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A STUDY OF

FIVE SETTLEMENT SCHEMES PRIOR TO IRRIGATION MODERNIZATION

Vol. V. Padaviya

AGRARIAN RESEARCH AND TRAINING INSTITUTE
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39

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FIVE SETTLEMENT SCHEMES

PRIOR TO

IRRIGATION MODERNIZATION

Volume V - Padaviya Scheme

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AGRARIAN RESEARCH & TRAINING INSTITUTE
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FOREWORD

This study on Padaviya Irrigation Scheme forms the fifth and the last of a series of bench mark studies undertaken by the Agrarian Research and Training Institute on a major irrigation investment project involving the modernization of five irrigation schemes in the North Central Dry Zone of Sri Lanka. The other studies refer to Mahawilachchiya, Mahakandarawa, Pavatkulam and Vavunikulam settlement schemes.

The data for this study were collected more recently - in September 1979, than in the case of the other four studies. In that respect this report provides up to date information about the situation of agricultural and living levels in the settlement area.

All field work and writing of the report were done by two Research and Training Officers of the Institute, namely, Messrs. W.A.T. Abeysekera and A.S. Ranatunga. The two of them were associated with the studies of all five schemes and Mr. Ranatunga functioned as the Co-ordinator of study project.

It is hoped that this presentation would be found useful in the final assessment of the impact of tank irrigation modernization project. I also wish to record my appreciation for the assistance given by other officers from the Institute as well as from other departments to make this study possible.

T.B. Subasinghe
Director
AGRARIAN RESEARCH & TRAINING INSTITUTE.

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

The completion of this report reflects the combined efforts of a number of individuals within as well as outside the Institute. The Officials in the Irrigation, Agriculture and other Departments assisted us in many ways, which we gratefully acknowledge. The services of the Investigators as well as other personnel in the Institute who helped us in this assignment is worthy of mentioning. Mr. Denzil Mallawa Arachchi, Investigator, was in particular of great assistance to us in the handling and tabulation of survey data in office. Our thanks also go to Mrs. Indrani Perera, Secretary of the Agricultural Economics and Extension Unit who attended to all correspondence and typing of manuscripts.

W.A.T. Abeysekera

A.S. Ranatunga

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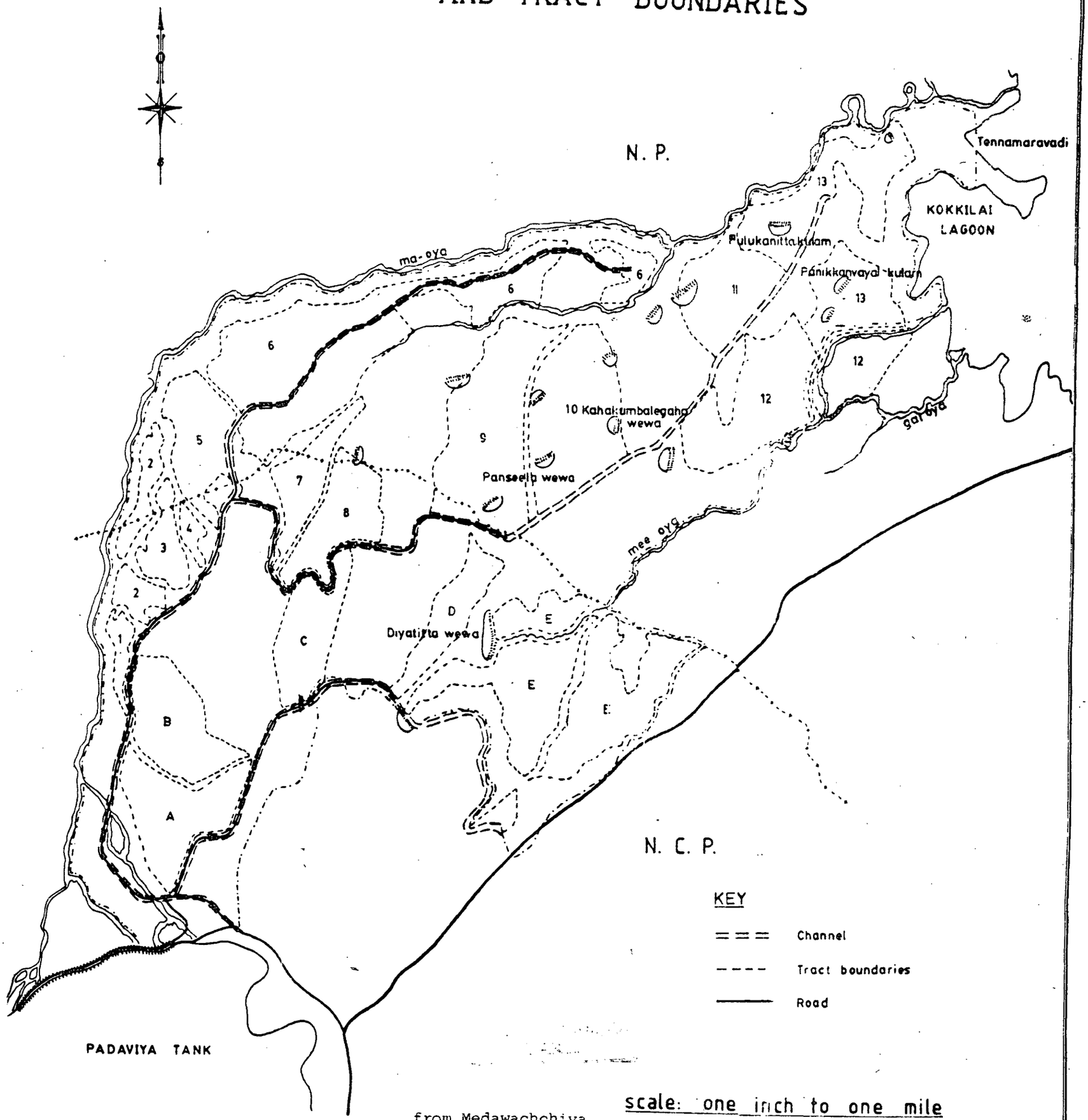
TABLE OF CONTENTS

LIST OF TABLES

PADAVIYA - SHOWING MAIN CHANNELS AND TRACT BOUNDARIES



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from Medawachchiya

A STUDY OF FIVE SETTLEMENT SCHEMES PRIOR TO IRRIGATION MODERNIZATION

VOLUME V - PADAVIYA

I. INTRODUCTION

1.1. THE SETTING

In early 1977, on a suggestion of the World Bank, the Ministry of Irrigation, Power and Highways requested the Agrarian Research & Training Institute to conduct appropriate evaluation studies to establish the impact of a major irrigation modernization project involving five tanks in the North Central Province. The irrigation schemes concerned are Mahawilachchiya, Mahakandarawa, Pavatkulam, Vavunikulam and Padaviya. As a part of the evaluation strategy adopted, a bench mark survey was conducted in respect of each of these tanks, immediately prior to commencement of their modernization activities. This report carries the findings of the bench mark assessment of the Padaviya Settlement Scheme[1].

Of the five irrigation schemes involved in this project, the present covers the largest irrigable extent. The exact history of development of this reservoir is somewhat unclear. However, it is believed to have been constructed during the reign of King Mahasen (535 - 555 BC), and the restoration of the present tank had been initiated in early fifties and the settlement was done during the period 1954 - 1958. The tank is formed by impounding the waters of Mora Oya and Mukunu Oya and has a catchment area of 106 square miles with a storage capacity of 72500 acre feet. The area of water spread is about 5800 acres.

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[1] Volumes I, II, III and IV of this series refer to the bench mark studies in Mahawilachchiya, Mahakandarawa, Pavatkulam and Vavunikulam respectively.

The current irrigable area under the tank is officially estimated at 12656 acres. (For a tractwise breakdown, see Table 3.1). The extent of highland within the command area is around 5300 acres and involves about 4000 farm families. Irrigation water from the tank is supplied through a single sluice which feeds two main channels, a shorter upper channel and a longer lower channel. The former caters to irrigation tracts A to E irrigating about 4000 acres, while the lower main channel provides water to tracts 1 to 13 with an irrigable extent of 8600 acres.

As common to all other irrigation schemes concerned in the Tank Modernization project, the most critical constraint to agricultural production in the area is the lack of a stable and assured irrigation water supply. During the dry season (April - September) the availability of water both for domestic as well as livestock needs becomes scarce and the tank forms the sole source of water supply. The specific problems relating to the development of the study area can be briefly outlined as :

i) Insufficient use of Maha rains and wasteful use of stored water in the tanks ; often the cultivation of paddy lands are undertaken after the rainfall has begun, by which time substantial quantity of rain water is unutilised.

ii) Inequitable irrigation water distribution as a consequent to poor levels of water management.

iii) Lack of adequate farm power for timely land preparation, thereby resulting a poor timing of the season.

iv) Poor access roads.

v) Ineffectiveness of the current agricultural services.

In broad terms, the proposed modernization programme basically relates to improvement of both crop production, water management as well as extension. As a final goal it envisages an improvement of living standards of the settlers by intensifying land use in the

lowland allotments. The improvement strategy is primarilly centred on the rational use of available water in the tank as well from the rainfall. The basic features envisaged in the modernization programme are;

a) Physical improvements to the present irrigation conveyance system.

b) Adoption of better water management practices and the enforcement of rotational issues of irrigation water;

c) Provision of adequate farm power equipment for timely field operations.

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

e) Strengthening the currently existing agriculture extension services.

The engineering work in this connection mainly involves earth work in channels, roads and bunds, canal lining and building irrigation structures and also road gravelling. Most of this work as well as other improvements suggested in Padaviya under the modernization programme had been scheduled to initiate in 1979.

1.2. STUDY OBJECTIVES

As already mentioned in the previous reports as well, this investigation is designed to serve as a bench mark for assessing the result of changes in farming and levels of living of Padaviya farmers, consequent to project implementation. The terms of references given in the original research proposal are;

1) To ascertain the current status of the project beneficiaries with reference to criteria such as social amenities, employment structure, labour application, agronomic practices, costs, income, credit, marketing and other services.

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

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

4) To examine the existing patterns of settlement, social organization and community living in the project area.

1.3. SAMPLING

The selection of farm units for survey investigations was based on a stratified random sample of the allottees with the tracts being treated as sample strata. The total sample size selected was 221 farm households.

	Lower Channel	Upper Channel	Total
No. of households selected	64	157	221
Total No. of allottees in residence[1]	821	2896	3717

[1] based on information furnished by District Land Officer, Padaviya.

1.4. REFERENCE PERIOD

The data given in the study relates to a period of 12 months of cropping, covering Maha 1978/79 and Yala 79 seasons. It may be important to mention that in terms of the availability of irrigation water for cultivation, the year under reference can be considered as one of the typical years in Padaviya.

1.5. DATA COLLECTION AND PROCESSING

The principal means of collection of farm data in this study involved a structured questionnaire, administered to a sample of farm households at the end of the cropping year under consideration - September 1979. Secondary information from the officers of the Departments of Irrigation, Agriculture and Land were also used to supplement the basic farm data. Data processing was undertaken manually. In presenting the report effort was specially made to be in line with the basic format of the earlier reports in this study

series, so as to facilitate comparisons among the different projects. However, in instances where the issue is specific to Padaviya scheme, appropriate references have been made.

II. FARM FACILITIES, SETTLEMENT FEATURES & LABOUR FORCE

Major administrative as well as physical facilities currently available in Padaviya settlement scheme together with key demographic and employment characteristics of the settlers are presented in this chapter.

2.1. ADMINISTRATIVE AND OTHER PHYSICAL FACILITIES

Unlike in Mahawilachchiya and Mahakandarawa Settlement Schemes, the District Land Officer (D.L.O) responsible for administrative matters relating to land,is resident in the project.

The Colonization Officers who function under the D.L.O. serve as a link between the D.L.O. and the allottees. The entire complement of six Colonization Officers assigned to this project is not functioning at present, and currently only 2 are available. Their duties are restricted mostly to routine land administration work with little or no involvement in agricultural development activities. Agricultural extension staff available at present consist of an agricultural instructor and eleven field level extension workers. At the Agricultural Instructor level, the staffing is inadequate to handle extension programmes involving 12,000 acres of irrigated paddy. The maintenance of irrigation structures as well as the distribution of irrigation water are handled by a resident engineer assisted by five technical assistants.

Housing and other basic amenities available to public officers working in the project are grossly inadequate. Padaviya project being situated in an extremely isolated location, the inadequacy of basic living facilities has aggravated the problem of retaining public officials connected with development activities in the project. At present, some of the project officers reside outside the project quite far away and commute to work.

2.2. PHYSICAL INFRASTRUCTURE

The only access to Padaviya settlement scheme is via the main road that runs from Medawachchiya to Padaviya covering a distance of

36 miles. Other than this main trunk road, the road net work within project is in a deplorable state. Most of the roads within the settlement scheme are not motorable even after a light shower and their improvement is a vital component of development strategy of the project. The bus service is very poorly run at present. The stipulated bus schedules to and from Padaviya to Anuradhapura as well as the services within the project are hardly adhered to. The principal mode of transport within the settlement scheme are tractors, bicycles and bullock carts.

The state medical facilities available in the area consist of a base hospital at Padaviya with 100 beds, a rural hospital at Sripura and two outdoor-dispensaries. In these medical institutions a dearth of doctors and other supporting medical personnel is seen. Public Health Inspectors are not available within the project. Malaria is the most common disease in Padaviya at present and the incidence of this disease is said to be on the increase due to lack of systematic control measures. Dysentry ranks next in importance and the poor quality of drinking water has contributed to this situation. Poisoning due to improper use of agricultural pesticides is reported to be on the increase. According to the medical officer at Padaviya, deaths arising from insecticide poisoning,accidental or otherwise have risen in the recent past. There is a felt need for farmer education on the safety use of agro-chemicals in this project. This aspect is particularly important since the use of agro-chemicals is considerably high among farmers.

2.3. HOUSING CONDITIONS AND RELATED AMENITIES

Standard colony houses with tiled roofs and cemented floors had been provided by the government to all regular allottees in tracts 1 - 9 at the time of settlement. However, a majority of those settled in tail end tracts mostly in 12A and 13 live in single roomed cadjan thatched huts with mud floors as these allottees were not provided with permanent houses. The general living conditions of the settler population do not appear to be high despite the fact that the settlement had been established nearly two decades ago. At least as far as the housing is considered there appear to be very little

improvement.

Currently there are 13 schools in the area, of which the majority are primary schools. One of the major problems faced by educational authorities is the staffing of these schools. Due to lack of basic amenities for living in a very isolated location retention of teachers appointed to these schools has become a major problem.

Tract No.	Number of Schools	Staff strength	Total enrolment 1979
2	One	30	675
5	One	30	725
7	One	21	751
9	Two	13	715
10	One	9	288
12	One	5	200
13	One	3	180
A	One	20	800
B	One	5	190
C	One	11	300
D	One	6	228
E	Three	14	653

The main Post Office at Padaviya with 5 sub Post Offices located in the project serve the postal needs. Telephone facilities are available only at the main Post Office, Padaviya. No private or other business telephones are available in the project area. The bazzar and some of the government offices in Padaviya are supplied with electricity from a generator. Though the supply network extends upto Sripura, none of the farm households have electricity.

The cooperative organisation within the project area is handled by two multi-purpose cooperative unions located at Parakramapura and Sripura. The former operates 8 primary societies, one wholesale store and 8 paddy stores. The latter manages 10 primary societies, one wholesale store and 9 paddy stores. Apart from purchase of paddy under the guaranteed price scheme the work of primary cooperative

societies is almost solely concerned with consumer oriented activities. The timely supply of inputs such as agro-chemicals and fertilizer often appears to be overlooked by these societies. Three large private rice mills with total capacity of milling 5000 bushels per week and 15 small rice mills operate within the project.

Lack of storage facilities for fertilizer within the project is a distinct handicap at present. Seasonal requirements of fertilizer are brought at present from Medawachchiya, located almost 50 miles away from the tail end of the project. There had been one fertilizer store in the project itself in the past, and this had been closed down in 1978. The need for providing local storage facilities is of utmost importance, as in many instances non-application or under application of this input had been attributed by farmers partly to supply problems.

2.4. LIVESTOCK ASSETS

Availability of a large buffalo population is a marked feature in Padaviya. On a rough estimate, almost a third of the farm households own buffaloes. Usually the individual herd size varies from 15 - 20 animals, but in certain instances they are as large as 30 - 40 animals per herd. Individual households owning one or two buffaloes is not frequent. Few instances were also found, where in small herds belonging to a number of farmers are entrusted to one individual for grazing and maintenance of animals during the off season. The present system of buffalo rearing here like in many parts of the dry zone is associated with large extents of land for free grazing and wallowing of animals. Perhaps under such extensive systems it appears that having small herds of one or two animals is considered less worthwhile by the farmers. It must be noted that bulk of the farm power within Padaviya seems to come from the buffaloes within the project.

2.5. POPULATION CHARACTERISTICS

The estimated population within Padaviya scheme at present is around 29,000. A classification of the sample population according to sex and age indicate the following situation.

Table 2.1. Percentage Composition of Population according to Age & Sex

Age Group (years)	Male (%)	Female (%)	Total (%)
0 - 13	42	41	42
14 - 20	18	19	18
21 - 30	14	15	14
31 - 50	17	20	18
51 - 65	7	4	6
Over 65	2	1	2
Total (%)	100	100	100
(No)	(796)	(636)	(1432)

Age distribution of population at Padaviya indicates a close resemblance to that of other two tanks investigated earlier in Anuradhapura. It is only natural to expect that such similarities in demographic characteristics are occuring among these projects since they have been settled during the same period. Nearly 40% of the children are below 14 years. Those under 31 years constitute around three fourths of the entire farm population.

The size of farm households is large. The average family size of the settlers vary from 2 - 12 individuals per household. Family units with 7 - 12 members constituted over 40% of the cases.

Table 2.2 Size classification of households

Family Size	Households (%)
2 and less	4
3 to 4	18
5 to 6	34
7 to 8	23
9 to 10	16
11 and over	5
All sizes	100

Most of these larger family units include individuals from the third generation as well. A notable feature is the presence of a large number of small children in almost all families. In view of the very limited land available for irrigation development in the future and the lack of off-farm employment opportunities in the area, the third generation problems are bound to become acute. On enquiring the attitudes towards family planning, around 40% expressed their approval of family planning measures but only 20% reported as having adopted such measures.

The educational status of the farm family at present was also examined and the information is presented in the table below.

Table 2.3. Education status of the farm family(members above 6 years)

	No schooling at all			Schooling completed				Currently attending school				
Family Member	Can not read or write	Can read and write	Sub Total	Up to Grade 5	Up to Grade 10	Grade 10 and above	Sub Total	Up to Gr. 5	Up to Gr. 10	Gr. 10 and above	Sub Total	TOTAL
	%	%	%	%	%	%	%	%	%	%	%	%
Farmer	6	4	10	37	47	6	90	-	-	-	-	100
Wife	17	4	21	29	41	9	69	-	-	-	-	100
Children												
a) Male	5	1	6	16	24	4	44	33	16	1	50	100
b) Female	5	-	5	17	20	5	42	34	17	2	53	100
Others												
a) Male	22	5	27	15	27	6	48	8	17	-	25	100
b) Female	23	-	23	16	37	3	56	12	9	-	21	100

Of the farm operators in the project, around 94% are able to read and write, and only 10% reported as not having a formal education. Nearly half of farm operators had attained a relatively high level of primary education. Among housewives, the educational attainments are generally lower than those of the operators. Of the children of the school going age about 6% has had no schooling and only about 50% currently attend schools. Among the younger population education is rarely continued beyond Grade 10.

Though almost all parents indicated their preferance to provide children with higher levels of education, such aspirations hardly materialized. In many households as children grow up they tend to get pre-occupied with assisting parents in their own farm work which eventually result in their dropping out of school. It was also noted that during peak labour demand periods for farming, school attendance showed a considerable drop - particularly among boys.

2.6. SETTLEMENT PATTERNS

The total number of allottees in Padaviya Settlement Scheme as recorded officially in the District Land Office is 3700. Of them around one third operate varying degrees of encroached lands. Apart from the practice of encroaching on lands reserved for channels, roads as well as other public purposes by allottees, incidence of encroachment of lands previously abandoned by allottees is common in tail end tracts. According to irrigation officials in the project, around 2000 acres of land had been asweddumized for irrigated paddy within the settlement scheme, outside the originally planned acreage given in the Blocking-out Plan. This would undoubtedly pose severe strains on the present water distribution programmes.

The settled population of Padaviya counts about two decades of residence in the project. Nearly two fifths of them had taken residence during the period 1957 - 1960 and another third between 1961 - 1965. Majority of these settlers had been drawn from neighbouring villages within Anuradhapura district as well as from far away districts such as Galle and Matara. The more important outside districts from which settlers had been selected are :

District	%
Gampaha	22
Kurunegala	15
Anuradhapura	13
Kegalle	12
Kandy	10
Colombo	6
Others	22
	100

The background of the settlers show that only around 40% of them have had some previous experience in farming. Of the balance, the bulk were either unemployed or had engaged in other non farm activities such as wage labour.

Though a certain amount of close contacts among settlers living in different tracts is seen during planting and harvesting seasons, particularly under *bethma* system of cultivation, their degree of association is rather limited. Perhaps a duration as long as 20 years can be considered as sufficient to evoke stronger ties among settlers, physical constraints such as lack of road and public transport facilities in the project too have been an important contributory factors for such reduced levels of coherence.

2.7. EMPLOYMENT, LABOUR FORCE AND WAGES

As common to many other areas in the dry zone, agricultural sector, mainly paddy, provides the almost sole source of employment. Nearly 70% of the labour force in the farm population is directly dependent on crop production. There is little diversity in the occupational patterns of the on farm residents, particularly with regard to traditional service sectors. The labour force defined here include those within the age group 14 - 65 years excluding students, invalids, disabled and monks etc. This data indicates that among males and females the labour force participation rates are 56% and 59% respectively, suggesting that nearly one half of the population is economically inactive and are dependent on the balance for their basic needs.

Composition of the present work force in the area in terms of their main pre-occupation is presented below.

Table 2.4. Sexwise breakdown of labour force according to primary activity

Type of primary activity	Male %	Female %	Total %
1. Self employment in agriculture	83	47	67
2. Hired labour in agriculture	*	0	*
3. Hired labour outside agriculture	4	0	2
4. Household work	-	30	14
5. Traders	-	-	-
6. State Services	1	-	1
7. Other service functions	2	1	1
8. Unemployed (excluding housewives)	10	22	15
All	100	100	100

*Less than 1 percent.

Nearly 80% of the males and 50% of the females in the labour force are engaged in cultivating their own lands, as the principal form of occupation. In Maha seasons, as the farming activities are quite intense, heavy demands for most of this labour are made representing the family labour input. In contrast to this, the cultivation activities in Yala are restricted to only one acre of paddy with little or no highland or chena work, and the labour force has very limited employment opportunities within their own farms. This results in considerable underemployment of man power resources during this season. A small amount of male labour (2%) hire their labour for non-agricultural persuits.

Table 2.5. Type of secondary employment classified by sex

Type of Employment	Male %	Female %	Total %
Self employment in agriculture	15	50	38
Hired labour in agriculture	51	5	22
Hired labour outside agriculture	12	-	4
Traders	1	-	1
Household work	-	44	27
Others	21	1	8
	100	100	100

A majority of the males reporting secondary employment are engaged in hiring out their labour during Maha. Around 21% work as masons, carpenters and *beedi* wrappers etc. during slack periods. Nearly 40% of the females who are primarily engaged as housewives reported participation in their farm work as a form of secondary employment.

2.8. FAMILY LABOUR COMPOSITION

The farm family size averages to 6.5 individuals per household of which 3.7 are in the labour force. As seen below, 2.3 adult members per family are engaged in their own farm work on a full time basis.

	No.	%
Average farm family size	6.5	100
of which engaged in full time own farm work :-		
Males	1.6	25
Females	0.7	10
All	2.3	35

2.9. WAGES

In the absence of any developments in the non-agricultural sector as well as highland farming, the hired labour market in this project is closely associated with paddy cultivation. The wage rates seems to fluctuate slightly between the two seasons showing an increase in the Maha season. The prevailing daily wage rates for agricultural labourers vary around Rs.15/-, Rs.12/- and Rs.8/- for men, women and children respectively. Usually a mid-day meal is also provided. However, in instances where a mid-day meal is not provided the corresponding wage payments vary from Rs.20/-, Rs.15/- and Rs.11/-.

Table 2.6 Wage rates in paddy sector - Padaviya

	Male	Female	Children
Transplanting	15.00	12.00	8.00
Hand weeding		10.00	6.00
Harvesting	15.00	12.00	8.00
Stacking	20.00	-	-
Threshing	15.00		

The more affluent operators eg. village boutique keepers seem to offer even higher wage rates during the peak labour demand periods, particularly at the time of harvesting. In the non-farm sector, the daily wage rates showed a clear resemblance to that in the agricultural sector. Here, the variation of wage rates within a season does not seem to be prominant unlike in the case of paddy.

Child labour for cultivation purposes mostly come as a part of family labour. If child labour is employed they are mostly used for driving buffaloes in land preparation and bird scaring, if any. Usually in paddy cultivation the female wages are around Rs.10/- per day and in some instances this rise to even Rs.15/- during harvesting.

III. FARM COMPOSITION, LAND USE & IRRIGATION

3.1. PATTERN OF LAND ALIENATION

The total paddy acreage in Padaviya as given in the original Blocking-out Plan amounts to 12,660 acres of lowland and 4460 acres of highland. However, of the extent of lowland earmarked for irrigation, a little over a tenth is estimated to be unirrigable by the irrigation officials in the project area. The irrigation net work comprises of two main channels. The lower main channel stretching a length of about 20 miles, irrigates nearly 70% of the lowland acreage in the command area. The upper main channel is relatively short - 8 miles and runs on a higher contour, the drainage water of which again comes back to the lower main channel. Irrigable lands under the lower main channel are divided into 14 irrigation tracts constituting the primary irrigation units. Similarly, the lowlands under upper main channel are divided into 5 tracts.

Table 3.1 Tractwise distribution of lowland cultivation[1]

Tract No.	Total extent alienated[2]	Estimated extent unirrigable or abandoned[3]	Estimated extent encroached[2]	Approximate extent under cultivation
	(Ac)	(Ac)	(Ac)	(Ac)
Lower Channel				
1	123	9	0	114
2	453	5	15	463
3	261	60	9	210
4	108	12	6	102
5	624	50	15	589
6	2097	90	75	2082
7	567	45	60	582
8	423	20	45	448
9	1071	150	150	1071
10	710	40	75	745
11	455	50	50	455
12	908	353	34	589
12A	146	40	200	306
13	951	412	200	739
Sub Total	8897	1336	934	8495

(continued)

(Table 3.1 continued)

Tract No.	Total extent alienated[2] (Ac)	Estimated extent unirrigable or abandoned[3] (Ac)	Estimated extent encroached[2] (Ac)	Approximate extent under cultivation (Ac)
Lower Channel				
Sub Total	8897	1336	934	8495
Upper Channel				
A	496	15	6	587
B	403	50	21	374
C	654	60	30	624
D	522	40	35	517
E	1936	120	180	1996
Sub Total	4011	285	272	2998
Total	12908	1621	1206	11893

1. Reliable data on encroachments and area unirrigable are not documented elsewhere.
2. District Land Officer, Padaviya
3. Irrigation Department - Personal communication to Mr. John Farrington, ARTI.

3.2. OPERATIONAL HOLDING

At the initial stages of settlement in this scheme, the basic unit of land allocation comprised of 3 acres of lowland and 2 acres of highland. However in subsequent occasions, particularly those in Stages II and III, the holding allocated per individual had been reduced to 2 acres of lowland and 1 acre of highland. Among the sample farmers the average size of the operational holding inclusive of encroachments and rented in land is 3.1 acres of irrigable land and 2.0 acres of highland.

Table 3.2 Average composition of operational land holding per farm - Maha 1978/79

Ownership status	Lowland (Ac)	Highland (Ac)	Chena (Ac)
Allotted land	2.8	1.6	-
Purana land	-	-	-
Encroachments	0.2	0.3	0.4
Land rented/leased in	0.1	0.1	-
Total	3.1	2.0	0.4

Chena cultivation is not common among Padaviya farmers unlike in many of the other dry zone settlement schemes. Operation of paddy lands in the neighbourhood villages by allottees is rarely seen here due to absence of *Purana* villages in the vicinity except closer to Pulmuddai area.

The extent of land rented/leased in per farm on the scheme as reported by the sample farmers in this instance is relatively small. In the case of lowlands, only 4% had reported renting/leasing in of paddy lands, while in highlands the number is still less (1%). Leasing or mortgaging of land is primarily associated with the lowland holdings. According to survey data, only 3% of the land holdings had been either leased or mortgaged during the Maha season under reference.

However in Yala, the leasing of lowland allotment is relatively more common. During Yala 1979, one fifth of the farmers had leased or mortgaged their paddy lands. The main reason for the high incidence of leasing of paddy lands in Yala is that the acre of lowland normally given to farmers for cultivation under the *Bethma* system is often situated far away from their places of residence. The rental charge for such lands varied from Rs.200 - 350 per acre - usually in cash. Mortgaging seems to be more prevalent than what appears superficially. Naturally, such data is difficult to obtain from the allottees through surveys of this nature. In instances where the paddy land is mortgaged, the primary reason appears to be the financial problems of the allottees. The agreement concerning the

mortgage is unofficial and stipulates that until the principal amount is paid in full, the money lender takes charge of the operation of the paddy field. In the case of mortgaged lands, very often the allottee works as a hired labourer under the money lender. Often these allottees are unable to find money to pay the principal amount and consequently, the land owner continues to exist as a hired labourer/ tenant of the money lender.

Around a tenth of the sample population had encroached on lands reserved for channels, roads etc. for cultivation of paddy and the average extent of such land per farm is about 0.2 acres. Highland encroachments are more common among allottees as reported by 24% and the extent per farm averages to 0.3 acres per unit.

Occupation of legally unallotted holdings inclusive of both highland and lowland within the command area as well as the cultivation of land reservations tends to be more prevalent in tracts at the tail end of the project area. The total extent of such encroachment of lowlands within the project is estimated to be about 1200 acres. A substantial proportion of the encroachers here are mostly the landless, both from within and outside the settlement scheme. Increases of such unplanned extents in paddy is partly responsible for some present day problems of irrigation water and its management.

In sharp contrast to Mahawilachchiya and Mahakandarawa schemes, the incidence of chena cultivation is much less prevalent here. Only about 7% of the sample farmers reported having chenas and the average extent of chena per farmer reporting is about 4.0 acres. However, most of these operators cultivated chena extents of around 2 - 3 acres.

Despite the fact that Padaviya is devoid of irrigation water for full cultivation in both seasons, the lower incidence of chena farming here raises some interesting issues as to it's causality. Generally, chena cultivation is a common feature observed among settlers in many of the Irrigation Schemes in the Dry Zone. In such situations, two factors relevant to this issue are :

firstly the uncertainity of tank based irrigation system for paddy, even in Maha - particularly at the tail end of the season, and secondly the availability of jungle lands in the vicinity of such settlements.

In this regard it may be noted that as far as Padaviya is concerned, land suitable for chena cultivation does not pose any supply constraints due to the availability of forest reserves around this settlement scheme. However, in the case of water supply conditions for paddy crops, the situation here is different from the other four tanks included in the irrigation modernization programme. Infact, Padaviya can be considered as having the best water supply among all the five tanks included in the modernization programme. Generally, in all Maha seasons, full cultivation of paddy lands is undertaken and the uncertainity factor surrounding crop failures due to lack of irrigation during this season minimal. In addition, in Yala seasons, cultivation is accomplished invariably at least in a third of the total lowland acreage under *Bethma* system of cultivation. The adoption of this system ensures that each allottee is assured of cultivation in at least one acre of lowlands in the Yala, thereby making the farmers relatively more closer to paddy lands in both seasons - unlike in Mahakandarawa and Mahawilachchiya. The relative stability of paddy cultivation in this scheme appears to have inhibitory influences on the farmers decision to engage in chena cultivation.

Table 3.3. Size distribution of lowland operational holding

Maha 1978/79

Extent cultivated per farm	Farmers reporting %
0 - 0.9	3
1.0 - 1.9	19
2.0 - 2.9	63
3.0 - 3.9	8
4.0 - 4.9	3
5.0 - 5.9	1
6 and above	3
All sizes	100

Though the lowland holdings allotted for paddy cultivation is either 3 or 2 acres in size, the actual extents operated by farmers during Maha under consideration is seen to vary substantially.

Table 3.4 Size distribution of cultivated extents per farm among highland allotments - Maha 1978/79

Extent cultivated per farm (Acres)	Farmers reporting %
0 - 0.5	63
0.6 - 1.0	7
1.1 - 1.5	18
1.6 - 2.0	12
2.1 - 2.5	-
2.5 and above	-
All sizes	100

3.3. SYSTEMS OF CULTIVATION

Table 3.5 Classification of farms according to systems of cultivation by season

Type of cultivation	Yala Season 1979		Maha season 78/79	
	Farmers reporting %	Average extent per farm reporting (Ac)	Farmers reporting %	Average extent per farm reporting (Ac)
No cultivation at all	18	-	2	-
Only lowland	72	1.0	35	3.0
Only highland	1	.3	3	.8
Only chena	1	.5	1	.7
Lowland + highland	8	1.1	54	4.6
Lowland + chena	-	-	2	.8
Highland + chena	-	-	-	-
Lowland + chena + highland	-	-	3	4.7

This data clearly shows that in both Yala and Maha seasons the cropping systems currently prevelant in the scheme is strongly biased towards paddy cultivation. As in a typical Yala season, during this particular Yala season too, farmers here had received

irrigation water for cultivation of only one acre of paddy. During this season nearly a fifth of the farmers is seen to have had no cultivation at all. These farmers had rented the land received by them under the *Bethma* system to others. In Maha, since adequate water is available for full cultivation, almost all allottees have cultivated their entire lowland acreage with paddy. The farming system prevelant is characteristic in that only about half the farmers utilised some highlands for cultivation purposes even during the rainy season. It is also seen that about a third of the farmers engaged entirely on paddy cultivation despite the availability of adequate rainfall in Maha for some highland cropping as well. This pinpoints the potential for developing an integrated farming system in which both lowland as well as highland play important roles in generating farm incomes.

3.4. LAND USE

For a large part, cropping in highland allotments is mainly restricted to a few permanent tree crops - coconut, mango, jak and cashew. A strong tendency to plant highland allotments with perennials when ever opportunities arise is a distinct feature seen among settlers. This is mainly a result of the unavailability of irrigation facilities on these lands for cultivation of annuals on a regular basis. Seasonal crops are hardly seen on highlands in Yala except in a limited number of allotments located in proximity to the main irrigation channel. However, in Maha such lands are relatively more intensively cropped and nearly 40% of the extent cultivated is devoted to seasonal crops such as cowpea, paddy, chillies, green gram and maize. The very strong desire of farmers to grow paddy on highlands when ever circumstances permit is seen in this settlement scheme, particularly in seasons of good rainfall. Infact nearly 10% of the farmers had grown rainfed paddy on their highland allotments during Maha season averaging to about one acre per farm reporting. Cropping patterns adopted on the highlands are as follows.

Table 3.6 Cropping pattern of highland allotments

Maha 1978/79

Crop	Extent as a percentage of the total cultivated
Cowpea	28
Paddy	27
Chillies	10
Maize	8
Green Gram	7
Vegetables	7
Manioc	6
Others	7
Total* (%)	100

*Represents about 20% of the entire highland acreage

Taken both permanent as well as annual crops together as constituting the cultivated acreage, the cropping intensity of highlands in Yala and Maha amounts to 37 and 55 percent respectively. Intensive land use practices are almost totally lacking, the reasons for which are many. Lack of definite extension efforts appears to be one of the major constraints in this regard. Other problems that loom large in this regard are, unavailability of regular irrigation supplies, inadequate market prices for the produce and lack of assured marketing outlets.

Lowland allotments are almost fully utilised for paddy cultivation by farmers in Maha with a cropping intensity of 93 percent.

Period	Average extent of lowland cultivated per farm (Ac)	Cropping Intensity
Yala 1979	0.8	27
Maha 1978/79	2.9	93
Annual	3.7	120

As mentioned earlier, in most Yala seasons usually around 30% of the paddy acreage in Padaviya Scheme is cultivated under the *Bethma* system. Under this arrangement, water is made available to

cultivate around one acre of land per settler. During the Yala under reference water was released only in the lower main channel providing water to tracts 4, 5 and 6 and each settler was allotted one acre of lowland in these three tracts for cultivation.

3.5. FARMER PERCEPTION OF PROPOSED CHANGES IN IRRIGATION & CROPPING

In view of changes envisaged in irrigation as well as cropping systems under the irrigation modernization project, farmer attitudes towards proposed changes were also ascertained in this study. A noteworthy feature of farmer responses was the marked preferance for paddy cultivation in lowlands when ever water is available. A complex of issues including the fulfilment of family consumption needs, role played by paddy as a means of food security and the availability of ready marketing facilities appear to be the main factors guiding farmer preferance for paddy over other crops on irrigable lands. This tendency is further reinforced by the observation that about 12% of the farmers had raised rainfed paddy crops on parts of their high-land allotments during Maha. The chena cultivators here also seem to grow highland paddy in the chenas as the principal crop.

The main reasons given by farmers for their specific preferance for paddy are as follows :

Reasons for preferring paddy cultivation	Farmers reporting (%)
Require paddy for home consumption	60
Involves less cash expenses	16
Easily marketable	10
Poor drainage inhibit other field crops	7
Requires less labour	5
Others	2
	100

As regards marketing of agriculture produce in Padaviya, paddy enjoys a distinct comparative advantage both in terms of price stability as well as institutional marketing channels. However, in the case of many of the other crops, the conditions differ markedly here.

The price fluctuations are very marked and often facilities for disposal of such crops are totally lacking. Problems of marketing as well as uncertain prices of these non paddy crops are bound to loom large in the envisaged efforts to change the cropping systems in paddy lands during Yala. These merits serious consideration.

Persuing further on the future potential for non-paddy crops that could be grown on lowlands in Yala, farmers were of the view that though irrigation improvement rightly deserves high priority, other complementary aspects such as marketing facilities, supply of planting material and extension advice particularly in pest/disease control also needs substantial improvements. If such problems could be remedied, a majority of the farmers (70%) felt that there is scope for cultivating non-paddy crops in irrigable lowlands in Yala season.

Given a choice, the types of crops preferred by farmers to be grown on their paddy allotments during the dry season were :

Crop	Farmers* reporting (%)
Cowpea	68
Chillies	45
Green Gram	33
Maize	11
Ground Nut	6
Vegetables	6

*Not additive due to multiple responses.

Cowpea is shown as the most popular crop mainly in view of it's short duration, marked adaptability to dry conditions with little or no cash requirements while providing a substantially high yields. In addition, cowpea has come to be accepted as a common food item among farmers. Chillie on the other hand though needing much more attention both in terms of labour and cash, generates very high cash incomes. On account of it's storability for long periods, many farmers were seen to store chillies for fairly long periods until the prices pick

up to favourable levels. In addition to irrigation at the farm level, the other major problems for introducing other field crops to paddy fields in Yala season as perceived by farmers were :

	Farmers* reporting (%)
Absence of marketing facilities	40
Heavy cash outlay	18
Pest and disease problems	10
Lack of familiarity with other field crops under irrigation	8
Poor drainage and other soil problems.	8

*Not additive due to multiple responses.

Rotational water issues for paddy cultivation had been practiced in Padaviya in the past as well, in both Maha and Yala seasons as a measure of economising on tank water storage particularly during Yala. However, irrigation officials are of the opinion that the present rotational issues of irrigation water could be further tightened leading to still larger savings of stored water. In contrast, farmers do not seem to share the same view and are emphatic that prior to further tightening of rotational issues, the conveyance system should undergo substantial improvements. It was observed on many points particularly towards the tail end of the channel system, the complete absence of control devices for water issues. In addition, it may also be noted that in places where the D Channels are extremely long the rotational issues of water had created problems to the farmers at the tail end.

IV. FARM PRACTICES, CROPPING PATTERNS & OUTPUT

4.1. FARM POWER USE

Buffaloes provide the bulk of the farm power used for paddy land preparation at Padaviya. The present pattern of farm power use among paddy cultivators in Padaviya can be seen from the following.

Table 4.1 Farm Power Use for Land Preparation

Farm power used	Yala	Maha
	Farmers reporting %	Farmers reporting %
Only buffaloes	40	34
Only 4 wheel tractors	8	9
Only 2 wheel tractors	6	5
Only manual labour	-	1
Buffaloes + 4 wheel tractor	38	46
Buffaloes + 2 wheel tractors	6	4
Others	2	1
	100	100

In both seasons, around three fourths of the farmers had harnessed animal power for tillage. Of this category, nearly one half had depended exclusively on buffaloes for field work. With the use of buffaloes generally the first ploughing is done mostly with a light iron plough. In place of the second ploughing, mudding is normally practiced. Of those who use both buffaloe and tractor, the first ploughing is invariably done with the tractor followed by a second ploughing with buffaloes. The preferance for tractor in first ploughing is mainly due to dry soil conditions, often covered with weeds and stubble after harvest of paddy crops which barely permit the use of buffaloes for initial tillage.

Tractor supply situation at Padaviya has improved considerably with the relaxation of imports in 1977 and enhanced credit facilities provided by the Bank of Ceylon for purchase of tractors. Among allottees, the present density of both 4 wheelers and 2 wheelers are about the same, 10 per 1000 acres of paddy. The four wheel tractors

available in the project are used mostly for paddy field work. Due to the very poor conditions of the roads in the project area, 2 wheel tractortrailer has become a principal mode of travel as well as transport of goods within the project.

The survey data shows that the prevailing hire rates for tractors range from Rs.180 - Rs.225 for the first ploughing and Rs. 160 - 175 for the second ploughing. Thus the total hire charge for a 4 wheel tractor for land preparation amounts to Rs.350 - Rs.400 per acre. The hire rate for buffaloes for first ploughing vary around Rs.100 exclusive of Rs.40 - Rs.50 payable to wage labour attending on animals. For second ploughing the costs seem to vary around Rs.100.00 per acre inclusive of payment to buffaloe drivers. The cost of hiring a pair of buffaloes at present is Rs.30 per day. Farmer preference for different forms of farm power are summarised below.

Form of farm power preferred	Land preparation (%)	Threshing (%)
Buffaloes	52	48
4 wheel tractors	41	52
2 wheel tractors	5	-
Human labour	1	-
	100	100

Use of buffaloes for land preparation is shown to be the most preferred form of farm power closely followed by 4 wheel tractors. Rating given for 2 wheel tractors as a source of power for both land preparation as well as for threshing is extremely low and consequently the choice is between the buffaloe and the 4 wheel tractor.

Main reasons for preferring buffaloes	Farmers reporting %
Better quality work	30
Own buffaloes	22
Cheaper than other forms of draught power	20
Easily available	17
Unavailability of tractors at the required time	12
Others	2
	100

As mentioned previously, the supply position of buffaloes in Padaviya is relatively better compared to the other four settlement schemes investigated earlier. Nearly one third of the sample households reported as owning buffaloes.

Those who considered 4 wheel tractors as more suitable for land preparation indicated the following reasons :-

Main reasons for preferring tractors	Farmers reporting (%)
Timeliness of field operations	70
Unavailability of buffaloes at the required time	16
Soil too hard to plough with buffaloes	10
Others	4
	100

Despite the relative abundance of buffaloes at Padaviya, the high preferance shown for 4 wheel tractors is of interest. The timeliness of field preparations which is of particular importance in the dry zone seems to be the major guiding factor underlying the preferance indicated here, even though many of the farmers agree that the use of buffaloes in field work is more advantageous to them, particularly in monetary terms. However, with the frequent increases of tractor hire rates, choice of technology in future would no doubt be decided by cost considerations.

Another important component of draught power use at the farm level constitutes the threshing of paddy crops, since threshing by foot is not seen at all here. Infact, two thirds of the farmers have used tractors for threshing their paddy crops. For the purpose of comparing the relative financial merits of using tractor vs. buffalo for paddy cultivation, the following partial budget estimates based on the farm survey data could be used.

It may be noted that the cost data presented here refers to the time period immediately after the increase of fuel prices in 1979. Tractor hire charges in the area consequently had witnessed an immediate increase. However, the buffaloe hire rates had been rather slow

in adjusting to this new price structure. This partly explains the relatively large difference between buffaloe and tractor hiring costs, particularly in tillage.

Cost comparison of buffaloe use vs tractor ue in Padaviya 1978/79 Maha, per acre

	Tractor use Rs./Ac.	Buffalo use Rs./Ac.
Tillage		
Tractor/Buffaloe hire charge[1]:		
1st ploughing	Rs.180 - Rs.225	Rs.90 - Rs.120
2nd ploughing	Rs.160 - Rs.175	Rs.60 - Rs.90
Driver hire charges	*	Rs.90
Other labour charges[2] (@ 15.00 per manday)	Rs.30	-
Total cost per acre	Rs.370 - Rs.430	Rs.240 - Rs.300
Threshing		
Tractor/Buffaloe hire charges	Rs.100 - Rs.125	Rs.60 - Rs.80
Driver hire charges	*	Rs.30
Other labour charges (@ 15.00 per day)	Rs.45	Rs.60
Total cost per acre	Rs.145 - Rs.165	Rs.150 - Rs.170

*Tractor driver hire charges is included in the tractor charge.

[1] 1st ploughing - 3-4 pairs of animals at the rate of Rs.30 a pair; 2nd ploughing 2-3 pairs at the rate of Rs.30.00 a pair. Threshing - Rs.20.00 a pair

[2] Tractor ploughing, unlike in the case of buffaloes require additional man power - around 2 man days for repairing broken bunds and preparation of unploughed corners etc. in the *Liyadde*.

From the above, it is seen that, given 1979 price conditions buffaloe utilization offer more favourable opportunity for draught power use for land preparation - in terms of financial considerations alone. However, this does not seem to be the case for threshing by animals. Though it is seen that the labour cost component in buffalo

usage constitute a relatively large proportion in relation to tractor use, most of this labour demand associated with buffalo use is often met by farm family members, notably the children. As a consequence, the actual cash expenditure borne by the farmer is less than the amount indicated here, providing them a further incentive to use the buffaloes as a means of draught power supply.

Furthermore, those who rely on buffaloes for land preparation strongly claim the superiority of the quality of land prepared by the buffaloe in relation to that undertaken by the tractor. This view does not seem to be substantiated with any research evidence. Perhaps in situations where hired tractors are employed for land preparation the farmer cannot exert much control over the quality of work and chances of ending up with a sub-standard work are greater. With hired buffaloe the situation is different since the family members too generally participate in driving the animals, allowing the farmer to obtain a work out-put to his level of satisfaction. In addition, tractor tillage also involves the additional use of man-power - around 2 man days to complete the operation by way of repairing broken bunds and preparation of unploughed strips and corners near the bunds. Apart from these financial considerations, speediness associated with tractor usage seem to be one of the important considerations of the farmer.

Winnowing of harvested paddy is traditionally undertaken manually. Even here some degree of mechanization is seen, as 8% had used 4 wheeled tractors and another 5% had depended on 2 wheel tractors fitted with fans for winnowing, and the speediness of the operation is another important factor considered by farmers.

4.2. VARIETAL USE

Almost the entire extent cultivated in Maha 78/79 was planted with high yielding varieties. The newer varieties such Bg-11, Bg 34-8 and Bg 90-2 are widely grown. Over four fifths of the extent cultivated during the reference season was under these varieties. In contrast to this, during Yala season, traditional varieties are quite common and almost a quarter of the cultivated area was under such varieties, principally *Pachchaperumal*. The prominance of this variety

in the dry season is attributed to its short duration - 3 months, relative ability to withstand water stresses and general ruggedness.

Table 4.2. Adoption of rice varieties

Location	Traditional varieties (%)	Old high yielding varieties (%)	New high yielding varieties (%)	All varieties (%)
		M A H A		
		Percentage extent under		
Upper main channel	2	11	87	100
Lower main channel	1	14	85	100
All	2	12	86	100
		Y A L A		
Upper main channel	28	2	70	100
Lower main channel	13	-	87	100
All	24	2	74	100

4.3. PLANTING METHODS

The predominant form of planting paddy crops is broadcast sowing under wet land conditions. In Yala the entire cultivated extent is broadcast sown while in Maha, nearly four fifths of the planted acreage is under this practice. Transplanting is seen only in Maha season and that too mostly in tracts closer to the tank. Row transplanting or row seeding as well as dry sowing are not seen.

Nearly half the farmers interviewed responded favourably to transplanting, if given a choice. Their preferance had arisen from desirable features such as less weed growth, lower water usage and higher yields associated with transplanting. However, the adoption of planting methods as shown below does not reveal widespread use of this technique. The main reasons given for this situation by the farmers were :

Reason	Farmers reporting (%)
High labour costs	33
Unavailability of labour	27
Lack of funds	22
Uncertainity of water	15
Others	3
	100

Table 4.3 Methods of Planting adopted

	Percentage of farmers reporting							
	MAHA				YALA			
	Mud Sowing	Trans-planting ordinary	Dry Sowing	TOTAL	Mud Sowing	Trans-planting ordinary	Dry Sowing	TOTAL
Lower main channel	80	19	1	100	99	1	-	100
Upper main channel	76	23	1	100	100	-	-	100
All	78	20	2	100	100	-	-	100

Given an assured supply of water as in Maha season, one of the major constraints for expansion of transplanting in Padaviya would be a bottleneck in labour supply. The physical location of this scheme normally does not lend itself for labour migration from elsewhere as seen in many of the other settlement schemes in the dry zone. Padaviya is quite remotely located and it's surroundings lack labour surpluses.

Dry sowing of seed as a practice of plant establishment envisaged under the irrigation modernization programme has received low priority both in the context of farmer preferences as well as adoption. Among the sample farmers, only 16% considered that dry sowing of paddy as a satisfactory substitute for the widely adopted present method of wet sowing. The attitude of the majority who are not in favour of this method of sowing are based mainly on the following reasoning -

Reasons	Farmers reporting* (%)
Difficulty of weed control	78
Uncertain rainfall	44
Low yields	22
Unavailability of tractors	4
Others	2

*Includes multiple responses.

It may be added that dry sowing does not present an altogether a new production technique to dry zone farmers and this practice had been successfully adopted in the past under conditions of uncertainity in rainfed farms in the dry zone. However, with the restoration of major irrigation works in the last few decades farmer willingness to accept the inherent risks under this system has dwindled. Judging from the above preferance pattern, motivating farmers to dry sow their lowland paddy crops as a means of economising irrigation water seems to be a challenging task particularly in educating the farmers. Dry land tillage demands not only a high degree of mechanization but also more power, both of which add to the cost factor. If such cost increases do occur as a result of dry tillage it would result in a negative influence in motivating farmers to adopt this practice.

4.4. FERTILIZER USE

Fertilizer use data in Padaviya show relatively high levels of application in both seasons. Nevertheless, there is substantial scope for improvement on this aspect. The average quantity of fertilizer applied for paddy amounts to 1.7 cwt. per acre during the Maha under consideration.

Table 4.4 Fertilizer Use for Paddy

		Maha (%)	Yala (%)
i.	Percent of farmers applying basal dressing	38	27
ii.	Extent fertilized as a percentage of cultivated extent	33	26
iii.	Amount applied per acre (cwt. per acre)	1.0	0.9
i.	Farmers applying top dressing at the time of tillering	79	80
ii.	Extent fertilized as a percentage of cultivated extent	68	72
iii.	Amount applied per acre (cwt. per acre)	0.9	1.1
i.	Farmers applying top dressing at the time of panicle initiation (*Heen bundi*) stage	59	54
ii.	Extent fertilized as a percentage of cultivated extent	49	50
iii.	Amount applied per acre (cwt. per acre)	0.8	0.8

Much of the fertilizer application practices pertain to top dressing of Urea, mostly at tillering stage. Around four fifths of the farms-covering 70% of the cultivated extent, had received about 1.0 cwt. of Urea at this stage. Little over half of those who had used fertilizer and top dressed with Urea at the *Heen bundi* (panicle initiation period) as well. Here, the quantity applied had amounted to 0.8 cwt. per acre. Application of basal dressings of fertilizer is less common, only a third of them had done so. In both seasons referred to here, almost all the farmers had availed themselves of production credit channelled through the cooperatives and under this credit scheme fertilizer had been made available to them. At the time of survey it was revealed that fertilizers are not available to the farmers in time and such lapses lead to delays in application. Infact, farmers do seem to pay scant attention to timely application of fertilizer, particularly to top dressings. Since in a majority of the cases, the control of weeds is poor, full benefits of fertilizer application are unlikely to be realised.

4.5 WEED CONTROL

Predominance of weed growth in cultivated paddy fields is a notable feature in Padaviya and the impact of weeds on reducing paddy output should be substantial. Weed control is practiced by many farmers on varying degrees, However, the finer points of this operation such as timing hardly receives consideration. Educating farmers on aspects of proper weed control needs to receive high priority.

Table 4.5 Methods of weeding adopted

		Upper Channel (%)	Lower Channel (%)	All (%)
Weeding for the first time -	Hand weeding	8	13	12
	Chemical weeding	53	45	48
Weeding for the second time -	Hand weeding	2	3	3
	Chemical weeding	9	6	7

A majority (73%) of those weeded had done so only once during the season. A quarter of the farmers had done a second weeding of their paddy plots. The commonest method of weeding adopted is the spraying of weedicides - about three quarters of the total weeded extent.

4.6. YIELDS

The average yield of paddy in Padaviya Scheme during the Maha and Yala under consideration were 51.8 and 51.6 bushels per acre respectively. Yala cultivation has been undertaken on a *Bethma* system in paddy lands in Tract VI and reasonably adequate quantities of irrigation water had been supplied during this season. The distribution of average yields among farmers in different tracts is given below. It is seen that as the distance from the tank increase there occurs a gradual decline of paddy yields. Paddy fields in tract 13 being situated furthest away from the tank has shown the lowest average yield of 34 bushels per acre which is almost a half of that in tracts located at top-end.

Table 4.6. Variation of paddy yeilds per acre by tracts
Maha 1978/79

Lower main channel		Upper main channel	
Tract No.	Average Yields (Bu/Ac)	Tract No.	Average yields (Bu/Ac)
1	74.4	A	57.3
2	54.5	B	46.5
3	75.8	C	55.0
4	75.7	D	50.9
5	61.0	E	50.5
6	46.4		
7	54.6		
8	51.5		
9	52.8		
10	55.2		
11	53.5		
12	42.5		
12A	46.6		
13	34.0		

The distribution of farmers according to different yield categories is given below -

Table 4.7 Distribution of paddy yields in Padaviya

(Bu/Ac)

Yield Category	Maha 1978/79 (%)	Yala 1979 (%)
Less than 20	-	5
20 - 29	3	16
30 - 39	16	23
40 - 49	23	22
50 - 59	25	15
60 - 69	19	10
70 - 79	5	4
80 - 89	6	2
90 - 99	2	1
100 - 109	-	2
110 - 119	1	-
All	100	100

V. LABOUR UTILIZATION

In the absence of any significant sources of non-agricultural work, Paddy sector forms almost the sole means of labour absorption in Padaviya. As mentioned earlier, chena cultivation is typically absent in the project area, except in very isolated instances. Systematic cropping on highlands with seasonal crops is also extremely limited. Though some cultivation is seen in Maha, it accounts for only about a tenth of the labour input (18 mandays per farm). In this case, labour input comes mainly from the farm family with little or no hired labour input. (Table 5.1)

Lowland cultivation on the other hand provides a contrast where the hired labour input is substantial. In Maha, it accounts for almost a half of the total labour applied while in Yala this becomes about one third.

Table 5.1. Labour application per farm classified by source of labour and type of cultivation

Production Unit[1]	Mandays per farm — Source of labour[2]											
	Maha 1978/79						Yala 1979					
	Family	%	Hired	%	Total	%	Family	%	Hired	%	Total	%
Lowland	82	83	71	97	153	89	47	99	25	96	72	98
Highland	16	17	2	3	18	11	*	1	1	4	1	2
All	98	100	73	100	171	100	47	100	26	100	73	100

*less than 1%.

Timewise allocation of labour input as seen in above table shows a heavy concentration of labour applications during land preparation and harvesting. Crop care activities including irrigation is seen to utilise a relatively high lanour input when labour is distributed over a period of nearly 8 - 10 weeks. Almost half the hired labour input in paddy production has been utilised for harvesting and about a third for land preparation.

[1] Exclusive of labour application for chena as only 3% of the farmers had reported work in chena.

[2] Family labour includes exchange labour as well. The incidence of exchange labour is negligible - less than 4% of the cases.

Table 5.2 Operationwise distribution of labour application per farm - Maha 1978/79 and Yala 1979 - Mandays.

	MAHA				YALA			
	Lowland		Highland		Lowland		Highland	
	Family	Hired	Family	Hired	Family	Hired	Family	Hired
Land preparation	6	1.3	23	21	11	7	-	1.0
Sowing/planting	2	-	7	11	3	3	-	-
Crop care	3	-	30	3	22	1	-	-
Harvesting	5	1.0	22	36	13	14	-	-
	16	2.3	82	71	49	25	-	1.0

Given the situation of a predominantly agricultural community as in Padaviya where the labour force is primarily engaged in a monoculture - paddy, a number of implications on the labour supply - demand aspects in the project area could be seen. In particular, the labour supply situation here is rather tight in comparison to many of the other settlement schemes in the dry zone. This is mainly due to the extreme isolation of Padaviya Scheme as well as to the absence of *purana* (traditional) villages in the neighbourhood. In many settlement schemes, the latter forms an important source of labour supply. Such locational factors in the present case seem to have imposed some restrictions on the labour supply.

On the demand side, paddy represents a crop with two distinct labour peaks - one during land preparation and other at harvesting intercepted by a relatively lull period of around two months. Under these circumstances, the full utilisation of labour within the cultivation season can be hardly attained. Accordingly, during the greater part of the season, the family labour is likely to be underutilised. Under typical conditions in Yala season, the level of family labour use becomes still less since the paddy acreage cultivated is only about a third of that of Maha. Thus in overall terms, in the paddy dominated agricultural system devoid of chena and highland cultivation as found here, seem to have led to considerable under-utilization of available man power. Hence incooperation of some diversity to the cropping systems in both highlands as well as lowlands is vital as a means of increasing labour productivity.

Table 5.3 Labour application for lowland and highland cultivation - (Mandays/acre)

	Lowland				Highland[1]	
	Maha		Yala		Maha	
	Mandays/Ac	%	Mandays/Ac	%	Mandays/Ac	%
Land preparation	15.3	28	17.4	25	9.3	25
Sowing/planting	6.3	12	5.6	8	6.7	18
Crop care :						
Application of chemicals and fertilizer	1.3	2	2.1	3	-	-
Weeding	1.7	3	1.5	2	6.3	18
Irrigation & other	8.4	16	18.4*	26	-	-
Harvesting	12.1	23	13.5	19	8.4	23
Processing	7.4	14	9.8	14	4.8	13
Transport and others	1.0	2	1.8	3	1.0	3
	53.5	100	70.1	100	36.5	100

[1] No cultivation of highland in Yala season.

*Primarily represents the family labour input used for irrigating the paddy field which seems to be higher than in the usual case. During this particular season farmers were operating paddy fields on the *Bethma* system where they were allocated one acre of paddy land each, in a location within the scheme (Tract 6). Most farmers had to travel distances as far as 6 - 8 miles to attend to cultivation operations. Since water is scarce during Yala, farmers had used considerably large labour inputs for irrigation management in their paddy fields.

As seen from the above table, the level of labour usage for paddy production in Maha amounts to about 54 mandays per acre. Bulk of the labour input is used in respect of the labour input is used in respect of tillage (25%) and harvesting (23%). Apart from the higher labour input for supplying irrigation water during Yala, the labour use pattern in this season does not differ markedly from that of Maha.

Exchange labour in paddy cultivation which had been an important source of labour supply in parts of dry zone is rarely seen here reflecting a changing social phenomena generally associated with the

transformation of agriculture seen elsewhere in the rural areas. An important factor that discourages the use of exchange labour would be the attempts made by the project authorities to synchronise the cultivation activities among farmers so as to optimise water use.

VI. COSTS AND RETURNS

6.1. TOTAL PRODUCTION COSTS

The total production costs inclusive of both the cost of purchased as well as own inputs for an average farm is indicated in table 6.1. During the year under reference the total annual production costs amount to Rs.6667 of which almost a three quarter is incurred in Maha season. It is significant to note that a major portion of the production cost is in respect of paddy cultivation. It is also important to note that in Maha season the cost of purchasing materials and services outside the farm is remarkably high in relation to the value of farmers own input used, unlike in the Yala.

Table 6.1 Average production cost per farm classified by cash and non-cash cost

Maha 78/79 & Yala 79

	1978/79 Maha			1979 Yala		
	Cash (Rs.)	Non-Cash (Rs.)	Total (Rs.)	Cash (Rs.)	Non Cash (Rs.)	Total (Rs.)
Lowland	2836	1519	4155	853	851	1704
Highland	76	244	320	*	*	*
Chena	128	160	288	-	-	-
Whole farm	3040	1923	4963	853	851	1704

*Cultivation almost non-existant.

The average production costs per farm presented above was then computed on a per acre basis for making comparisons of cost intensiveness. Paddy cultivation in the lowland allotment is seen to be utilizing the highest cost per acre in comparison to both chena and highland. Total production cost here amounts to a little over Rs.1400 per acre of which about 70% is in cash.

Table 6.2 Production costs per acre in terms of cash and non cash costs - Maha 1978/79

	Cash cost (Rs.)	Non cash cost (Rs.)	Total cost (Rs.)
Lowland	935	500	1435
Highland	197	635	832
Chena	346	433	779

Since cash production cost forms an important item of the farm cost structure, this aspect was examined in more detail. (Table 6.3)

6.2. CASH PRODUCTION COSTS

Of the total cash expenses incurred in cultivation, paddy accounts for almost the entire cost (93%). Bulk of the cash production inputs here have been on hiring labour and tractors (62%). Fertilizer and agro-chemicals had accounted for only one fifth of the total cash cost in paddy. It is also seen that the percentage composition of cash costs during the two seasons are very similar.

Table 6.3 Percentage distribution of cash production expenses classified by inputs - Maha 78/79.

Input item	Maha season			Yala Season
	Lowland (%)	Highland (%)	Chena (%)	Lowland (%)
Hired labour	36	45	66	37
Tractor hire charges	26	15	-	28
Buffaloe hire charges	7	-	-	10
Seed and planting material	11	22	12	5
Fertilizer and agro chemicals	19	15	15	18
Others	1	3	7	2
	100	100	100	100
Rs. per farm	(2836)	(76)	(128)	(853)

The wage payment to hired labour represent a substantially higher proportion of the entire production cost structure not only in paddy but also on highland as well as chena. The two operations which demand the highest wage payments are pre-sowing operations and harvesting. Most of these wage labour are drawn from within the scheme.

Table 6.4 Composition of wage payments classified by field operations - Maha 1978/79

Field operation	Lowland Allotment	Highland Allotment	Chena
	(%)	(%)	(%)
Pre sowing operations	29	62	44
Sowing/planting	16	11	12
After care	4	3	26
Harvesting	31	13	18
Post harvest operations	20	11	-
Total (%)	100	100	100
(Rs. per farm)	(1021)	(34)	(84)

6.3. NON CASH PRODUCTION COSTS

The value of production input used by the farmers represent non-cash production costs. As seen from Table 6.5, this almost exclusively involves application of family labour. However, in paddy cultivation the value of owned buffaloe services as well as tractor services amounts to 11% each of the total non cash production cost of the farmer.

Table 6.5 Non cash production costs classified by types of inputs[1] - Maha 1978/79 & Yala 1979

Type of input	Maha 78/79 Lowland	Highland	Chena	Yala 79 Lowland
Family labour	78	100	85	83
Own seed/planting material	-	-	15	7
Own buffaloe services	11	-	-	8
Own tractor services	11	-	-	2
	100	100	100	100
Rs. per farm	(1519)	(244)	(160)	(851)

[1] Family labour was valued at Rs.15 per manday and other resources were valued at their current market prices.

6.4 GROSS INCOME

The gross income per household investigated averaged to about Rs.9300/- per annum. Among the different income streams the predominance of agricultural income is distinct (90%). Activities outside agriculture had generated only about Rs.950 per farm, for the twelve month period under reference showing it's relative insignificance.

Table 6.6 Annual gross income per farm classified by season and source

Source	Maha		Yala		Annual	
	Rs.	%	Rs.	%	Rs.	%
Agriculture	6489	93	1884	79	8333	90
Non-agriculture	456	7	492	21	948	10
Total	6945	100	2376	100	9281	100

Income distribution over the two seasons of the cropping year also shows a marked variation, primarily resulting from variations in agricultural rhythem. It is seen that the incomes during Yala season is only a third of that in Maha. Obviously, such wide variations in income levels over the year partly contributes to a lowering of living levels as well as expectations of the farmers here. A notable feature in the income levels from non agricultural sources is that they remain low and relatively stable in both seasons. The need for improving the avenues for securing employment opportunities outside agriculture is strongly felt and attempts in this direction would help to augment not only the income levels but also reduce the seasonal fluctuations in income observed at present. In general, the Yala incomes derived from agriculture alone is hardly adequate to meet the basic needs.

Highly seasonal income patterns also have it's consequences on the expenditure pattern among the settlers. Extremely high consumption of liquor and indulgence in gambling are common factors seen among the population here during the harvesting of Maha paddy crops. In the case of purchase of consumer durables, bicycles, radios etc. the general tendency among many households is to indulge in heavy

buying immediately after harvest of Maha crops. Invariably bulk of such purchases are generally sold back within a few months after harvest - during Yala season, at a fraction of the purchased prices to tide over the cash needs. Despite the high level of incomes received by most of the allottees at the end of Maha season farmers do not exhibit tendencies for savings and thriftiness. It would be of interest to study their spending and consumption patterns in detail during this period.

A further subdivision of agricultural income shows that paddy as the most dominant contributor to income (around 85%). Cultivation of highland allotments have provided only about a tenth of the gross income from farming. Livestock products are hardly of any importance at present as a source of income. A few households have reported some income from livestock - almost solely from hiring buffaloes. Sale of milk or milk products could be of potential use in view of the large population of buffaloes available in Padaviya. Marketing poses serious problems in this regard.

Table 6.7 Composition of gross income per farm from agriculture

	Maha 1978/79		Yala 1979		Annual	
	(Rs.)	%	(Rs.)	%	(Rs.)	%
Lowland	5476	85	1651	87	7172	85
Highland	719	11	205	11	924	11
Chena	226	3	-	-	226	3
Livestock	62	1	28	2	95	1
Total	648 3	100	1884	100	8417	100

6.5 CASH INCOMES

The annual income in the form of cash alone averages to Rs.5566/- per farm which represents about 66% of the gross income. As a source of generating cash, paddy cultivation account for about a three fourths of total.

Table 6.8 Composition of cash farm income

	Maha 1978/79		Yala 1979		Annual	
	(Rs.)	%	(Rs.)	%	(Rs.)	%
Lowland	3435	79	665	54	4100	74
Highland	225	7	46	4	301	5
Chena	119	3	-	-	119	2
Livestock	66	1	28	2	95	2
Wage labour	91	2	88	7	179	3
Others	369	8	403	33	772	14
	4305	100	1230	100	5566	100

As was observed in the case of gross incomes earlier, the cash incomes also show a marked variation between the two seasons ranging from Rs.4305 in Maha and Rs.1230 in Yala. The composition of cash farm incomes derived from highland allotments is indicated in the following :

Table 6.9 Cash income derived from highland allotment by type of crops and seasons

	Farmers reporting (%)	Average cash income per farm reporting - (Rs)	Farmers reporting (%)	Average cash income per farm reporting (Rs)
Tree crops	35	319	19	206
Cowpea	16	260	-	-
Chillies	9	490	1	333
Tobacco	3	566	-	-
Paddy	4	348	-	-
Maize	2	23	-	-
Vegetables	5	364	1	212
Manioc	5	375	-	-

Contributions from highland allotments to farm economy is meager. Less than half the farmers reported some cash sales of highland produce. As seen from above, many such cases refer to produce from tree crops such as mango, coconut and *Murunga*. On the whole a very negligible proportion had reported sales from systametic

annual cropping. As a means of comparing the intensity of incomes generated from lowland, highland and chena the following information can be used.

Table 6.10 Incomes per acre of land cultivated

	Lowland		Highland		Chena	
	Gross Income (Rs.)	Cash Income (Rs.)	Gross Income (Rs.)	Cash Income (Rs.)	Gross Income (Rs.)	Cash Income (Rs.)
Maha 1978/79	991	521	2114	1326	432	153
Yala 1979	-	-	2623	815	202	52

The levels of income derived from chena are substantially higher than those reported from highland allotment. The principal reason being the dominance of paddy as a chena crop. Infact, all the chena farmers concerned have had grown paddy as their principal crop.

6.6. INCOME DISTRIBUTION

An examination of the income distribution pattern based on the annual cash farm incomes indicate that nearly one tenth of the farmers received Rs.3000 or less per annum. The group of farmers at the upper 10% of the income scale seem to receive incomes ranging from Rs.10,000 to Rs. 15,000 per annum. Nearly 60% of the farmers receive cash incomes ranging from Rs.2000 - 6000 during the 12 month period under reference. The gross income distribution is given in Annex 1.

Table 6.11 Distribution of annual cash income among Project farmers (inclusive of Yala 79 and Maha 78/79)

Annual cash income per farm (Rs.)	Percentage of farmers	Cumulative percentage
0 - 1000	1	1
1001 - 2000	6	7
2001 - 3000	12	19
3001 - 4000	16	35
4001 - 5000	16	51
5001 - 6000	13	64
6001 - 7000	11	75
7001 - 8000	8	83
8001 - 9000	4	87
9001 - 10000	3	90
10001 - 11000	2	92
11001 - 12000	3	95
12001 - 13000	2	97
13001 - 15000	3	100

VII. FARM SUPPORTING SERVICES

7.1. PROCUREMENT OF MATERIAL INPUTS

The principal supply channel of planting material within the project area is the extension division of the Department of Agriculture. Currently the extension net work is mainly concerned with the supply and distribution of seed paddy. Planting material such as grafted mango seem to have a heavy demand by farmers during the rainy season but unfortunately the supply situation is not encouraging.

Sale of seed material from the Extension Office

Type		Maha 78/79	Yala 1979
Chillies	(lbs)	13	6
Green Gram	(")	150	-
Cowpea	(")	230	400
Vegetables	(")	21	60
Ground nut	(")	44	223
Onions	(")	-	220
Seed paddy	(bu.)	2284	581

The supply of sprayers and dusters mainly for use on paddy crops form another function undertaken by the extension staff. At the time of survey, around 136 sprayers were available with them for release to farmers.

As regards fertilizer, primary cooperatives in the villages form the retail level distribution points. The available storage facilities within the project appears to be a major bottleneck in the supply net work of this inout. The only available store located in the project had been closed down in 1978 and since then, the storage problems had not received due attention. Consequently, the purchases of fertilizer made by cooperatives are often undertaken on an adhoc basis from the store at Medavachchiya to meet the immediate needs of the farmers. The total quantity of fertilizer applied for paddy in the entire project as estimated by the Agricultural Extension

Office, Padaviya is as follows :

Table 7.1 Fertilizer Sales in Padaviya
1974/75 Maha-1978/79 Maha Season

Season	Type of Fertilizer	
	Urea (cwts)	V_1 (cwts)
1974/75 Maha	155	195
1975/76 "	160	130
1976/77 "	6000	2900
1977/78 "	5600	1300

According to above figures, the fertilizer sales show extreme fluctuations even among Maha seasons indicating that the practice of fertilizer application for paddy is not firmly stabilized unlike in some of the other major settlement schemes. The erratic levels of fertilizer usage seen in Maha seasons can not be considered as arising from scarcities of water supply, but largely governed by other factors limiting the demand. One of the critical determinants in this regard is the availability of production credit for paddy. This is closely seen in seasons where government credit disbursement regulations are relaxed, the fertilizer usage too had followed sharp increases. Another major factor influencing fertilizer sales is the ready availability of this input at the village cooperatives. Measures for timely supply of this input is often overlooked by the cooperatives and the extension personnel in the Project area.

7.2. SAVINGS & CREDIT

Padaviya Scheme is relatively well serviced with banking facilities. Currently two branches of the rural banks as well as a branch of Bank of Ceylon and Peoples Bank operate in this area. Their activities have expanded considerably over the past few years. Besides providing services to a limited number of trading establishments operating in the area, these banks are directly linked to the agricultural sector particularly in disbursing production credit for paddy cultivation. The lending position for paddy during the year was as follows :

Table 7.2 Credit disbursements from the Banks*

1978/79 Maha & 1979 Yala

	1978/79 Maha			1979 Yala		
	Rural Bank- Sripura	Rural Bank Parakrama pura	Bank of Cey- lon Parakra- mapura.	Rural Bank Sripura	Rural Bank Parakra mapura	Bank of Cey- lon
For Paddy :						
No. of loan applications	512	212	62	-	-	3
No. of loan approvals	297	82	58	-	-	3
Amount of loans granted (Rs.)	516995	198450	88382	-	-	3360
No. re-paid in full	208	52	57	-	-	2
No. re-paid in part	40	6	1	-	-	-
No. not paid at all	49	24	-	-	-	-
Crops other than Paddy :						
No. of loans approved	5	4	3	9	-	-
Amount of loans granted (Rs.)	15,000	6000	1350	24000		

*Information from Peoples' Bank Padaviya is not available.

As regards savings and current accounts the position based on the information furnished by farmers is as follows.

	Savings A/c		Current A/c	
	No.	Amount (Rs.)	No.	Amount (Rs.)
Bank of Ceylon	879	722413	47	106726
Rural Bank				
i. Sri Pura	4007	845382	-	-
ii. Parakramapura	3605	186202		

Of the sample households surveyed, nearly 80% reported as having an account in a bank. In many instances farmers maintain a savings account in a bank in order to facilitate the securing of cultivation loans and not with the sole motivation of saving. Only 3% of the households are operating current accounts. About a tenth of the farm households reported as having post office savings accounts. The information on loans taken for cultivation as well as for other purposes during the year under reference reveals the following.

Table 7.3 Classification of loans taken by farmers according to source and purpose - Maha 1978/79 & Yala 1979

Source	Cultivation of paddy		Cultivation of other crops		Non cultivation purposes	
	% of borrowers	Amount per borrower (Rs.)	% of borrowers	Amount per borrower (Rs.)	% of borrowers	Amount per borrower (Rs.)
Maha 1978/79:						
Co-operative	12	1605	-	-	-	-
Banks	11	1607	-*	-	-	-
Relatives and other private sources	36	1056	1	650	16	697
Yala 1978 :						
Cooperatives	-*	-	-	-	-	-
Banks	1	1166	-	-	1	616
Relatives and other private sources	10	546	-	-	13	400

*less than one percent.

Loans taken by farmers have been primarily for cultivation of paddy. Nearly half the paddy growers have taken loans during Maha 1978/79 and the average amount per borrower is around Rs.1500.

7.3. FARMER ADVISORY SERVICES

The personnel directly involved in the agricultural extension work in this settlement scheme constitute one agricultural instructor(A.I.)

and five extention workers (KVS) at the village level. This shows a rather thin spread of resource personnel in the project area with about 1 KVS per 2,200 acres of paddy land (750 farm families) and one A.I. per 12,000 acres of irrigable paddy (4,000 farm families). The present extension staff strength is below the sanctioned cadre of 2 Agricultural Instructors and 14 KVSs. This situation has been continuing for years in the past as well.

Mainly due to lack of suitable housing as well as poor transport system, some of the extension personnel are not resident in or near the project, and consequently the desired level of contact between them and the farmers are unlikely to be attained. As this scheme has functioned for a decade as a special project which envisages an intensified extension coverage than elsewhere and would therefore expect a closer level of extension worker-farmer interaction. However, the general impression gained from the investigations on this aspect are not particularly encouraging. Some indication of the degree of association of extension personnel in the project with the settlers at present is seen from the following information.

Percentage of farmers reporting as	Extension personnel	
	KVS	AI
Knew extension worker personally	62	34
Closely associated with him	28	14
Visited him regarding problems	41	26
Able to contact him when in need	72	43

Of the sample farmers only about a 12% had visited their extension centre for specific purposes related to cultivation. Purchases of seed material as well as problems pertaining to pest and disease damage to crops had been the main concern for making such direct contacts. Only about a fifth of the farmers interviewed had sought some form of direct contact with the KVS on specific issues relating to their cultivation problems.

Reasons for farmers visits to KVS	Farmers reporting (%)
Pest and disease problems	22
To secure seed paddy	12
Irrigation problems	4
Other problems	3

As against the individual contacts made between the extension personnel and the farmers discussed above, the group extension methods such as training classes, demonstration plots, field days etc. also seem to have been adopted here. However,available information suggest that such extension methods had not received sufficient attention,through group methods, if conducted properly is likely to generate substantial benefits as means of carrying extension messages across to farmers.

Print medium as a source of receiving agricultural information is hardly used by farmers despite their high literacy rates. The main problem in this regard is the unavailability of reading material. Due to extreme isolation of Padaviya, even the daily newspapers are hardly available here and none of the sample households buy a newspaper

7.4. MARKETING

In the absence of any chena farming or cultivation of highlands on a commercial basiswithin the project area, the present agricultural surpluses pertains mainly to paddy. Here, most of the disposal problems arise as a consequence of having a peak production period confined to a short duration of about 2-4 weeks.

As already mentioned, the average paddy output amounts to about 148 and 54 bushels per farm in Maha and Yala respectively totalling the average annual output per farm to about 200 bushels. Since paddy output in Maha is thrice that of in Yala, extensive sales of this commodity is seen after Maha harvest. All farmers investigated reported paddy sales, the quantity sold being around 60% of the harvest - 92 bushels per farm.

Table 7.4 Methods of disposal of paddy in the Project

	Farmers reporting (%)	Amount per farm reporting (bushels)
Sales :		
Cooperatives	73	85
Private traders	47	62
Payment in kind	13	15
Home retentions:		
Consumption	100	48
Seed paddy	31	9

As regards the available sales outlets for paddy, the primary cooperatives in the project area play a dominant role. Of all the farmers interviewed, majority (48%) had sold their paddy solely to the cooperatives and another one quarter to both the cooperative and the private traders. A fourth of the farmers have sold their paddy only to private traders in the Maha season.

The purchase price offered at the cooperative was Rs.40/- per bushel whereas in the private trade, the price had varied from Rs.35 to Rs.41 per bushel. The private traders purchasing paddy constitute the botique keepers and rice millers in the area. In many instances, the price offered by the private purchasers were lower than the guaranteed price. Despite such lower prices, an appreciable proportion of farmers had relied on private marketing channels as a means of selling their paddy due to ready cash payments, less rigidity in quality specifications and the convenience of selling direct from the threshing floor itself. Furthermore, it was also found that the village cooperatives lack not only adequate storage to cope up with seasonal peaks but often are short of ready cash for prompt payment for purchases made. Besides this, some cooperatives are said to remain open for paddy purchases only on some days in the week.

Table 7.5 Pattern of paddy sales among farmers - Maha 1978/79

Paddy sales as a percentage of total farm output	Farmers reporting (%)	Amount sold per farm reporting (bushels)
No sales	-	-
1 - 19	2	30
20 - 29	2	39
30 - 39	7	27
40 - 49	14	60
50 - 59	16	75
60 - 69	22	95
70 - 79	22	125
80 - 89	14	130
90 - 100	1	157
	100	

Paddy purchases made from the farmers through the village cooperative societies are finally channelled to the Paddy Marketing Board (PMB) Stores located in the Project. PMB operates 8 stores, each with a capacity of 50,000 bushels and this storage capacity is considered adequate to meet project needs. The mechanism of channelling paddy to PMB Stores also involves authorised private dealers in addition to the normal cooperative network. However, the role played by the private dealers is relatively small.

Paddy purchases made from the Project area by the Paddy Marketing Board.

Season	Cooperative Societies (bushels)	Authorised Private dealers (bushels)	Total (bushels)
1977/78 Maha	325,000	20,300	345,500
1978 Yala	75,000	15,000	90,000
1978/79 Maha	380,600	105,000	485,600
1979 Yala	40,000	13,200	53,200

Of the paddy purchases made by the PMB, a portion is milled within the project in 3 private mills with a capacity of 5000 bushels per week.

Non-paddy crops produced in the area with substantial surpluses are cowpea, green gram, chillies, vegetables and some fruits such as mango. The cooperatives are inactive in purchasing items such as pulses and chillies. Consequently, almost all these commodities marketed, are handled largely by private traders. Occurence of considerable price fluctuations seems to be a characteristic in marketing these commodities mainly due to absence of regular marketing channels. One of the important bottlenecks that would hinder the expansion of production of such crops in future in this area would be the lack of a suitable marketing mechanism for channelling farm produce. Geographic isolation of Padaviya from major market places is a serious handicap in this connection. A majority of non-paddy crop producers are small scale operators and it is unlikely that even with an expanded production situation, the farmers themselves could perform the marketing functions. Infact, one of the critical constraints for expanding the non-paddy cultivation at Padaviya lies within area of produce marketing. It may also be added that a system of floor prices by themselves is bound to have little or no impact on the farm incomes unless complemented with a suitable purchasing mechanism. In the matter of handling farm produce, the cooperatives upto now have concentrated their resources solely on paddy. It appears that the facilities and the infrastructure available with these organisations could be improved further for handling the subsidiary food crops and the like produced in the area. Marketing of these crops is seen to be a potential problem and needs further investigations to design suitable remediable action.

7.5. IRRIGATION MANAGEMENT

As common to many other settlement schemes in the Dry Zone, Irrigation water constitutes one of the most critical basic input needs for sustained agricultural growth in the Padaviya Project. Equitable and rational use of available Irrigation water not only ensures a satisfactory crop production but also provides a basic need for both humans and livestock population. As mentioned earlier also, owing to the inadequacy of storage in the tank, the cultivation of entire acreage of paddy is only seen during the Maha season. In most years, 70% of these paddy land is left fallow in Yala.

In the following discussion it is hoped to raise a few of the major issues relating to the management of irrigation system in this Project. In so far as problamatic aspects of irrigation management are concerned it may be noted that the present case does not feature a unique situation, but shares many similarities to problems in other irrigation schemes elsewhere.

Active farmer participation on decisions taken on matters relating to water distribution and management is often thought as a critical component of efficient system of irrigation management. However, farmer participation on such matters, in this particular case seem to be greatly wanting. Though most decisions are formally made at the water meeting held prior to commencement of the season it seems merely a mechanism more to satisfy the stipulations under the Irrigation Ordinance. Often the decisions taken in the meetings are hardly adhered to. Consequently, the management decisions on irrigation water issues is largely a reflection of the views of Irrigation Officials in the Project due to lack of farmer participation.

In accordance with the provision of the Irrigation Ordinance, a meeting of all paddy cultivators in this project is held well in advance of each cultivation season. Such meetings are also attended by all officers concerned with the agricultural programme of the project, and major decisions on the cultivation calendar and acreages are agreed upon. In practice, however such decisions are rarely adhered to by farmers. Farmer attendance at some of these meetings is extremely low, reflecting their attitudes and interests towards these meetings. Levels of attendance and participation at these meetings appears to be guided also by the availability of irrigation water in the tank. During seasons of good rainfall with plenty of water in the tank, the farmer attendance is particularly poor.

Despite the availability of a number of local level institutions as well as field level personnel to support and coordinate agricultural production, their influence on matters relating to irrigation water management is hardly seen.

In so far as the Irrigation Department is concerned the official hierachy handling matters directly relating to the maintenance of conveyance system and water distribution in the project area is represented by a 4 tier system headed by the Irrigation Engineer of the Project.

Irrigation Engineer	- 1 per Project
Technical Assistant	- 1 per 2500 acres of paddy
Work Supervisors	- 1 per 1000 acres of paddy
Water Issue Labourers	- 1 per 500 acres of paddy

The responsibility for control and maintenance of the head works, main channel and distributory channels rest with the irrigation officers. Their last effective control point being, the point of entry into field channels. The overall control of water issues from a given channel to individual allotments is left to the farmers, and this situation results in considerable waste of water, which is particularly evident at the time of land preparation. During this period, the paddy fields appear to be supplied with unlimited quantities of irrigation water.

In a newly formed organisational set up in this project for increasing the representation of farmer's interest at higher decision making levels, elected farmer representatives at two different levels had been attempted. Under this system a representative is to be elected annually among a group of farmers for each 60 acres of paddy land. These group representatives are expected to assist and coordinate the water distribution within their areas. Among the group representatives, twelve area representatives are then elected to represent farmers' interests at the project level. These area representatives are included in the Tank Committee which is chaired by the Irrigation Engineer and includes other project level officials as well. However, in actual practice, even with such arrangements, the interest of the group representatives to sort out problems of water distribution among fellow farmers do not appear to be forthcoming. Perhaps these representatives do not feel that they have

sufficient authority to exercise control over their neighbours. Investigations on the functioning of these Committees indicated that these representatives do not seem to meet regularly as intended.The low attendance of the members in these meetings is also suggestive of a lack of interest and motivation even among the farmer representatives.

One of the reasons for lack of motivation among these representatives is that these positions do not carry financial incentives for their services. On the other hand with financial remuneration, their services would become one of subbordination to irrigation officers. In such an event, the group representatives will cease to represent farmer interests and would become more an extension of the irrigation beauracracy at the field level.

SUMMARY

The findings presented in this report refers to an investigation undertaken by the ARTI on Social, Economic and Agronomic aspects of Padaviya irrigation settlement, prior to the implementation of proposed modernization project. The study covers 221 farm households in this project and refers to both Maha 1978/79 and Yala 1979 seasons.

1. The current irrigable area under the Padaviya tank is estimated to be around 14,600 acres inclusive of encroachments. The extent of highland within the command area is around 5300 and involves about 4000 farm families. The estimated population within the scheme is around 29,000 of which 40% are below 14 years of age. Those under 31 years constitute around 75% of the households. The family size averages to 6.5 individuals of which 3.7 are in the labour force.

2. The educational status of the farm operators in the Settlement indicate that almost all the farm operators in the Project are able to read and write. Only a tenth of them had no formal schooling. However, among housewives, the educational status is lower. 6% of children of the school going age in the Project had no previous schooling at all and only 50% attend schools currently. School drop-out rate associated with higher grades of schooling is generally high. Most of these children are engaged in their own farm work, helping their parents.

3. Of the family labour supply, 2.3 adult members are engaged in their own farms on a full time basis. Employment wise, paddy sector provides the greatest demand on the labour force, and little diversity is shown in their occupational pattern. The labour force participation rates are 56% and 59% for male and female population in the project, suggesting that little over one half of the population is economically active. Nearly 80%

of the males and 50% of the females in the labour force are directly engaged in cultivating their own land, as the principle form of occupation. However, most of the family labour during Yala season is considerably underemployed due to limited agricultural activities during this season. Around 28% of the males and 35% of the females, in addition to their major occupation, had reported some form of secondary occupation as well. In such cases, the principle secondary occupation of males is hiring out labour. Among females the work in their own farms as well as hiring labour is seen to be important secondary occupations.

Hired labour market is closely linked with paddy cultivation in the area. The prevailing daily wage rates for agricultural labour vary around Rs.15/-, Rs.12/- and Rs.8/- for men, women and children respectively. Wages in the non-agricultural sectors in the project seem almost closer to these wage rates.

4. Poor communication facilities available within the Project, particularly roads, transport and telecommunication facilities worthy of mentioning. Housing and other basic amenities available to public officers are greatly inadequate and this had created problems of retaining them within the project.

5. The basic unit of land alienation at the time of initiation of the scheme comprised of 3 acres of lowland and 2 acres of highland per allottee. However, in subsequent occasions particularly those in Stage II and III, the holding size is small consisting of 2 acres of lowland and 1 acre of highland. Unlike in a majority of dry zone settlements, only a few are engaged in chena farming.

Inclusive of lands encroached, leased or rented in, the average extent of operational land holding among the sample farmers consists of 3.1 acres of lowland and 2.00 acres of highland.

Though leasing out or mortgaging of paddy holding among settlers is not specially significant according to the survey data, based on informal observation and discussion, it appears to be of

fairly common occurance. Leasing of paddy land is particularly common during the Yala season when farmers are given about one acre of lowland for cultivation, which in many instances is far away from their residences. Frequently such land is given on rent/lease mainly due to problems of management and supervision particularly in relation to water. In Maha the mortgages/leasing outs seem to be less common but the indications are that the problem is more acute than what is shown superficially. Perhaps this problem may be commonly found in other schemes and a detail study designed to investigate the situation could provide valuable insights.

A substantial proportion of farmers, particularly those at the tail end of the irrigation system had reported occupation of legally unallotted holdings. Most of them do not have adequate irrigation facilities and seem to have been abandoned by the original allottees. It is also estimated that at present about 2000 acres of land is cultivated by farmers in the project as irrigated lowlands outside the original plans of the project. Expansion of such paddy extents outside the original irrigation plans could have undoubtedly caused some of the present day irrigation problems in the scheme.

6. Information on land use pattern highlights two important aspects; (a) dominance of paddy in the cropping systems, (b) poor utilization of the highland allotment. Cultivation of seasonal crops on the highland allotment on a systematic basis is almost rare and a marked preferance for growing permanent tree crops on these highland allotments is clearly evident, and most of the highlands are in a fairly neglected state.

7. Buffaloes provide the bulk of farm power for paddy land preparation. Availability of large buffalo population is a distinct feature here. About a third of the farm households own buffaloes and the individual herd size typically varies from 15 - 20 animals. Most farmers use both tractors and buffaloes for land

preparation. Typically the tractor is used for first ploughing where the second ploughing or mudding is generally done by buffaloes. Tractor supply situation has improved considerably with the relaxation of import restrictions in 1977 as well as due to credit facilities extended to farmers under the Irrigation Modernization Project. The density of both 4 wheelers and 2 wheelers among allottees seem almost about the same; 10 per 1000 acres of paddy.

The prevailing hire rates for tractors range from Rs.180 - 225 for the first ploughing and Rs.160 - 175 for the second ploughing. The cost of hiring buffaloes during land preparation vary from Rs.150 - 200 per acre, with an additional amount of about Rs.90 payable to the buffaloe drivers, in cases where both the animals as well as the drivers are hired. The hire charge of a pair of buffaloes is around Rs.30 per day. A distinct preference for buffaloe use for land preparation work is indicated by farmers and this is based mainly on cheapness and quality of work criteria. In cases where a preference is shown for 4 wheel tractor, the underlying reason being the speediness of work, particularly at the peak labour demand periods.

8. Almost the entire extent cultivated in Maha 1977/78 was planted with improved varieties of paddy. The new high yielding varieties are widely grown covering 80% of the area. However in Yala, the traditional varieties were common and cultivated in 25% of the area cultivated. The commonest method of planting paddy is broadcast sowing under wet land condition. Despite the awareness of the advantages of transplanting it is seen only in limited extents, particularly at top end of the Scheme, during Maha season. Dry sowing of seed is not practised. Weed control in paddy fields does not receive adequate attention which would undoubtedly reduce the yields. Flooding of paddy fields seem to be the commonest means used to supress weed growth and whenever other methods are used chemical spraying is the most important. The data is indicative of comparatively higher levels of application of fertilizer in both seasons, the average quantity used being around 1.7 cwts per acre reported.

Fertilizer usage in many cases refer only to top dressings of Urea. The use of balanced fertilizer mixtures does not receive adequate attention of farmers and more extension efforts are needed to educate farmers on these aspects. The supply of cultivation credit is a major factor affecting the fertilizer usage among farmers.

9. A noteworthy feature of farmer response towards proposed changes in cropping patterns was the marked preference shown for paddy cultivation in the lowland. A number of reasons are given for this situation; Among them the more important are - the need for home consumption, involvement of less cash expenditure in relation to other cash crops such as chillies as well as the easy marketability of paddy. As regards introduction of non-paddy crops to irrigable lowlands in Yala season, farmers are of the view that though irrigation improvements rightly deserve priority, many other aspects such as supply of planting material, extension support, finance facilities and marketing also needs substantial improvements than at present. Those crops that seem to receive priority in such a programme are cowpea, chillies and green gram. Cowpea is particularly attractive in this regard, mainly due to its adaptability under extensive management practices with less problems with pests and diseases, low cash expenses and low levels of labour usage.

10. Rotational issues of irrigation water supply as a means of water conservation is already practised in the scheme both in Yala and Maha. Nevertheless, the possibility of further tightning of these irrigation schedules is distinctly clear, resulting further savings in irrigation water. However, lack of farmer co-operation as well as to their non-adherence to accepted norms and irrigation regulations had been cited as critical bottlenecks hindering the efficiency of a strictly enforced rotational irrigation schedules.

11. As a strategy of increasing farmer participation in decision making on irrigation matters, election of farmer representatives at two levels had been attempted here. Under this system a

farmer representative is elected annually among a group of farmers for each 60 acres of paddy land. Among these farmer representatives twelve area representatives are then elected to represent farmers interest at the project level, working in close collaboration with the project officials forming the tank committee. The Tank Committee in addition to irrigation management is primarily concentrating on the tank modernization activities. However, evidence indicate that even with such arrangements adequate enthusiasm from such representatives is not forthcoming. In practice, the situation does not have sufficient influence on problem issues of water management.

12. Timely supply of inputs such as fertilizer and agro-chemicals often appears to be overlooked by the cooperative societies. Lack of storage facilities in the project is a distinct handicap in the fertilizer distribution net work. Provision of suitable storage facilities is of prime importance.

13. Labour use data clearly shows that the paddy sector forms almost the sole means providing employment opportunities to the available man-power in the area. Cultivation of highlands and chenas also present limited avenues of employment and non-farm occupation also do not constitute as an important source of alternative employment means. As a consequence of the heavy dependency on paddy, employment opportunities are seasonal. During the Yala season the labour force within the project is mostly under utilized due to lack of cultivation on a significant scale. In terms of provision of more employment avenues to the labour force, the intensification of paddy production methods, full utilization of highland allotment, use of paddy land during Yala and shifting towards cash crops needs to receive high priority.

The average labour input per farm in respect of lowland is 153 mandays per farm in the case of paddy during Maha. In terms of intensity of labour use paddy represents 54 man days per acre and bulk of this labour is used in respect of tillage (25%) and

harvesting (23%). As between seasons the labour use pattern in paddy does not seem to vary substantially except in the irrigation operations. Hired labour usage is prominant in paddy constituting nearly half the amount used.

14. The average production cost per farmer incurred in farming amounts to Rs.6667 of which almost a three quarter is incurred in Maha season. A major portion of this production costs is incurred in respect of paddy which amounts to about Rs.1400 per acre. Nearly Rs.900 of this is solely in cash.

Of this cash expenditure, a bulk is spent on account of wage payments for labour (36%) and tractor hire charges (26%). The highest amount of wage labour is used for land preparation and harvesting operations. Eighty percent of the non-cash input for agriculture production of the farmer is represented by family labour.

15. The gross income from all sources averages to about Rs.9300 per household in which agriculture forms the dominant source (90%). Arising from the variations of the cultivation rhythm in the area, the farm income fluctuation occuring between the Maha and Yala season is substantial. Nearly 75% of the annual income is generated during the Maha season. Such fluctuations of income levels over the year exerts adverse impacts on the living standards of the farm family.

Income from paddy holding alone provide around 85% of the farmers' total agricultural income. It is also seen that highland allotment provides a mere one tenth of the total agricultural incomes. In terms of cash, the farm income averages to Rs.5566 per year, representing two thirds of the gross income. Paddy cultivation, accounts for three quarters of the total cash revenue of the farm. Contributions from highland allotment to farmers cash income is almost non-significant (5%). Livestock production does not virtually contribute to farm income in this scheme as well.

Income distribution data show wide variation among farms. The top decile of farmers have reported as earning annual cash/income ranging from Rs.10,000 - 15,000 per household. The lowest decile of households receive cash incomes varying from Rs.1000 - 2500 per year.

Appendix I

Distribution of Annual Gross Income
per farm - Padaviya
Yala 1979 & Maha 1978/79

Income Category (Rs. per Annum)	Percentage of farmers	Cumulative Percentage	Percentage of income	Cumulative Percentage
0 - 1000	1.1	1.1	0.1	0.1
1001 - 2000	1.6	2.7	0.3	0.4
2001 - 3000	0.5	3.2	0.2	0.6
3001 - 4000	3.7	6.9	1.5	2.1
4001 - 5000	5.9	12.8	2.9	5.0
5001 - 6000	10.7	23.5	6.6	11.6
6001 - 7000	8.6	32.1	6.2	17.8
7001 - 8000	11.2	43.3	9.3	27.1
8001 - 9000	13.4	56.7	12.6	39.7
9001 - 10000	10.7	67.4	11.1	50.8
10001 - 11000	9.6	77.0	11.4	62.2
11001 - 12000	5.3	82.3	6.8	69.0
12001 - 13000	3.3	85.6	4.4	73.4
13001 - 14000	3.7	89.3	5.6	79.0
14001 - 16000	2.8	92.1	4.3	83.3
16001 - 18000	3.7	95.8	7.1	90.4
18001 - 20000	1.0	96.8	2.2	92.6
20001 - 22000	3.2	100.	7.4	100.