AN ANALYSIS OF THE PRE-MAHAWELI SITUATION IN H4 AND H5 AREAS IN KALA-OYA BASIN

Research Study No. 33

December 1979

Agrarian Research and Training Institute
Colombo, Sri Lanka

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A.S.Ranatunga
M.P. Perera
A.M.T.Gunawardene
W.A.T.Abeysekera
U.L.J.Perera

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AGRARIAN RESEARCH AND TRAINING INSTITUTE
P.O.BOX - 1522
COLOMBO
SRI LANKA

PREFACE

The Mahaweli Development Board, on the recommendation of the World Bank, commissioned the Agrarian Research and Training Institute to undertake an indepth bench-mark study of H-4 and H-5 areas of the Mahaweli Ganga Development Project. Accordingly, the field surveys were carried out prior to initiation of development work in the area in early 1978.

In view of the high rating given by the Government to this project by accelerating its implementation, the study was given top priority in the Institute's research programme and a five-member research team consisting of M/s A.S. Ranatunga, M.P. Perera, A.M.T. Gunawardena, W.A.T. Abeysekera and U.L.J. Perera were entrusted with the assignment. Mr. Ranatunga functioned as the co-ordinator of the study. The present report is the outcome of their efforts.

As the settlement programmes in H-4 and H-5 areas have begun to gain momentum, we consider the publication of this report as very timely. The study team has raised a number of important issues that have emerged in the course of their investigations which no doubt would be of interest to the implementing authorities. It is hoped that this report would be useful at policy level to the Ministry of Mahaweli Development and the Mahaweli Development Authority as well as to the project implementing agency - Mahaweli Development Board.

Finally, I wish to record my appreciation to the efforts of the study team as well as to the others who made this publication possible.

T.B. Subasinghe

DIRECTOR

December 1979.

ACKNOWLEDGEMENTS

As the study co-ordinator, I wish to place on record the services of an inter-disciplinery team of researchers comprising of Messrs. M.P. Perera, A.M.T. Gunawardena, W.A.T. Abeysekera, U.L.J. Perera and A.S. Ranatunga that handled this assignment. Though this report reflects a team effort, the specific contributions of individual members at the report writing stage deserve mentioning.

Summary and Conclusions	*A.S. Ranatunga* *M.P. Perera*
Introduction	*M.P. Perera* *A.S. Ranatunga*
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Crop Yields and Disposal of Farm Produce	*A.S. Ranatunga* *A.M.T. Gunawardena*
Institutional Support	*A.M.T. Gunawardena*
Social Structure and Change in the Study Area	*U.L.J. Perera*

I take this opportunity to record the assistance received from many officers of the Mahaweli Development Board. Among them special mention should be made of Dr. Walter Abeygunawardene (General Manager) and Land Officers of Nochchiyagama, Eppawala, Thalawa and Tambuttegama. Mr. D. Pathiraja, Economist of the Board functioned as the liasion officer in this study between the Agrarian Research and Training Institute and the Mahaweli Development Board.

The advice given in sample selection, research design and data processing by Miss. T. Sanmugam as well as suggestions and comments on the draft given by Dr. H.D. Sumanasekera, Research Officers of the Institute are gratefully acknowledged. The services of the statistical investigators of the institute, Mr. A.P. Samarakoon, late Mr. K.G. Mallikarachchi, Mr. M. Sirisena and Mr. P.V. Dassanayake and the other investigators recruited from outside for the survey are acknowledged with thanks. Special mention should be made of the contribution of Mr. A.P. Samarakoon who assisted in processing the study data.

Mrs. Indrani Perera and Miss. Punyakanthi Perera, Stenographers did all typing work and their assistance is gratefully acknowledged.

A.S. Ranatunga
STUDY CO-ORDINATOR

December 1979
Agrarian Research & Training Institute.

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SUMMARY AND CONCLUSIONS

This analysis presents a bench mark assessment of the agronomic, economic as well as some aspects of social conditions seen in H-4 and H-5 areas in Kala Oya basin of the Mahaweli Development Project immediately prior to commencement of development work in 1978. The highlights of the study findings based on a randomly selected sample of 512 (7%) households covering the Development Regions 5,6,7 and 8 are presented below along with some issues arising from them :

1. The population within the study area is currently estimated around 45,000. Around 5% of heads of households are recent migrants (after 1971). A significant demographic feature is a distinctly prominent young population with two thirds of household members being under 25 years of age and 40% being under 14 years. The presence of such a marked youthful community has a number of implications. The more important among them being it's impact on the labour supply situation in the area, with only half the population available for farm work. Under such conditions, migrant labour has a key role to play in the future agricultural development of this area. The predominance of youthful man-power also implies that the general aspirations and expectations of the labour force are aligned more towards the modern society than to those found in the traditional village society. Accordingly, in designing employment programmes, this aspect has to be borne in mind. Furthermore, the organisational structure and planning needed for provision of welfare services to the community in question such as education, health and nutrition etc. has to take cognisance of the special needs of this emerging young population.

2. The literacy rate of the population is high with 86% of the household members above 5 years of age either having attended or currently attending school. The student-teacher ratio of 31.4 is higher than the district figure of 23.3. Three fourths of the households are within a mile of a school. There is a

great dearth of Science graduate teachers in the schools in the study area.

3. General housing conditions in the area are poor with only a fifth of dwelling houses having permanent structures. Sanitary arrangements are unsatisfactory with only about 30% of households having lavatories, of which over three fourths are pit lavatories. 95% of the households use well water for drinking but only a third of them reported having their own wells. A little over 80% of the households are accessible by a motorable or cart road and are within 1 mile of a bus route.

4. The average bed-strength of rural hospitals in the area (2.6 beds per 1000 population) is lower than the district (3.5) and national (3.0) averages. Nearly all households are within 5 miles of a dispensary or hospital.

5. Postal facilities are limited with about a third of the households within a mile and nearly all households within 5 miles of a Post Office.

6. Banking habit is catching on in the area with the number of Bank Accounts in 1977 averaging 325 per 1000 population (H4 : 160 per 1000 population; H5 : 640 per 1000 population).

7. Very little occupational diversification is seen in the areas studied. A large majority, nearly 80% of the labour force, is primarily employed in agriculture as small scale operators or share croppers or agricultural labourers. Employment in the public sector with about 6% of the workforce ranks as the second most important source of income.

8. Non-farm employment is extremely low due to absence of any organised industries in the area. Furthermore, the over-emphasis given to monocropping in lowlands as well as lack of raw materials needed for agro-based industries have retarted development of off-farm employment opportunities.

However with the implementation of the project and broadening of

the agricultural production base which includes crop diversification and integration of crop, livestock and fisheries, the opportunities for increased employment in the non-farm sector should expand substantially. Encouragement of both private and public sector investments on non-farm employment generation activities are extremely important in order to exploit fully the development potential of the study area in terms of increased employment. In this regard, the importance of undertaking some investigations on the possibilities of occupational diversification deserves to be borne in mind.

9. The average annual gross income per farm during the year was about Rs.5200 per family which amounts to about Rs.880/= per capita per annum. The income distribution data shows that nearly half the households in the area earn an income of Rs.3000 or less. Nearly two thirds of the farm income is presently derived from agricultural production. The income from hiring labour accounts for about 13% of the total income. The farm economy is centred around paddy cultivation in the lowlands. 66% of the agricultural income is derived from cultivating paddy. Chena cultivation had generated nearly 30% of the gross farm income, thus ranking this as the second most important source of agricultural income. However with the envisaged development of the area, the existing opportunities for chena cultivation would no longer be available to the farmer. Hence development of stable farming on highland areas under rainfed/irrigated conditions should be explored fully.

The survey data also pinpoints that at present, the income from livestock is almost negligible.

If ownership of household items like Radios, Sewing Machines, Bicycles etc. is used as a proxy for economic status, then, the households in the study area are relatively "better off" than those settlers in Region 3 (H-1 & part of H-2), who have already enjoyed three cultivation seasons with irrigation.

10. Income data arranged on the basis of half acre land size classes shows that income from paddy is approximately twice

that of chena for all half acre classes upto 3.5 acres. As the size class increases from 3.5 to 4.0 acres, the paddy income becomes thrice that from chena, and a plausible reason for this, is the absence of a scheme for price stabilisation for field crops grown in chena together with poor marketing facilities for such crops. In contrast paddy enjoys a guaranteed price with comparatively adequate marketing facilities and the uncertainity of price due to increased production, as in the case of field crops, is totally absent here.

11. The estimated extents under principal forms of land use are as follows :-

	Sample percentage	Estimated gross acreage
Lowland	39	15,717
Chena	30	12,090
Village homesteads	24	9,672
Others	7	2,821
	100	40,300

Agriculture in the study area typically comprises of an interrelated farming system based on paddy in irrigable lowlands, mostly under rainfed village tanks and shifting cultivation (chena) on unirrigated highlands. Such diversification of farming activities has provided the much needed stability to the traditional farming economy in an uncertain production environment. As mentioned earlier, nearly a third of the annual agricultural income comes from chena and, in terms of cash revenue, farmer dependence on chena is greater than from lowland paddy. The fact that only a tenth of the farms had concentrated solely on lowland cultivation is a reflection of the unstable production conditions seen in lowlands at present.

12. A characteristic feature of the landscape with a bearing on land tenure is the predominance of traditional *(purana)* villages, numbering around 160. The fact that slightly over half the households do not possess their own agricultural holdings is of significance in a region of small holdings dominated by peasant proprietorship. The high ratio of households without owned land seen here is partly a reflection of

inflow of landless migrant labour into the area, natural increases in population in the traditional villages, and unavailability of freehold lands due to the presence of large tracts of jungle belonging to the crown. The Lorenz Curves for the distribution of operated land and owned land show skewed distributions, the latter being more skew than the former. For instance it is seen that a third of the land is operated by only 13% of the households and a quarter of the land is owned by only 5% of them.

Encroachments on crown lands constitute the principal form in which land is held at present, with two fifths of all cultivated lands falling into this category. Chena cultivation is the principal land use seen in such cases. Owned agricultural holdings is seen only in respect of about 30% of the cultivated acreage, which refer primarily to lowlands and homesteads in *purana* villages. Leasing in of lowlands is very common and one quarter of the paddy acreage cultivated is under some form of lease. Half the crop share harvested is surrendered to land owners as rent. The high land rent paid could be explained mostly on the basis of lack of balance between the supply of and demand for lowland parcels. Though the land 'per se' is not scarce in the study area, there is definitely a dearth of lowlands with assured water under village tanks.

13. Under the proposed land alienation scheme of allocating 2.5 acres of irrigable land and 0.5 acre homestead to a settler family, around 10% of the existing households in the study area would have their owned land reduced by one half. There is therefore a prima facie case for examination of the land reform aspect of the scheme and to see how far they are likely to work against positive motivation of future Mahaweli farmers.

14. The traditional 'closed' *purana* village communities in the region have been 'opened' due to several factors such as the inflow of outsiders into the villages, the expansion of national politics and the establishment of grass root level rural institutions which are linked vertically with the state and the large

scale development projects sponsored by the government e.g. Mahaweli Development Project.

The study reveals that the members of *purana* villages show a general feeling of uncertainty towards the envisaged development and this ambiguity has been increased by the inconsistent advice given by various personnel engaged in construction works in the area. Many of the villagers are anxious to see the survival of their social system which provided them security and identity, among other things, in the region. Such uncertainties can be eliminated and a healthy attitude towards the project among the settlers can be developed by several ways. Among them are the visits by competent officers to the villages to discuss and to hear the grievances of the villagers and to clarify certain ambiguities. This can be supplemented by (a) radio programmes which broadcast dialogues between villagers and the project officers, (b) the distribution of pamphlets and other handouts explaining the logic and objectives of the project. Priority in selecting settlers deserves to be given to *purana* villagers, LDO settlers and encroachers.

15. The existing lowlands are underdeveloped in terms of irrigation. Currently Development Region 5 has the best water delivery system and Regions 7 and 8 are poorly served with irrigation water. Such qualitative differences in water supply influence the cropping intensities as shown below. These cropping intensities are low in the light of estimates given in the World Bank Appraisal Mission Report.

Development Region	Cropping Intensity		
	Yala %	Maha %	Annual %
5	58	84	142
6	37	59	96
7	27	89	116
8	16	88	103
All	39	81	120

Low cropping intensities seen in Yala imply that over half the asweddumized lowlands remain fallow for nearly 6 months of the year for lack of water and consequently incomes associated with farming tend to remain low.

16. Maha rains are not made use of effectively for paddy cultivation. Over one half of the farmers had initiated land preparation only after the first water issues have been made from village tanks. At present, a time lag of few weeks occurs between the first Maha rains and commencement of field preparation, until the soil becomes soft and moist. Farmers have strong reservations in undertaking early land preparation at present due to a number of reasons. -

(a) high risks associated with early cultivation in an environment devoid of assured irrigation;

(b) hard and dry soils; a field condition generally encountered at the commencement of the Maha season.

(c) unavailability of adequate farm power (tractors at the required time);

(d) family labour being occupied with work in chena in early part of the Maha season.

Encouragement of dry land preparation for early sowing of Maha crops is very vital for both efficient use of irrigation water and attainment of higher cropping intensities envisaged under the Project. In this regard, the lack of implements as well as other tools suitable for dry tillage in small farms appear to be an important constraint. Designing or introduction of appropriate tillage implements deserve priority consideration.

17. Buffaloes and tractors are of equal importance as sources of farm power at present and over 80% of draught power needs are hired. The average tractor hire rate at the time of survey for both ploughings was around Rs.160/- per acre and hire charges for a pair of animals was Rs.20/- per pair. On this basis, both forms of power were just about equally expensive, particularly if labour needed for working with buffaloes were

hired as well. The number of tractors as well as buffaloes currently available in the area is exceedingly small. Consequently there is an urgent need to provide more farm power.

The design and lay out of farm lots with 0.5 acre homesteads and lack of provision for grazing lands and water for animals within settlements would undoubtedly discourage buffalo rearing in the future. The present trend towards large scale mechanization of tillage operations in small farms may well prove to be detrimental in the long run, in the face of escalating fuel as well as machinery costs and uncertain fuel supplies in the future. In fact, the cost of tractors as well as fuel have shown a steady increase over the last 5 years and this trend is likely to continue in the future as well. In the context of escalating tractor operating costs, buffalo usage would seem to be a better alternative for most of the small farms in the area. The maintenance of large herds of buffaloes as currently practised is also likely to pose problems in future, due to non-availability of grazing grounds in the area, if the conventional system of rearing buffaloes in the dry zone is continued. Hence it is extremely important to explore the possibilities of introducing more intensive systems of buffalo rearing in the area involving cut and carry systems of feeding rather than letting the animals loose in open grounds as done at present. With the availability of irrigation water in the channels almost throughout the year, rearing a couple of buffaloes per farm in the area should not prove too difficult.

The "timeliness" of field operations is likely to assume tremendous importance in the future, particularly in the face of attempts to synchronise land preparation in large paddy tracts with a view to minimise irrigation water losses. Besides, the high degree of double cropping contemplated in the project area in future would restrict the "turn-around time" for tillage between two seasons. In such situations, the demand for draught power during the initial phase of paddy cultivation is bound to be extremely high and would encounter supply bottlenecks.

Too small a power unit or inadequate availability of power could result in reduced output, while the penalty for too large a power unit would be excessive overhead costs. A key consideration in this regard is the capacity of the type of farm power used. As the capacity of machines is directly related to costs, higher utilisation of available capacity is necessary to achieve lower operating costs. Each of the three alternative forms of farm power used at present (buffaloes, 2-wheel tractors and 4-wheel tractors) has the performance capability to meet the functional requirements of the different tillage operations in small farms. The three power alternatives differ substantially not only in initial capital and maintenance costs, both in terms of foreign exchange as well as local currency, but also in their work capacity. Thus the most promising alternative system of providing farm power on small farms has to be worked out.

18. The only modern technology widely adopted in lowlands is the use of new high yielding varieties of BG series as seen in 90% of the farms surveyed. However, in Development Region 5, under assured water supply conditions, improved cu tural practices such as transplanting and fertilizer use are adopted on a wider scale. Infact, in this particular Region, around 80% of the paddy acreage is fertilized compared to only 23% in Region 8 under poorly rainfed conditions. Applications of complete fertilizer mixtures are seen more under stable water supply conditions in Region 5. In contrast top dressing with Urea is the main form of fertilizer application practised under rainfed conditions. The average quantity of fertilizer applied per acre amounts to 1.3 cwt per farm reporting which is only a fraction of the dosage recommended for irrigated paddy in the dry zone.

The differential rates of adoption of improved practices seen above may be described as farmer's adjustment mechanism against risks. However with the provision of irrigation infrastructure, this element of weather-induced risk faced by farmers would be greatly minimised. Thus, with

the envisaged on-farm development of lowlands, it should not be too difficult to get the farmers to adopt improved cultural practices in lowlands provided farmer education programmes are backed up by a timely input delivery system.

19. The average cash outlay per acre of paddy cultivation in Maha is low (Rs.450/-) which is less than half the cash expenses incurred in a region such as Polonnaruwa. Low cash expenses implies lower levels of purchased input-use generally associated with traditional farming practices. Extensive forms of cultivation seen in the area with attendant low levels of cash investments in the form of purchased inputs and hired labour is understandable in view of the uncertainty faced by farmers due to lack of irrigation water.

20. Low level of labour application is a marked feature seen in paddy cultivation. Only around 50 man-day equivalents are used in this area compared to about 92 man-day equivalents in Polonnaruwa. Lack of satisfactory irrigation facilities, other than in Region 5, limit the opportunities for more intensive use of labour. High incidence of share cropping tenancy is another relevent factor in this regard. Such tenurial arrangements superimposed on essentially a rainfed environment are not conducive for intensive labour applications. Labour input data also indicates a family labour dominant farming system with almost two thirds of the labour being contributed by the family. However, with the envisaged on-farm development of 40,000 acres, some of the major constraints seen at present - water and existing tenure problems are unlikely to dominate the production environment. In future, more intensive use of land with higher levels of labour input would not only become possible, but also necessary to recover project investments. Any such large increases in demand for labour have to be met more from outside the project area. Thus migrant labour has a key role to play in the future agricultural development of this area. Accordingly, in the planning of village centres and townships etc., this aspect deserves to be borne in mind in order to make some provision for the accommodation of migrant labour. In the alternative,

accommodation for such labour has to be found in the individual farms.

21. Highlands across the study area are used extensively for chena cultivation. Around 80% of the chenas operated at present have a short cycle of 2 - 3 years. Chillie is the main crop grown on these lands followed by cowpea. In terms of cash revenue, farmer dependance on chena appear to be greater than from lowland paddy at present. This together with the risks involved in lowland paddy cultivation under the existing water supply conditions offer major reasons underlying the farmer anxiety to cultivate chena whenever opportunities exist.

With envisaged on-farm development and provision of irrigation infrastructure in the H4 and H5 areas, the lands presently under chena will not be available for shifting cultivation in the near future. However, the process of weaning out these farmers from practices akin to chena cultivation would be more complex than usually thought of. This requires more attention by the researchers, extension personnel and planners alike. Intensive field crop production on well drained lands with supplementary irrigation would need not only properly designed irrigation water conveyance systems, but also intensive farm level extension efforts. In this regard, extension personnel will have to take note of the past experiences and skills of the settlers, their attitudes to new farming systems, risk-taking potential and other limitations. This is all the more necessary, as the present experiences of farmers in H4 and H5 areas with field crop production are confined mostly to rainfed chenas. Since cultivation of other field crops under irrigation is altogether a new concept to the farmers in the study area, a heavy responsibility is cast on the extension staff to launch well designed extension programmes. Firstly, the farmers have to be convinced of economic benefits of the new cropping patterns. Secondly the necessary skills and knowledge about new practices (irrigated farming on well drained soils) have to be imparted. Thus the need for a massive extension effort backed up by teams of subject-matter specialists cannot be

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over emphasised. Success of extension work will however depend on the adequacy of other supporting services-input supplies, credit and marketing.

Livestock rearing for milk and poultry keeping are hardly seen in the area at present. The existing farming activities are confined solely to production of seasonal crops. Buffalo rearing is seen on a limited scale for draught purposes. The development of suitable livestock enterprises in the area needs to be emphasised as an integral part of the farming system of the area. For successful introduction of livestock activities into the project area, a great deal of extension effort would be necessary, in addition to provision of marketing outlets.

22. The mean acre yields of paddy during the two seasons considered are as follows :

Season	Mean yield bu. per. ac.	Standard error	95% confidence interval
Maha 1977/78	53	1.7	50 - 57
Yala 1977	42	1.9	38.- 46

Well distributed rainfall experienced during the Maha season under reference has masked to a great degree the disadvantages normally associated with paddy cultivation under rainfed tanks, stressing the importance of water as a production input. Infact in Maha 1977/78, the mean acre yields among the 4 Development Regions did not show marked variations, despite the earlier observed Regional differences in the existing irrigation facilities, implying that the mode of water supply is less important in a season of well distributed rainfall. However, Region-wise yield differences were very marked in the (dry) Yala season with Region 8 (rainfed) reporting yields less than 30 bushels per acre.

The potential for yield increases in the paddy sector by the application of fertilizer is clearly seen in survey data. Despite the lower levels of fertilizer usage (1.3 cwt. per acre) per farm reporting, the yields of fertilized fields have shown an increase of 12.5 bushels per acre compared to yields of

fields without any fertilizer during Maha season. Accordingly, the increases in use of fertilizer appears to be one of the effective short term solutions to the problem of low levels of productivity in the paddy sector. The heavy subsidy on fertilizer (85%) on prices incurred by the government at present would, no doubt, act as a motivating factor in this regard, provided timely supplies are assured. With provision of irrigation water and introduction of new technology in rice culture, a mean acre yield of over 80 bushels per acre in Maha should become a reality, at least in the initial stages, provided production inputs and draught power are made available to settlers in time.

23. Paddy sales have been carried out immediately after the harvest with very little retained for later sales. This is to be expected as paddy enjoys a guaranteed price. In such circumstances there is no particular advantage for farmers to postpone sales in anticipation of higher prices later on in the season. Such farmer behaviour in marketing of paddy implies the need for speedy purchasing arrangements, particularly at peak harvesting periods. With 40,000 acres coming under irrigation, production would increase substantially and in consequence a very heavy responsibility would be cast on those responsible for marketing and transport of produce to organise prompt purchase of farm produce. At present H5 area does not have a paddy store, while the total capacity of stores in H4 area is inadequate.

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Village fairs (*polas*) scattered throughout the study area serve as focal points for marketing agricultural produce other than paddy. Region 6 is best served by these fairs at present as all households are within 5 miles of a fair, while in the other three Regions only about half the households are within this range.

Brinjal is the most paying cash crop produced in chenas at present. Although the observed production of brinjals was in large scale units, generally atypical of the area, marketing

difficulties of this perishable crop may prevent small farmers from entering commercial production. Even in the case of dry grains and pulses, bulk of the produce is sold immediately after harvest when the prices are unfavourable to them, and the implication of such hurried sales is that the farmers are tight for money at the end of the cultivation season.

The absence of institutional arrangements for the marketing of agricultural produce other than paddy has depressed agricultural income. The absence of a floor price scheme as well as regular marketing outlets for most of the field crops have contributed to marked price fluctuations. Regular marketing arrangements for field crops are very necessary to encourage farmers to take to crops other than paddy.

24. The traditional group methods of extension such as method demonstrations, training classes, field days, etc. have received little attention in comparison to individual consultations in the study area. Extension service should therefore take precautionary steps so as not to neglect or to give lesser emphasis to these methods of extension, since these methods have their own desirable qualities. With the introduction of the contact farmer scheme (CFS) the best development one could visualise is illustrated below.

Position prior to the introduction of the C.F.S.	Most desirable development with the introduction of C.F.S.
a) Individual consultations	Group consultations (contact farmer/follower farmers) (small group situations)
b) Group methods of Extension (Method Demonstrations (Training classes (Field days etc. (small groups - large groups situations)	Group methods of Extension (Method Demonstrations (Training classes (Field days etc. (large groups or aggregates of small groups)
c) Mass media	Mass media

The high literacy rate of the farming community and the satisfactory reach of mass media (particularly radio & newspapers) should be made use of in the best possible manner in extension work. The available information indicates that although the penetration of mass media to the farming communities is relatively high compared to many developing country situations, the reach of agricultural messages through mass media is not as satisfactory.

In a literate society, print medium should be more effective in communicating messages, compared to other media such as radio or film. It has the advantage of low cost, ability to decentralise the production and distribution of the material and possibilities of incorporating numeric and graphic illustrations. Printed matter may be given out in a variety of forms.

25. Four of the important observations in relation to agricultural credit are :

(a) The minor role played by non-institutional sources as sources of farm finance

(b) The marked increase in lending in the Maha Season when even the defaulters of previous loans became eligible for further loans

(c) Lack of a relationship between the usage of credit and the usage of cash inputs.

(d) A general lack of a strong demand for credit in the area, at the present level of development.

In the analysis of the survey data in the subsequent chapters an attempt is made to raise a number of issues important for planners as well as project administrators. In particular, mention may be made of the (a) implications of youthful manpower available in the area, (b) the need for occupational diversification, (c) examination of the Land Reform aspects in *purana* lands, (d) resulting changes in the social organisation, (e) timely supply of draught power needs of small farms, (f) other field

crop production on well drained lands under irrigation by farmers whose previous experience is often confined only to chena, (g) marketing facilities of farm produce and price stabilisation measures - particularly of non-paddy crops and (h) integration of livestock farming with crop husbandry. In this regard, it has to be stated that the mere assurance of water does not lead to the full utilization of land, since farmers leave land fallow at times for reasons not altogether connected with the non-availability of water. Infact, changes in cropping patterns do not necessarily take place on mere receipt of irrigation water. Changes are slow and gradual, the farmers generally being averse to abandonment of age long tested cropping systems as well as crops - eg. chena cultivation by *purana* villagers. Farmer behaviour is one of selective experimentation which involves trying of new crops on land receiving water. Besides, the mere assurance of availability of water would have little impact on maximising production, if there are management draw-backs in the distribution of irrigation water. Thus the proper management of water in the project area has to receive the highest priority. To maximise returns on investments and optimise the utilization of water resources, diffusion of knowledge of new agricultural technology and farming practices along with the supply of necessary inputs as well as efficient marketing facilities for farm produce are as important and relevant as construction of irrigation channels.

I. INTRODUCTION

1.1. GENERAL

In response to a request of the World Bank, the Mahaweli Development Board (MDB) commissioned the Agrarian Research & Training Institute (ARTI) to undertake an in-depth Bench Mark Survey in a section of the Kala Oya basin earmarked for development in 1978. This report is an outcome of the investigations made by the ARTI in this regard.

The Master Plan of the Mahaweli Ganga Development Project envisages the development of 900,000 acres of land in 3 phases and these lands have been grouped under 14 irrigation systems designated A to M. The phase 1 of the Development Project consist of three projects, the first of which is the Polgolla diversion. With the completion of the headworks at Polgolla and Bowatenna in stage 1 of this project, the Mahaweli waters have been diverted to Kala Wewa and Kandalama Wewa reservoirs through a tunnel and trans-basin canal for irrigating some of the lands under existing major schemes in the North Central and North Eastern regions. The stage II is scheduled to develop 71,000 acres of potential farm land in the Kala Oya Basin designated as Irrigation System H. For purposes of planning, the irrigation system H has been divided into 12 sub-divisions from H-1 to H-12.

The assignments given to ARTI however cover only H4 and H5 blocks occupying 40,300[1] acres of land - (Fig.1). With the provision of irrigation and social infrastructure for these areas, the land holding pattern is to be organised into the 2.5 acre irrigable farms and 0.5 acre homestead lots.

The scope of the present study covers agronomic, economic as well as social conditions seen in the H4 and H5 areas immediately prior to development of farm lands scheduled to commence in 1978.

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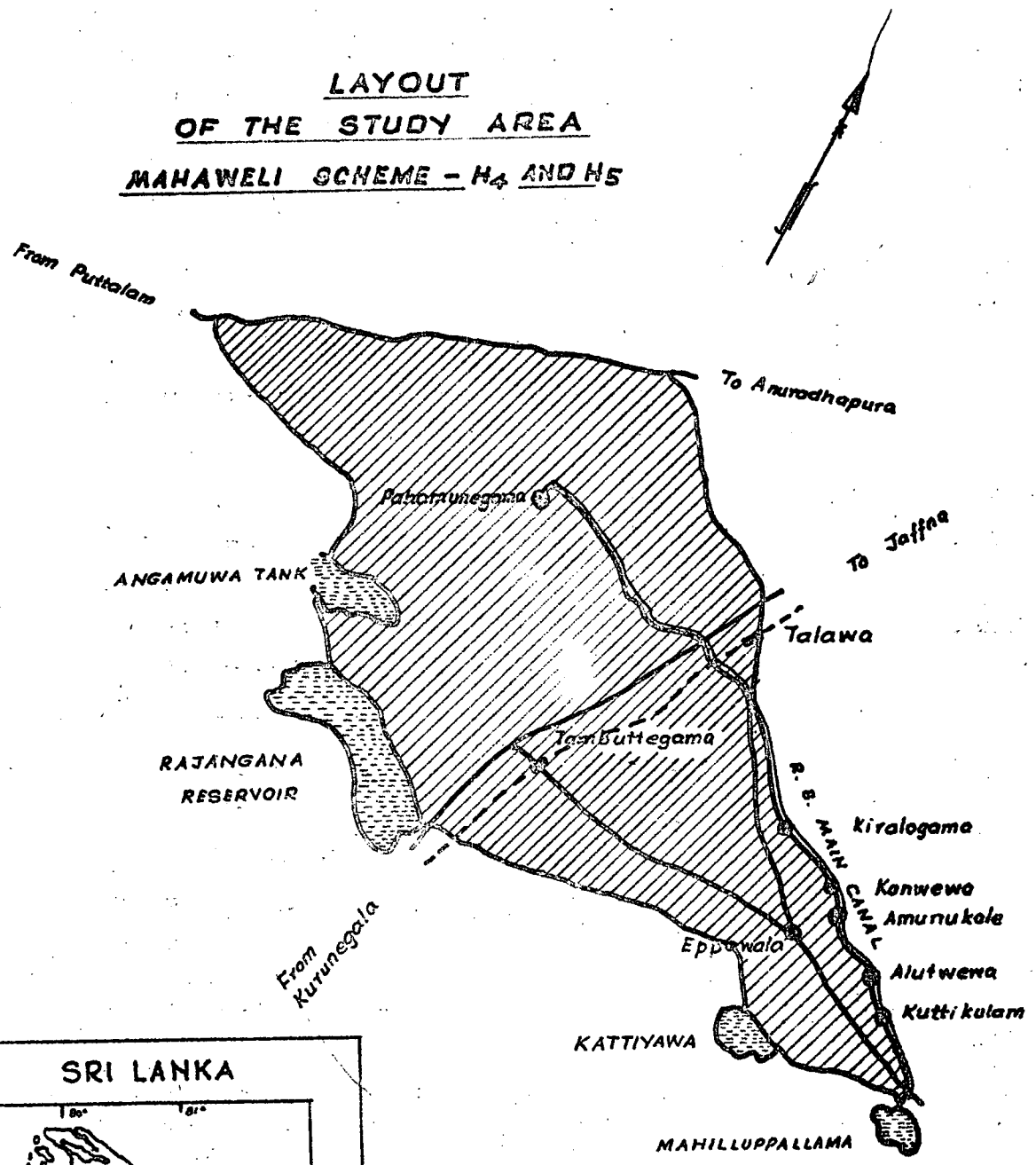
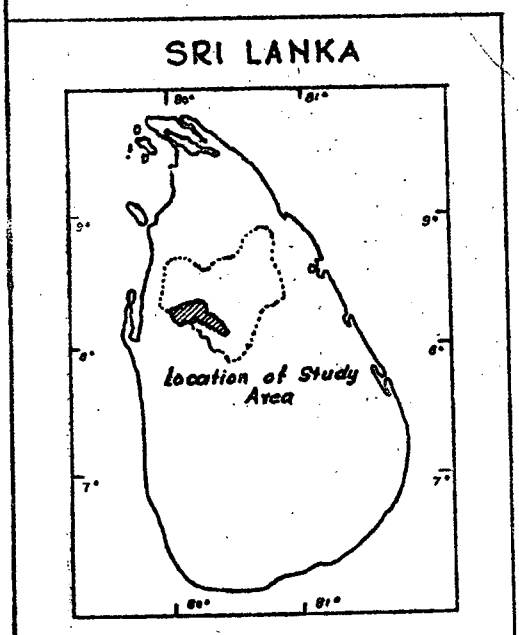
[1] Mahaweli Ganga (II) Irrigation and Rural Development Project - Report of the follow-up Appraisal Mission, IDA (1976).

Fig: 1


LAYOUT
OF THE STUDY AREA
MAHAWELI SCHEME - H4 AND H5
From Puttalam
To Anurodhapura
To Jaffna
Palatiyunegama
ANGAMUWA TANK
Talawa
Tambuttegama
RAJANGANA
RESERVOIR
R. B. MAIN CANAL
Kiralogama
Konwewa
Amunukole
Eppawala
Alutwewa
Kutti kulam
From Kurunegala
KATTIYAWA
MAHILLUPPALLAMA
REFERENCE
Tank
Road
Railway Line
Canal


SRI LANKA
Location of Study Area

1.2 OBJECTIVES OF THE STUDY

The objectives of this study are :

i. To examine the existing farm practices in both lowlands and highlands with particular emphasis on cropping patterns, use of inputs, levels of farm production, farm incomes, marketing channels and prices, farm capital owned etc., in the reference area;

ii. To ascertain the characteristics of the labour force: age, educational levels, skills and employment patterns;

iii. To identify the existing institutional support and infrastructural facilities for farming;

iv. To observe the existing social organisation and structure in a selected village in the reference area;

1.3. METHODOLOGY

1.3.1. Sampling Design : For purposes of development, the entire H - area has been demarcated into 41 Irrigation Blocks, each ranging from 3000 to 4000 acres. In this demarcation natural features such as ridges and drainage lines have been used as boundaries and are numbered according to the channel system as indicated below :

	Right Bank	Left Bank
Kandalama Wewa	101 to 104	201 to 205
Kala Wewa	401 to 421	301 to 311

In the study area, four to six Irrigation Blocks formed a Development Region[1].

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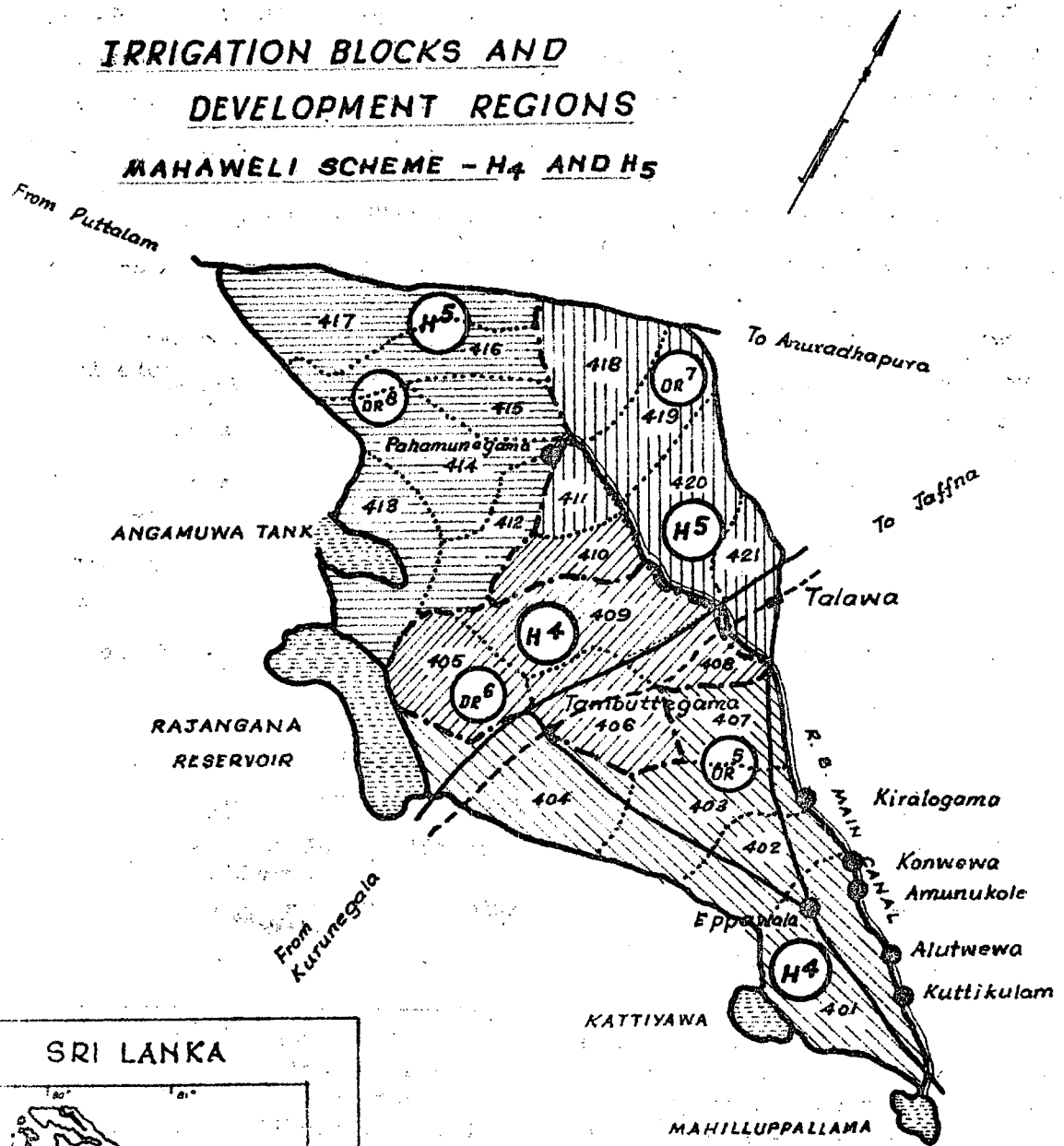
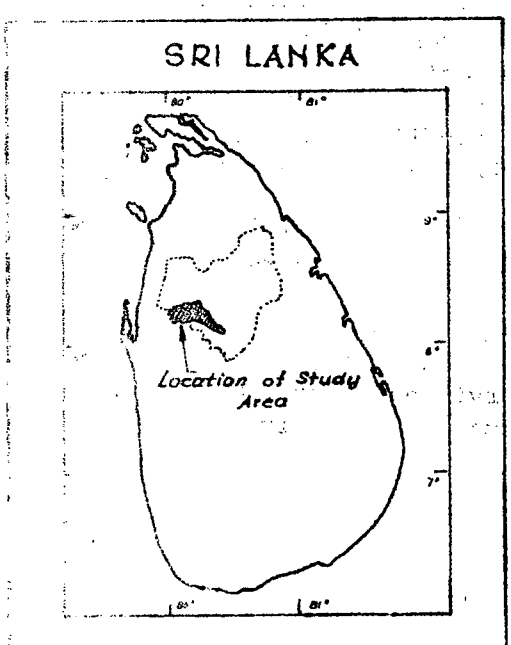
[1] Each Development Region is about 8000 to 12000 acres in extent, and this extent is considered by the MDB to be a convenient unit for the proper operation and management of the irrigation systems. A Development Region generally falls into the settlement profile mapped out by the MDB and consists of a township, village centre, and hamlet which are arranged in accordance with the irrigation layout. Each hamlet would consist of about 100 to 125 families, 4 to 5 hamlets clustered together would form a village centre and several village centres constitute a township. At the village centre (cluster of 4 to 5 hamlets) most of the supporting services such as branch cooperatives, storage facilities, Agricultural Training Centres etc. would be located. The largest service centre would be the Township servicing about 3000 to 4000 families. It would have facilities of primary cooperatives, storage, milling plants etc.

IRRIGATION BLOCKS AND DEVELOPMENT REGIONS

MAHAWELI SCHEME - H_4 AND H_5





REFERENCE

- DR = Development Region
- = Tank
- = Road
- = Railway line
- = Canal

Since these Development Regions generally fall into the settlement profile mapped out by the MDB for system H and development planning would be based on such Regions, it is appropriate to use these Development Regions as distinct land units for purposes of the survey. Taking these into consideration a single-stage stratified random sampling design was used for the survey with the Development Regions 5,6,7 and 8 (fig. 2) as the strata and households as the sampling unit.

Table 1.1 shows the distribution of households according to Development Regions and Irrigation Blocks comprising H4 and H5 areas.

Table 1.1 Distribution of sample households in H4 & H5 areas

Development Region	Irrigation Block No.	No. of Households in a Development Region	Sample size
5	401 402 403 404 407	2637	180
6	405 406 408 409	1804	125
7	410 411 418 419 420 421	1476	103
8	412 413 414 415 416 417	1505	104
TOTAL		7422	512

1.3.2. The Sampling Frame

The Food Controller's list of households was the only frame available for the selection of the sample. The only other alternative would have been to do a complete enumeration of the area which was not possible given the time constraints. This frame has some short-comings, the more important being some inconsistencies in the enumeration of multiple household dwelling units. Few instances were found where multiple households were shown separately in the list while in other cases they had been entered as one household. It was, therefore, decided that if a selected household refers to either a household within a dwelling unit or a complete dwelling unit, then that household would be surveyed if, in its farming activities and/or spending, it forms a separate unit from the other households of the dwelling. If, however, more than one household within a dwelling unit combine in the farming activities and/or spending of that dwelling, then these households combined would be considered as a'household' for the purpose of this survey.

1.3.3. Sample Size

Due to limited manpower resources and the necessity to complete the survey before the start of the development work in the survey area, a sample of around 500 households (7%) was considered feasible. This sample was allocated among the strata proportional to the size of population (Table 1.1).

1.3.4. Data Collection

A pre-tested structured questionnaire was utilised for collecting information on agronomic and economic conditions prevalent in the area for the period April 1977 to March 1978. This reference period covers two cropping seasons viz. *Yala* 1977 and *Maha* 1977/78.

Field work commenced in April 1978 and continued for a period of one month. The services of fifteen trained investigators were obtained to administer the questionnaire. Their work was closely supervised by four Research Officers who were in the field throughout the survey period. Information generated by the main survey was supplemented by the data collected by another questionnaire administered to the Land Officers of the MDB working in the study area. The latter was primarily concerned with non-farm enterprises and infrastructural facilities such as health, education etc. available in the area.

One *purana* village was studied in order to obtain a general view of the social structure and its changes in the study area. This necessarily would raise the question as to how one could generalise for the whole region with the findings from a single village. Interaction systems of communities develop in compliance with the physical, climatic and demographic factors of a ecological given area. In that sense, we found H4 and H5 areas to be a single ecological area. Therefore, the structures of its communities, eg. base of local groups, land tenure patterns and economic organisation cannot vary very much from one another. Therefore, an in-depth study of one of the communities in the region should throw some light on the general characteristics of the whole area. The *Tambuttegama* village was selected for this purpose. This village was chosen for two main reasons :

(i) It is the largest traditional *(purana)* village in the study area;

(ii) It is one of the villages that will be developed into a township after the Mahaweli Development Project is completed. Thus it will retain it's identity for future studies.

This village study was done by a Research Officer (a Sociologist) with the assistance of two investigators trained in sociological methods. Their methodology involved living in the village and having informal interviews with the villagers. Additional data was collected with the help of a structured questionnaire and from official documents.

2. THE STUDY AREA

2.1 LOCATIONAL CHARACTERISTICS.

The study area encompasses the sub-areas H4 and H5 of the Irrigation System H.

The Irrigation System H is located in the North Central Dry Zone of Sri Lanka within Kala Oya basin about 10 miles South West of Anuradhapura. The lowland is presently cultivated with paddy, largely under small village tanks. Unirrigated highlands are mostly under scrub jungle and shifting cultivation *(chena)* is practised on such lands. These lands lie in proximity to existing major irrigation works of Kandalama Wewa and Kala Wewa servicing about 45,500 acres of land. These two tanks regulate the water supply to the H - area and are closely interlinked with the areas to be developed which, in the H - area, is estimated around 106,000 acres. The principal sources of water for the H - area are the local inflows of streams in the area and diversions from the Mahaweli Ganga via the Polgolla and Bowatenna Complexes.

The available road network is relatively well developed on the Right Bank of the Kala Oya as compared to the Left Bank. Two railroads from Colombo, namely the Northern and Eastern lines traverse through the area and have four railway stations in this area at present. The existing settlements found in the H - area are mostly in *purana* (traditional) villages, with traditional patterns of clustered homesteads located in proximity to small village tanks. *Chena* lands, which form the other major component of such settlements are generally away from the main villages. Cultivation of paddy in lowlands under village tanks and other field crops in *chenas* form the principal occupation of the resident population during the *Maha* Season. (A description of the climatic conditions and the soils of the area is given in APPENDIX 1.)

The study area (ie) H4 and H5, is covered by 21 Irrigation Blocks from 401 to 421 with H4 consisting of Blocks 401 to 410 and H5 from 411 to 421. Total study area consists of 40,300 acres, with the individual Blocks ranging from 1750 to 2250 acres. The distribution of land and resident families in the study area as at 1977 is given below.

	H4	H5	Total
Gross area to be developed (acres)	23,200	17,100	40,300
Number of resident families	4,764	2,658	7,422
Estimated population	29,060	15,071	44,131

A network of village tanks provide the people with water for farming, livestock needs and general household chores like washing, bathing, cooking etc. Over a hundred village tanks serving H4 irrigate about 5650 acres. Of them, about 40 are fed by a major irrigation canal (Yoda - Ela) and benefits 3100 acres of lowland paddy. Nearly all the tanks in H5, numbering about 50, are rainfed and these form the principal source of water for about 3350 acres of paddy land in the area where a single paddy crop in *Maha* season is taken in most years. Accordingly, only about a tenth of gross acreage in H4 and about fifth in H5 are irrigated by the rainfed village tanks and that too only in the *Maha* Season. Above shows that, in the study area as a whole, the rainfed village tanks service about 15% of the total gross area to be developed and that too only for one season. The *Yoda Ela* fed tanks irrigate about 8% of the total land usually in both seasons. The traditional land utilization in the study area is characterised by a threefold system.

(i) Irrigated paddy in lowlands
(ii) Village homesteads on high lands
(iii) *Chena* plots in jungle patches.

2.2. INFRASTRUCTURE

Available infrastructure like schools and medical institutions and other facilities such as postal and banking are described briefly below.

2.2.1 Educational needs of the study area are provided by 34 schools. These institutions fall into three categories of schools namely, Primary (upto Grade 5), Junior (Grade 6 to 9) and Senior Secondary (Grades 10 and 11).

The school enrollment in 1978 is given in Table 2.1 below.

Table 2.1 School enrollment in H4 and H5 areas in 1978

Type of School	H4 No. of Schools	H4 No. of Pupils	H5 No. of Schools	H5 No. of Pupils
Primary	07	984	04	418
Junior	07	1927	11	2095
Senior Secondary	02	2353	03	2891
TOTAL	16	5264	18	5404

Information relating to field of training of the teaching staff of these schools shows a dearth of science graduate teachers in the area, where of the 96 graduate teachers only 2 are qualified in science (Table 2.2)

Table 2.2 Distribution of teachers according to field of training - 1.1.1978

Qualification of Teacher	H4 Science	H4 Arts	H4 Total	H5 Science	H5 Arts	H5 Total
Untrained	11	24	35	08	33	41
Trained	04	97	101	15	52	67
Graduate	02	44	46	00	50	50
TOTAL	17	165	182	23	135	158

The existing pupil-teacher ratio[1] of 31.4 is higher than the national average of 21.7 and the district average of 23.3[2]. This is not surprising, considering that the area covered is relatively undeveloped without the basic infrastructural facilities - Table 2.3

Table 2.3 Pupil - Teacher ratios - 1.1.1978

Area	Teachers No.	Teachers As a % of District No.	Pupils No.	Pupils As a % of District No.	Pupil-Teacher Ratio
H4	182	4.6	5264	5.7	28.9
H5	158	4.0	5404	5.8	34.2
H4 & H5	340	8.6	10668	11.5	31.4

[1] Pupil - Teacher Ratio = $\frac{\text{No. of Pupils}}{\text{No. of Teachers}}$

[2] School Census 1977, as quoted in "Statistical Profile of Children - 1977 Sri Lanka" - Dept. of Census and Statistics.

2.2.2 Health services are mainly provided through a number of state-run out-door dispensaries and rural hospitals, details of which are given below - (Table 2.4)

Table 2.4 Rural hospitals and out-door dispensaries - 1.1.1978

Area	No. of Hospitals	No.of beds	No. of Dispensaries	Average No. of beds per 1000 population	Population per Dispensary
H4	02	49	03	1.7	7265
H5	02	66	03	4.4	5024
H4 & H5	04	115	06	2.6	6304

The average bed strength of 2.6 beds per 1000 population for the rural hospitals in the study area is lower than the district and national averages of 3.5 and 3.0 respectively.[1] Records available with the medical institutions in the area show that the number of malarial cases treated in these institutions in 1977 was around 160 per 1000 population with H5 having a higher ratio than H4. Furthermore, a large number of indegenous (Ayurvedic) medical private practitioners dispense the medical needs of the people of the area. It is a common occurrence to find a number of such practitioners in every village settlement and often provide specialised treatment against snake bites, fractures etc.

2.2.3 Postal facilities available are limited with three Post Offices in H4 serving over 29,000 persons and the situation being relatively better in areas under H5 with four Post Offices serving about 15,000 persons. Telephone facilities are sparse with only one Post Office in H4 and two in H5 having telephone connections.

2.2.4 The two State Banks - The Bank of Ceylon and Peoples Bank operate a number of branches - three in H4 and five in H5. The number of accounts opened with these Banks in 1977 averaged 325 per 1000 population with H5 having four times as much as H4 (Number of Accounts in H4 averaged 160 per 1000 population). The greater number of bank accounts reported from H5, perhaps reflects the affluence of farmers in *Pajangane* Colonization scheme that adjoins this area.

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[1] Ministry of Health as quoted in "Statistical Profile of Children - 1977 Sri Lanka" - Dept. of Census and Statistics.

Furthermore, the fact that nearly a third of the population has had bank accounts suggests that the banking habit is catching on with the farming population of the area.

2.2.5 Altogether 27 multi-purpose cooperative societies serve in the area, and the average number of people served by them is given below.

	H4	H5	H4 & H5	H
Number of multi-purpose co-operative societies	13	14	27	84
Average number of people served by a cooperative society	2235	1076	1635	1500*

* The number of people served by a cooperative society for the undeveloped lands of the H - area is about 2500.

Cooperative societies play a vital role in the life of rural communities, as these institutions supply their basic needs such as food and clothing. In addition, they serve as the focal points for channelling production credit as well as other agricultural inputs and act as the marketing outlet for paddy.

2.2.6 The maintenance of law and order is the responsibility of the two Police Stations located in the area - one each in H4 and H5. The strength of police personnel appears to be inadequate with 1.4 officers per 1000 population in H4 and 2.7 in H5.

2.2.7 Serviceable tractors and trailors and other infrastructural facilities available in the study area are shown below.

	H4	H5
Tractors : 2 Wheel	95	14
4 Wheel	15	18
Trailers : 2 Wheel	67	12
4 Wheel	12	15
Tractor Repair Shops	3	3
Petrol Stations	1	2
Paddy Stores	3	0
Paddy Mills	20	11

The average gross extent of land that could be developed with an available tractor irrespective of its type (i.e. whether 2 wheel or 4 wheel) would be 211 and 534 acres respectively in the H4 and H5 areas.

While 6 tractor repair shops (3 each in H4 and H5) employing 24 persons offer repair facilities to tractors, a single petrol station in H4 and 2 in H5 provide the Petrol/Diesel to the vehicles and offer servicing facilities to them; H5 area had no paddy stores while the stores in H4 provide for a storage capacity of about 250,000 bushels of paddy. 31 paddy mills, 3 of which are registered with the Paddy Marketing Board, offer milling facilities for paddy in both H4 and H5 areas, and provide employment to about 150 persons.

2.2.8 Some of the non-farm activities in the area include :

	H4	H5
Bakeries	10	11
Brick Making Centres	01	02
Saw Mills	01	--
Handloom Centres	01	01
Pottery Centres	09	--
Jewellery Making Centres	02	01
Motor Vehicle Repair Shops	06	02
Bicycle Repair Shops	16	17

All these activities provide employment to about another 225 persons.

3. HOUSEHOLD CHARACTERISTICS

This chapter concentrates primarily on the demographic features of the households, housing conditions, accessibility to service centres, and ownership of household items, farm equipment, and livestock.

3.1. DEMOGRAPHIC FEATURES

The population within the study area is currently estimated around 45,000 persons. Around 5% of heads of households had migrated to the study area after the initiation of the Mahaweli Development Scheme in 1971. The overall migratory pattern shows that 43% of the households had migrated to this area within three decades prior to 1970, principally from districts like Kurunegala, Anuradhapura itself, Colombo, Kandy, Galle and Kegalle in that order. Regionally, this means that 63% of household heads in Region 6, 44% in Region 5, 34% in Region 7 and 26% in Region 8 are migrants to these areas. A great majority of the inhabitants in the study area are Sinhalese Buddhists (over 99%).

Some of the basic demographic indicators are presented in Table 3.1.

Table 3.1 Basic demographic indicators of the sample households

Demographic indicators	All Regions	REGIONS 5	6	7	8
Av. Household size	5.9	6.0	6.2	5.6	5.7
Av. Family size	5.3	5.3	5.7	5.1	5.2
Sex Ratio (Masculanity Ratio per 100 females)	100.0	95.8	100.0	118.2	91.7
Crude Birth Rate per 1000 population	27.4	32.0	29.8	17.6	25.4
Crude Death Rate per 1000 population	4.7	4.7	2.6	8.8	3.4
Rate of Natural Increase per 1000 population	22.7	27.3	27.2	8.8	22.0

The average household size of the study area of 5.9 persons is almost the same as the average household size of the Dry Zone rural sector in the survey of Sri Lanka's Finances, 1973. The rate of natural increase of 22.7 per 1000 population seen here is considerably lower than the Anuradhapura district average figure of 31.4.

This is due to the lower birth and death rates prevailing in the area. In this regard, the extremely low rate of natural increase of 8.8 per 1000 population seen in Region 7, compared to the other three Regions is a noteworthy feature. This particular Region is mostly under scrub jungle with a sparse population characterised by a high component of males as shown by the sex ratio of 118.2. The predominance of males coupled with a high crude death rate are the main underlying reasons for the very low rate of natural increase seen in Region 7. In contrast, Regions 5 and 8 have a high proportion of females. The higher female component in the population seen here is likely to influence the future labour supply situation in these two Regions.

3.1.1 AGE STRUCTURE AND DEPENDANCY

Analysis of the age - structure (Table 3.2) indicates a "youthful" population with children (under 14 years) and youth (14 to 25 years) together forming 67% of the population. Children under 14 years constitute 40% of the total household members and the proportion of working ages (i.e) 14 to 65 years is around 58%.

Table 3.2 Age structure and dependancy ratios of sample households

Area	All ages	Age-groups				
		0-13	14-25	26-65	66 & over	Dependency Ratio (R)
All Regions	100.00	39.4	27.6	30.1	2.9	0.73
Region 5	100.00	38.3	27.6	31.3	2.9	0.69
Region 6	100.00	42.1	26.4	28.6	2.9	0.81
Region 7	100.00	36.4	28.9	30.5	4.2	0.65
Region 8	100.00	41.8	27.1	29.4	1.7	0.76

A very significant aspect of this youthful age - structure is the fairly high dependancy ratio[1] of 0.73 (ie) approximately 100 persons in the productive ages (14 - 65 years) have to support 73 dependents in terms of food, clothing, health, education and the like. This shows that in the study area, as in Sri Lanka as a whole, (where the young age-group is disproportionately large), the burden of supporting the two unproductive ends of the age scale (ie the young and the old) fall on relatively small proportion in the working ages. The presence of a youthful population with a preponderence of children has also implications for the Project administration, as heavy investments on social overheads for education, health, childcare and recreation etc. are required in the initial phase of project implementation.

The age-pyramids of the four Development Regions are shown in (Fig.3). In a normal population (ie) a population not much disturbed by migration and violent changes in birth or death rates, one may expect the proportion of persons in each successive age-group to be less than in the previous one. However, the age-pyramids in fig. 3 show that proportion of people in certain age-groups are more than in the preceding groups showing certain amount of migration and changes in birth or death rates.

3.2 HOUSING

The general housing conditions in the area are poor. A majority of the dwelling houses are traditional type of village houses with mud walls and thatched roofs.

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[1] Dependency Ratio, R is defined as :

$$R = \frac{\text{Young (0 to 13 years) + Old (66 years and over)}}{\text{Segment of working ages (14 to 65 years)}}$$

This implies the degree of burden of dependency potentially imposed upon the population of working ages. In other words, this ratio to some extent measures the impact of the age composition on the economic activity of the people of the area. This segment of 14 to 65 years for the working age group is considered reasonable for this area as it is a predominantly agricultural population.

AGE PYRAMIDS OF HOUSEHOLD MEMBERS

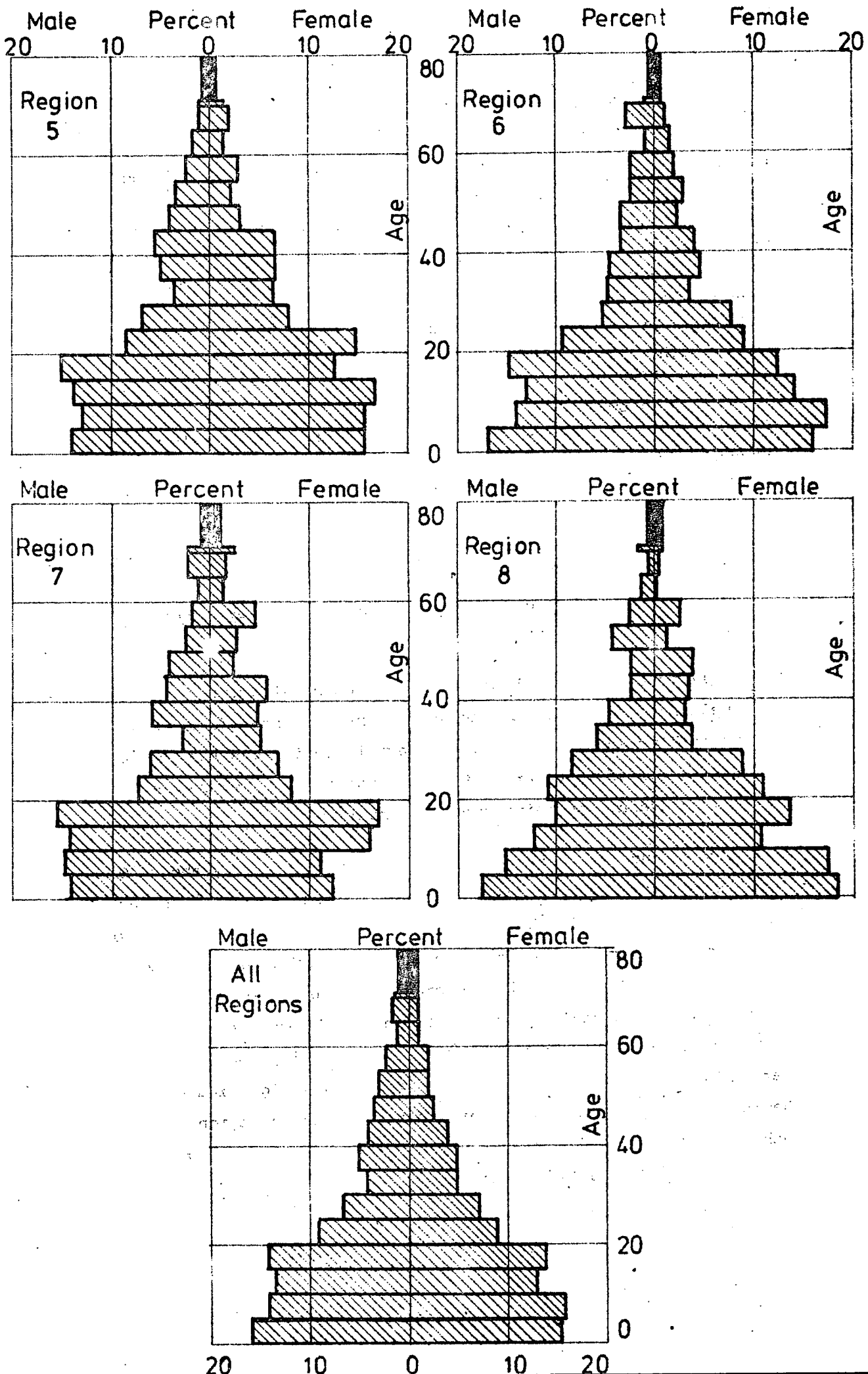

Table 3.3 Nature of housing

Nature of houses & facilities available	REGION 5		6		7		8		All Regions	
	No.	%	No.	%	No.	%	No.	%	No.	%
Houses with permanent walls	35	19	26	21	26	25	19	18	106	21
Houses with permanent roof	37	21	22	18	27	26	17	16	103	20
Houses with separate kitchen	138	77	96	77	76	74	69	66	379	74
Houses having own well	59	33	40	32	25	24	37	36	161	31
Houses having a lavotory	58	32	49	39	27	26	17	16	151	29
Houses with electricity	4	2	2	2	2	2	7	7	15	3
Accessibility to house by a motorable or cart road	147	82	99	79	83	81	86	83	415	81

Only a fifth of dwelling houses have permanent structures. Often the dwellings are one-roomed houses and nearly three fourths have detatched kitchens. Electricity is available in less than 3% of the houses all of which are situated close to town centres of Talawa, Eppawala, Nochchiyagama and Tambuttegama.

Sanitary arrangements are very unsatisfactory with only about 30% of houses having lavatories, of which more than three fourths are pits. In this regard, the situation in Region 8 is very acute with only about a sixth of the houses having lavatories and that too mainly open pits. Statistics regarding incidence of diseases due to poor sanitary conditions are not available. However, an analysis of the number of days lost by family labour during the Maha 1977/78 season due to ill health indicates a relatively high figure in Region 8. Perhaps the poor sanitary conditions in Region 8, among other factors, explain the higher number of labour days lost due to sickness in that particular Region.

The provision for drinking water is satisfactory, as 95% of the households use well water for this purpose. Though only a third of the households reported owning wells, the others rely on neighbouring wells for drinking purposes. Village tanks are the main source of bathing water.

3.3 ACCESSIBILITY TO SERVICE CENTRES :

In view of the importance of accessibility of farm households to service centres, this aspect was examined in detail and the relevant data are presented in Appendix 3. It is seen that over 81% of houses are accessible by a motorable or cart road. The bus forms the principal form of travel to and from service centres and presently this area is serviced by a fairly extensive network of bus routes. In fact 84% of households are within a mile and all households are within 5 miles from a bus route. The study area is served by two Railway Stations at Talawa and Tambuttegama on the Northern line and Regions 6 and 7 benefit most from them at present. Region 5 is furthest away from the Railway where only a fourth of the households are within 5 miles from a station.

The proximity of households to some basic service institutions and facilities are summarised in Table 3.4.

Table 3.4 Percentage distribution of households according to distance from basic service Institution/facility

Service Institutions/ facility	Percentage of Households within	
	1 mile	5 miles
School	78	100
Hospital/Dispensary	36	98
Post Office	37	96
Cooperative	63	100
Shopping Centre	44	92
Bus route	84	100

It is observed that the households in the study area as a whole have ready access to basic service centres and other facilities irrespective of the Regions. However, in the case of some specific service institutions such as Banks, Police Stations and Village Fairs *(Polas)*, Regional differences are evident. Three fourths of the households are located within 5 miles of a Bank. But in the case of Regions 6 and 7 over a third of the households have to travel upto 10 miles to a Bank. The study area is served by two Police Stations which are located in Regions 6 and 8. Consequently households in Regions 5 and 7 have to travel longer distances to a Police Station.

A number of village fairs *(Polas)* operate throughout the study area. These institutions serve as focal points for marketing of agricultural produce from Chenas and homesteads. Nearly all households in Region 6 are within 5 miles of a fair, while only a little over half are within this range in other Regions.

3.4 OWNERSHIP OF HOUSEHOLD ITEMS

As household items like Radios, Sewing Machines, Bicycles etc. are valuable assets to a rural household, a measure of such items would be a fair proxy for their current economic status. The details in respect of available selected household items are given in Table 3.5.

Table 3.5 Region-wise distribution of household assets

Item/Transport facility	No. of items/transport facilities per 100 households.					
	R E G I O N					
	5	6	7	8	All	3
Wall Clock	21	22	23	15	20	
Petromax Lamp	27	38	39	23	31	26
Radio	43	51	50	34	45	50
Sewing Machine	23	27	23	22	24	13
Kerosene Cooker	4	4	8	3	5	
Almirah	23	23	29	18	23	
Drawing Room set (atleast 3 pieces)	31	38	34	25	32	
Bicycle	52	52	43	40	48	49
Cart	9	18	12	5	11	10
Motor Cycle	1	2	--	--	1	
Lorry	1	1	2	--	1	
Car	2	2	1	--	1	

Note : Underlined figures show the Region with the highest figure.

A comparison of household items in the study area with those reported from settlers in Region 3 of the H-1 area[1] (which has already enjoyed three cultivation seasons with irrigation) shows that the households here are relatively better off economically than those in H-1. On a Regional basis, households coming under Regions 6 and 7 appear to have a higher economic standing than Region 8.

3.5 OWNERSHIP OF FARM EQUIPMENT

Farmers own only a very limited range of agricultural appliances as shown in Table 3.6

Table 3.6 Region-wise distribution of farm equipment owned

Agricultural Implements	REGIONS 5	6	7	8	All	3
	(No. per 100 households)					
Mammoty	213	244	215	234	225	
Plough	66	29	51	42	49	105
Sprayer/Duster	5	2	6	2	4	
Tractor (4 wheel)	2	--	2	1	1	
" (2 wheel)	2	1	--	--	1	5
Water Pump	4	1	2	--	2	

A sprayer/duster is owned by 1 in 25 households while only 1 in 100 households owned a 2 - wheel/ 4 - wheel Tractor.

3.6 LIVESTOCK

Rearing of buffaloes for farm power is the main livestock activity seen in the area - Table 3.7.

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1 Factors influencing the cultivation of subsidiary foodcrops in Mahaweli H - area. (forthcoming ARTI publication)

Table 3.7 Region-wise distribution of livestock owned

Livestock	REGION 5	6	7	8	All
	(No. per 100 households)				
Bulls	23	2	11	18	20
Cows	15	19	90	29	34
Buffaloes	63	64	78	32	60
Goats	6	3	6	--	4
Pigs	3	--	--	--	1
Poultry	43	120	26	14	53

Commercial livestock farming is hardly developed in any of the Regions. Complementary livestock enterprises in the form of Dairy Farming, Poultry and Pig Keeping appear to be in a dormant state. The extreme fluctuations in climatic conditions, absence of institutional arrangements for marketing of livestock products together with religious prejudices of the people appear to act as constraints for development of animal husbandry on a commercial basis.

4. LABOUR FORCE, EMPLOYMENT & INCOME

This chapter intends to examine the nature of the labour force as well as particulars of employment and income structure among the sample households.

4.1 AGE AND SEX-WISE COMPOSITION OF THE SAMPLE HOUSEHOLDS

The total population under consideration in the study sample amounts to 3033 persons, of which half are males- (Appendix 2).As shown earlier, those falling within the age group of 14-65 years comprise 58% of the population and within this group, there occurs a preponderance of the younger age categories. This is in general conformity with the situation elsewhere in the country. Such a marked youthfulness of the community would have a number of implications on the development strategies to be adopted. An important aspect in this regard would be the impact of a youthful population on the labour supply-demand situation in the area. The adult family members available for attending to farm work account for only about half the population in the area. Furthermore, the planning for provision of welfare services to the community such as education, health and nutrition etc. has to take cognisance of the special needs of this young population.

4.2 EDUCATIONAL STATUS OF THE SAMPLE HOUSEHOLDS

A little over 70% of the heads of households in the area are both able to read and write. Among the younger members of the households the literacy rates are still higher. The data gathered in the survey on the level of formal education of the family members showed that around 86% of the individuals above five years of age, either had attended or currently attending schools. Of those with no schooling, slightly over half belong to the older age group of 30 years or more and two thirds are females. As seen below only 8% have passed the G.C.E.(O.L) or a higher examination.

Table 4.1 Distribution of levels of education attained[1]

Levels of Education	REGION 5	6	7	8	All Regions
No Schooling (%)	15.5	14.8	12.6	13.1	14.3
Upto Grade 5 (%)	63.0	64.4	54.6	62.9	61.8
Grade 6 to GCE (O.L) (%)	12.8	13.7	22.4	17.0	15.6
Passed GCE (O.L) & above (%)	8.7	7.1	10.4	7.0	8.3

4.3 SCHOOL ATTENDANCE ACCORDING TO AGE-GROUP.

Of the total household members only a quarter is attending schools at present. Within the age-group of 14 to 30 years, the data shows that 92% had received a formal education. Taking the school-going population as a whole, it can be clearly seen that as the age advances the school-going rate shows a clear reduction. For instance, among the children of 12 - 14 years of age in the study area, about 32% do not attend school at present. This figure rises to 56% in the next age-category of 15 - 17 years. The data does not reveal a substantial difference in school attendance rates between male and female children. Poor economic base of the family, coupled with inadequate schooling facilities available in the area seem to be among the major determinants of early school drop-out. A temporary drop in school attendance is also noticeable during peak periods of cultivation such as land preparation, sowing and harvesting. During these periods, the younger members of the farm family assist their parents in their farm work.

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[1] A Region-wise breakdown of the educational status of the sample households by age-group and sex is given in Appendix 4 (Four tables)

Table 4.2 Level of school attendance of the school-going members of the sample households

Age-Group (Years)	Male		Female		Total	
	No.	% attending school	No.	% attending school	No.	% attending school
< 6	235	10	236	9	471	9
6 - 8	133	88	150	73	283	88
9 - 11	115	87	11	84	231	85
12 - 14	136	70	142	65	278	68
15 - 17	98	47	113	42	211	44
18 - 20	150	19	137	13	287	16
21 - 23	85	4	79	6	164	5
All age groups	1516	27	1517	27	3033	27

4.4 LABOUR FORCE

The labour force analysis presented below includes all adults between the ages of 14 - 65, excluding students, invalids and the like. The data shows that the labour force constitutes approximately 58% of the household members.

	No. of individuals	%
Average household size	5.9	100
Those in the labour force	3.4	58
of which		
Male labour	1.7	29
Female labour	1.7	29

The labour force under consideration was further categorised on the basis of it's age composition (Table 4.3).

Table 4.3 Age-wise distribution of the labour force

Age Group (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
14 - 19	240	27	239	28	479	28
20 - 25	173	20	183	21	356	20
26 - 35	168	19	188	22	356	20
36 - 45	139	16	138	16	277	16
46 - 55	105	12	73	8	178	10
56 - 65	57	6	45	5	102	6
TOTAL	882	100	866	100	1748	100

Marked youthfulness of the potential labour force is an important feature emerging from the above data. Individuals between 14 - 25 years of age constitute half the potential man-power in the study area, while those between 14 - 19 years of age is about 28%. The labour - force belonging to the older age-group ie. those above 35 years, comprise only a third of the total available man-power. Such a labour force with a predominance of youthful man-power can in general be expected to be associated with aspirations and expectations aligned more towards the modern society rather than to those found in the traditional village society. Hence in designing programmes to provide employment to the population under consideration, this aspect needs to be borne in mind.

For a further analysis of the labour force, it was studied under two sub-categories namely, economically active and economically not active. The first group comprises of all persons of 14 years of age or older but under 66 years of age and of both sexes that form the man-power which could be deployed in the production of goods and services in the area. The second group comprising of the economically not active, includes housewives, students, Buddhist monks and disabled persons. In this particular analysis unemployed also belong to the economically active category and includes those having no job at the time of survey, having lost a previous job and/or looking for jobs for the first time. (Table 4.4)

Table 4.4 Economically active and economically not active members of sample households

Category	Male		Female		Total	
	No.	%	No.	%	No.	%
Economically active:						
Income earners	498	33	50	3	548	18
Not income earners	180	12	76	5	256	4
Un-employed	75	5	121	8	196	7
Economically not active:						
Housewives & family helpers	--	--	502	33	502	16
Students	414	27	412	27	826	26
Other (invalids old etc.)	349	23	356	24	705	23
All	1516	100	1517	100	3033	100

The magnitude of the economically active population forms one of the measures relating to the supply aspect of the labour force. In other words, it indicates the number of individuals available for work. From the above data, it is seen that nearly 50% of the male population belongs to the economically active group, while in the case of females the relevant figure is as low as 16%. The very low rate of economic activity of the female population in the area is noteworthy. Being a typically rural agricultural area, females of these households are mainly employed as housewives and family helpers (33%). However during the periods of peak farming activities, they also do participate in activities in their farms. In many instances, they even work as hired labourers during these periods. Table 4.4 also reveals that only about a fifth of the sample are income earners. Hence the remaining four fifths is dependent on this group of income earners. Furthermore, it is also seen that the income earners in the area are predominantly males. Among females only a mere 3% had reported as income earners.

The overall unemployment rate in the study area is seen to be around 7%. The unemployment rate among males is slightly lower (5%) than the females (8%). It may be noted that the levels of unemployment indicated here may perhaps be a slight under estimation of the actual level of unemployment, since this figure does not include the seasonal unemployment which is invariably seen in a predominantly agricultural community such as the present.

The data also shows that as much as 73% of the total households surveyed are directly dependent on agriculture, thus showing the potential role of agriculture as the principal source of employment to the labour force in the area. Within agriculture, paddy forms the dominant activity reported by 54% of the total household units.

A sector-wise analysis of the labour force in the area also confirms the importance of agriculture as a means of providing employment (Table 4.5). About 81% of the entire labour force is engaged in agricultural activities.

Table 4.5 Classification of the labour force according to sectors

Sector	%
Agriculture	81
Government	6
Commerce & Trade	5
Manufacturing	1
Electricity and water	2
Transportation and communication	3
Others	2
	100

Employment in the Government sector accounts for 6% of the total employment and other sectors are only marginally developed at present. With the envisaged development of this area, the sectoral composition of the labour force shown here is likely to undergo marked changes in the future. The data clearly indicates that the non-farm employment sector is extremely weak at present. A major reason for this being the absence of any major industrial enterprises dependent on agricultural or non-agricultural raw materials as seen in chapter 2. As will be seen later, the non-farm sector is mainly restricted to the traditional employment types in the rural areas.

As already mentioned, the non-farm sector as a means of providing gainful employment to the households is almost negligible. Except for a handful of servicing units such as small rice mills, cycle repair shops, eating houses, bakeries etc. the study area at present does not possess any industries or any other non-farm activities of substantial magnitude. The only important type of employment seen outside agriculture is constituted by different types of white-collar employment in the government sector such as teachers, postal employees etc.

Table 4.: Distribution of types of non-agricultural employment

	No. of individuals
White-Collar employment	20
Traders and Boutique Keepers	14
Drivers	11
Workers in Cooperatives	6
Watchers	7
Mechanics	6
Carpenters	6
Peons & similar grade	3
Bakery workers	3
Barbers	1
Timber sawyers	2
TOTAL	79

4.4.1 EDUCATIONAL ATTAINMENTS OF THE LABOUR FORCE

The level of education attained by the labour force forms an important measure of the labour force reflecting their attitudes, quality of work, output and levels of management etc.

Table in Appendix 5 shows the educational status of the labour force classified by age and sex. It is seen that of the older individuals between 60 - 65 years of age in the labour force, one half had not been exposed to a formal school education. In the youngest group 14 - 19 years, the corresponding number is about 13%. In 90% of the cases in the labour force within the area, the education received lies below the G.C.E. (O.L) and the individuals who have passed G.C.E (A.L) were almost negligible - less than one percent. The low percentage of the labour force who had higher educational qualification such as G.C.E. (O.L) is perhaps due to out-migration of such persons in the area due to lack of opportunities available for them to pursue their education further or to secure jobs outside the study area. It may also be due to the high drop-out rate arising from poor economic conditions of the families. The survey also reveals that individuals in the study sample with some training or skills outside the formal schooling, counts for less than one percent of the labour force.

Investigations on the preference pattern for employment of the members of the labour force clearly showed that they expressed a distinct preference for employment in the public sector. Infact, agriculture seemed to have received the least priority by the younger members of the labour force. The main reasons given by them for this preference for public sector employment were the stability and security of income offered by these jobs as well as to their reluctance to associate with tasks involved in farming. However, its clear that within the foreseeable future, agriculture, undoubtedly, would form the main source of employment. Hence a majority of the young labour force in the area would still have to remain in farming due to lack of other alternative employment opportunities in their villages.

4.5 INCOME

4.5.1. SOURCES OF INCOME IN THE AREA

A classification of the sample households according to the source of income is given in Table 4.7. It is observed that 7 out of every 10 households in the study area depend on cultivating their lands as their primary means of income and nearly three fourths of these households depend on paddy cultivation. A Region-wise break down of this data shows that the highest dependency on agriculture is seen in Region 8 with 83% while in Region 5 this is lowest (68%). Nearly a tenth of the households depend on regular sources of income from their permanent employment elsewhere, supplemented by incomes accrued from cultivation of paddy or other crops. Of the households investigated around 5% reported that hiring out labour as their sole source of income. They are either landless or with small extents of highland not suitable for regular cultivation at present. Many of them are involved in either cutting channels or engaged in construction work in the Mahaweli Project. Another 11% of the households derive their incomes chiefly from non-agricultural pursuits.

Table 4.7 Classification of households according to income sources

Major means of Income	Basis	% of Farmers reporting in Region 5	Region 6	Region 7	Region 8	Whole area
1. Entirely Agric. Households	Paddy	54	44	54	67	54
	Non-paddy	14	26	21	16	14
2. Regular income earners	Permanent employment supplemented by paddy	4	2	5	5	4
	Permanent employment supplemented by Non-paddy	2	12	3	2	4
3. Hiring out labour	Supplemented with some paddy	4	-	-	1	2
	Supplemented with income from non-paddy	2	3	1	4	3
4. Other non-Agricultural pursuits	With small extent of Home garden crops	6	5	4	1	4
	Without any form of cropping in Home gardening	12	7	6	4	11
ALL		100	100	100	100	100

4.5.2 LEVELS OF INCOME

The average gross income per farm during the year under reference was about Rs.5200/- which amounts to a gross income of about Rs.880/- per capita per annum in the study region. Here, it may be noted that the national per capita income during 1977 averaged to about Rs.860/-. The average composition of the farmers gross annual income in the study area is given below..

Table 4.8 Composition of the average annual gross farm income

Item	Amount per farm (Rs.)	%
Income from farming	3439	66
Hiring out labour for agricultural work	143	3
Hiring out labour for non-agricultural work	519	10
White-Collar jobs	565	11
Self employment	288	5
Others	266	5
	5220	100

About 66% of the income in the area is currently derived from domestic agricultural production. Incomes derived from hiring out labour of the farm households is relatively high (13%). At the time of data collection some amount of preparatory work in Mahaweli Project - such as land clearing, building construction and channel cutting etc. had been just initiated and this had created new employment opportunities for the man-power available in the area during the off-farm seasons. The income information also shows that the earnings from self-employment during the year under reference is as low as Rs.288/- per farm.

Since farming constitute the main source of income for a majority of households in the study area, the income derived from this source is classified by source as well as season. (Table 4.9)

Table 4.9 Composition of average annual gross agricultural income per farm by season

Source	Yala 1977		Maha 1977/78		Annual	
	amount (Rs.)	%	amount (Rs.)	%	amount (Rs.)	%
Paddy	765	63	1509	68	2274	66
Highland	67	5	112	5	179	5
Chena	374	31	591	27	965	28
Livestock	11	1	10	-	21	1
	1217	100	2222	100	3439	100

This data again emphasises the predominance of farm income from paddy cultivation in the area in both Yala and Maha seasons. Infact, almost two thirds of the gross income per farm is accounted for by paddy. However in Yala, the income from paddy is half that of Maha. Chena cultivation form the second most important source of agricultural income to the farmer averaging to about Rs.1000 per farm per year. Currently, the sales of livestock and livestock products in the area had contributed only a negligible proportion to the household gross incomes (1%). Income derived from cultivation of crops in highlands other than chena accounts only for a 5% of the annual agricultural income and hence play a minor role as a source of farm income. This is primarily due to the fact that farmers had hardly grown any seasonal crops on their highlands.

The survey data on agricultural income was next re-examined on the basis of cash revenue generally by sale of produce. (Table 4.10)

Table 4.10 Composition of cash income from agriculture

	Cash income per farm		Cash income as a % of gross income	
	Yala 1977 (Rs.)	Maha 1977/78 (Rs.)	Yala 1977 (%)	Maha 1977/78 (%)
Paddy	393	232	52	36
Highland	44	71	66	64
Chena	343	390	92	66
Livestock	6	5	55	50
TOTAL	786	998	65	45

In terms of cash revenue, the most important sources of agricultural income of the farm are the paddy and chena plots. The level of cash income generated per farm from chena in Yala is closer to that of paddy, the respective figures being Rs.343 and 393 per farm respectively. However, in Maha, the cash income from chena is even greater than that from paddy. Accordingly this data clearly shows that farmer dependence on chena for their cash requirements is atleast equal or greater than that from paddy. The relatively low level of cash sales seen in the case of paddy is due to higher domestic consumption of paddy produced in the farms thus leaving only a fraction of the harvest for sales.

The amount of cash income from highland cropping as well as from livestock raising is almost negligible in both Yala and Maha seasons.

Table 4.11 Annual gross income distribution of the households classified by Regions

Income (Rs. per annum)	REGIONS 5		6		7		8		Total	
	No.of House-holds	%	No.of House-holds	%	No.of House-holds	%	No.of House-holds	%	No.of House-holds	%
Less than 1000	32	18	16	13	21	20	15	14	84	16
1,000 - 2,000	34	19	28	22	9	9	16	15	87	17
2,000 - 3,000	20	11	15	12	12	12	11	11	58	11
3,000 - 4,000	24	13	22	18	20	18	20	19	86	17
4,000 - 6,000	22	12	16	13	17	17	21	20	76	15
6,000 - 8,000	14	8	10	8	5	5	11	11	40	8
8,000 - 10,000	7	4	8	6	2	2	6	6	23	5
10,000 - 12,000	5	3	0	0	9	9	3	3	17	3
12,000	22	12	10	8	8	8	1	1	41	8
ALL	180	100	125	100	103	100	104	100	512	100

The data shows a preponderance of farmers with lower incomes. Infact those households earning a gross income of less than 3000 per annum (less than Rs.250/- a month) constitute almost one half of the study sample. Those earning below Rs.6000 (less than Rs.500/- a month) is about 80% of the households. The distribution pattern of gross incomes of the sample farmers does not reveal substantial differences among the Regions concerned.

5. LAND USE AND TENURE

The principal patterns of land use and tenurial arrangements in lowlands are examined here. The latter section of this chapter discusses on some of the possible effects of the proposed land alienation on those already farming in the area.

5.1 LAND USE

The traditional land utilisation seen in the study area is characterised by a threefold system :-

i) Paddy on lowlands;
ii) Village homesteads on relatively high lands;
iii) Chena plots on jungle patches

The extents under principal forms of land use given below are estimates computed from sample proportions.

Table 5.1 Gross and Net acreage under different forms of land use

Form of land use	Sample Percentage	Estimated Gross Acreage	Estimated Net acreage
Lowland	39	15,717	14,157
Unirrigable highlands : Chena	30	12,090	10,890
Village homesteads *'gangoda'*	24	9,672	8,712
Unirrigable highlands other than chena	7	2,821	2,541
	100	40,300	36,300[1]

Paddy is the exclusive crop grown on lowlands at present and the current acreage under this crop amounts to approximately 14,000 acres - almost 40% of the land area available. Rice being the staple food crop of the people, production of paddy is prominent in two thirds (60%) of the households surveyed. Lowland paddy cultivation is based on tank irrigation and there are nearly 150 village tanks in the area studied. Paddy is cultivated in the valley bottoms under tank irrigation from the village tanks in small parcels of 0.5 - 1.0 acre.

[1] Mahaweli Ganga (II) Irrigation and Rural Development Project - Report of the follow-up Appraisal Mission, IDA (1976).

Based on the pattern of rainfall distribution, two seasons of cultivation are recognised. The Maha, the major season coinciding with the North East monsoon from October to March. During this season, paddy cultivation is seen over most of the lowlands independent of the source of water supply. The Yala is a minor season and corresponds with the South West monsoon. Paddy cultivation during Yala is confined to lands under village tanks mainly fed from major irrigation schemes *(Yoda Ela)*. The varieties grown in Maha are of 4 - 4½ months duration and shorter aged. 3 month varieties are seen mostly in Yala. It is a common practice to raise a mid season *(Meda)* paddy crop during the period from February to July, if North East monsoon rains are delayed. In times of drought, when the available water in the village tank is inadequate for a full cultivation, only a portion of the paddy tract is cultivated and this practice is called *"Bethma"* system of cultivation. Under this system, all farmers concentrate cultivation on a compact block adjacent to the tank, each villager cultivating the parcels which he has in that block primarily for water conservation.

The village homesteads *(Gangoda)* are located besides or below the tank bund on relatively high ground often adjoining irrigated lowlands. The dwelling houses are arranged in groups on one or both sides of the tanks on the available high grounds. In recent years, with the increase of rural population new homestead gardens have been developed along the roads passing through or entering villages. The alienation of highlands under the village expansion programme has led to the expansion of village gardens. The old homestead gardens near the tanks are small and congested. The *gangodas* are not systematically cultivated with seasonal crops. A variety of fruit and other tree crops are seen on them. The main tree crops found on this category of land are coconut, jak, lime, mango, breadfruit, plantains and arecanut.

Shifting cultivation *(chena)* is seen on an extensive scale on the unirrigable uplands mostly under scrub jungle adjoining the *gangoda*. At the time of survey, a third of the cultivated acreage in Maha was under chena and almost two thirds (64%) of the households reported some form of chena activity.

Infact, chena cultivation forms a vital element in the farm economy, as 40% of the total cash farm earnings were derived from chena during the two seasons considered. The forest is cut during the dry season in June - July, burnt in August and crops are sown, broadcast or dibbled with monsoon rains around mid September. Upland paddy is grown on the lower slopes of unirrigable highlands (*Vi hena*) as this land class get water logged with the onset of Maha rains. The upper slopes of these lands *(Goda hena)* carry a variety of dry crops in Maha season, the most common crop combination being a mixture of cereals, millets, spices and vegetables. Such crops are sown broadcast over the whole chena early in the season with the onset of rains in September - October. The complementary pulse crops are sown later on in the season after some of the heavy rains are experienced. In Yala, gingelly is sown in newly cleared chenas or on the *Maha chena* itself after a light hoeing to clear away weeds.

5.2 SYSTEMS OF CULTIVATION

The cultivation systems presently prevalent in the area are summarised in Table 5.2.

Table 5.2 Classification of type of farm by percentage of farms reporting, average farm size and season.

Type of farm	Yala 1977		Maha 1977/78	
	Farms reporting	Average Extent per farm reporting	Farms reporting	Average Extent per farm reporting
	(%)	(Ac)	(%)	(Ac)
Only lowland	13	1.59	8	2.05
Only highland	33	1.24	19	1.35
Only chena	19	1.59	11	1.34
Lowland + Highland	12	3.72	23	3.56
Lowland + Chena	10	2.92	20	3.07
Chena + highland	8	2.37	6	2.78
Lowland + highland + Chena	5	3.78	18	5.94
All Farms	100	2.04	100	2.94

Diversification of farming activities is clearly seen in the study area. In Maha season, 60% of the farms investigated had adopted more than one system of cultivation, the commonest being a combination of lowlands with unirrigable highlands in the form of Chena. The fact that only about a tenth of the farms had concentrated solely on lowland cultivation is perhaps a reflection of the unstable production conditions prevalent in lowlands at present. In the face of erratic rainfall and unavailability of irrigation water for most of the lowlands, diversification of farming activities has provided the much needed stability to the farm economy.

An analysis of cultivation systems shows that the availability of irrigation water is the key explanatory factor for the differences seen in the farming systems adopted during the two seasons. In the rainy season (Maha) farm production is centred mostly around lowland paddy as seen in two thirds of the farms investigated. In contrast, during the dry season (Yala) much less activity is seen on lowlands. Of the farms surveyed, 60% had no lowland cultivation in Yala, due to lack of irrigation water. Under the existing conditions, the main thrust in farm production in the Yala season is on the unirrigable highlands. In Maha the inclusion of lowland in the farming system increases the total extent operated per farm substantially. In farm units, with a three tier farming system, the average extent operated in Maha is over 3.0 acres, whereas those without access to lowlands, the cultivated extent is less than 2.0 acres.

A noteworthy feature in this regard is the presence of a high proportion of homesteads without paddy cultivation even in the Maha season. Of the households investigated a third had not engaged in paddy cultivation in Maha. This is striking as the conventional land use pattern in the study area includes lowland paddy as an integral part of the farming system. A close observation on this aspect showed that a majority of such households are of recent origin and forms a part of the 'new arrivals' to the area in anticipation of developed lands in the future. Almost all these cases, expect to receive land from the locality on completion of development works in the area. Such a shift of population into the study area has resulted in large scale encroachments on forests, waste lands, road reservations and other vacant lands.

These encroachers being 'outsiders' have hardly any access to irrigated paddy lands in traditional villages.

5.3 LAND TENURE

A characteristic feature of the landscape with a bearing on land tenure is the predominance of traditional *purana* villages which number around 160. These villages, as seen earlier, consist of several components - the village tank, paddy fields below it, settlement clusters in proximity to paddy fields, common grounds such as grazing lands and surrounding jungle where shifting cultivation is practiced. In general, the traditional villages in the dry zone have continued to serve as centres of social and economic activities. The land use pattern, kinship and other social ties along with customs followed in village communities have a profound influence on the existing tenurial arrangements. The bonds of kinship among village families are usually quite close, and often families living in the same village group are also kinsmen. Prior to the advent of Western influence, lands in the North Central dry zone were held and administered by the village society or at least by the extended family. Absolute ownership of land by individuals in traditional villages is a relatively recent development and the practice of issuing title deeds of lands had begun only at the turn of the last century[1].

The distribution of operational holdings according to form of tenure are summarised in tables 5.3 and 5.4.

Table 5.3 Percentage distribution of operational holdings classified by type of tenure

Forms of Tenure	Acreage %
Singly owned *(Purana lands)*	29
Jointly owned *(Purana lands)*	3
Rented/leased in	10
L.D.O. allotments	14
Encroachments	40
Others	4
	100

[1] Leach, E.R., Pul Eliya, Cambridge (1971) 20, 46 pp.

Encroachments on crown land constitutes the principle form in which operated land is held at present. As seen in table 5.3 two fifth of all the lands cultivated at present fall into this category. Such lands are utilised almost exclusively for Chena cultivation. Encroachments on lowlands is very limited. Owned lands constitute only a third of the cultivated acreage and refer primarily to lowlands and highland settlements within *purana* villages. 'Leasing in' of lowland paddy is another tenancy form seen mainly in *purana* villages, with about a tenth of all agricultural lands operated being under this arrangement. Infact, a quarter of the lowlands cultivated are reported to be under some form of lease tenure. Lands alienated under the Land Development Ordinance presents another distinct form of tenancy.

Table 5.4 Percentage distribution of land classified by form of tenure and type of land

Form of tenure	Acreage Under			
	Lowland	Chena	Highland other than chena	Home Gardens
	%	%	%	%
Singly owned	51	--	47	22
Jointly owned	6	--	3	2
Rented/leased in	26	2	--	1
L.D.O. allotments	7	3	23	36
Encroachments	5	95	21	34
Others	5	--	6	5
	100	100	100	100

Further analysis of data on tenancy forms show that formal leasing arrangements are associated almost exclusively with the operation of lowland parcels. Broadly, the lowlands seen here could be classified into two categories; *purana wela* or 'old fields' and the free hold lands *(akkara idam)*. The bulk of singly and jointly owned lowlands are found in 'old fields'.

Almost all the original families in a *purana* village have claims to some land in the 'old fields'. These lands are normally located immediately below the tank bund and adjoins *gangoda*. Ownership of a plot of land in 'old fields' is also considered as a symbol of prestige.

Due to the nearness of such fields to the tank and *gangoda*, land in 'old fields' are in great demand. This discourages owners from selling inherited fields, however small the individual plots may be. The high values thus attached to 'old fields' tend to aggravate fragmentation. The high ratio of 'leased in' lowland (26%) seen in table 5.4 is not due to landlessness alone, as is the case in wet zone. High incidence of fragmentation of paddy lands in *purana* villages is a major reason here. The equal distribution of one's land among children has been responsible for the presence of small non-contiguous paddy plots often in dispersed locations under different village tanks. Due to such wide dispersion of lowland parcels, it is common for farmers to 'lease out' small parcels located far away from homesteads and 'lease in' plots in proximity to their homes. In the study sample, the maximum number of parcels operated by a single farmer was found to be 11, covering 7.5 acres of lowland. Among individual households, the cultivation of 4 to 6 lowland parcels was quite common.

Free hold lands *(akkara idam)* are located in the outer periphery of 'old fields', further away from the tank. These lands being *asweddumized* much later than the 'old fields', less fragmentation is seen, and are owned by the villagers individually or collectively by groups as well as by outsiders. Water supply to these lands is less assured, compared to 'old fields'.

Table 5.5 Percentage distribution of lowland by type of tenure and Development Regions

(Percentage Distribution of Acreage)

Forms of Tenure	REGIONS			
	5	6	7	8
	%	%	%	%
Singly owned	56	50	60	34
Jointly owned	5	7	2	9
Rented/leased	24	23	23	36
L.D.O. allotments	5	9	7	10
Encroachments	6	5	--	8
Others	4	6	8	3
	100	100	100	100

Region 8 stands out in 'renting in' of lowlands. Here, around a third of the acreage cultivated is leased land compared to only one fourth in the other Regions. The ratio of owner-operated paddy lands in this Region is smaller, being only a third of the acreage as opposed to half the extent in rest of the study area. This particular Region has not only a smaller acreage under paddy but a greater number of households compared to Region 7. Infact Region 8 has the lowest acreage under lowlands among the four Regions covered. Consequently the size of lowland operational holdings in this particular Region averages only to 1.7 acres compared to over 2.0 acres in the rest of the Regions. In instances where lowland paddy parcels are 'leased out' it is customary to rent out paddy plots for cultivation purposes, mainly to those belonging to the village community, often to relatives. Due to the well entrenched kinship and other social ties found among village communities, land owners with small paddy parcels scattered under different village tanks often lease out those parcels located far away from homesteads to less affluent relatives.

The predominant form of leasing out land seen here is under the system of *Ande*[1]. A percentage share of the crop harvested is surrendered to land owners under *Ande* system as shown in Table 5.6.

Table 5.6 Crop share paid by tenants

Development Region	Percentage of tenants paying crop share				
	1/4 %	1/2 %	3/4 %	Others %	All %
5	2	91	2	5	100
6	5	85	5	5	100
7	-	95	-	5	100
8	6	88	-	6	100

[1] *Ande* - it is the widely practised form where the tenant generally surrender 1/2 the produce to the landlord. The proportion may slightly vary depending on the inputs provided by the landlord.

The rent payment for leased land in the study area is determined more by the supply situation of irrigable land in *purana* villages than on kinship and other social ties that exist in such village communities. This is not surprising as the acreage under irrigable lowlands in this particular area is very limited, even though land as such is not scarce due to the availability of scrub jungles. The survey data shows that nearly half of the households in the sample did not own any lowlands and consequently the demand for irrigable lowlands under village tanks is very high. Infact, bulk (82%) of the tenanted paddy acreage at present is irrigated by village tanks and around 90% of the tenants continue to pay half the crop share to land lords as rent. Such a high crop share paid to land owners as rent may be explained more on the basis of lack of balance between the supply and demand forces.

Collateral help given by land owners is another reason for the relatively high crop share paid as rent. Almost three fourths of the tenants paying half crop share had received at least one input from their land-lords. Such contributions include mostly the supply of seed paddy.

In addition to owned and leased lands, around 14% of the acreage cultivated constitute allotments given under the Land Development Ordinance. Such lots are generally known as L.D.O. allotments and consist mostly of highlands and occassionally paddy or both. The average size of L.D.O. allotments is small - about 2 acres in extent. Establishment of homesteads and cultivation of tree crops such as coconut, mango, jak are the principal uses made of such lands. Landless or near-landless villagers generally receive lots under this form of tenure.

5.3.1. LANDLESSNESS

One final aspect of the tenurial conditions observed in the study area is the high incidence of landlessness[1].

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[1] Landlessness in this study means lack of any legal title to land, although encroached land may be operated with reasonably secure tenure.

The fact that little more than half of the sample households are without holdings of their own is of significance in a region of small holdings dominated by peasant proprietorship. The surprisingly high ratio of households with access to owned agricultural holdings is perhaps partly a reflection of the inflow of labour into this area as seen in Chapter 3 and the presence of large tracts of scrub jungle belonging to the state (Table 5.1). Over the years, mostly landless labour had moved into the study area primarily to stake a claim to a plot of irrigable land. Such movements of labour is very likely to have inflated the data presented on landlessness.

Table 5.7 Percentage of households owning little or no agricultural land - 1978

Development Region	House holds %
5	49
6	66
7	46
8	60

In the case of even lowlands, landlessness appear to show a similar distribution among Regions as for all agricultural land.

Table 5.8 Percentage of households owning little or no lowlands - 1978

Development Region	House holds %
5	50
6	63
7	48
8	59

In *purana* villages, the landless rely mostly on 'rented in' paddy lands and chena cultivation on encroached highlands for their sustenance. In constrast, the landless households outside *purana* village settlements have little or no access to traditional lowlands. Consequently such families eke out their existence mainly on highland encroachments primarily engaged in chena cultivation. Hiring out labour is seen more among such households.

5.4 FARM SIZE

The basic farm unit as seen earlier includes lowland paddy, chenas on encroached land and a garden plot with the dwelling house. The availability of lowlands to individual farm households appears to be positively related to overall farm size. In farm units possessing lowlands, the gross farm size averages to over 3.0 acres whereas those without access to lowlands are smaller and is less than 2.0 acres. (Table 5.2). In general, the relatively large size is a primary feature of the farms in the study area. Those consisting of lowland, chena and other highlands with the homestead average to 3.5 acres.

Table 5.9 Composition of operated holding per farm

1978

Form of land use	Number of farms	Average operated farm size (acs)
Lowland	314	2.2
Chena	326	1.6
Other highlands	62	1.9
Home gardens	445	0.9

The land alienation policy of the government under the Mahaweli Development Project is to allocate 2.5 acres of irrigable land and a 0.5 acre homestead to a settler in the study area. It is prudent at this stage, to ascertain how far this policy affects the existing pattern of holding of agricultural land and the agricultural incomes derived by the people from their land holdings.

Survey data shows that 38% of the households in the area operate more than 2.5 acres of lowland, highland and chena combined. These account for about three quarters of the total operated land averaging about 5 acres per operator. 12% of the farm families in the area operate more than 5 acres of lowland, highland and chena combined. For these households, implementation of the scheme means a reduction of operated acreage by more than half. These larger operators although they make up only 12% of the farm families, between them farm more than a third of the land, with an average holding of 8 acres : that is to say, they will have their operated acreage reduced by over two thirds.

Analysis of the distribution of land owned by the households shows that 45% of the farm families own land of which about a quarter had more than 3.0 acres of lowland, highland and homegarden together. They accounted for about 60% of the total land owned averaging 6.1 acres. Therefore, the alienation of land on the basis of one unit of 3 acres to a household shows that nearly a quarter of households owning land (i.e. over 10% of total households) will have their land halved while an increased allocation of two units would prevent such a happening. This should be contrasted with the fact that more than half the households own no land at all.

The bare figures of reduction in operated and owned farm acreage seem to need consideration especially when they are taken in conjunction with the figures for reduction in size of homegardens. Here, over half the sample households have gardens larger than the half acre they will be allotted under the scheme and no less than 18% have gardens larger than an acre i.e. will have their garden holding more than halved by the Mahaweli Scheme. The crucial question here is the intensity with which these gardens are cultivated and hence their importance to the operator. It may well be argued that under the Scheme, work on the farm plot will be both so time consuming and profitable that a half acre home garden will be more than sufficient for the average family. In a similar way, it could be argued that a reduction in size of total operated holding may be quite acceptable to the smaller plot under the Scheme which produces a high level of profit due to regular irrigation and adoption of recommended cropping patterns. A point to be considered here is the way in which the operated holdings at present are split between paddy, and chena production, and the relative values which farmers attach to each. This is considered below.

In *purana* villages, life centres around the tank which ensures a fairly safe crop of paddy at least once a year. Many households operate a paddy holding though usually a small one - and some have more than one; Not all these holdings are of equal value; a farmer may own a small plot directly under the tank (with assured irrigation) together with a larger plot in a marginal position.

Relatively few farmers (under 10%) operated more than 2.5 acres of paddy alone in Maha even after taking operation of more than one paddy holding into account. For most farmers, Mahaweli Scheme will therefore mean not only a net increase in paddy holding but a double increase given two sure irrigated seasons (where paddy/paddy will be the cropping sequence). It is fairly clear from the data that it is in fact chena land cultivation which tips the majority of the 38% of operators into their "greater than" 2.5 acre bracket (highland is not a very significant proportion of total acreage).

The value farmers attach to their best chena lands could affect their attitudes to the scheme. Production in chena lands has been very low due to severe drought conditions in the 4 or 5 years before Maha 1977/78. But it is unfortunate, perhaps for the scheme, that Maha 1977/78 produced good climatic conditions and hence comparatively higher production and incomes from the chena lands. Infact the cash farm income from chena in Maha 1977/78 accounted for about 38% of the total cash income. It may well be that farmers with the evidence of comparatively larger incomes in their hands from chena will be valuing chena highly just the year in which they learn that it will be taken from them.

The significance of land reform, therefore, does not lie simply in total holdings "before and after". It lies also in relative profitabilities of different combinations of paddy/chena holdings at present.

Table 5.10 shows the distribution of annual (Yala 1977 & Maha 1977/78) income from paddy, chena and highland crops for different land size classes.

Table 5.10 Distribution of mean annual agricultural income (Yala 1977 & Maha 1977/78) for different land size classes.

Land size Class	Mean Annual Income (Rs.) Paddy	Chena	Highland
0.01 - 0.50	664.98	374.57	155.49
0.51 - 1.00	1126.44	660.85	229.79
1.01 - 1.50	1801.06	788.27	324.56
1.51 - 2.00	1669.11	993.74	200.80
2.01 - 2.50	2094.71	1239.68	483.47
2.51 - 3.00	2947.77	1387.64	909.44
3.01 - 3.50	2078.90	985.50	418.33
3.51 - 4.00	6346.33	2088.31	806.67

Note : Averages for land sizes greater than 4 acres are not included due to comparatively fewer sample points.

From above it is seen that income received from paddy is higher than that from chena or highland crops for all categories of holdings. Infact for each category (extending upto 3.5 acres) the paddy income is almost double that of chena while it is trebled for the 3.5 to 4.0 acre holding size.

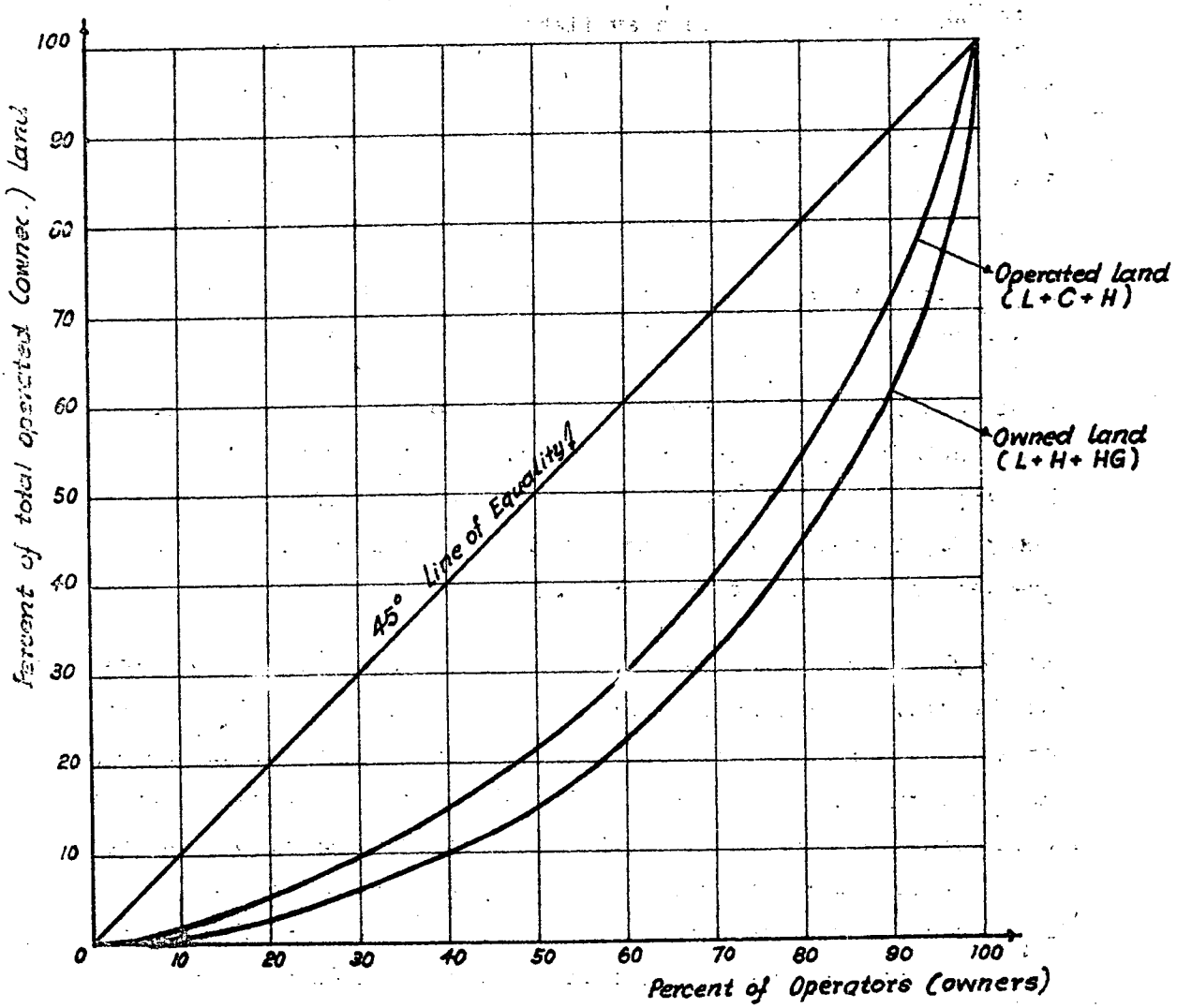
The higher income from paddy over other crops may partly be explained on the basis of the beneficial effects accruing to paddy growers under the guaranteed price scheme for paddy and due to the absence of a scheme for price stabilization of other field crops grown on chena and highlands. Poor marketing facilities available to the latter crops, particularly during the peak harvesting seasons depress the farm gate prices of chena crops. The above factors together with the management difficulties experienced by operators of larger chenas due to shortage of labour, perhaps, explain partly why the paddy income is treble that of chena for the 3.5 to 4.0 acre category.

The distribution of operated and owned holdings among the sample households is given by the Lorensz Curves shown in Fig. 4, the latter curve being more skewed than the former. It is seen that a third of the land is operated by only 13% of the households while a quarter of the land is owned by only 5% of them.

COMPARISON OF LORENSZ CURVES FOR OPERATED LAND AND OWNED LAND

Inequality : Distribution of land

Lorenzg Curve: Percent operators (owners) and % of total operated (owned) land.



L = Lowland ,
H = Highland
HG= Home Garden
C = Chena

There is therefore a prima facie case for examination of the land reform aspects of the scheme and to see how far they are likely to work against positive motivation of future Mahaweli farmers. The attitudes to development of the existing population are all important for the success of the scheme in the study area, since the existing population is so large that it will take up nearly half the new irrigated acreage to be made available.

6. FARMING PRACTICES

A. LOWLANDS

As cultivation of paddy on lowlands is the dominant agricultural activity in the study area, this chapter focuses attention primarily on the existing farming practices seen on lowlands. Since availability of adequate farm power is a key consideration for intensive land use envisaged under the project, this aspect is examined in more detail. In addition, the existing patterns of labour utilisation as well as cash operating expenses incurred for paddy cultivation are also discussed. In the latter section, farming practices seen on unirrigable highlands are presented.

6.1 SOURCES AND LEVEL OF IRRIGATION

The existing lowlands estimated around 14,000 acres are underdeveloped in terms of irrigation. As seen in chapter 2, lowlands depend mainly on village tanks scattered throughout the project area for water. The lack of farmer response for adoption of improved farming practices, as would be seen later on, could be attributed largely to unstable water supply conditions in the study area.

The sources of irrigation studied by Development Regions (Table 6.1) helps to understand some of the reasons underlying the differential rates of adoption of improved farming practices seen on lowlands. The mere fact that 75% of the paddy acreage across the four Development Regions have access to supplementary irrigation does not necessarily imply an assured water supply. As mentioned earlier, though many of the small tanks in Region 5 benefit directly from major irrigation, the tanks in Regions 7 and 8 are mostly rainfed. Accordingly, the water supply from village tanks exhibit marked qualitative differences between Development Region 5 on the one hand and Regions 7 and 8 on the other.

Table 6.1 Percentage distribution of paddy acreage by source of irrigation and Development Regions

Development Region	Rainfed (%)	Village Tanks (%)	Major irrigation (%)
5	1	78	21
6	7	77	16
7	14	73	13
8	8	87	5
	100	100	100

Currently the Development Region 5 has the best water delivery system. Regions 7 and 8 are poorly served with irrigation water for paddy cultivation at present. Successful raising of paddy in these two particular Regions depend largely on timely arrival as well as distribution of monsoon rains. A general characteristic of the existing irrigation facilities available in all Regions is the lack of a terminal network to spread water over the farm fields. Water is supplied to individual paddy fields simply by overflowing from upper placed fields to lower lying fields. Accordingly, the term 'irrigated paddy field' here implies the introduction of water by overflowing from a field inlet across the upper fields to lower fields.

6.2 IRRIGATION & CROPPING INTENSITY

The qualitative differences in irrigation facilities seen in the area, directly influence the cropping intensity between seasons as well as among Regions. Table 6.2 permits an inter-Regional comparison of cropping intensity.

Table 6.2 Paddy cropping intensity by Development Regions

Region	Cropping Intensity		
	Yala 1977 (%)	Maha 1977/78 (%)	Annual (%)
5	58	84	142
6	37	59	96
7	27	89	116
8	16	88	103
	39	81	120

In the light of the estimates of the World Bank Appraisal mission[1], the overall cropping intensity of 120% (Table 6.2) is considered low. During Yala season, the cropping intensities reported are extremely low, except in Region 5. The ready availability of irrigation water in Region 5 has largely circumscribed some of the adverse influences of climatic factors. Here, as many of the small tanks are augmented from the *Yoda Ela*, water is available during both wet and dry seasons for lowland paddy in most years. Thus double cropping in lowlands is seen mostly in this particular Region. As a rule, in the other three Regions, the minor tanks are mostly rainfed, and as a result irrigation water is available mainly during the Maha season in most years. Consequently over three fourths of the paddy acreage remain fallow in Yala which results in low cropping intensities. With considerable extents of developed paddy lands remaining fallow for nearly six months of the year, the full agricultural potential of the irrigable lowlands is not realised at present. Consequently the incomes associated with farming tend to remain low.

The partially irrigated lowlands available at present do not provide a stable environment for regular paddy cultivation. In fact under the existing water supply conditions, the probability of realising even a single paddy crop per year is relatively low. (see Table 6.3)

Table 6.3 Number of seasons during which the full extent of lowlands was not cultivated during 1973 - 1978

	Maha Season			Yala Season		
	1 - 2	3 - 4	5 - 6	1 - 2	3 - 4	5 - 6
Percentage of farmers who did not cultivate full extent	22	34	18	20	44	34

According to above data, the opportunities for cultivation of the full extent of lowlands even during Maha season is limited. The main reason for non cultivation is the lack of water as indicated by 87% of the respondents. In this regard it is relevant to mention that the period from 1971-76 were generally years of low rainfall with 1975 and 1976 being particularly bad years.

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[1] The Appraisal Report No.1487 a-Ce of 31.3.77 gives a cropping intensity of 150% with 80% to 90% in Maha and 60% to 70% in Yala.

6.3 TILLAGE

Primary tillage consists of the first ploughing of lowlands, 3 - 4 weeks before sowing. Shallow flooding practised before first ploughing, aids this operation and permits decomposition of weeds and stubble. The commonest forms of implements used for primary tillage are buffalo-drawn wooden ploughs and harrows. Light iron ploughs are hardly used. In the case of tractors, a tyne tiller is used with 4-wheel machines and a rotavator with 2 wheelers. A second ploughing is done 10 - 14 days after first ploughing with buffaloes or tractors. Just prior to sowing, a rough levelling of the field is undertaken with an animal drawn harrow.

6.3.1. Timeliness

Land preparation normally commences only after the first issues of water are made from the village tank as seen in over 50% of the sample farms. Such adjustments in land preparation tend to push the planting dates of Maha paddy crops back often resulting in inefficient use of the North East monsoon rains. Early land preparation is seen only in the primarily rainfed areas - parts of Regions 7 and 8. Two fifths of the farmers in the rainfed areas had commenced field work with first rains. Under the existing conditions, a number of problems appear to be associated with early land preparation. Infact, farmers have strong reservations in undertaking land preparation with first rains. The main reasons given by them are presented in a descending order of importance.

(a) high risks associated with early cultivation in an environment devoid of assured irrigation;

(b) hard and dry soils; a field condition generally encountered at the commencement of the Maha season in September.

(c) Unavailability of adequate farm power (tractors) at the required time;

(d) family labour being occupied with work in chena in the early part of the Maha season.

6.3.2. Farm Power

The principal forms of farm power used are buffalo and tractor. At present, they are of equal importance in primary and secondary tillage. However, more of animal power is used for final seed bed preparation. The main forms of farm power used for tillage during Maha 1977/78 and Yala 1977 seasons are given below.

Table 6.4 Forms of farm power used

Maha 1977/78

Field Operation	Forms of farm power used			
	Buffaloes	2-wheel Tractors	4-wheel Tractors	All Types
	(%)	(%)	(%)	(%)
First ploughing	50	22	28	100
Second ploughing	56	21	23	100
Puddling and levelling	88	3	9	100

Table 6.5 Forms of farm power used

Yala 1977

Field Operation	Forms of farm power used			
	Buffaloes	2-wheel Tractors	4-wheel Tractors	All Types
	(%)	(%)	(%)	(%)
First ploughing	60	24	16	100
Second ploughing	63	24	13	100
Puddling and levelling	94	2	4	100

In the near future, with the envisaged development of nearly 40,000 acres in the study area, the farmer access to arable land will increase substantially. Consequently the demand for farm power will increase many fold in the short run. In recognition of this growing need, farmer preferences for different forms of power were investigated, and their responses are summarised;

Form of power	Given a choice, preference indicated (%)
Buffaloes	49
Tractors :	
(a) 4-wheel	30
(b) 2-wheel	21

The almost equal preference shown for the two main forms of farm power (tractors and buffaloes) supports the earlier observation that buffalo and tractor assume equal importance at present.

Most of the draught power needs both for tillage as well as threshing are currently met from sources outside the farms (Table 6.6). The very high dependence on hired farm power seen in this instance has to be viewed more in the context of the existing production conditions in the area. The holdings here are not only small, but also the individual paddy parcels are widely dispersed in an area devoid of assured water during greater part of the year. Such unstable production conditions hardly permits farmers to make significant investments on outright purchase of draught power.

Table 6.6 Ownership of farm power used for paddy cultivation

Type	Maha 1977/78			Yala 1977		
	Owned (%)	Hired (%)	Total (%)	Owned (%)	Hired (%)	Total (%)
Buffaloes	15	85	100	14	86	100
Tractors	4	96	100	6	94	100

The excessive reliance on hired farm power seen here often places farmers in a disadvantageous position in the timely execution of cropping programmes. In fact, during the cultivation year 1977/78, one half of the farmers (54%) reported as having failed to obtain the draught power needs during the desired period, although from available data it is impossible to say how serious the efforts to obtain farm power has been. Thus the provision of adequate farm power for the study area is an urgent need particularly in view of the rapid expansion of the cultivable acreage.

The tractor hire rates for both ploughings were around Rs.160 per acre. For tractor threshing of paddy, the charges were around Rs.70 per acre. The hire charges for animals was around Rs.20 per pair of buffaloes per day. As 3 pairs of animals are normally required for a single ploughing of an acre of paddy land in a day, the cost of animal hire alone for 2 operations is estimated at around Rs.120 per acre. If a man from outside the farm is employed to plough with hired buffaloes, land preparation with hired farm power will be just about equally expensive irrespective of the type of power used. The selection of the best farm mechanisation system is determined primarily by the size of farming operations and secondly by anticipated ownership and operating costs.

As the size of future farm allotments would be 2.5 acres of irrigable land and 0.5 acres of non-irrigable homestead, the individual ownership of tractors at farm level could be ruled out in most instances. A family farm operation requires a power unit with which the family could complete the seasonal work within the available time period. Besides, the high degree of double cropping contemplated in the project area in future would restrict the "turnaround time" for tillage between two seasons. Accordingly, the 'timeliness' of field operations is likely to assume tremendous importance in the future. An advantage often stressed on behalf of mechanised tillage is the timeliness achieved by tractors. However, the mere fact, that a tractor operates much faster than a pair of animals does not necessarily result in timely operations. Too small a power unit or undependable availability of power could result in reduced output, while the penalty for too large a power unit would be excessive overhead costs. A key consideration in this regard, is the capacity of the type of farm power used. As the capacity of machines is directly related to costs, higher utilisation of available capacity is necessary to achieve lower operating costs. Each of the three alternative forms of farm power used at present (buffaloes, 2-wheel tractors and 4-wheel tractors) has the performance capability to meet the functional requirements of the different tillage operations in small farms. The three alternatives differ significantly not only in initial capital costs, but also in the effective command area of each power alternative.

Assuming that tractor and buffaloes are perfect substitutes for tillage, the demand for different types of farm power in the future will be guided mainly by factor prices. The cost of tractors as well as fuel have shown a steady increase over the last five years and this trend is likely to continue in the future. On the other hand, the maintenance of buffaloes is also likely to pose problems in future, due to non-availability of grazing grounds in proximity to family farms in this area. Thus the most promising alternative system for providing farm power on small farms has to be worked out for optimum utilisation of the newly developed lands.

6.4 TIME OF PLANTING

The Maha paddy planting season commences in October and extends up to the end of January with a modal concentration of sowing in December. A sharp peak in planting activities is seen during the period from the middle of November until the end of December (Table 6.7) However, in the irrigated areas in Region 5, intense sowing activities are observed earlier in the season from the end of October.

Table 6.7 Percentage distribution of farmers according to the time of sowing - Maha 1977/78

Month	Percentage of farmers who planted paddy crops in		
	1st fortnight (%)	2nd fortnight (%)	Total (%)
October	2	4	6
November	14	22	36
December	20	21	41
January	11	6	17
			100

In Yala, the planting season is of shorter duration and three fourths of the farmers had completed their sowing during the months of May and June. The peak sowing period is in May.

6.5 VARIETAL USE

The new high yielding paddy varieties have spread with extraordinary rapidity and are now established in the study area. During the two seasons considered, over 90% of the sample farmers had adopted new varieties. BG 11-11, BG 90-2, BG 34-6 are the most popular.

Table 6.8 Percentage distribution of farmers by variety grown and source of irrigation

Maha 1977/78

Type of variety grown	Percentage of farmers according to source of water			
	Rainfed	Village tanks	Major Irrigation	All
New high yielding	77	94	96	93
Old high yielding	8	5	--	5
Traditional	15	1	4	2
	100	100	100	100

Table 6.9 Percentage distribution of farmers by variety grown and source of irrigation

Yala 1977

Type of variety grown	Percentage of farmers according to source of water			
	Rainfed	Village tanks	Major Irrigation	All
New high yielding	90	91	100	91
Old high yielding	-	3	-	2
Traditional	10	6	-	7
	100	100	100	100

The levels of adoption seen here demonstrate the enthusiasm among farmers to adopt new varieties. Despite qualitative differences in water supply conditions observed earlier, a Region-to-Region variation in the rate of adoption of new varieties is not seen. However, in the absence of a good irrigation system at present, the full potential of new varieties are unlikely to be realised in areas other than in Region 5. The older varieties are seen mostly in

Regions 7 and 8 which have a poor water supply and here too, only a small extent (15%) is cultivated under such varieties.

Table 6.10 Percentage distribution of extents under different paddy varieties by Development Regions - Maha 1977/78

Development Region	Type of variety grown			
	NHY[1] varieties	OHY[1] varieties	Traditional varieties	All
	(%)	(%)	(%)	(%)
5	98	2	--	100
6	91	4	5	100
7	84	9	7	100
8	85	12	3	100

A further analysis of the pattern of varietal spread shows a higher rate of adoption of old varieties in the smaller size holdings. None of the farmers who operated 2 acres or more had grown any of the traditional or old varieties in the two seasons considered. In the face of technical and economic uncertainty, a higher adoption rate of innovation can be expected more from farmers operating larger paddy holdings who are likely to be above subsistence level. On the other hand, the operators of very small holdings with current output close to minimum subsistence level appear to be more cautious towards new technological innovations.

6.6 PLANTING METHODS

Broadcast sowing of germinated paddy in puddled fields is the commonest form of stand establishment (Table 6.11)

Table 6.11 Percentage distribution of farmers by method of planting

Method of planting	Maha 1977/78 (%)	Yala 1977 (%)
Broadcast sowing	87	95
Transplanting	11	5
Row sowing	1	--
Kekulan (dry sowing)	1	--
	100	100

[1] NHY - New High Yielding
OHY - Old High Yielding

Sowing of ungerminated seed in dry seed beds (*Kekulan* sowing) in anticipation of Maha rains is hardly seen here. Transplanting of paddy is not popular in the study area and is practised in about 13% of the cultivated extent in Maha and 11% in Yala. In the different Development Regions, the rate of adoption of transplanting varies considerably. In fact, the data shows some association between adoption of this practice and the availability of irrigation water. In Region 5, with the best water supply at present, a fourth of the cultivated extent is transplanted in Maha.

Table 6.12 Transplanting by Development Regions

Maha 1977/78

Development Region	Percentage extent transplanted (%)
5	26
6	9
7	5
8	2
	13

In this regard, the two rainfed Regions 7 and 8 provide a marked contrast. A similar trend is seen in Yala season too with regard to adoption of transplanting in the four Development Regions.

6.7 FERTILIZER USE

An appreciable proportion of farmers seem to recognise the yield increasing effects of fertilizer use in Paddy cultivation. Around 56% of the sample farmers had applied some kind of fertilizer to paddy during Maha season. The extents fertilised show considerable variation in the 4 Development Regions (Table 6.13)

Table 6.13 Percentage distribution of extents fertilized by Development Regions

Region	Extent fertilized as a % of extent cultivated	
	Maha 1977/78 (%)	Yala 1977 (%)
5	82	81
6	70	66
7	50	61
8	23	17
All	62	69

Among Regions, the important variable explaining the difference in fertilizer consumption is water availability.

In both seasons, widespread use of fertilizer is seen mostly in Region 5 with assured irrigation water. On the other hand, in the rainfed areas particularly in Region 8, a majority of the farmers faced with unstable water supplies had refrained from applying fertilizer.

In all Regions, the nitrogenous fertilizer, Urea is the commonest form used, followed by top dressing mixture (TDM) and basal mixture V_1. During the two seasons considered, around 60% of the acreage fertilized had received only Urea. The use of only a single type of fertilizer is seen more in Region 8, with 80% of the fertilized acreage receiving only Urea. In contrast, application of complete fertilizer mixtures is observed more under stable water supply situations. In Region 5, nearly half the fertilized extent had received basal mixture V_1 in addition to Urea. Top dressing mixture (TDM) too is widely used (70% of the extent) in this particular Region in Maha season, though the Department of Agriculture recommends only Urea for top dressing. However, in the Yala season, a marked drop in the use of top dressing mixture is observed.

The rates of fertilizer application reported are substantially lower than the 'recommended' rates[1] in all the 4 Regions. Region 5 records the highest usage of fertilizer with an average of 1.5 cwt. per acre. The lowest usage is seen in Region 6 with an average of 1.1 cwt. per acre. Of those who have applied fertilizer, the quantity used averaged to 1.3 cwt. per acre.

With regard to timing of fertilizer applications, it is observed that 80% of those who had used basal mixture V_1, had done so at the appropriate time, before planting. The top dressing mixture (TDM) is given in split doses. Three distinct periods are seen here at 3 weeks, 6 weeks and 8 weeks after planting. Application of Urea is seen mostly (75%) when paddy crops are 3 to 4 weeks old.

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[1] The Department of Agriculture fertilizer recommendations amount to 2¾ cwt. to 3¼ cwt. per acre for new improved varieties in the study area.

A number of reasons may be suggested for the relatively low levels of fertilizer use observed in the study area. The high discounting of physical response by farmers faced with unstable water supply conditions and non-availability of fertilizer at the required time could be considered as relevant here. However, with the provision of irrigation water, the task of convincing the farmers of the desirability of using higher doses of fertilizer should not be overwhelming as the potential for yield increases with fertilizer are clearly seen even under existing conditions (see 7.1.1)

6.8 WEED CONTROL

Nearly 80% of the paddy acreage was found to be atleast partially weeded during the two seasons considered.

Table 6.14 Extent and method of weeding

	Extent weeded as a % of total cultivated	Extent under		
		Hand weeding (%)	Chemical weeding (%)	Total (%)
Maha 1977/78	87	5	95	100
Yala 1977	83	4	96	100

Use of weedicides is the commonest form of weed control practised here. 24-D based chemicals which are effective against sedges and broad leaf weeds are most commonly used. The marked preference shown for chemicals over manual weeding may arise primarily from the difficulties associated with pulling weeds in broadcast sown fields where standing water is not readily available.

6.9 PEST & DISEASE CONTROL

About a third of the respondents in the survey had encountered some pest problems during the reference period. The most common pests found were leaf roller and paddy bug. Around 90% of those who had experienced such pest problems had used chemical sprays as a curative measure.

6.10 LABOUR UTILISATION

Low level of labour utilisation is a marked feature seen in paddy cultivation. The distribution of labour by tasks presented in Table 6.15 shows that land preparation and harvesting together with threshing had the largest share of labour input, 57%, followed by after-care. In the two seasons considered, labour application per acre had averaged to around 50 man day equivalents which is relatively low, compared to labour use intensity seen in areas such as Polonnaruwa with assured water supplies in both seasons.[1] The lower levels of labour application reported in this instance greatly reflects the extensive forms of cultivation practised on lowlands at present.

Table 6.15 Labour application in paddy cultivation by tasks (man-day equivalents per acre)

Task	Maha 1977/78		Yala 1977	
	Man-days	%	Man-days	%
Land preparation	16	30	14	29
Sowing/planting	6	12	6	12
	15	29	13	28
Weeding	2	4	2	3
Harvesting	9	18	10	20
Threshing	4	7	4	8
TOTAL	52		49	

The level of input of labour in the study area is largely influenced by the existing water supply conditions and tenurial status of farmers. The lack of satisfactory irrigation facilities, other than in a section of Region 5, limit the opportunities for more intensive use of labour. The high incidence of share tenancy is perhaps another relevant factor in this regard. As almost half the households do not own lowlands (Table 5.8) leasing in of paddy lands is quite common. Under the existing leasing arrangements half the share of the paddy crop harvested (Table 5.6) is often surrendered to land owners as rent.

[1] In Maha 1976/77, 92 man-day equivalents had been used in Polonnaruwa for cultivation of an acre of paddy - Profitability and Resource Characteristics of Paddy Farming, *Ranatunga, A.S.* and *Abeysekera, W.A.T.* ARTI Research Study No.23 1977.

Such tenurial arrangements superimposed on essentially rainfed farms are unlikely to motivate farmers to adopt intensive farming practices that require a high labour input.

The data on types of labour used clearly indicates a family labour dominant farming system with almost two third of the total labour input being contributed by the family.

Table 6.16 Type of labour used for paddy cultivation

Forms of labour	Man-day equivalent per acre			
	Maha 1977/78	%	Yala 1977	%
Family labour	34	65	29	60
Hired labour	14	28	17	34
Exchange labour	4	07	3	06
TOTAL	52	100	49	100

Of the hired labour used, nearly three fourth had been deployed in 2 short spells for land preparation and harvesting and threshing. In fact, the family labour dominant production with a minimum use of purchased inputs seen here at present typifies subsistence oriented production generally seen in uncertain production environments in the dry zone such as at Mahakandarawa.[1]

However with the envisaged development of 40,000 acres, some of the major constraints seen at present - water and tenure problems are unlikely to dominate the production environment in future. Under such conditions, more intensive use of land with much higher levels of labour input would not only become possible but also necessary to recover project investments. Any such large increases in demand for labour have to be met more from outside the project area, as the stock available within is inadequate. Thus, migrant labour has a key role to play in the future agricultural development of this area. Accordingly, this aspect deserves to be borne in mind even in the early stages of planning of village centres and townships etc. in order to make some provision for the accommodation of migrant labour.[2]

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[1] A study of 5 settlement schemes prior to irrigation modernization, Vol. 2 Mahakandarawa Scheme. ARTI Study No.31.

[2] A study of seasonal labour migration from wet zone to dry zone is currently being undertaken at ARTI by G.G. Crooks and H.A. Ranbanda.

6.11 CASH OPERATING EXPENSES

Under the farming practices prevalent in lowlands, cash production expenses per unit of land are relatively small. The average cash outlay per acre of paddy cultivated during Maha 1977/78 is around Rs.450 which is less than one half of the cash operating expenses incurred in a high productive region such as Polonnaruwa[1]. Lower cash costs per unit of land imply applications of lower levels of purchased inputs generally associated with traditional farming practices.

Table 6.17 Cash operating cost per acre of paddy classified according to major inputs. Maha 1977/78

Cash inputs	%
Wage labour	34
Tractor charges	27
Buffalo charges	9
Seed paddy	11
Fertilizer	12
Agro chemicals	5
Others	2
	100 (Rs.450)

Wage payments to hired labour form the most important single item of cash costs and amounts to a third of the total cash outlay. The reported modal wage rates were Rs.10.00 per man and Rs.6.00 per woman for a day together with the mid day meal. The need to fit specific farming operations to the climatic rhythm makes the labour input heavily concentrated in short spells within the cultivation season. The outcome of such concentration of labour use to specific periods compels even the small farmers to rely on some form of hired labour. Tractor hire charges constitute a fourth of cash expenses followed by fertilizer and seed paddy. Heavy dependence on hired draught power seen earlier (Table 6.6) explains the relatively high costs incurred in respect of tractor use.

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[1] In Maha 1976/77, cash production costs per acre in Polonnaruwa was Rs. 1,162 - ARTI Research Study No.23 1977., Ranatunga A.S., and Abeysekera, W.A.T.

Relatively low cash costs incurred on purchased inputs such as fertilizer and agro-chemicals is a feature worthy of note. The low usage of fertilizer seen earlier explains the lower costs incurred on this item. Farmer reluctance to incur cash costs on inputs is not surprising, as the existing production environment is quite unstable due to lack of assured water. Of the well-recognised sources of risk in agriculture, weather is the key source of risk in the study area. Extensive forms of cultivation seen in the earlier discussion with attendent low levels of investments in the form of purchased inputs and labour may be described as farmer's adjustment mechanism against risk. In fact, virtually the only modern technology seen in the area studied is the use of new high yielding varieties.

B. HIGHLANDS

6.12 CHENA

Highlands across the study area are used extensively for chena cultivation. The economic system on which the farmers rely at present includes not only the irrigated lowland, but also rainfed chena. In the 4 Development Regions, farmer involvement with chena work shows considerable variation.

Table 6.18 Percentage distribution of farmers cultivating chena by Development Regions - Maha 1977/78

Development Region	Farmers Operating chena %	Average size of chena (acres)
5	50	1.46
6	64	1.64
7	67	1.87
8	83	1.62
	64	1.63

Chena farming is seen most prominently in Region 8, where relatively more secondary jungle is available for chena work. Besides the availability of land suitable for chena cultivation, the unstable water supply conditions for most of the lowland paddy too, encourages farmers to concentrate more on chena work. This particular Region being largely a rainfed area faced with a high rainfall uncertainty, farmers rely heavily on chena farming to supplement the returns from lowland paddy. On the other hand Region 5 with more stable water supplies for lowlands provides a contrast with less chena activity and more double cropping of paddy.

A factor that has made a significant impact on chena cultivation over the years is the increase in population pressure witnessed during the last two decades in the study area. Relatively high population densities seen at present no longer permits traditional long cycle chena. The large scale encroachments of forest reserves by 'new arrivals' in the area has made serious inroads into the traditional long cycle chenas of the past. The cycle of cropping

has been drastically reduced from the traditional two crops once in every 10 to 15 years to once in every 2 - 3 years. Around 80% of the chenas operated at present have a short cycle and are within about a mile from their dwellings. Over the years, the size of chena too has dwindled and the average size of chena plot worked at present is around 1.4 acres. The modal size range of chena in the area covered is 0.5 to 1.0 acre in extent.

Table 6.19 Percentage distribution of farmers according to time of chena operations - Maha 1977/78

Month	Percentage of farmers reporting			
	Clearing (%)	Fencing (%)	Sowing (%)	Harvesting (%)
July	22	1		
August	72	15		
September	5	65	21	
October	1	15	66	
November		4	12	1
December			1	10
January				60
February				27
March				2
	100	100	100	100

Table 6.20 Percentage distribution of farmers according to time of chena operations - Yala 1977

Month	Percentage of farmers reporting			
	Clearing (%)	Fencing (%)	Sowing (%)	Harvesting (%)
February	82			
March	18	31	4	
April		65	74	
May		4	22	8
June				68
July				24
	100	100	100	100

The study data on the time of chena operations in table 6.19 show a heavy involvement of farmers with chena work in the early part of Maha season, particularly during the period from August to October. It was seen earlier (Table 6.7) that the peak work load in lowlands generally stretches from November to end of December. Thus the data on labour allocation for chena and paddy suggest that intensive labour application for Maha paddy commences only after the peak labour demands for chena are met. This is in conformity with the usual sequence of farming operations seen in parts of the dry zone with unstable water supplies for lowland paddy. In such areas, it is customary to initiate chena cultivation in the early part of Maha season and to commence work on lowlands later on in the season, when the village tanks are full. Much reduced activity in lowland paddy in Yala in the study area provides ample opportunities for farmers to concentrate on chena work uninterrupted, but the prolonged dry weather experienced during Yala season however restricts such work.

The study data confirms that production techniques in chena are traditional. Agronomic practices such as fertilizer application, pest and disease control measures are generally not adopted. The principal crops sown in chena during the two seasons considered are enumerated in table 6.21.

Table 6.21 Cropping patterns in chena

	Extent cultivated as a % of total chena extent	
	Yala 1977 (%)	Maha 1977/78 (%)
Chillies	1	48
Cowpea	5	10
Brinjals	-	10
Gingelly	91	-
Kurakkan	-	11
Green Gram	1	1
Maize	-	11
Tobacco	-	1
Paddy	-	2
Other vegetables	2	6
	100	100

Chillie, the foremost cash crop in the dry zone is the premier crop grown in chenas. This crop occupies almost half the chena acreage in Maha followed by Cowpea. The traditional cereals such as Kurakkan and maize no longer dominate the crop mix under this system of cultivation. It is of interest to record that in Development Regions 7 and 8, large scale commercial cultivation of brinjal is seen in chenas. Gingelly is the single most important crop grown in the Yala season.

6.13 HIGHLAND OTHER THAN CHENA

The cultivation of unirrigable highlands other than chena is seen more in Development Regions 5 and 6. Region 5 is an area with an assured supply of irrigation water for lowland paddy, and farming on highland here too is relatively well established. In this area, some of the lands that were originally under chena are fully developed now and more stable cropping is seen on them. Tree crops such as coconut, jak, breadfruit, mango and lime are common. The principal seasonal crops seen here are chillie, cowpea, maize and vegetables in Maha season and cowpea and gingelly in Yala. Application of fertilizer and spraying of agrochemicals for pest control are seen only in case of chillie crops.

7. CROP YIELDS AND DISPOSAL OF FARM PRODUCE

An analysis of crop yields mainly in respect of lowland paddy is presented in this chapter along with a brief discussion on the disposal of farm produce.

7.1 YIELD LEVELS

7.1.1 PADDY

Information regarding harvested paddy yields collected on the basis of farm interviews may be an under estimate compared to yield data obtained through crop cutting experiments. However, the yield analysis based on reported putput levels reflect the broad levels of land productivity at the time of survey. The mean acre yields in the study area as reported are ;

	Mean yield per acre (bushels)	Standard error	95% confidence interval
Maha 1977/78	53	1.7	50 - 57
Yala 1977	42	1.9	38 - 46

Relatively higher yields seen in respect of the Maha season could be attributed largely to the favourable rainfall distribution experienced during 1977/78 Maha season.

Table 7.1 Mean acre yields of paddy by Development Regions

Region	Seasons	
	Maha	Yala
5	58	42
	(2.5)	(2.9)
6	58	46
	(4.0)	(3.7)
7	47	48
	(2.6)	(4.0)
8	50	29
	(3.9)	(4.6)

(The figures in parenthesis indicate standard error)

The mean acre yields between the 4 Development Regions in Maha do not exhibit marked variations, despite the earlier observed Regional differences in irrigation infrastructural facilities. For instance, the mean yields reported from Regions 5 and 8 in Maha season are relatively close, though the irrigation facilities available in the two Regions differ considerably. The relatively more even yield distribution seen in the different Regions in Maha may largely be attributed to the favourable rainfall distribution experienced during the particular Maha season under reference. In seasons of good rainfall distribution, the disadvantages normally associated with rainfed paddy farming get masked to a great degree, stressing the critical nature of water as a production input. In such circumstances the rainfed areas having received an adequate water supply perform relatively well with regard to output levels and consequently the mode of supply of water becomes less important in the production process. The Region-wise yield differences are more marked in the dry season (Yala) with Region 8 reporting very low acre yields of less than 30 bushels.

A statistical analysis of paddy yields according to water supply conditions was not attempted as only a small number of yield observations were available from major schemes and rain-fed areas. Infact, 80% of the yields reported were from fields under village tanks. However, the mean yields arranged on the basis of water supply are given below.

Sources of Water	Maha 1977/78	Yala 1977
Village tanks	53.0	38.8
Major schemes	59.1	54.5

The benefits of major irrigation in the way of higher yields are more marked in the Yala (dry season). In Maha, the well distributed rainfall experienced has reduced the yield differences between fields under major schemes and village tanks.

Fertilizer being an important production input that determines the output level, paddy yield data in the study sample was further examined on the basis of fertilizer use. A grouping of paddy yields

with and without application of fertilizer was attempted in this regard. The results are shown below -

Paddy yields according to fertilizer application

Maha 1977/78

	Mean yield per acre (bushels)	Standard error	95% confidence interval for mean yield per acre (bushels)
With application of fertilizer	59.6	2.4	55 - 64
Without any application of fertilizer	47.1	2.9	41 - 53

The difference in yield of 12.5 bushels per acre was found to be statistically significant. A majority of those who had fertilized their fields had used much less than the recommended level of 3.0 cwt. per acre, the average being 1.3 cwt. per acre per farm reporting.

7.1.2 CHENA

The crop yields in chena are low and fluctuate markedly depending on weather conditions. As mixed cropping is the standard practice in chena, the acre yields given here are only an approximation.

Crop	Yield per acre
Cowpea (Bushels)	7
Kurakkan (Bushels)	11
Maize (Bushels)	10
Paddy (Bushels)	32
Brinjals (pounds)	6,000
Chillies - dried (pounds)	144

7.2 DISPOSAL OF PADDY

Of the paddy produced in Maha, 31% was sold, 34% was kept for home consumption and a further 12% was given as rent payments. (Table 7.2) In terms of number of farmers, 41% reported sale of paddy.

Table 7.2

Disposal of paddy

	Maha 1977/78		Yala 1977	
	Quantity (Bu)	Proportion of total production	Quantity (Bu)	Proportion of total production
Quantity sold	4281	31	4332	44
Quantity retained for consumption	4808	34	3545	36
Rent payments	2105	15	894	9
Repayment of loans in kind	686	5	153	2
Other payments made in kind	637	5	384	4
Quantity retained for seed	1095	8	564	6
Quantity stored for later sales	393	3	72	1
Total	14005	100	9944	100

A higher proportion of sales (44% of the production) was observed in the Yala season. This is not due to a higher productivity in Yala but due mainly to relatively smaller rent payments made for land, loan repayments, and other payments made in kind. The probable reason for this observation is that majority of farmers (more than half) who cultivated in Yala were from Region 5, where incidence of tenancy is much less and paddy farming is more stabilised.[1] The possibility of Maha paddy being retained for Yala expecting unfavourable weather also cannot be ruled out.

The amount of paddy retained for consumption purposes was around 35 bu. per household per season.

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[1] At the time of the survey not all farmers who had cultivated in Maha had completed their cultivation operations and disposed their produce. The sample of farmers for whom information on disposal of paddy was available for the Maha season was therefore smaller than the total sample studied. Hence the smaller difference between production data pertaining to Yala and Maha appearing in Table 7.2. The Maha sample however was a cross section from all four Regions, whereas the Yala sample had a higher representation from Region 5.

On the basis of annual rice consumption of 97 kg. of rice per person,[1] the paddy requirement for a family of 6 works out to 41 bu. per annum. Hence, the amount kept for consumption seems to be reasonable, keeping in mind the other needs of a rural family.

The sales from Regions 5, 6 and 7 constituted more than 90% of the total sales in the Maha season. The situation in Yala was somewhat different with Region 5 contributing a larger share (40%) and the contribution of Region 8 dropping further.

The data shows that all sales are made immediately after harvest and very little had been retained for later sales. Since paddy enjoys a stable guaranteed price, there is no particular advantage for the farmers to delay sales in anticipation of higher prices later on in the season. Thus the general tendency is to market the produce immediately after harvest. Such farmer behaviour in marketing of paddy would imply the need for making speedy purchasing arrangements at peak harvesting periods in future. With 40,000 acres coming under irrigation, production would increase substantially and in consequence a very heavy responsibility would be cast on those responsible for marketing not only for prompt purchase of paddy but also for speedy transport and storage of produce.

7.3 DISPOSAL OF CHENA PRODUCE

Brinjal appears to be the most paying cash crop, which generates high incomes compared to other chena crops normally grown in Maha. Although the income derived from chillies is less than from Brinjals, it is grown more widely. (Table 7.3). The third most important chena crop is cowpea. Both maize and kurakkan are less important cash crops though grown in most chenas. In fact most of the Kurakkan grown is retained for home consumption.

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[1] Edirisinghe N and Poleman T., (1976); Implications of Government intervention in the rice economy of Sri Lanka.

Table 7. Production and sale of chena produce Maha 1977/78 and Yala 1977

Crop	No. of farmers reporting cultivation	Value of production per acre(Rs.)	Value of sales per acre (Rs.)
Maha season crops			
Chillies	256	942	632
Brinjals	47	2520	2394
Cowpea	68	677	234
Maize	97	343	162
Kurakkan	89	165	24
Vegetables	39	362	361
Green Gram	11	1047	893
Tobacco	4	1063	125*
Yala season crops			
Gingelly	190	659	596
Cowpea	26	771	548

(*Sales not completed at the time of the survey).

On a per acre basis, the incomes derived from most chena crops are low primarily due to the low productivity of chena farming and the low prices received for most of the chena produce.

The perishable produce - brinjals and other vegetables are usually sold immediately after harvest while there is a tendency to store small quantities of other dry grains and pulses - cowpea, green gram and chillies etc. for later sales. In all these cases, however, the amounts stored did not exceed quarter of the total harvest, suggesting that sales are generally made soon after harvest. One reason underlying such quick sales of dry grains and pulses is that the financial position of farmers are quite tight at the end of the cultivation season. This perhaps is the main reason for farmers to dispose of their produce even when the prices are not so favourable to them.

A number of marketing channels have been used by the chena farmers. The two most important being, the traders who visit villages or chenas and the traders in the nearby village boutiques. Seventy two percent of farmers who marketed their chena produce reported using these two marketing outlets. Selling produce on roadside sale points were reported mainly in Region 8, through which the Puttalam -Anuradhapura trunk road passes. State sponsored institutions do not appear to participate in the purchase of chena produce.

The averages of maximum and minimum prices received for chena produce as reported by farmers are given in table 7.4

Table 7.4 Prices received for chena produce as reported by farmers

Crops	Unit	Maha 1977/78		Yala 1977	
		Maximum Price (Rs.)	Minimum Price (Rs.)	Maximum Price (Rs.)	Minimum Price (Rs.)
Chillies	lb.	9.36	8.70	12.00	10.00
Brinjals	lb.	0.55	0.26	0.60	0.10
Cowpea	bu.	96.11	78.57	128.57	73.57
Gingelly	bu.	-	-	102.09	85.71
Kurakkan	bu.	16.00	16.00	-	-
Maize	bu.	33.90	30.50	26.00	26.00
Vegetables	lb.	0.41	0.28	0.60	0.55
Green Gram	bu.	-	-	120.00	90.00

The prices given here are relatively low and also fluctuate particularly in the case of brinjals, cowpea and vegetables. If similar crops are to be encouraged under more stable irrigated conditions, a primary requisite would be an improved system of marketing to assure a fair price to the producers.

The study also attempted to identify the problems faced by chena farmers in marketing their produce. The two most important problems shown up by farmers are (a) the low price and (b) the lack of proper purchasing points. Farmers do not perceive availability of transport as a problem

at present, apparently, as the purchases are now made in the chenas or in the nearby village boutiques. An underlying reason for low prices received by producers is the heavy transport cost normally debited against them, when purchases are made at the chena itself or in nearby boutiques.

Institutional arrangements for purchasing of agricultural produce are available only for paddy, in which the co-operatives form the village level purchasing point. The absence of a floor price scheme as well as regular marketing outlets for produce other than paddy, contribute markedly to the fluctuation of prices of many of the field crops grown in the area at present. This pinpoints the need to introduce institutional arrangements for marketing of field crops. Regular marketing arrangements are very necessary to induce farmers to take up to crops other than paddy.

8. INSTITUTIONAL SUPPORT

8.1 RURAL INSTITUTIONS

Farm supporting services - agricultural extension activities, farm credit, input supplies and marketing channels are discussed in this chapter.

A number of rural institutions functioning at village level play a vital role in supporting farming activities in the study area. The village cooperatives are the main suppliers of farm inputs such as fertilizer and agro-chemicals. In addition, the cooperatives serve as the agents of the Paddy Marketing Board for purchase of paddy. The two premier Banks, the Bank of Ceylon and Peoples' Bank provide agricultural credit, mainly through the sub offices of the Bank of Ceylon and Rural Banks respectively. The extension service of the Department of Agriculture handles farmer education, while the Department of Agrarian Services provide administrative and other supporting services for village level farmer organisations along with maintenance of minor irrigation works and distribution of fertilizer.

A Region-wise breakdown of the existing services provided by different rural institutions in the project area is given in Table 8.1. It is observed that the coverage of the Departments of Agriculture and Agrarian Services is quite uniform in the different Development Regions. However the cooperatives provide a more intensive coverage in Region 5 where bulk of the paddy acreage is under major irrigation at present. Region 6 did not have a bank at the time of survey and appears to be poorly served in many respects compared to other Regions.

Table 8.1 Coverage of rural level institutions and their staff by Regions

Institution/Staff	Number of units or number of staff members in service				
	Region 5	Region 6	Region 7	Region 8	Project area
Divisional officers of the Dept. of Agrarian Services	1	1	1	1	4
Agricultural Instructors of the Dept. of Agriculture	1	1	1	1	4
KVSS of the Dept. of Agriculture	4	2	4	7	17
Number of Branch Cooperatives	7	5	9	6	27
Cooperatives offering following services :					
(a) Fertilizer Sales	5	--	5	3	13
(b) Insecticide Sales	5	1	5	3	14
(c) Paddy purchasing	7	4	7	2	20
(d) Purchase of other crops	7	2	1	--	10
Branches of :					
(a) Bank of Ceylon	1	--	1	1	3
(b) Peoples Bank	1	--	--	1	2
(c) Rural Banks	1	--	1	1	3

As seen in chapter 6, the agricultural sector in the study area is characterised by a relatively low level of productivity of paddy. The near absence of settled highland cultivation and the predominance of shifting cultivation are other important features seen here. The lower level of productivity of the paddy sector could be attributed mainly to unstable water supply conditions in the lowlands. Such unstable water supply conditions infact act as a constraint in the application of developed technology. Chena farming, an important economic activity in the area, hardly demands external servicing due to the very nature of practices adopted.

The low level of utilization of services provided by the village level institutions in the area provides good evidence with regard to the stage of development of farming. It may also be a reflection of the shortcomings of some of these institutions. Agriculture practised at

present is close to the subsistence end rather than to the commercially oriented end on outside servicing for the supply of material inputs such as seed, fertilizer, agro-chemicals and equipment, and other services, namely, marketing of produce, credit, extension and crop insurance. The observed low level of dependence (relative to the developed farming areas) on institutional sources for servicing can be attributed to the low level of development of farming in the area. Table 8.2 summarises the extent of dependence on institutional sources for servicing paddy cultivation in the Maha 1977/78 season. Nearly a half of the farmers who cultivated paddy have made use of institutional sources to receive production credit, fertilizer and agro-chemicals.

Table 8.2 Dependence on institutional sources[1] for servicing the paddy sector (Maha 1977/78).

Service	No. & percentage of farmers utilizing the service		
	No.	As a % of all farmers (N = 512)	As a % of farmers who cultivated in Maha. (N = 301)
Agricultural credit	148	29	49
Purchase of seed paddy	29	6	10
Purchase of fertilizer	124	24	41
Purchase of agro-chemicals	146	29	49
Marketing of paddy	70	14	23*
Crop insurance	78	15	26

(*This figure works out to 41% when expressed as a percent of farmers who reported harvesting at the time of survey, N = 175)

8.2 AGRICULTURAL CREDIT

8.2.1 CREDIT UTILIZATION FOR PADDY CULTIVATION.

In the Maha season nearly half the paddy cultivators except in Region 6 had obtained credit from institutional sources for cultivation purposes. Region 6 with the lowest rate of usage of credit is an area without any branches of the two banks. This may perhaps be one reason for the low level of credit utilization here. Another possible explanation is

[1] Institutional sources include cooperatives, agricultural extension service, banks, Paddy Marketing Board, Department of Agrarian Services, and the Agricultural Insurance Board.

the better financial situation of the farmers in Region 6 who derive a substantial income from chena farming.

The usage of credit in the four Regions hardly show any relationship with the use of cash inputs. Though the highest rate of usage of cash inputs was seen in Region 5, credit usage here is not different from Regions 7 and 8. Further, Region 6 which recorded a high rate of usage of fertilizer (only second to Region 5) recorded the lowest rate of usage of credit. This observation leads to the conclusion that the usage of credit in paddy cultivation is determined more by the availability rather than the need for credit.

Table 8.3 Utilization of credit for paddy cultivation

No. of borrowers by Region

	Region 5		Region 6		Region 7		Region 8		Project area	
	A.	B.	A.	B.	A.	B.	A.	B.	A.	B.
Yala 1977	4	6	None	-	2	9	3	20	9	7
Maha 1977/78	48	43	17	29	32	56	44	60	141	47

A - No. of borrowers

B - No. of borrowers as a percentage of cultivators of paddy in the season under consideration.

Very few farmers have used credit in Yala. The high rate of credit utilization in Maha was due to the relaxation of the lending criteria in August 1977[1]. As a policy directive of the government, even the defaulters of previous loans became eligible for further loans and consequently volume of credit handled in Maha was many times greater. In contrast, during Yala, the loan defaulters were not eligible for further loans from institutional sources.

The study data also shows that institutional sources form the single most important source of cultivation credit. In Maha, 94% of the cultivation loans taken were from institutional sources. Non institutional sources such as friends and relatives are of minor importance as source of farm finance. Further, loans obtained from friends and relatives are smaller in amount and carried lower rates

[1] Central Bank of Ceylon - Review of the Economy (1977)

of interest compared to institutional credit reflecting a lower demand for such credit. (Table 8.4).

Table 8.4 Utilization of credit for paddy cultivation in Maha 1977/78
(Classification on the basis of source of borrowing)

Region	Source	No.of loans	Amount borrowed (Rs.)	Interest rate per year(%)	Amount per acre.(Rs.)
5	Private	3	711	7.67	149.68
	Institutional	44	56,250	12.16	516.29
	Friends & Relatives	2	400	10.00	100.00
6	Private	2	1,020	6.00	408.00
	Institutional	15	15,363	11.73	722.96
	Friends & Relatives	--	--	--	--
7	Private	--	--	--	--
	Institutional	31	28,564	11.90	389.95
	Friends & Relatives	2	300	--	66.67
8	Private	--	--	--	--
	Institutional	44	50,671	11.07	767.74
	Friends & Relatives	--	--	--	--
Project Area	Private	5	1,731	7.00	238.76
	Institutional	134	150,848	11.69	559.84
	Friends & Relatives	4	700	5.00	82.35

8.2.2 CREDIT UTILIZATION FOR HIGHLAND FARMING

The total number of farmers who cultivated highlands other than chena was small. Of them, a third had obtained credit in the Maha season while only 6% had utilised credit in Yala. Here again institutional sources of credit were more important. On a Regional basis, Region 7 reflected the highest usage of credit followed by Region 8.

8.3 SUPPLY OF MATERIAL INPUTS

8.3.1 SEED PADDY

The extension service of the Department of Agriculture handles the production and distribution of seed paddy as a supplementary service to it's farmers' educational activities. The earlier discussions revealed a high level of usage of improved varieties of paddy in the study area. Although the usage of improved seed is widespread, the purchase of pure seed from institutional sources is not satisfactory as only 9% of the farmers had utilised this service. In other words, the rate of renewal of seed does not seem to be high enough implying that the seed used cannot be of very high quality. The Department of Agriculture recommends renewal of seed from certified stocks once in 4 years, which means that around 1/4th of farmers are expected to renew their stocks for every season.[1]

8.3.2 FERTILIZER & AGRO-CHEMICALS

Institutional sources are the most important sources of input supply for paddy cultivation. The supply of fertilizer is handled mainly through the cooperatives which are the points of supply of subsidised fertilizer at the village level. Table 8.5 reveals the extent of purchase of fertilizer from institutional sources.

The role played by institutional sources as suppliers of agro-chemicals is less important. Of the farmers who used agro-chemicals 53% and 43% purchased them from institutional sources in the Maha and Yala seasons respectively. The balance purchased them from private sources.

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[1] On the assumption that varieties cultivated in Maha are different from those cultivated in Yala season.

Table 8.5 Purchase of fertilizer from institutional sources

Maha 1977/78

Region	No. applied fertilizer	Purchase from institutional sources	
		No. of farmers	As a percentage of those who applied fertilizer
5	87	71	82
6	37	25	68
7	28	17	61
8	18	11	61
Project area	170	124	73

8.4 UTILIZATION OF SERVICES PROVIDED BY EXTENSION SERVICES

For the purpose of this discussion, the services offered by the extension service (extension service of the Department of Agriculture) are classified into two categories, i.e. (1) extension work by the field extension workers through direct contact with farmers (2) the indirect attempts to reach farmers through media - the print media and the radio in this instance. Regarding the extension work carried out through the field staff, evidence indicates a clear dominance of individual contact of farmers with extension personnel compared to group contact[1] - (Table 8.6). It appears from the data presented in this table that the traditional group methods of extension had received very little attention in extension work in the area. This could be expected, to a certain extent, in a highly heterogeneous farming area, at the initial stages of development, since the knowledge needs of farmers are such that they can be best provided through individual consultation. However, extension services should always be careful not to neglect group methods of extension, particularly since they are less costly in terms of number of contacts made.

The four Regions did not show much variation in farmer contacts with extension personnel as is evident from Table 8.6. The degree of contact with extension personnel seems to be satisfactory considering the stage of development of paddy farming in the area.

(1) The contacts made through the training and visits system of extension which operates in Anuradhapura District were considered to be direct individual contacts of extension officers with farmers since farmers considered these visits as ways & means of personal contact with the extension staff.

Table 8.6 Utilization of services provided by extension services Maha 1977/78

Service	Extent of utilization of the services by farmers									
	Region 5		Region 6		Region 7		Region 8		Project area	
	No.	%	No.	%	No.	%	No.	%	No.	%
Obtaining extension advice personally	71	39	25	20	34	33	44	42	174	34
Attended field days	8	5	5	4	--	--	3	3	16	3
Attended training classes	9	5	7	6	--	--	6	6	22	4
Attended demonstrations	2	1	1	1	--	--	2	2	5	1

(The percentage is expressed as a percent of all households in the area; N for Region 5 = 180, Region 6 = 125, Region 7 = 103, Region 8 = 104, Project area=512)

The exposure to media, more specifically to print medium and radio, were somewhat significant when considering the stage of development of farming. Although the exposure to print medium was less, the exposure to radio agricultural programmes was satisfactory. This compares well with the general high level of exposure to newspapers and radio. 27% and 38% of the heads of households reported daily and occassional exposure respectively to newspapers while 39% and 33% reported regular and occassional listening to radio. The high literacy rate of the farming community in the country, as well as the satisfactory reach of mass media should be made use of in the best possible manner in adult education work.

Table 8.7 Readership of agricultural literature and listnership to agricultural programmes

	Region 5		Region 6		Region 7		Region 8		Project area	
	No.	%	No.	%	No.	%	No.	%	No.	%
Readers of advisory leaflets	22	12	21	17	24	23	10	10	77	15
Readers of agricultural magazines	17	9	16	13	16	16	9	9	58	11
Regular listeners to Radio agricultural programmes	39	22	29	23	30	29	28	27	126	26
Occassional listeners to radio agricultural programmes	46	26	28	22	20	19	19	18	113	22

(the percentage is expressed as a percent of all households in the area; N for Region 5 = 180, Region 6 = 125, Region 7 = 103, Region 8 = 104, Project Area = 512).

8.5 MARKETING OF PADDY THROUGH INSTITUTIONAL SOURCES.

In the Maha 1977/78 season, a total of 41% of the farmers reported sales of paddy from the Maha harvest and the total amount marketed amounted to 31% of the total production. As indicated in Table 8.8, sales to private dealers were nearly 50% more than what was sold to cooperatives. In the Yala season, a larger proportion of farmers reported sales and the sales to cooperatives were the same as the sales to private traders. The possible explanation for this observation is that a majority of farmers who cultivated in Yala were from Region 5 where farming is more stabilised, with assured water conditions, and their greater use of institutional sources in marketing paddy. The reason for a larger proportion of farmers marketing paddy in Yala may be again due to stable water conditions enjoyed by farmers who cultivated in Yala. Previous studies[1] have shown that private traders generally give lower purchase prices than institutional buyers. The widespread sales to private traders are therefore of interest.

[1] A Study of Five Settlement Schemes Prior to Irrigation Modernization, Ranatunga, A.S. and Abeysekera, W.A.T. - ARTI Research Study No.31 1979.

They may reflect transport difficulties which are overcome by the on-farm purchasing done by private traders. They may also reflect low quality of paddy which may be rejected by institutional buyers.

Table 8.8 Marketing channels for paddy - project area
Maha 1977/78 and Yala 1977

Season	Percentage of farmers who marketed paddy		Percentage of total production sold	
	To Co-operatives	To private dealers	To Co-operatives	To private dealers
Maha	17*	24*	12	19
Yala	31	36	22	22

(* As a percent who reported harvesting at the time of the survey).

9. SOCIAL STRUCTURE AND CHANGE IN THE STUDY AREA

This chapter examines the social structure and the changes of a *purana* village[1]. The common community type in the study area is the *purana* village. There are about 160 *purana* villages in the area and one of the villages - *Tambuttegama* - was studied in depth to understand the social system of the area. As mentioned earlier the *purana* village is the common community type in the area and in both socio-cultural and economic aspects they show a great similarity to each other which warrants a single village study in depth to generalise for the whole area.

9.1 SETTLEMENT NETWORK

Physically, each *purana* village is characterised by four main components. They are, the village tank *(wewa)*, from which usually the village derives its name, village settlements *(purana gammaddas)*, the paddy fields below the tank *(purana wela and akkara wela)* and the jungles *(badda)* and other common lands of the village. *Tambuttegama* has its own *wewa*, three *purana gammaddas*, *purana wela* and *akkarawela* and its own *badda*.

During the last four decades, the population of *Tambuttegama* increased rapidly. For example, in 1932 there were 450 villagers in 89 households. In 1962, 812 villagers lived in 186 households. In 1978, the number increased to 1250 villagers in 238 households. The state opened several village expansion schemes in the peripheries of the *purana* villages to cope with the population pressure. Between 1951 - 1964, four village expansion schemes were opened at *Tambuttegama*. Thus the settlements of the *purana* villages are now of two types: *purana gammaddas* and the new village expansion schemes.

In May 1978, 238 households of this village were distributed among various settlements as follows:

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[1] A separate case study - Tambuttegama : A village in the Mahaweli Development Aaea - will be available shortly.

Settlement	No. of households	%
Gala Gammadda	90	38
Kalunda Gammadda	53	22
Ranorawa Gammadda	29	12
LDO Schemes	66	28
	238	100

The above table shows that nearly three fourths of the total households of the village still live in *purana gammaddas*. Most of the settlers of new village expansion schemes are considered as "outsiders" by the *purana* villagers. The distinction between the *'purana'* villagers and the *'outsiders'* is very prominent in socio-cultural melieu in the village as well as in the area.

Compounds - Residential Groups

Each *purana gammadda* has several compounds *(kotuwa or watta)*. A compound is associated with a group of villagers, namely those who live in the compound and/or have the right to live in it. Compounds could emerge due to various factors such as kinship relations, political affiliations and equal income status of the resident etc.

Ideally, one's identity as a *purana* villager is decided by two factors; ownership of a *pangu* (share) in the *purana wela* and the membership in a village compound. But now several *purana* villagers do not own any paddy lands in the village (46%) and ownership of a *pangu* in the *purana wela* does not serve as an index of one's identity with a village. Therefore, the membership in a compound has now become the only indicator of villagers' identity with a *purana* village.

9.2 KINSHIP NETWORK

Kinship is one of the main factors which governs the behaviour of villagers and is expressed in several ways. One way is the classification of all the kinsmen on the basis of family *(paula)*. Villagers use the term *'paula'* to recognise two groups of relatives. The first group is the nuclear family. It consists of parents and their children. The authority, consumption and economic decision making etc.,

are governed by the nuclear family which is often patrilineal.

There are various tasks such as the harvesting of crops and mending a house roof etc. which require the help of many. A nuclear family often cannot handle such tasks alone. The close relatives who live near to each other in a compound constitute a group which operate in such occassions. This can be called the effective family. Its operations are governed by two elements. One is the time element. A man's effective *paula* comprises those of his kinsmen who at any particular time can be relied upon to act as allies.[2] The second is the element of proximity. Often effective family is coterminous with a compound.

In the sphere of social interaction among the *purana* villages, another network of kinship operates. It is called *variga*. Ideally, a *purana* village is a separate *variga* and is of one caste. Two elements are important in this context. The first is the equal caste status of the members of a village community. The second is the familiarity. The element of familiarity does not arise within the boundaries of a *purana* village. This explains why many *purana* villagers still prefer to see their children marry within the village although outside village marriages are allowed. In an exchange of a member in marriage to another *purana* village, the element of familiarity plays an important role.

Variga as a social institution in the *purana* villages had become obsolete except in the matters of kinship and marriage. The abolition of the feudal post of the *Ratemahathmaya* (who was replaced by the Divisional Revenue Officer in 1939), the spread of Civil Law into the villages, migration, social mobility and the impact of outsiders contributed to this process.

The groupings discussed above are, in varying degrees, groups which endure through time, independently of the life span of particular individuals. In terms of these networks,[3] we could say Tambuttegama as well as the majority of *purana* villages have retained a semi-autonomy from the larger society and homogeneity of their population. Because

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[2] E.R. Leach, Pul Eliya. Cambridge University Press, 1961. 113p.

[3] Economic Organisation is discussed in Chapter 5.

the village social system was relatively autonomous and cohesive, attachment and obedience to the system was strong, reference groups were primarily within the community, and social control was effective. Further, because people in Tambuttegama and other *purana* villages, in general, were born and socialised within a relatively isolated social system, they possessed personality traits closely in lines with the structure of the social system. Also, in accord with the social system was the culture of the village and region.

9.3 SOCIAL CHANGE

The gradual opening of the "inward oriented", relatively closed *purana* village communities started with the process of the penetration of state activities into the area from 1935. Several factors contributed to accelerate the changes in the village social system.

9.3.1. THE INFLUX OF OUTSIDERS INTO THE VILLAGE

Until the 1940's *purana* villages survived without much change. The opening of new settlement schemes between 1930 and 1960 in the North Central Sri Lanka has brought many outsiders from Kurunegala, Colombo, Galle and Kegalle Districts into the area. They first came as contractors and labourers of development projects, eg. the restoration of old tanks and the construction of new trunk roads in the area. Some others arrived to begin new business ventures such as timber felling and catering to the labour groups of various projects. Some of them gradually started to encroach the Crown Lands by the side of the roads (which were in the periphery of the *purana* villages). Despite repeated attempts made by the authorities to eject them from the Crown Lands, they 'survived' to become the owners of occupied lands under the village expansion schemes during 1950 - 1965. On the other hand, the *purana* villagers did not make attempts to extend the *purana* settlement boundaries to enclose the lands close to the main roads or to the emerging townships and bazaars. This was mainly due to their desire to live close to each other in the *purana gammaddas*. But the population pressure in *purana gammaddas* caused some of them to move into the village expansion schemes in the village periphery. Thus there developed contacts among the 'outsiders' and the *purana*

villagers. The most important outcome of this social intercourse is the introduction of market economy to the isolated *purana* villages. Several changes in consumption habits such as beef eating, consumption of liquor and religious beliefs such as recognition of natural gods in place of village deities etc., were also introduced by the outsiders to the village. Further, marketing of produce, shop keeping, carpentry and transport, etc. have been monopolised by the *'outsiders'* upto date in the villages.

9.3.2 THE RAPID GROWTH OF POPULATION

Population pressure on limited resources has made the following changes in the village economy and society.

(a) The fragmentation of paddy and highland holdings in *purana* villages; It created a new class of agricultural labourers and the landless. The presence of these categories has changed the criteria of village identity of villagers.[1]

(b) Further, new settlements such as village expansion schemes emerged to cope with the population increase in the village. Thus, there developed a social differentiation among various settlements and compounds. For example, at Tambuttegama, *Gala gammadda* considers to be the most prestigious *gammadda* where the traditional customs and rules are protected. *Ranorawa gammadda* is looked down upon by the other *gammaddas*, because of its members' poverty and non - *variga* marriages.

9.3.3 RURAL INSTITUTIONS AND PARTY POLITICS

The establishment of local level institutions, such as the Cultivation Committees and the abolition of the posts of the village Headman and the *Vel Vidane* (the Village Irrigation Headman), have introduced several changes at the village level. The first is the provision of a broad based new political arena where the villagers could compete for the village resources. The second is the creation of a new resource of power, i.e., access to bureaucracy and party politics at the local level. With the establishment of new institutions like the Cultivation Committees, many villagers have become eligible to hold responsible

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[1] See sub section 9.1 on Compounds.

posts in the village. Further, many officers were appointed by the government at the divisional and district level to coordinate the agricultural and other development activities at the village level. Thus, there developed a gradual link-up between the micro-structures of the villages and the macro structure of the central government.

Party politics play a vital role now in the village affairs. The leadership of rural institutions at the village level which were established with the abolition of old feudal posts clearly shows political affiliations. In fact, these affiliations were formally recognised by the 1972 Agricultural Productivity law and the 1973 Agricultural Lands Law. The new Cultivation Committees and the Agricultural Productivity Committees, in 1973, replaced the election of office bearers with the nomination by the Member of the State Assembly of the electorate. This allowed several party representatives of the area to become office bearers of village 'developmental' institutions. They are to be only 'known' supporters of the Member of the State Assembly and nominated irrespective of their village roots or popularity. This category of powerful leaders, often unpopular but politically influential, is a new phenomenon in the *purana* villages. Some of them are not *purana* villagers nor they own any land in those villages. Their base of power and influence mainly depends on their political affiliations and access to regional and national bureaucracy.

According to the *purana* villagers, these institutional and political changes in the *purana* villages have accelerated the change of the traditional social system. Some of the indicators of thie are :

(a) The disappearance of village integrity. Feuds among the blood relations are more common now than in the past.

(b) The sale of *purana* lands by the villagers to the 'outsiders' has increased. About twenty years ago, it was impossible even to think of the sale of *purana* paddy lands to 'outsiders'.

(c) Indiscipline among the younger generation - gambling, thefts and addiction to narcotics (ganja) are common even among the teenagers of the village.

(d) The holding of influential posts by persons who do not care about the traditional values and norms.

9.3.4 GOVERNMENT SPONSORED LARGE SCALE DEVELOPMENT PROJECTS

The settlement pattern, water management and socio-economic structure of the new projects eg., Rajangana and Mahaweli Development Projects are radically different from the existing *purana* villages. Since one of the objectives of the projects is to ameliorate the socio-economic conditions of the people who already live in the project areas, attitudes of the original settlers on the envisaged development is important to observe at this point.

9.4 FARMER ATTITUDES TOWARDS NEW SETTLEMENTS

A very important facet of the study area is the existence of a well established community pattern. It is possible to identify three categories of settlers who will be settled in the study area. They are (a) original *purana* villagers, (b) outsiders i.e. LDO settlers and encroachers on Crown Lands who came from different areas and (c) the new settlers from outside the region. The majority of settlers in the future settlements will be from the original *purana* villages and LDO settlements followed by the new settlers who will constitute around 40% of the total population of new settlement schemes.

The settlement and the interaction patterns of the categories of settlers will have an influence on the success or failure of the project. Therefore, a brief analysis of the relations among these categories of settlers at this point is in order. Our analysis will be limited to the original *purana* villagers and outsiders as, at the time of the survey (1978), there were no new settlers in the area.

Purana villagers treat themselves as an integrated group, at least, for social and cultural matters vis-a-vis the "outsiders". From their view point all the non-*purana* villagers are "outsiders". But the converse is not true; all the "outsiders" do not consider themselves as an integrated group nor *purana* villagers as one group. Interests and identities of "outsiders" are still at their places of origin. Each group feels that it is superior to the other and resent

each other. For example *purana* villagers feel that "outsiders" have encroached their ancestral lands while the "outsiders" feel that they cannot become paddy cultivators because of the jealousies of the *purana* villagers.

Both groups have expressed their views with regard to the new settlement schemes. Many of the *purana* villagers do not like to move out of their ancestral places to receive new lands. A strong desire to retain *purana* village settlements was evident, specially among the propertied class. They felt that the best course of action for the government was to repair the existing village tanks and allow those with lands to remain where they are and to transfer the landless to new areas where new lands are to be opened. The landless poor villagers preferred to move out of their *purana* settlements in order to obtain cultivable land elsewhere. On the other hand, most of the encroachers and LDO settlers preferred a settlement arrangement which provides them with irrigable lands.

Both groups want to retain their identities if they ultimately have to move out of their present homesteads. They like to have their present settlement patterns on new settlements too. Many are quite averse to living with strangers from different areas and sometimes of different castes and religions. Another aspect that has caused considerable concern and worry to the inhabitants is the construction of new houses in the future settlements. Apart from the inadequacy of the cash grant given for construction of dwelling houses, both original *purana* villagers as well as "outsiders" feel that they are incapable of building new houses satisfactorily to accommodate their belongings that have been, in some cases, accumulated for several generations. If the disabled are not to be considered in the alienation of new lands, the villagers feel that they should be allowed to retain their old houses temporarily until they construct their new houses and get a firmer footing in the new environment. Although the *purana* villagers and outsiders do agree on certain issues elaborated above, it is difficult to expect an integration of those two groups fully in their new environment. But with the diminishing claims of *purana* villagers over their much valued land and water resources in

purana villages and with the necessity to develop a cooperative attitude towards farming activities with the other settlers in the new settlements, it is realistic to expect more interaction between the members of the two groups than what they had in the past.

Thus, both groups are in an advantageous position in re-settlement vis-a-vis new settlers. The stress that those two categories have to overcome in new settlement would be much less than that of the new settlers. Further, it is safe to expect that the "outsiders" will become better farmers in the new settlements as they are the pioneer risk takers in the area and are accustomed to the social and environmental conditions through their experience in the area. Their determination to survive for the last several decades in adverse social and environmental conditions show their spirit which would assist them greatly in enhancing their economic and social status in the new settlement. In conclusion, it could be stated that in the selection of settlers for new settlement schemes, priority should be given to the following:

(1) *Purana* villagers who lose their village rights because of the development project.

(2) "Outsiders" who live in LDO Schemes and encroached lands

(3) Villagers of the dry zone especially those living in areas adjacent to the project area and

(4) The wet zone farmers.

APPENDIX I

CLIMATIC CONDITIONS AND SOILS OF THE H - AREA

The H - area benefits from the rainfall of only one monsoon season and receives 78% of its total of around 50 inches[1] annual rainfall during this season (i.e) during the MAHA Season from October to March. As a result, the mean annual rainfall distribution shows a bi - modal pattern with two dry seasons - One in January/March, which is short, and the other from June to September, which is longer and pronounced - see fig. (1) of this Appendix.

Climatic data from Maha Illuppallama Research Station[2], centrally located in H - area near the South Western tip of sub area H4 are shown in Table (1) of this Appendix. Fig. (1) also shows the average monthly variation of Relative Humidity and the monthly mean Maximum and Minimum temperature for the period 1971 to 1977. The available data shows that in most months, the Relative Humidity at night is considerably higher than during the day. In fact, the Relative Humidity at night ranged from 86% to 93% whereas, during the day it varied from 59% to 78%. The observations on the diurnal variation of Relative Humidity clearly indicate the dependence of humidity conditions on the regimes of the South-West and North-East monsoons.

The humidity is lowest during the dry season in February/March and highest during the wet months from October to December. Monthly mean temperature ranged from 76°F to 83°F with the minimum temperature varying from 67°F to 76°F and maximum temperature from 84°F to 93°F.

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[1] The mean annual rainfall for the 30 year period from 1931 to 1960 is 58.4 inches as against 50.5 inches for the 10 year period from 1968 to 1977 : Department of Metereology.

[2] Department of Metereology : Maha Illuppallama Research Station
Latitude 8° 07' N
Longitude 80° 28' E

The soils[1] of the area are similar in most aspects and are composed of two main types. :

(i) Well-drained, dark brown to reddish brown soils (reddish brown earths or Alfisols), on the crests and upper slopes of the undulating landscapes; and

(ii) Poorly drained, finer, dark brown to dark grey soils wirh pseudo-gley and gley horizons (Low Humic Gley, Aqualf suborder of Alfisols).

The Reddish Brown Earths (RBE) cover about 60% of the area and low Humic Gley soils (LHG) about 40%. The RBE soils are developed on material derived from the underlying weathered metamorphic rocks and are separated from the decomposing rock by a gravelly sandy clay loam layer 2 to 4 feet below the surface.

The most important characteristics of the soils with regard to development and land use are :

(i) High infiltration and permeability rates from a low of 0.17 inches per hour (LHG Soils) to more than three inches per hour (RBE soils).

(ii) Low available moisture holding capacities (1.2 to 1.6 inches per foot of soil).

(iii) High bulk densities - mostly 1.6 to 1.7 gram/cm^3

(iv) Very low silt content

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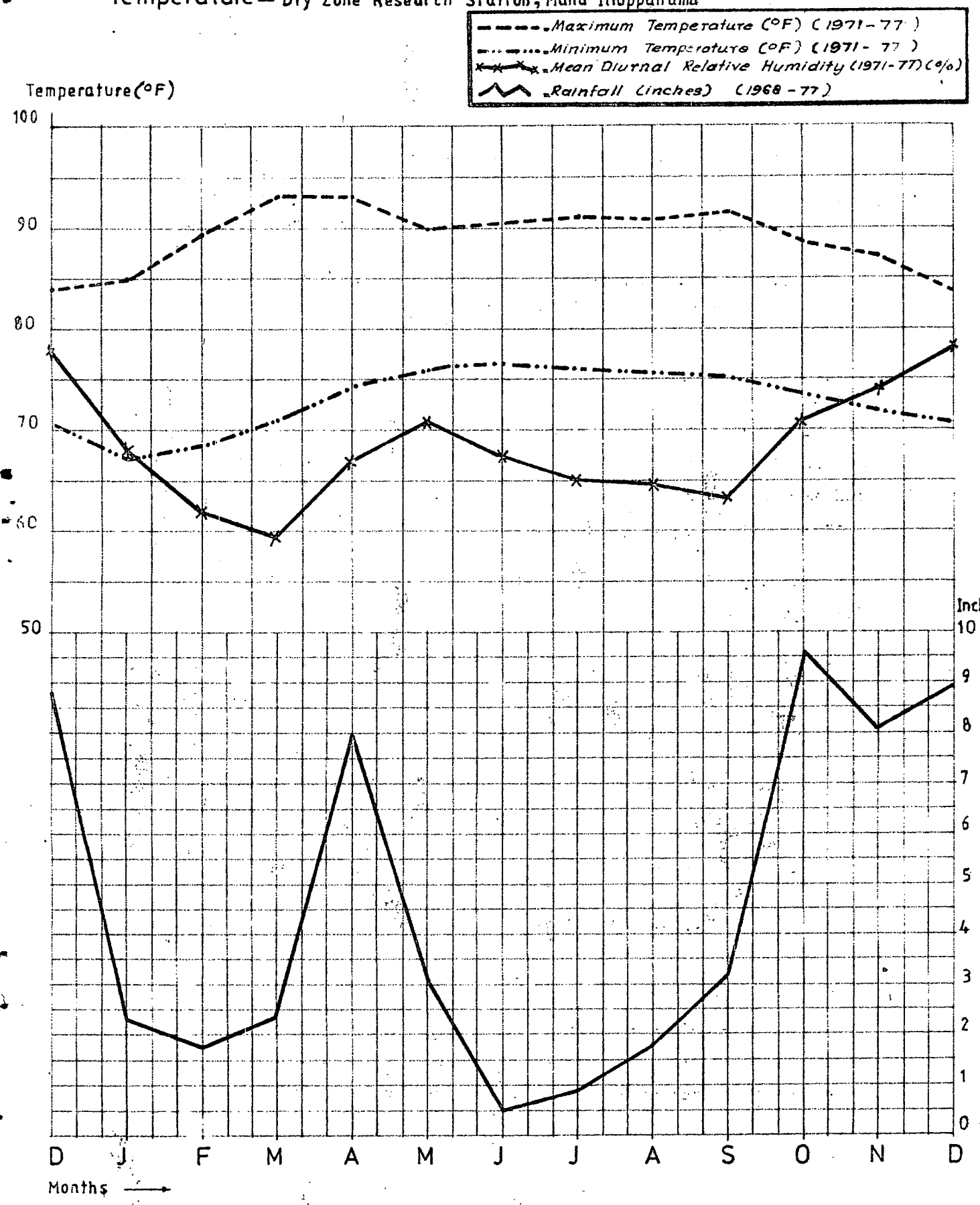
[1] Mahaweli Ganga (II) Irrigation and Rural Development Project - Report of the follow - up Appraisal Mission, IDA (1976).

Average Monthly Variation of Rainfall Relative Humidity and Temperature — Dry Zone Research Station, Maha Illuppallama



APPENDIX I - Table (1)

CLIMATIC DATA[1]

Rainfall (inches)	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
Average (1931 - 1960)	5.54	1.91	4.64	7.24	4.18	1.33	1.43	1.61	3.05	9.46	9.96	8.06	58.41
Average (1968 - 1977)	2.30	1.75	2.41	8.00	3.08	0.48	0.92	1.83	3.20	9.63	8.07	8.86	50.53
Relative Humidity (%)													
Mean Diurnal (1971 - 1977)	68.0	62.0	59.4	67.0	71.1	67.6	65.1	64.6	63.0	70.7	74.0	77.9	
Mean Nocturnal	Not computed												
Temperature (°F)													
Mean maximum (1971 - 1977)	84.9	89.3	93.0	92.9	89.7	90.3	90.9	90.7	91.4	88.8	87.1	83.8	
Mean minimum (1971 - 1977)	67.2	68.4	70.9	74.1	76.1	76.5	75.8	75.5	75.1	73.6	71.7	70.4	
Mean	76.0	78.8	82.0	83.5	82.9	83.4	83.3	83.1	83.2	81.2	79.4	77.1	

1 Source - Department of Metereology : for the Maha Illuppallama Station : Latitude 8° 07' N; Longitude 80° 28" E

APPENDIX 2

DISTRIBUTION OF HOUSEHOLD MEMBERS BY AGE-GROUPS AND SEX

Age Group	REGION 5						REGION 6						REGION 7						REGION 8						ALL REGIONS					
	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0 - 5	74	14.1	86	15.6	160	14.8	66	16.9	63	16.1	129	16.5	45	14.4	32	12.1	77	13.4	50	17.5	58	18.6	108	18.0	235	15.5	239	15.7	474	15.6
6 -10	68	12.9	90	16.4	158	14.7	55	14.0	68	17.4	123	15.7	46	14.7	29	11.0	75	13.0	43	15.0	55	17.6	98	16.4	212	14.0	242	15.9	454	15.0
11-15	75	14.2	68	12.4	143	13.3	51	13.0	56	14.3	107	13.7	45	14.4	42	15.9	87	15.1	35	12.2	33	10.6	68	11.4	206	13.6	199	13.1	405	13.4
16-20	78	14.8	81	14.7	159	14.8	58	14.8	48	12.3	106	13.6	48	15.4	44	16.7	92	16.0	29	10.1	44	14.1	73	12.2	213	14.1	217	14.3	430	14.3
21-25	45	8.5	44	8.0	89	8.3	37	9.0	35	9.0	72	9.2	23	7.4	22	8.4	45	7.8	30	10.5	35	11.2	65	10.9	135	8.9	136	9.0	271	8.9
26-30	37	7.0	35	6.4	72	6.7	21	5.4	30	7.7	51	6.5	19	6.1	18	6.8	37	6.4	24	8.4	28	9.0	52	8.7	101	6.7	111	7.3	212	7.0
31-35	18	3.4	36	6.5	54	5.0	19	4.8	14	3.6	33	4.2	9	2.9	13	4.9	22	3.8	17	5.9	12	3.8	29	4.8	63	4.2	75	4.9	138	4.5
36-40	27	5.1	36	6.5	63	5.8	19	4.8	18	4.6	37	4.7	18	5.8	12	4.5	30	5.2	14	4.9	10	3.2	24	4.0	78	5.1	76	5.0	154	5.1
41-45	29	5.5	17	3.1	46	4.3	14	3.6	17	4.3	31	4.0	14	4.5	15	5.7	29	5.1	7	2.5	11	3.5	18	3.0	64	4.2	60	4.0	124	4.1
46-50	21	4.0	12	2.2	33	3.1	14	3.6	9	2.3	23	2.9	13	4.2	5	1.9	18	3.1	7	2.5	12	3.8	19	3.2	55	3.6	38	2.5	93	3.1
51-55	19	3.6	15	2.7	34	3.1	10	2.6	12	3.1	22	2.8	8	2.6	7	2.7	15	2.6	12	4.2	3	1.0	15	2.5	49	3.2	37	2.5	86	2.8
56-60	13	2.5	7	1.3	20	1.8	10	2.6	8	2.0	18	2.3	6	1.9	12	4.5	18	3.1	7	2.5	8	2.6	15	2.5	36	2.4	35	2.3	71	2.3
61-65	9	1.7	7	1.3	16	1.5	3	0.8	6	1.5	9	1.2	4	1.3	3	1.1	7	1.2	4	1.4	-	-	4	0.7	20	1.3	16	1.1	36	1.2
66-70	7	1.3	9	1.6	16	1.5	10	2.6	4	1.0	14	1.8	7	2.2	4	1.5	11	1.9	2	0.7	1	0.3	3	0.5	26	1.7	18	1.2	44	1.4
⩾ 71	7	1.3	7	1.3	14	1.3	4	1.0	3	0.8	7	0.9	7	2.2	6	2.3	13	2.3	5	1.7	2	0.7	7	1.2	23	1.5	18	1.2	41	1.4
All Groups	527	100	550	100	1077	100	391	100	391	100	782	100	312	100	264	100	576	100	286	100	312	100	598	100	1516	100	1517	100	3033	100

APPENDIX 3

ACCESSIBILITY TO BASIC SERVICE CENTRES

Service Centre/facility	Within 1 mile				Within 5 miles				Within 10 miles				More than 10 miles			
	Region				Region				Region				Region			
	5	6	7	8	5	6	7	8	5	6	7	8	5	6	7	8
Railway Station	2.2	20.8	22.5	2.0	28.3	81.6	56.8	8.7	78.9	96.8	89.1	28.9	21.1	3.2	10.9	71.1
Bus Route	82.2	93.6	84.5	78.8	100.0	100.0	100.0	100.0	--	--	--	--	--	--	--	--
School	73.3	76.8	88.2	80.8	100.0	100.0	100.0	99.1	--	--	--	100.0	--	--	--	--
Hospital/ Dispensary	24.6	43.2	41.2	34.6	97.8	100.0	93.2	91.3	100.0	--	100.0	100.0	--	--	--	--
Post Office	26.1	25.6	47.5	57.7	97.8	94.4	95.0	97.8	100.0	100.0	100.0	100.0	--	--	--	--
Bank	21.7	16.8	22.5	32.7	95.6	59.2	66.6	89.4	99.5	84.8	98.0	100.0	0.5	15.2	2.0	--
Cooperative	50.0	64.8	83.5	66.0	98.9	99.2	100.0	100.0	100.0	100.0	--	--	--	--	--	--
Police Station	0.5	31.2	2.0	34.0	13.3	71.2	32.7	88.4	52.2	88.0	90.1	100.0	47.8	12.0	9.9	--
Shopping Centre	40.2	55.2	39.2	41.2	98.3	97.6	74.5	90.2	100.0	100.0	100.0	99.0	--	--	--	1.0
Village Fair (Pola)	2.4	33.1	25.7	6.7	59.8	97.6	58.4	52.8	97.1	100.0	92.1	81.0	2.9	--	7.9	19.0

APPENDIX

DISTRIBUTION OF HOUSEHOLD MEMBERS BY AGE, LEVEL OF EDUCATION & SEX - REGION 5

Age Group (years)	Sex	Level of Education 1	2	3	4	5	All Groups
0 - 5	Male	64	2	8	0	0	74
	Female	75	2	9	0	0	86
6 - 9	Male	0	2	50	1	0	53
	Female	0	6	68	0	0	74
10 - 13	Male	0	7	40	19	0	66
	Female	0	8	35	16	0	59
14 - 19	Male	0	11	27	36	15	89
	Female	0	11	35	39	8	93
20 - 29	Male	0	5	23	35	18	81
	Female	0	6	29	39	10	84
30 - 39	Male	0	3	14	17	8	42
	Female	0	15	28	19	10	72
40 - 49	Male	0	8	34	14	4	60
	Female	0	16	12	6	2	36
50 - 65	Male	0	8	21	16	3	48
	Female	0	19	6	3	2	30
≥ 66	Male	0	3	4	6	1	14
	Female	0	13	3	0	0	16
All Groups	Male	64	49	221	144	49	527
	Female	75	96	225	122	32	550

No. of households = 180

Level of Education Code: 1 No Schooling < 5 Years
2 No Schooling ≥ 5 Years
3 Up to Grade 5
4 Grade 6 - GCE(OL)
5 Passed GCE(OL) & above

APPENDIX 4 (ii)

DISTRIBUTION OF HOUSEHOLD MEMBERS BY AGE, LEVEL OF EDUCATION & SEX - REGION 6

Age Group (years)	Sex	Level of Education 1	2	3	4	5	All Groups
0 - 5	Male	52	4	10	0	0	66
	Female	53	4	6	0	0	63
6 - 9	Male	0	4	39	0	0	43
	Female	0	9	45	1	0	55
10 - 13	Male	0	4	37	8	0	49
	Female	0	3	33	17	0	53
14 - 19	Male	0	4	18	32	6	60
	Female	0	8	16	24	7	55
20 - 29	Male	0	3	20	29	11	63
	Female	0	6	19	26	11	62
30 - 39	Male	0	3	19	7	5	34
	Female	0	9	17	9	5	40
40 - 49	Male	0	1	18	12	1	32
	Female	0	8	12	7	0	27
50 - 65	Male	0	3	15	11	1	30
	Female	0	16	6	5	0	27
⩾ 66	Male	0	4	4	6	0	14
	Female	0	7	2	0	0	9
All Groups	Male	52	30	180	105	24	391
	Female	53	70	156	89	23	391

No. of households = 125

Level of Education Code : 1 No Schooling < 5 Years
2 No Schooling ⩾ 5 Years
3 Upto Grade 5
4 Grade 6 - (GCE(OL)
5 Passed GCE (OL) and above.

APPENDIX 4 (iii)

DISTRIBUTION OF HOUSEHOLD MEMBERS BY AGE, LEVEL OF EDUCATION & SEX - REGION 7

Age Group (years)	Sex	Level of Education 1	2	3	4	5	All Groups
0 - 5	Male	38	1	6	0	0	45
	Female	29	1	2	0	0	32
6 - 9	Male	0	0	35	0	0	35
	Female	0	0	19	0	0	19
10 - 13	Male	0	0	27	11	0	38
	Female	0	4	15	16	0	35
14 - 19	Male	0	1	17	24	12	54
	Female	0	4	8	31	6	49
20 - 29	Male	0	1	13	29	11	54
	Female	0	5	12	16	12	45
30 - 39	Male	0	1	8	8	4	21
	Female	0	4	13	14	2	33
40 - 49	Male	0	3	13	11	2	29
	Female	0	5	8	3	3	19
50 - 65	Male	0	3	7	10	2	22
	Female	0	19	3	0	0	22
>/ 66	Male	0	4	6	4	0	14
	Female	0	8	2	0	0	10
All Groups	Male	38	14	132	97	31	312
	Female	29	50	82	81	22	264

No. of households = 103

Level of Education Code : 1 No Schooling < 5 Years
2 No Schooling >/5 Years
3 Upto Grade 5
4 Grade 6 - GCE (OL)
5 Passed GCE(OL) and above.

APPENDIX 4 (iv)

DISTRIBUTION OF HOUSEHOLD MEMBERS BY AGE, LEVEL OF EDUCATION & SEX - REGION 8

Age Group (Years)	Sex	Level of Education 1	2	3	4	5	All Groups
0 - 5	Male	48	1	1	0	0	50
	Female	53	2	3	0	0	58
6 - 9	Male	0	5	32	2	0	39
	Female	0	3	39	0	0	42
10 - 13	Male	0	4	17	6	0	27
	Female	0	1	21	12	0	34
14 - 19	Male	0	2	12	22	0	36
	Female	0	0	24	17	6	47
20 - 29	Male	0	2	14	26	9	51
	Female	0	7	26	22	11	66
30 - 39	Male	0	4	15	12	5	36
	Female	0	4	13	5	3	25
40 - 49	Male	0	1	6	8	0	15
	Female	0	6	8	3	0	17
50 - 65	Male	0	2	11	12	0	25
	Female	0	17	3	0	0	20
>/ 66	Male	0	1	3	3	0	7
	Female	0	3	0	0	0	3
All Groups	Male	48	22	111	91	14	286
	Female	53	43	137	59	20	312

No. of households = 104

Level of Education Code : 1 No Schooling < 5 Years
2 No Schooling >/ 5 Years
3 Upto Grade 5
4. Grade 6 - GCE(OL)
5 Passed GCE (OL) and above.

Appendix 5

EDUCATIONAL STATUS OF THE LABOUR FORCE CLASSIFIED BY AGE & SEX

Age Group (years)	No Schooling	Upto Grade 5	Grade 6-GCE (OL)	Passed GCE (OL)	Passed GCE (AL)	Other Qualifications	TOTAL[1]	No Schooling	Upto Grade 5	Grade 6-GCE (OL)	Passed GCE (OL)	Passed GCE (AL)	Other Qualifications	TOTAL[1]	No Schooling	Upto Grade 5	Grade 6-GCE (OL)	Passed GCE (OL)	Passed GCE (AL)	Other Qualifications	TOTAL[1]
14-19	16	60	48	10	1	-	135	23	77	51	5	1	-	157	39	137	99	15	2	-	292
20-29	18	69	109	38	2	3	239	27	83	99	32	4	1	246	45	152	208	70	6	4	485
30-39	12	58	43	17	1	2	133	36	71	47	15	1	5	175	48	129	90	32	2	7	308
40-49	12	72	46	2	-	4	136	35	41	21	1	-	2	100	47	113	67	3	-	6	236
50-59	9	48	35	2	-	2	96	38	14	8	1	-	-	61	47	62	43	3	-	2	157
60-65	6	8	11	1	-	1	27	26	4	3	-	-	-	33	32	12	14	1	-	1	60
TOTAL	73	315	292	70	4	12	766	185	290	229	54	6	8	722	258	605	521	124	10	20	1538

[1]This table excludes the disabled, students and the Buddhist monks between the ages of 14 and 65.