reported low paddy yields with an average of 36 bushels per acre. The maximum yield reported during this season was 73 bushels per acre while three fourths of the farmers reported yields ranging from 20-50 bushels per acre.

18. Labour utilisation data in Maha under reference reveals that 93% of the total farm labour (468 mandays per farm) is supplied by the farm family. *Chena* pproduction accounts for about 60% of the total farm labour input (305 mandays per farm) in which hired labour formed an insignificant fraction. Paddy cultivation ranks next with 146 mandays per farm (about 30%) of which a fifth is drawn from hired labour. Highland allotment had made the least demand on farm labour input (10%) with no hired labour.

19. Two thirds of the total farm labour input of the Maha season is utilised during September to January with a prominent peak in October-November corresponding mainly to *chena* planting. In terms of operational sequence, chena takes a distinct precedence over lowland paddy and in fact, paddy field work had commenced after the peak labour demands of *chena* have been met. It was also shown that the farmers tend to postpone their paddy land preparation until the tank water storage reaches a minimum level so as to ensure them an adequate quantity of irrigation water throughout the season. These results confirmed that during the initial phase of Maha rains, chena activities had received priority over paddy field work.

20. The total production cost per farm during Maha 76/77 is Rs.4,248 which includes the value of both purchased and owned inputs used. Of this, the cash expenditure amounts to a third - Rs.1,243 per farm. The bulk of the farm cash cost (90%) had been incurred for lowland paddy. Hiring of draught power and labour along with cost of purchasing seed had accounted for 36%, 20% and 25% of the cash expenditure respectively. The value of farmer's own production resources used amounts to Rs.3,005 per farm. Almost all of this is accounted for by the family labour used.

21. Use of hired labour is found only in paddy cultivation. One half of the wage payments for hired labour in paddy is for harvesting and processing operations while another third had been for land preparation. The modal wage rates prevalent in the area at the time of the survey ranged from Rs.6.00 - Rs.7.00 for a male and Rs.5.00 - Rs.6.00 for a female. This is exclusive of the value of meals normally provided, estimated to cost around Rs.3.00 per day.

22. The gross annual incomes from all sources, both in terms of cash and non-cash, averages to Rs.7,300 per farm with a per capita gross income of Rs.1,058 per annum. This is almost a half of the national average. The gross incomes per farm shows marked variation in the two seasons. Monthly gross income per family in Yala is only a quarter (Rs.255) of that derived in Maha (Rs.966).

23. Agriculture makes the highest contribution to household incomes which vary from 63% in Yala to 93% in Maha. In terms of proportions, non-agricultural incomes - mainly wage labour is important only in Yala (37%). However, in absolute amounts, it varies from Rs.566 to Rs.406 per farm in Yala and Maha respectively.

24. During Yala, *chena* incomes constitute 72% (Rs.694) of the gross farm income while in Maha it is around 34% (Rs.1,793). Lowland allotment generates income only in Maha and amounts to Rs.3,209 (60%). Incomes from cultivation of highland allotment is insignificant.

25. Farm income in terms of cash averages to Rs.4,437 per annum. In both seasons, *chena* provides half the total cash farm earnings of the farmer. The significant *chena* cash crops are tobacco, chillies, maize, cowpea, vegetables and blackgram. Paddy ranks next in importance by providing a third of the cash income in Maha season.

26. On a per acre basis, gross income during Maha from lowland allotment is Rs.1,144 which is almost twice that of *chena*. However, in terms of cash incomes, *chena* production is similar to lowland paddy. In Yala, the lowland had not generated any income whereas *chena* cultivation has provided a cash income of Rs.341 per acre.

27. The average net cash returns from *chena* is extremely high (Rs.1,257) in relation to both lowland (Rs.-2.00) and highland (Rs.71.00) allotments. This is understandable since *chena* production is undertaken solely with family labour devoid of purchased inputs. Besides, the bulk of *chena* produce is sold for cash unlike in the case of paddy.

28. The average labour productivity in paddy cultivation is higher than in the case of *chena* , particularly in respect of gross returns per man day. However, it is of interest that most of the labour used in *chena* comprise of family labour applied during slack periods when alternative employment opportunities are not available. As regards productivity of working capital, the analysis shows that the average returns per rupee spent on *chena* is ten times higher than that of paddy. Land productivity of *chena* and paddy measured in terms of cash returns per acre cultivated are of the same order. However, gross returns per acre of paddy is nearly three times that of *chena* (Rs.448.00).

29. Income distribution analysis showed considerable variation among project farms. Thirty per cent of the household units earn a cash income of Rs.3,000 or less per annum. The upper 10% had reported annual cash earnings ranging from Rs.8,000 - Rs.10,000. It is observed that income from *chena* has a desirable effect in narrowing the income disparities among project farms.

30. An analysis of cash flow data showed that in *chena* farming, the cash expenses are low and are evenly distributed over the season. In this respect, paddy cultivation in project farms show a marked contrast. As regards incomes, *chena* production is seen to serve as a continuous stream of cash almost throughout the season.

31. The study bears that the common hypothesis - *chena* farming is a supplementary undertaking often distracting the settlers from intensive use of their allotted land, does not hold good in this instance. In fact, *chena* activities can be interpreted as an integral part of the farm unit in Mahawilachchiya under the prevailing circumstances faced by the farmers. The key explanatory factors for the predominance of *chena* farming in this instance can be summed up as farmer's poor liquidity position, his subsistence level of production and lack of other alternative means of resource application, along with the remarkably high rainfall uncertainty..

32. The proposed modernisation programme envisages economically viable farm units based mainly on intensive use of irrigated lowlands independent of *chena*. However, the study data shows that the economic system on which these farmers rely at present includes not only the irrigated lowland, but also rainfed highlands *(chena)*. Such a diversified farming activity has provided the much needed stability to the farm economy in an uncertain production environment. This has been so for centuries in the north central dry zone. Consequently an issue that may be raised relates to the capability of the irrigated lowland alone to sustain a viable farm unit in the long run. In this regard, the incorporation of an intensive highland development programme along with the introduction of livestock enterprises also needs consideration.

33. The quantity of paddy sold per farm averages to 35.4 bushels which is 37% of the total farm output. Nineteen per cent of the farmers did not have any paddy for sale while 65% sold less than half their produce. Only 14% of the farmers had disposed of 50 - 70% of their harvest. The subsistence nature of paddy production was clear from the study data.

34. Cooperative societies form the main marketing channel (60%) for paddy. However, 31% of the farmers had used private channels. The average price for paddy offered by the private sources ranged from Rs.26.00 - Rs.28.00 per bushel. A compelling reason for such transactions is the necessity for settling outstanding consumption loans to the village boutique keeper in kind.

35. Marketing of non-paddy crops, particularly pulses such as green gram and cowpea appeared to pose problems. In this connection substantial price variations in these commodities were seen. The need for a suitable institutional device geared to handling these commodities at the project level is strongly felt.

36. Institutional arrangements for purchasing agricultural produce is seen only in the case of paddy in which the cooperative forms the village level purchasing point. Vegetables, pulses, dried grain and chillies are handled solely by the private traders visiting the area. Marketing of the tobacco crop which was recently introduced to the area is entirely undertaken by the Ceylon Tobacco Company Limited. The output of livestock produce such as milk, eggs, etc., in Mahawilachchiya is extremely low, which hardly enters the market. The absence of a regular marketing outlet, at least for milk, seems to be a constraint in this regard.

37. The available organisation for the supply of production inputs caters mainly for paddy. These functions are under-

taken by the cooperative societies along with the Agricultural Productivity Committee of the area with the assistance of the agricultural extension personnel.

38. Cooperatives form the main source of financing for cultivation loans taken during Maha 76/77. Sixty six per cent of the project farmers had borrowed from this source amounting to Rs.899 per borrower. During Yala 76, loans for consumption had been reported by three fourths of the farm households, the amount averaged to Rs.391 per farm. An attempt made to assess farmers' creditworthiness for raising a private loan revealed a remarkably low rating. As regards loan defaulting, almost 75% of the farmers reported as having outstanding loan repayments to the cooperative, the main reason being the failure of their paddy crop.

39. The agricultural extension personnel currently available for servicing the scheme (2,600 acres of paddy and 1,800 acres of highland) comprises of an Agricultural Instructor assisted by three village level Extension workers. A few selected indicators used to assess the degree of farmer contact with the Extension activities revealed a remarkably low interaction. This primarily seems to be an outcome of the lack of regular cultivation in the project.

40. Data gathered on the status of water management indicates that the farms located in tracts furthest from the tank frequently suffer water shortages. This is particularly significant at the tail-end of the season especially for farmers whose paddy allotments are located in reddish brown earths. These difficulties seemed to be aggravated not only due to the low water levels of the tank during this period, but also to an inefficient distribution of irrigation water. The very poor maintenance of the conveyance system by the authorities had been cited as a major problem in this regard. On the other hand, the

project officials were of the view that disputes on water issues were common among the farmers and indiscipline among farmers results in substantial damage to irrigation structures. As a remedy the officers are strongly in favour of rigid enforcement of the legal sanctions in the Irrigation Ordinance. It may be added that irrespective of the underlying causes the problems of water management in the project is bound to increase manyfold with the proposed systematisation of the irrigation distribution and hence due attention should be paid to this aspect.

41. Settlement patterns and resulting social and economic interaction, were examined on the basis of several criteria such as ethnicity, caste, spatial distribution of colonists, etc. In this respect the distinction between the left and right banks is marked, an important feature of this difference being the origins of the settlers. While the left bank colonists are predominantly from the surrounding *purana* (traditional) villages, most of the right bank colonists are from Kandy and Kurunegala. Among many other factors, the differences in origins and the resultant adaptation to the colony offers one plausible explanation for achieving higher yields in paddy in the right bank than in the left bank.

42. The community level dimension was assessed on the basis of the extent of shared associations and levels of tensions manifested in the project area. While common residential interests should predictably maximise economic and social cooperation, the residents themselves articulated a low participation rate in *shramadana* (self help) activities (despite food incentives for work). Where water disputes did occur, there was a difference both in the frequency of occurrence and in the manner of resolution of the disputes for the two banks. With regard to the level of crime and other deviant behaviour within the project

area, the colonists were of the opinion that it was diminishing with time both as residents began to establish social norms in common and after the advent of the police in the area .

43. Despite the recognition of the need for peoples organisations that foster the participation of all categories of people in economic and socio-political decision making, popular participation appears to be seriously lacking in all the institutions studied in the area and a correspondingly high degree of politicisation was apparent especially in the APC and the CCs. Even though clear community leaders were not apparent, since colonisation schemes encompass groups of people with divergent backgrounds and interests, farmers state that they would prefer leaders who are more closely associated with agriculture or who have shown success in village administration in the past.

THE PROJECT

The following details on selected aspects of the project are presented with a view to provide a fuller picture of the irrigation modernization project proper[1].

General

The project would increase cropping intensities in the command areas of the tank schemes by making better use of rainfall and water stored in the tanks. It would also ensure an equitable water distribution through strictly enforced rotational delivery schedules. The proposed improvement in water use would require: rehabilitation and modification of the existing conveyance system; measurement of water flows at various points along the canals; reduction in delivery losses, and improved water use on the field.

To derive full benefits from the project, the extension service would be strengthened and supplies of farm inputs would be improved. Also, to cope with the tightened crop calendars and more intensive cropping patterns, the project would provide for a substantial increase in the number of farm tractors for land preparation.Finally, for proper handling of the increased farm production, the farm roads would be improved.

Cost Estimates

Total project costs are estimated at US $ 30.0 million equivalent, including about US $ 8.0 million in import taxes and duties. The foreign exchange component is estimated at US $ 9.1 million or about 41 per cent of the total net of taxes and duties. Estimates are based on preliminary design, with unit prices at January 76 levels. The

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[1] Extracted from the appraisal report No.951-CE of the World Bank on Tank Irrigation Modernization Project.

major elements included in the cost estimate are civil works (US $ 8.7 million), construction equipment and vehicles (US $ 7.0 million), agricultural equipment and vehicles (US $ 4.5 million), technical assistance (US $ 0.2 million), and engineering and administration (US $ 1.3 million), totalling to a base project cost of US $ 21.7 million. Physical contingencies of US $ 1.7 million (20 per cent of civil works costs) and price contingencies of US $ 6.6 million (28 per cent of the base cost plus physical contingencies) bring the total project cost to US $ 30.0 million.

Civil Works

(i) desilting and enlarging the entire water conveyance system (main and branch canals, 120 ml; distributaries, 180 mls; and field channels about 500 mls) to provide sufficient capacity for a seven day rotation with only daylight irrigation (estimated earthwork: 0.6 M. cu. yd);

(ii) repairing, enlarging and surfacing with gravel the embankments used as farm roads (estimated earth work: 1.3 M. cu. yd. and gravel work: 0.4 M cu. yd);

(iii) excavating some 300 mls. of drains to improve the drainage (estimated earth work: 1.6 M cu. yd);

(iv) where necessary, brick lining of the conveyance system to reduce excessive seepage or erosion, and to provide the necessary degree of water control. In addition, all irrigation canals and field channels under the Mahawilachchiya tank would be lined, with different kinds of lining, as a pilot programme for determining the effect on seepage losses, and capital and maintenance costs (estimated lining requirements — main and branch canals: about 6 mls; distributaries: about 7 mls, and field channels: about 50 mls);

(v) repairing and modifying the existing structures in the irrigation system to enable daylight irrigation for each farm on a seven day rotation schedule;

(vi) installation of some 170 new regulators in the main and branch canals to increase water control in the conveyance

system. Similar regulating structures would also be installed in distributaries and field channels;

(vii) installation of Parshal flumes to measure releases from the tanks and water flows at various points in the system and

(viii) provision of offices, workshops, stores and housing for supervisory and construction crews. For each 6,000 ac. units such buildings will include: 2,400 sq. ft. for temporary officers; 4,000 sq. ft. each for storage and workshops; temporary quarters for three senior officers; six units of 500 sq. ft. each for bachelor officers quarters, and 2,000 sq. ft. of dormitory space for labourers. After construction is completed, all buildings, except the temporary offices and quarters would continue to be used in connection with the expanded operation and maintenance (O & M) programme for the project.

Technical Assistance

(i) a water management specialist would be engaged for a period of at least two years to assist in layout and design (particularly the field channels and farm drains), in the development of the operating schedules for the tanks and the rotation schedules for the water supply system and to train local engineers, technicians and Cultivation Committee (CC) members on intermittent irrigation. These local staff would then train farmers to help them adapt to the new irrigation practices.

(ii) engaging of an independent organization such as the Agrarian Research and Training Institute (ARTI) to conduct appropriate benchmark and follow-up surveys in order to evaluate the impact of the project on the efficiency of water utilisation, equitable water distribution, O & M costs, cropping patterns, and yields and production levels. Emphasis would also be

placed on evaluating the merits of various types of canal linings proposed for the Mahawilachchiya tank.

Revised Construction Schedule

Scheme	1978 (Acres)	1979 (Acres)	1980 (Acres)	1981 (Acres)
Mahawilachchiya	1,500	1,100	-	-
Mahakanadarawa	4,000	2,000	-	-
Vavunikulam	500	2,500	3,000	-
Padaviya	500	4,000	4,000	4,000
Pavatkulam	500	1,500	2,400	-
	7,000	11,100	9,400	4,000

Source: Department of Irrigation, January, 1978

ANNEX 2

Classification of Land Holding According to Soil Types
- Mahawilachchiya -

Soil Type		Lowland Allotment			Highland Allotment		
		Left Bank (%)	Right Bank (%)	Total (%)	Left Bank (%)	Right Bank (%)	Total (%)
R.B.E.(I.M)	Suitable for paddy not suitable for upland crops	-	-	-	7	1	4
L.H.G		-	-	-	-	2	1
R.B.E(I.M)+L.H.G)		-	-	-	2	2	2
L.H.G+A.L.		-	-	-	-	2	1
R.B.E(I.M)+L.H.G) +A.L		62	59	60	-	-	-
R.B.E(W.D)	Suitable for upland crops but rice could be grown partially in Maha	8	8	8	53	27	52
R.B.E(W.D)+R.B.E(I.M)		18	17	18	16	8	8
R.B.E(W.D)+R.B.E(I.M)+L.H.G		7	12	10	-	-	-
R.B.E(W.D)+V.S.S		-	-	-	9	-	4
Others (including not surveyed)		2	4	3	13	58	42
Total No. of surveyed allotments		100 (N=60)	100 (N=90)	100 (N=150)	100 (N=55)	100 (N=86)	100 (N=141)

R.B.E(W.D) - Moderately deep to deep, moderately fine textured, well drained Reddish Brown Earths. Slope 2-3%

R.B.E(I.M) - Moderately deep to deep, moderately fine textured, imperfectly drained, Reddish Brown Earths. Slope 1-2%

L.H.G - Moderately deep to deep, moderately fine textured poorly drained low humic gley soil. Slope 0-1%

A.L - Deep Alluvial soils of variable texture and drainage. Slope 0-2%

V.S.S - Very shallow soils and/or rock outcrops. Slope 3-4%

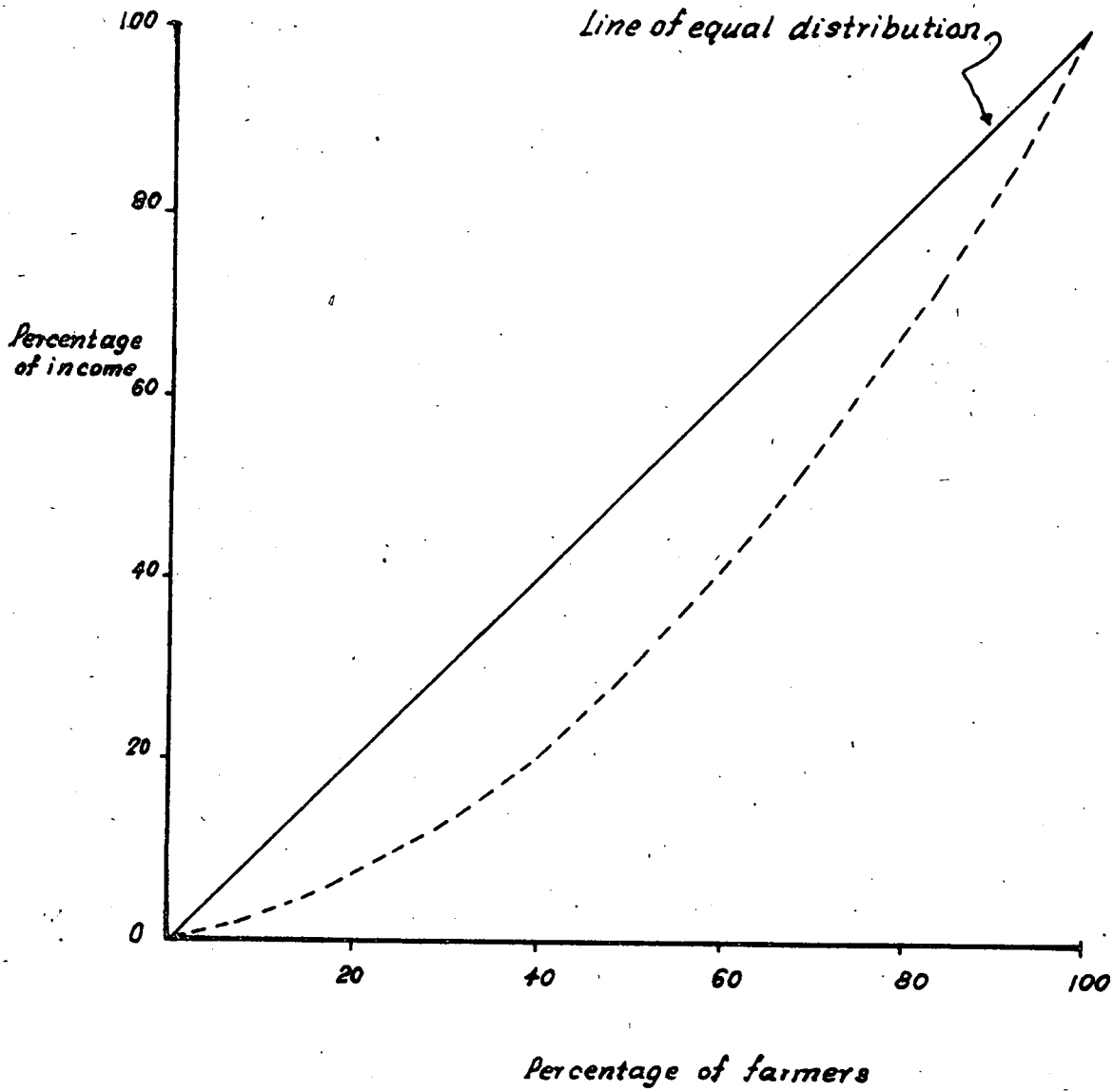
ANNEX 3

Distribution of Annual Gross Income per Farm
- Mahawilachchiya - Yala 76 and Maha 76/77

Income category (Rs./Annum)	% of farms	Cumulative percentage	% of ~~farms~~ income	Cumulative percentage
0 - 1000	1.96	1.96	0.21	0.21
1000 - 2000	-	1.96	-	0.21
2000 - 3000	5.88	7.84	1.92	2.13
3000 - 4000	9.8	17.64	3.96	6.09
4000 - 5000	5.88	23.52	3.35	9.44
5000 - 6000	3.93	27.45	2.53	11.97
6000 - 7000	5.88	33.33	4.50	16.47
7000 - 8000	7.85	41.18	7.13	23.60
8000 - 9000	23.53	64.71	23.95	47.55
9000 - 10000	5.88	70.59	6.63	54.18
10000 - 11000	1.96	72.55	2.45	56.63
11000 - 12000	9.80	82.35	13.75	70.38
12000 - 13000	5.89	88.24	8.72	79.10
13000 - 14000	1.96	90.20	3.18	82.28
14000 - 15000	7.84	98.04	13.69	95.97
15000 - 16000	-	98.04	-	95.97
16000 - 17000	1.96	1000.0	4.03	100.00

ANNEX 4

Distribution of Annual Gross Incomes per Farm- MAHAWILACHCHIYA - Yala 76 and Maha 76/77.



ANNEX 5

Farm Gate Prices of Agricultural Commodities - Mahawilachchiya Maha 76/77

	Highest received (Rs)	Lowest received (Rs)	Average (Rs)
Kurakkan (Bu.)	18		
Maize (Bu.)	33	24	31
Chillies (Lb.)	14	12	13
Cowpea (Bu.)	120	80	87
Black Gram (Bu.)	130	100	116
Tobacco (Lb.)	4.00	2.80	3.40
Paddy* (Bu.)	33	26	28
Gingelly (Bu.)	140	70	105

1. Guaranteed price paid at the Cooperative at the time of survey is Rs.33 a bushel.