ARTI / WAGENINGEN UNIVERSITY

RESEARCH PROJECT IN AGRICULTURAL PLANNING

KURUNEGALA DISTRICT INTEGRATED RURAL DEVELOPMENT PROJECT: A CRITICAL ANALYSIS OF PROJECT FORMULATION

REPORT NO. 4

IN

REGIONAL PLANNING FOR AGRICULTURAL DEVELOPMENT IN SRI LANKA

RESEARCH STUDY NO. 55

MARCH 1983

AGRARIAN RESEARCH AND TRAINING INSTITUTE,
114, Wijerama Mawatha, Colombo 7.

SRI LANKA

ARTI Wageningan University

Research Project in Agricultural Planning

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ABSTRACT

This case study of a specific example of regional plan formulation is one in a series concerned with the general field of intermediate level planning for agriculture. After a brief restatement of the methodological issues that arose in the course of planning research performed by the same team in Matara district, attention is brought to bear on the Kurunegala Integrated Rural Development Project: the dimensions - both spatial and financial- of KIRDAP were felt to be such that this development effort could be regarded as a long term endeavour of regional significance. The theory of 'integrated' rural development in the Sri Lankan context is discussed; the procedures followed for gathering data and subsequent project formulation are carefully documented with a view to making explicit the manner in which existing administrative structures and prevailing government policies iminge upon the design of components. In Chapter Four an attempt is made to predict the impact of KIRDP, as it is at present being carried out, upon the district's agricultural sector towards the end of this century. The conclusion is reached that positive benefits will be few and unlikely to reach those in the rural population who need them most. The bulk of the report(Chapter 5-7) constitutes a reanalysis of the basic planning data using for this purpose the methods elaborated by the team in Matara. An alterna ve scenaric concentrating on three sectors neglected under KIRDAP (rainfed agriculture, live-stock and minor export crops) is postulated and calculations are made to demonstrate the positive impact that such an approach could in the long term still have upon rural standards of living and incomes. A final chapter briefly highlights the type of action that could and should be taken in the near future to ensure that the second phase of KIRDAP profitably involves a larger proportion of the designed beneficiaries whilst at the same time generating higher levels of regional income.

FOREWORD

The rapid expansion in the last few years of the District Integrated Rural Development Programme of the Ministry of Plan Implementation is a clear manifestation of the trend towards decentralisation of planning and implementation in Sri Lanka.

Kurunegala and Matara were the first districts where an IRDP was mooted. Implementation started in 1979. After four years of practical experience in district planning under IRDP, it is of crucial importance to find what the results of this exercise are. The ARTI in the course of its evaluation of Kurunegala IRDP has conducted a number of studies in association with the Ministry of Plan Implementation and the World Bank. But the present study is not part of that evaluation programme. This was undertaken by the ARTI/Wageningen University Research Project in Agricultural Planning in the context of their own research objectives.

This study is more planning oriented than the other studies on Kurunegala IRDP done by ARTI. Having found that the present Kurunegala IRDP has no favourable effect on income distribution in the district, the ARTI/Wageningen University team identified alternative areas of agricultural development which have a potential to reach the smaller farmers and the near landless people. I hope that this report will usefully contribute to a renewed planning effort in Kurunegala District.

T.B. Subasinghe
Director ARTI

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ABBREVIATIONS USED IN THE TEXT

AGA	Assistant Government Agent
ARTI	Agrarian Research and Training Institute
CCB	Coconut Cultivation Board
CE	Cow equivalent
CI	Cropping index
DAPH	Department of Animal Production and Health
DPA	Dairy Producers Association
EAP	Economically active population
EEC	European Economic Community
GOSL	Government of Sri Lanka
IDA	International Development Association
IITA	International Institute of Tropical Agriculture
ILP	Intermediate level planning
IRD	Integrated rural development
IRR	Internal rate of return
KIRDP	Kurunegala Integrated Rural Development Project
NLDB	National Livestock Development Board
T and V	Training and Visit

Chapter One

INTRODUCTION

The present paper is but one in a series concerned with different aspects of agricultural planning in Sri Lanka. It constitutes an analytical critique of work already accomplished followed by an attempt to demonstrate the efficacy of an alternative methodology for dealing with a limited range of problems at a specific level in planning.

The reader unconversant with other studies carried out by the same team may thus be struck by a tendency to dwell upon the shortcomings of past performance. But it should be borne in mind that district level agricultural planning is in Sri Lanka a comparatively new departure. Every innovation, however promising, passes of necessity through a period during which adjustments and refinements are incorporated by a process of trial and error.

We should like to hope that the harshness of our criticism is ultimately justified by the proposals that we have to offer by way of constructive amendment. For it is the purpose of this paper to improve, not merely to negate.

1.1 THE RESEARCH CONTEXT

The Agrarian Research and Training Institute and the Agricultural University of Wageningen embarked in September 1979 upon a five year joint research project in the field of intermediate level agricultural planning. One of the major purposes of this collaborative effort was to design an appropriate methodology to meet the requirements of those officials involved in regional agricultural plan formulation.

Research developed along two parallel lines of action. These were, on the one hand, the actual drafting of area specific plans and, on the other, a series of indepth studies to evaluate the success met with by certain plan components when implemented. The intention was that the latter should serve to verify the validity of working hypotheses employed in plan formulation.

The team thus drew up a fully fledged plan for the agricultural sector in Matara district and has subsequently begun an analogous exercise in Ratnapura. In Matara the Training and Visit system of agricultural extension and modernisation programmes in tea processing were investigated to determine their impact in the context of a district wide rural development project. Similar studies will later be undertaken in Ratnapura to inform and complement efforts in plan formulation. Supplementary position papers dealing with theoretical issues arising from all these activities are also published.

The work carried out by the team in Kurunegala has been of a slightly different character. In this district, an integrated rural development project with extensive foreign funding has been in operation since January 1979. It has been regarded from the start by both the Government of Sri Lanka and the World Bank as a test case and great emphasis has therefore been placed on the evaluation of performance with a view to learning for the future.

The ARTI/Wageningen group was initially requested to examine the project's administrative and management structures to determine how appropriate these were proving in the general purview of agricultural development. The findings of this research were set out in ARTI/Wageningen 1982b. The researchers soon discovered, however, that an evaluation of present managerial arrangements remained of limited significance unless some effort was made to trace the genesis of problems now besetting the project's leadership. It was found that the difficulties encountered were as often due to errors committed in the course of design as they were to a malfunctioning of the administrative framework itself.

It became clear that the Kurunegala Integrated Rural Development Project (KIRDP) might legitimately be regarded as a regional agricultural plan in embryo: 82.8% of the total estimated initial expenditure of Rs. 444.8 million on components (other than 'coordination and investigations) is devoted to investment in production oriented activities in the field of agriculture (World Bank 1979: Annex 2, Table 1). ts incremental benefits are moreover calculated by the authors of the project document for a period of 13 years.

It was therefore decided to use the experience gained whilst preparing the paper on administrative and management structures to serve as the basis for a critical appraisal of KIRDP seen as a regional agricultural plan.

1.2 OBJECTIVES OF THE PRESENT STUDY

Planning is the identification of potentials and the formulation of reasoned strategies to permit their phased development for the attainment of predetermined economic, social and political ends. It involves the drawing up of resources inventories and the definition of precise criteria to enable planners both to make the right choices in view of preestablished priorities and to eliminate those options which would afford only marginal (or even negative) benefit. Planning at the intermediate level refers to the same activities when performed in a field which lies between that of national macro-planning and the design of individually managed, short or medium term projects characterised by concentration on no more than a few functionally related components.

Intermediate Level Planning (ILP) is a procedure for the screening and subsequent correct selection of development proposals with a view to their coordination and phased implementation within a given geographical area. The main objective of ILP is to increase the overall benefits accruing from investment in different sectors by eliminating the wastage associated with piecemeal project planning.

It is our purpose in this study to determine the extent to which the basic principles of ILP were taken into account during the design of KIRDP and to demonstrate how a more rigorous attention to

methodology might have resulted in the selection of more judicious strategies for the socio-economic development of Kurunegala district.

For it is our contention that intermediate level planning must take place within a framework, which postulates a series of sequential stages in the collection of specific types of dat. and the subsequent ranking of clusters of interlinked priorities. If this procedure is not followed, wrong options will be made and promising opportunities will be neglected.

Given the scope of the Kurunegala project, it initially surprised us, for example, that almost no consideration had been given to the district's distinct potential for greatly increased production in the areas of dryland farming and dairying. The minor export crop programme also intrigued us by the extreme modesty of its targets. By reviewing the criteria employed to cause the subordination of these potentials to far more ambitious undertakings in the fields of paddy farming, coconut, input supply, water management and credit, we hope to highlight certain deficiencies in the planning process.

In a preliminary chapter we will present our methodological framework for district agricultural planning which incorporates the experience gained during work in Matara. We shall then examine exactly how the Kurunegala project came into being - the premises that presided over the choice of components and the manner in which these were articulated to constitute a five-year plan. We attempt, in two other chapters, to measure the long term impact of this plan as it stands and then to identify the conceptual errors which will have resulted in a failure to promote significantly higher levels of agricultural performance.

In conclusion, we endeavour to identify areas of significant agricultural development potential which were overlooked in designing the current Kurunegala project. We will demonstrate how an effort to exploit these potentials during a second five-year period of implementation might give rise to substantially greater benefits and generate a more equitable pattern of distribution over the next two decades until the year 2000. The number of jobs thus created

would be so considerable that unemployment in the agricultural sector would virtually disappear.

1.3 DATA COLLECTION

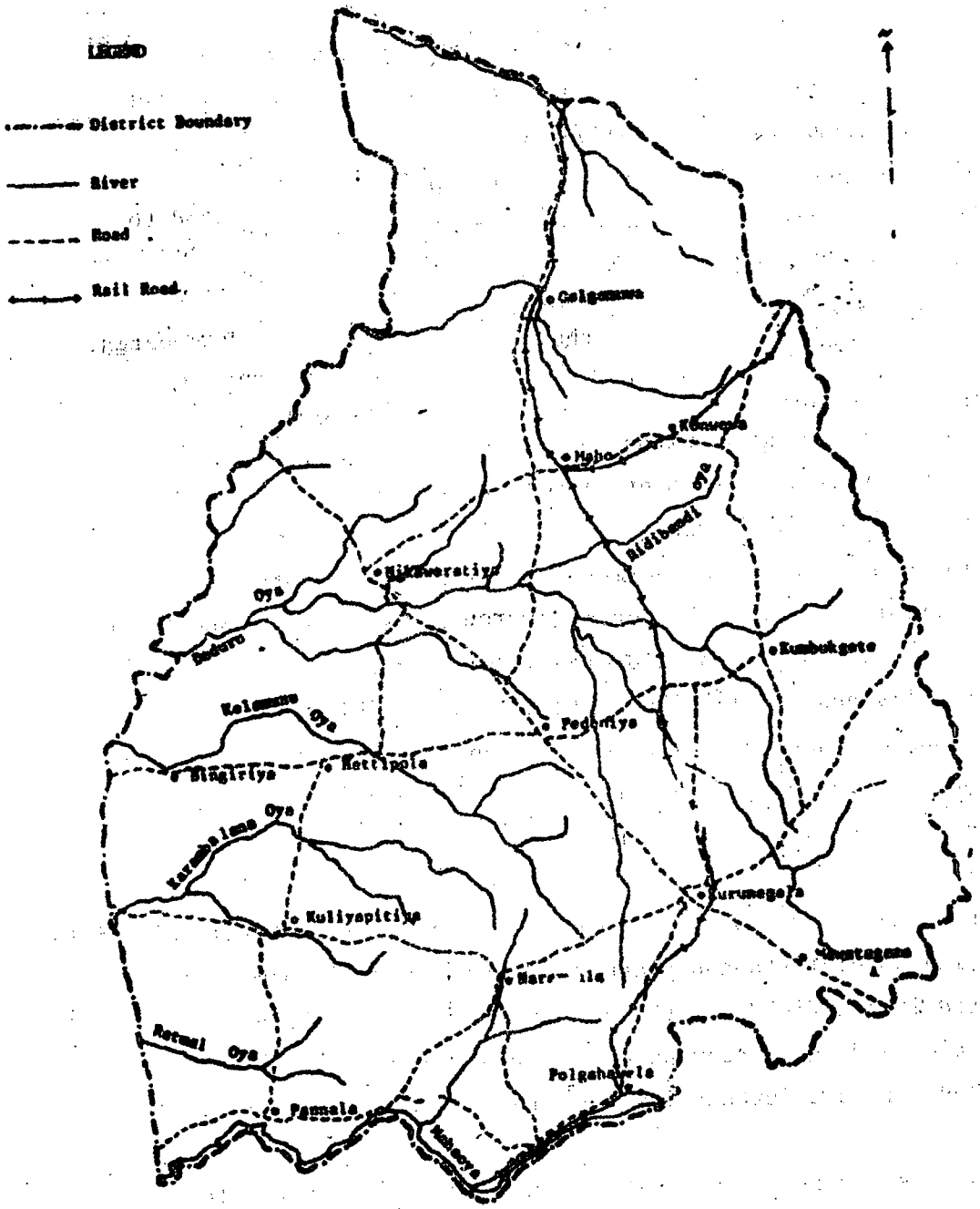
The need for a case study of this type gradually emerged in the course of discussions centering on ongoing research in other areas. All members of the ARTI/Wageningen group contributed to defining the general approach. In late April 1981 two researchers - an agro-economist and a socio-agronomist - were given the responsibility of carrying out the work along the lines suggested. One of them had been heavily involved in the earlier study of KIRDP.

Extensive prior knowledge of the district and a certain familiarity with the documentation made it unnecessary to undertake more than three field trips, during which considerable emphasis was placed upon those categories of agricultural production that KIRDP stresses least. The potential for livestock development and dairying, dryland farming and minor export crops under coconut was as carefully assessed in the field as was possible under present conditions of institutional, economic and technological uncertainty. Numerous farmers were informally questioned on the problems they encounter in these areas of production.

Lengthy interviews were carried out with agricultural scientists, marketing specialists and planners to complement information gathered in the field. A thorough review of the available statistics and the sector papers prepared during the design stage of KIRDP afforded further insight into planning procedures.

A first draft of the text was submitted for comment to all team members in late 1981. The present report incorporates certain modifications as a result of subsequent debate.

MAP OF KURUNEGALA DISTRICT



Scale : One inch to seven and half miles
1" - 7.5 miles

Prepared by Mapping Unit
Dept. of Census and Statistics Sri Lanka

Chapter Two

CRITERIA FOR THE ASSESSMENT OF IRDP PLANNING PROCEDURES

The Sri Lankan economy is essentially - and will for the foreseeable future remain - rooted in the island's potential for agricultural production. Farming and related activities provide a livelihood for an overwhelming majority of the population. It is for this reason that regional planning for rural areas must begin with the comprehensive description and subsequent analysis of both the organisation of agricultural production and the constraints inherent in the resource base. A reasoned taxonomy of farming systems must thus be drafted before any attempt is made to act upon the course of economic development at district level.

Regarding this postulate as a point of departure, the team elaborated a methodological framework for regional agricultural sector planning in the Sri Lankan context. With minor modifications the approach should be valid throughout the developing world wherever smallholder farming predominates over other forms of agricultural production. For small scale growers are consistently more amenable to programmes that are area specific than they are to development initiatives taken and directed from the centre.

Most steps in the methodology we advocate remain nonetheless apposite in a variety of other situations characterised, for instance, by the presence of very large, heavily capitalised production units, communal management or direct state control. In applying our approach in such circumstances care would however have to be taken to ensure a correct evaluation of corporate decision making behaviour, managerial motivation and strategies for labour deployment.

It should perhaps be noted that the efficiency of our methodological framework for agricultural planning remains commensurate with the accuracy of our forecast of the probable reaction of producers to economic incentives. When such producers are corporate bodies or large scale entrepreneurs, the consistency of political will begins to play an ever greater role in determining reactions. if government policies with regard to plan implementation fluctuate, the more extensive production units will tend to assert their capacity for autonomous action, which is theirs by dint of sheer size, and follow an independent path.

The different steps that go to make up our methodological framework for agricultural planning at district level are enumerated below.

2.1 STAGES IN PLAN FORMULATION

We distinguish two principal phases in plan formulation: a prior analysis of the socio-economic situation, followed by the design of programmes conceived to alleviate the problems identified and to secure accurately calculated, long term benefits with specific target groups in view. The first phase comprises three areas of analysis.

i. An overview of socio-economic realities concentrating on the relationships between different factors/fields of activity.
   - the structure of production, with particular attention paid to the relative importance of the agricultural sector.
   - income and income distribution
   - employment
   - the role of the state in economic development at regional level
   - current trends in the regional economy

ii. A structural breakdown of the agricultural sector seen as a system of farm types, the latter being specified as a function of:

- location (in the landscape and the agro-ecological region)
- size of holding
- tenurial status
- cropping patterns
- volume of purchased inputs
- yields
- the production of marketable surpluses
- labour deployment (family as against hired hands)
- non-agricultural income

iii. A micro-analysis of the economic motivations of different categories of farmers:
- the nature of socio-economic constraints at farm level
- the non-productive allocation of resources

Our first phase in plan formulation constitutes a synchronic inventory of socio-economic forms and perceived tendencies. It is essentially descriptive. The second phase is prospective. The aim is to identify unexploited potentials, to determine how - given existing constraints - these can be tapped and, ultimately, to anticipate the magnitude and distribution of the expected benefits over a number of years.

Of these three objectives it is the first which is the most time consuming, as it demands a considerable amount of field work and the gathering of ample background information.

iv. The systematic identification of agricultural development projects can only be carried out when research has been completed in the following areas:
- land suitability classification (as a function of soils, topography and climate)
- ground and surface water resources (with a view to assessing irrigation potentials)
- cropping practices and varieties (results obtained by better farmers in the region, national and international research stations)
- crop budgets (local markets, subsidies, and domestic as against economic prices in the national context).

The findings must be evaluated to establish the adequacy of current patterns of land use and the potential for improving upon present levels of productivity. However, it will only be possible to identify agricultural development projects after two further sets of factors have been taken into account:

- the implementation capacity of agricultural supporting services, and
- the economic viability of each farm type earlier inventorised (see ii above) given the different development options tentatively proposed.

v. Projects are then selected to constitute a development programme. The principal criterion for selection must be the extent to which informed calculus reveals that their combined impact upon farming systems, incomes and employment will be favourable.

vi. Projections of the medium and long term effects of the programme are finally computed. The probable evolution - as a result of implementation - of production, incomes, income distribution and foreign exchange earnings is mapped to ensure that no contradictions subsist between regionally defined objectives, on the one hand, and the equitable distribution of benefits or national policies, on the other.

2.2 LESSONS FROM MATARA

The initial stage described and all three stages in the second phase of this methodological framework were the focus of concerted effort in the work leading up to the formulation of the agricultural sector plan for Matara.

The problem of analysing farming systems and drawing up a taxonomy of farm types (stage ii) was broached in Matara, albeit in a rather sketchy manner. The necessity for determining farmer motivations was however, at that point in our research, not yet perceived with the same acuity as it is now. As a result, we were unable to predict whether farmers would be inclined to adopt

the innovatory practices recommended or, quite simply, to ascertain what proportion of them even possessed the wherewithal to participate in a modernisation programme aimed at certain categories of small-holders.

Inventorisation of physical resources was on the other hand carried out with some thoroughness. It enabled the team to attain considerable precision when identifying optimal locations for project activities and determining the scale of crop development programmes. Our proposals in this respect constituted a substantial improvement over those incorporated in the integrated rural development project for the district, which was then already in the course of implementation and was clearly marred by the absence of any reasoned complementarity between components selected seemingly at random.

The experience gained in Matara and later in Kurunegala, where the team was entrusted with an evaluation of IRDP management structures, has convinced us that intermediate level planning for agriculture must start with an indepth analysis of farming systems. For each agricultural production unit contains in embryo a combination of factors that will condition its receptivity to programmes designed to increase or diversify output.

The first task of rural development planners is thus to determine the structure of farm types and the frequency with which each occurs. A command of detailed micro-information of this kind constitutes a *sine qua non* for the successful manipulation of administrative statistics, which are the fuel for more conventional planning procedures. ILP for rural areas, as we understand it, does not neglect the statistical approach, but endeavours first to verify and then to complement its conclusions by paying more substantial attention to inter-farm variation and the motivational patterns common to differently endowed categories of growers.

Chapter Three

STAGES IN PLANNING FOR KURUNEGALA IRDP

A preliminary decision to coordinate large scale multisectoral investment in rural areas of Kurunegala district was taken in mid-1976. Subsequent government commitment to a policy of 'integrated rural development' exercised a strong influence upon the type of planning it was possible to undertake in the circumstances.

In this chapter we examine the interrelationship between this fundamental option and the planning procedures which evolved in response to it.

3.1 THE INTEGRATED RURAL DEVELOPMENT OPTION

Integrated rural development has in the course of the past five years been the focus of sustained debate in Sri Lanka. Discussion has centred on determining the precise parameters of the concept. Opinion has been so divided that the definition ultimately retained has of necessity had to be somewhat succinct. The political and organisational postulates behind the kind of rural development planning envisaged by the Government have themselves played a role in restricting the operational significance of the term.

3.1.1 Measuring integration

We have elsewhere* discussed at length the evolution of the notion of integration in the context of Sri Lankan planning. We

* Chapter Three in ARTI/Wageningen 1982b.

will here stress only the main points in our earlier findings.

Although some controversy still obtains, it is generally agreed in official circles that a minimal definition of integrated rural development refers to the fact that a number of mutually supportive activities are funded and carried out simultaneously, within a given geographical area, in order that the overall effect should amount to more than the sum of the parts. Whereas this definition would seem to point to a decrease in the importance hitherto vested in an approach to development that emphasises the boundaries between disciplines and implementing agencies, it nonetheless hardly departs from the conceptual framework of 'traditional' sector planning: each sector of the rural economy is reinforced separately in the hope that cross-linkages will more or less spontaneously come into play and produce a multiplier effect. Little express attention is given to the elaboration of interdependent programmes carefully designed to enhance general performance.

Whatever the theory of integration, it is in practice difficult to achieve in the Sri Lankan context, where two policy options severely limit the extent to which truly integrated planning can be carried out: integrated rural development projects were to be both inexpensive and quick yielding. This led to a necessary concentration on components with a distinct short-term potential, where minimal inputs would provide maximal returns within specific organisational parameters. The financial and temporal constraints inherent in this policy more or less precluded any attempt to design and implement a more global strategy for development at district level.

The fact that district development projects have been endowed with autonomous management structures, whose role it is to orchestrate the activities of a multiplicity of sectorally defined implementing agencies, may be taken as a gesture towards integration. The coordinating function of such structures does at least ensure that there is little or no duplication of effort and that funds are not diverted to unplanned appropriations.

But the choice of this very flexible management structure was apparently dictated in the first instance by a desire to avoid interfering with certain aspects of the administrative *status quo*. That it might prove a suitable instrument for the carrying out of ongoing readjustments in the course of plan implementation does not seem to have been a decisive factor in its adoption. In the opinion of an official closely connected with IRD from the very start, planners were more concerned to institute a form of management, that would in no way impinge upon existing ministerial jurisdications or jeopardise career opportunities within implementing agencies, than one which would foster close and fruitful interaction between project components. So even this potentially 'integrating' aspect of management was attenuated to accommodate certain socio-political realities.

3.1.2 Replicability

It was from the outset proposed that the Kurunegala programme be designed with a view to elaborating a rural development planning model, that it would be possible to replicate in a number of other districts. In the absence of any very compelling evidence to suggest that the model could be described as 'integrated', some considerable emphasis was instead laid upon the replicability of management structures.

Relevant district level subsidiaries of line ministries were made responsible for the implementation of project objectives and for a very large part of the administration relating to such work. The small project office in Kurunegala and its Colombo based superstructure (comprising a Project Cell in the Ministry of Plan Implementation and a national Steering Committee) confined themselves to the coordination and monitoring of activities.

Whilst making it unnecessary to disturb existing patterns of administration, these management arrangements are designed to ensure that the project should enjoy complete freedom of movement and decision. It was intended that project design be flexible enough to satisfy a series of guidelines laid down for all IRD undertakings without there arising any conflict with policies peculiar to individual districts.

These guidelines were that the formulation of projects should be such as:

i. to comply with national orientations and priorities;
ii. to avoid competition with schemes already existing at local level (e.g. under the Decentralised Budget);
iii. to enhance the efficacy of national programmes by removing bottlenecks occurring within the district;
iv. to pay special attention to local resource endowment and needs;
v. to decrease inter- and intraregional disparities.

Both the management structure chosen for IRD and the guidelines elaborated to inform project design constitute laudable attempts to avoid past planning errors, which often resulted in the excessive centralisation of authority within the projects and some inconsequence. But the guidelines had nonetheless a somewhat deleterious effect upon planning for Kurunegala insofar as they tended to limit the scope for innovative thinking and prompted conservative options.

A couple of examples* will make this clear: it was considered that no scheme for crop development could be entertained unless appropriate subsidies were *already* available on a countrywide basis - numerous promising enterprises like bananas, pineapple, citrus and cotton were thus not even contemplated; the potential in Kurunegala for animal husbandry and milk production could not be exploited because the National Livestock Development Board and an IDA funded dairy project were already involved in these activities, albeit on a modest scale, in certain areas of the district.

The restrictive manner in which the concept of 'integrated' rural development was interpreted thus ultimately led to a form of area planning in which anything that was complex in terms of interagency

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* These two examples were cited in the course of our interviews with them by members of the original KIRDP design team. Much of the information reported elsewhere in this chapter derives from the same source.

cooperation, district specific or simply costly was eliminated on the somewhat spurious grounds that such components were not replicable.

3.2 PLAN FORMULATION

The Kurunegala project went through three distinct phases before a definitive document could be drawn up and implementation begun. These were: firstly, choice of a geographical area which would serve as a suitable testing ground for the theoretical premises discussed above; secondly, formulation of project components which would concur both with the guidelines already mentioned and a number of current government priorities; and, lastly, a process of paring down during which many of the components initially proposed were either substantially pruned or else entirely deleted.

3.2.1 Inception

Kurunegala district was initially selected as an area in which to elaborate an integrated rural development model, because it exhibited a combination of characteristics that were representative of conditions in many other parts of the island, yet not so complex in their inter-relationships as to constitute an insurmountable obstacle for planners. Kurunegala, it was thought, was amenable to the kind of simple solutions necessary in building a replicable model, but at the same time sufficiently heterogeneous to stimulate a versatile approach.

It was decided that a whole district must be the target area of integrated rural development, because this was the administrative unit within which the majority of prospective implementing agencies deployed a territorially autonomous cadre of field staff. It was realised that some agencies of government organise their field activities irrespective of district boundaries. (This is the case, for instance, of the Ceylon Electricity and the Water Resources Boards). It was felt, notwithstanding, that this was a minor disadvantage in comparison with the replicability potential of building upon administrative capacity at district level throughout the island.

A number of features caused Kurunegala in particular to be chosen as the first candidate for district development planning. It is large not only in terms of area but also population. There are no truly urban centres outside the principal town, so that socio-economic conditions in the district may be regarded as authentically rural. There is substantial agro-ecological variation from extreme southeast to northwest. Most climatic zones in the island - with the major exception of the high altitude humid ecotype - are thus represented within its boundaries. These are all objectively verifiable criteria.

Some degree of subjectivity was displayed when two further criteria were applied to justify the selection of Kurunegala. It was claimed that, on the one hand, Kurunegala was from the agricultural point of view a 'simple' district, in which only two crops - paddy and coconut - entirely dominated all other forms of rural production. This, it was argued, would greatly simplify planning and would make it easier to evaluate the validity of the model. Similarly, it was maintained, that the antiquity of farming patterns and the absence of large scale new settlements guaranteed a fairly conservative environment, in which the selective introduction of conventional yield increasing innovations would be well received, as long as no concomitant attempt was made to modify aspects of the existing social structure.

By concentrating on the 'simple' dichotomy between a predominance of coconut in the south and irrigated paddy in the drier north, planners believed that they would be able to create an economic equilibrium contributing to a reduction in intra-district disparities. Because these two crops are grown over large areas of the island, a project design based on their development was considered *ipso facto* replicable (World Bank 1979: 59-60). The stability of the farming environment was moreover supposedly favourable to a rapid spread of the innovative technologies envisaged.

Why either of these hypotheses was entertained and subsequently employed to justify the choice of Kurunegala is not at all clear: the conditions of paddy cultivation in Kurunegala are very different to those met with in many other areas; coconuts are of major

economic significance in only the southwest quadrant of the island and there exists *a priori* no demonstrable relationship between stability of the social structure and a readiness to innovate.

However, questionable this rather loose argumentation, a clinching factor in the choice of Kurunegala proved to be that it was a district which over the past decade had received relatively little attention from central government. Since one of the declared intentions behind the IRD programme was to 'bring local resources up to national average level', it was quite rational to select an apparently neglected area. How this degree of neglect was initially measured has never transpired.

The fact nonetheless remains that Kurunegala was chosen as a rather underdeveloped district in which to test an axiom of official IRD planning doctrine. This is to 'strengthen the capacity of existing institutions'. Even so, when a World Bank identification mission first visited the district to make an inventory of possible project components, roads and the irrigation network were assessed for their development potential because of their direct significance for increasing agricultural production. But investigations did not extend to an evaluation of the implementation capacity of agencies involved in the maintenance and management of the social infrastructure.

The Government of Sri Lanka could not accept the mission's initial recommendations, which were seen as unnecessarily restrictive. The Bank subsequently relented and agreed to finance the greater part of a more ambitious programme conceived from the outset to foster the simultaneous development of the principal cropping systems occurring in the district and of numerous other aspects of rural life.

3.2.2 Planning procedures

Preparation for KIRDP began in mid-1976 when a single foreign advisor in the Development Planning Unit of the then Ministry of Planning and Economic Affairs received the brief to explore the district's potential. At that time the Government's major

priorities were to improve the situation in the areas of food production, employment, exports, import substitution and income distribution. The advisor's instructions were to draw up proposals for the development of Kurunegala district that would contribute to the achievement of national objectives under each of these headings.

The foreign expert in agricultural planning, who commenced investigations, was subsequently joined by another expatriate. A Sri Lankan specialist, working for the Bank of Ceylon, assisted in matters related to agricultural credit. This core group received abundant support from local counterpart staff.

3.2.2.1 Data collection

Tasks were parcelled out sectorwise to members of the team so that what were judged to be the most significant aspects of rural development were all covered. Reports were prepared on each topic describing the situation as it then was, detailing the potential for development and outlining a prospective plan for that sector. This work took some two years.

Progress was slow for two reasons. In the first place, there was initially very little specialised manpower available to collect and process the necessary data. Then, with the change of government and political orientations in the course of 1977, time had to be allowed for a reappraisal of objectives before planning could continue.

By the second half of 1978 a considerable body of information had been gathered and more than a dozen sector reports had been drafted. These ranged over a wide variety of subjects from coconut cultivation, agricultural credit and water management, through road construction and rural electrification, to health, education and employment. It was intended that this corpus of material be used to formulate a series of rational choices that would provide the framework for a coherent district development plan.

However, only one primary option was absolutely clear to planners: agricultural production must increase. The shift in basic political and economic orientations that occurred as a result of the change of government and the absence of hard-edged policies that characterises the first months of any new regime made it difficult for the Development Planning Unit to draft concrete proposals certain to meet with political approval. Planning thus tended to be pragmatic. Final proposals were constrained by the circumstances and did not always represent, in the eyes of the authors, an optimal solution.

3.2.2.2 The consequences of haste

Delays in completing the preliminary research proved the cause of some precipitation towards the end of the planning period. This had a number of consequences.

The initial brief stated that 'Full cooperation of District authorities should be sought and maintained in the component selection procedure. This injunction was respected. But collaboration at district level was sometimes less than perfect and time was not available to pursue the process of consultation. When canvassed for their views on the design of project components, the heads of numerous government agencies in the district had done little more than hastily draw up a 'shopping list' of pieces of equipment or buildings that they hoped to acquire when KIRDP came into being. Little or no thought was given to the potential for structural change and development programmes tended to be conceived by those consulted as no more than an opportunity for increasing the volume of services already offered.

Although cooperation was actively sought and obtained in the identification of tanks eligible for rehabilitation under KIRDP, a tight schedule here again made it impossible to deploy all the caution necessary in selecting the most suitable locations. Field officers of the Territorial Civil Engineers Organization in each AGA division were requested to make inventories of the village irrigation systems that it was in their opinion most urgent to refurbish. In this manner it was hoped that the improvements

financed under KIRDP would be equitably spread throughout the district.

It however soon became clear that, in order to limit overall costs, only a very small proportion of the field officers' propositions could ever be taken up. It was necessary to select for rehabilitation those village irrigation systems that showed the greatest promise of returns in terms of increased agricultural productivity. A decision to restrict rehabilitation work to tanks lying in the dry zone of Kurunegala was taken on the highly rational grounds that irrigated paddy was in this area the mainstay of agricultural production, whereas in the southern, wetter half of the district water storage was both a less essential component of rice farming and furthermore of no relevance to the main crop, which is coconuts.

Attempts to maintain this vein of rationality foundered when criteria had to be defined to assist in the final selection of dry zone tanks mooted for improvement. The time factor made it necessary to establish arbitrary measures to determine whether the increased productivity of village irrigation systems once refurbished would warrant the funds expended on them. A minimal storage capacity for tanks eligible in relation to the extent of their command areas was thus decreed with scant regard for data on the permeability of soils*, evapotranspiration and the efficiency of field channel networks. An indication of just how arbitrary was the definition of this particular criterion may be grasped from the fact that it has since been twice revised.

It is similarly held by a member of the original team that, for want of enough time, sufficient consideration could not be given to such key issues as precisely how funds earmarked at the planning stage for a strengthening in Kurunegala of agricultural extension services would be employed to achieve the desired effect. Blind

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* A World Bank appraisal mission did actually warn that, the beds of tanks selected 'should not be on permeable soils'. But no mention is made of the soils in the command area, where water losses due to percolation can be as wasteful or more so.

faith was ultimately placed in the efficacy of financing the introduction of the Training and Visit* system before any investigation had been undertaken to ascertain its appropriateness under local conditions.

Hasty conclusions were likewise drawn with regard to all areas of rural activity in which clear cut development solutions were not readily available. It was simple enough to plan for rural feeder roads, an extension of the network of village schools or domestic water supply. Data were at hand and a negative response on the part of target populations was unlikely. Planning in such areas involved a mere allocation of funds according to objective criteria of urgency and the programming of phases in execution.

But the situation was quite different when it came to taking planning decisions relating to the development of sectors in which the principal unknown was the probable reactions of the beneficiaries. A tight schedule, it is said, (though perhaps also lack of imagination) prevented any serious prior investigation into the wisdom of proposing a water management package to the farmers of Kurunegala. Little or no effort was made to calculate as a function of holding size the relative profitability and, hence, acceptability of different schemes for intercropping under coconut. Credit was assumed to be a necessary component, because a 1971 survey had indicated that only 25% of all agricultural loans were contracted with banks or cooperative societies: no thought was given to the distinct possibility that peasants frequently prefer non-institutional credit, despite higher interest rates, for its flexibility and the manner in which it reinforces social linkages.

So planning proceeded, without enquiry into farmer motivations, on the gross assumption that more resources automatically entailed greater productivity. If the time factor substantially limited the

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* Training and Visit is the name given to a rigorous restructuring of agricultural extension activities first experimented with in northern India and subsequently adopted under World Bank auspices in numerous countries with extremely varying degrees of success. See Benor and Harrison 1977 for a description of how the system *should* work.

scope for preliminary investigations in depth, two further constraints also weighed heavily upon the type of planning decision that could be taken. These were the prior existence of crop subsidy programmes and staffing problems that beset several agencies involved in field operations.

3.2.2.3 Institutional and political constraints

Planners thus opted for solutions that would exploit subsidies currently offered islandwide but would not increase their number in response to specific problems of economic motivation peculiar to farmers in certain parts of the district. If this was perhaps justifiable on the grounds that it was not politically desirable to make a special case of Kurunegala, little cogency can on the contrary be attributed to the decision to restrict the dimensions of certain components so that they would not surpass the existing staffing capacities of implementing agencies. It is held, for instance, that the coconut development component was kept as simple as possible in order to avoid the necessity to recruit supplementary field staff. But were this so, it could be asked why the Department of Agriculture was given the possibility under KIRDP of nearly doubling its cadre of extension officers in the district.

The team entrusted with the responsibility of drafting proposals for the Kurunegala Integrated Rural Development Project was thus apparently given little scope, to pursue an optimal planning exercise. The inadequacy of initial data, political uncertainty, an insufficiently long gestation period and the national context were all so restrictive that innovative thinking proved difficult. Planning was reduced to an orchestration of constraints, which resulted in a project designed to house under a single roof a number of largely disparate elements.

3.2.2.4 Limited means to attain indeterminate goals

The basic policy of strengthening the implementation capacity of existing institutions and the subsequent imposition of a requirement that components should be both labour intensive and quick yielding concentrated the attention of planners on specific

sectors of the rural economy, in which a single government agency usually played a dominant role. This made component design relatively simple, because it merely involved the programming of inputs whilst leaving the precise scheduling of outputs to, in the first instance, the agency concerned and, ultimately, the beneficiaries.

It is indeed interesting in this respect to note how vague the project document remains when it broaches the nature and magnitude of benefits accruing from investment; none are specified except in a cursory attempt to forecast increases in paddy and coconut production.

Herein lie the major shortcomings of KIRDP planning:

i. excessive polarisation of investment in two major crops;
ii. failure to ensure farmer motivation to develop them; and
iii. an approach so fragmentary as to cancel out the multiplier effect that can be achieved by a carefully balanced programme of mutually supportive investments in complementary sectors.

The net result was a plan of which its authors themselves foresaw that one of its principal characteristics would be to have to distributional impact whatsoever (World Bank 1979:59): the rich would get richer and the poor would stay in their place.

3.2.3 Paring down components

The dictates of circumstance had eliminated from plan formulation any nuance of structural sophistication. The search for simplicity was even such that no provision was made for the processing or marketing of a planned increase in the production of cash crops like coffee, cocoa and spices: it was assumed that traditional channels would suffice. Numerous proposals were however mooted in working papers that were later axed before the project document was published. Had some of these been allowed to subsist, the mere fact of their multiplicity might have encouraged planners to look for cross-linkages with a view to achieving economies of effort and thereby instituting a certain measure of functional integration.

Reasoned elimination is always an important instrument in planning. It could be maintained that in the case of KIRDP almost no other tool was used. Final proposals constituted - with one or two exceptions - the residue that remained after all else had been excluded on the grounds of duplication, excessive cost, complexity or political expedience.

Members of the planning team itself exercised a certain amount of selfcensorship. But the largest number of exclusions were imposed by the project Steering Committee, upon which sit senior officials of all the government departments concerned, and by the World Bank, that was to provide most of the funding.

3.2.3.1 The economics of elimination

Duplication was invoked to justify the elimination of an extension officer training centre to be built in Kuliyapitiya and programmes for livestock and milk development: the forthcoming National Extension Project (T and V) made the proposed centre unnecessary, while dairying and meat production were to be covered by the National Livestock Development Board under a separate IDA credit envelope. There was, however, obvious scope for creating formal linkages between the latter and the future Kurunegala project, though this possibility was never given serious consideration.

Collaboration with the National Milk Board was not entertained because of anticipated reluctance on the part of this body to enter into a relationship with the extension wing of the Department of Agriculture. Support to rural industries was also dismissed out of hand on the (unproven) grounds that these were already adequately dynamic and that proposals for their development could anyway be tested in the context of later IRD undertakings.

Excessive cost was the reason given for cutting back a long list of components principal among which were tank rehabilitation schemes and proposed improvements to the social infrastructure. In this the World Bank proved draconian. Its project appraisal team had from the first tried to avoid any involvement in the

financing of non-productive investments. The Development Planning Unit of the Ministry of Finance and Planning had nevertheless drafted a series of programmes for the fields of health, education, communications, electrification and sanitation. Resistance on the part of the Bank caused these to be reduced by two-thirds. Insofar as investments in irrigation were concerned, the situation was quite clear. The Bank would make available a certain sum only that the value of work undertaken was not to exceed. Consequently, fewer schemes were scheduled for construction or repair than was initially envisaged and cost overruns occurring during implementation were later responsible for further eliminations.

3.2.3.2 Political and technical factors

The complexity of some potential components and political expedience tended to complement each other in the exclusion of a further set of proposals. Thus, the intercropping of pineapples, bananas and limes with coconuts was not entertained, ostensibly because there were no subsidies available at national level for these crops. But on another plane, it was feared that the Coconut Cultivation Board would be very averse to any cooperation with the Department of Agriculture's extension service responsible for introducing the new technology. Besides, it was felt that not enough was yet known about the profitability of such enterprises grown under coconuts. Although the proposal was finally dropped in favour of a more conservative coffee/cocoa/pepper option, the CCB made a successful bid to resist pressures exerted to induce it to increase its field staff assigned to intercrop follow-up duties. The object of this move seems to have been to demonstrate that the Board was master only unto itself.

A major area in which the complexity of the problems - both technical and political - to be broached caused planners to adopt a low profile was the development of homegardens and dryland farming in general. According to ARTI's *Analysis of the pre-project situation* the former 'occupy nearly one-third of the agricultural land' (1981:49). It is probable that more or

less stabilised swidden agriculture accounts for an even larger proportion of the land used in the district for agricultural purposes.

Any attempt to develop this huge potential would run up against three difficulties. The first is that an adequate improved dryland farming package is not yet available. Secondly, an increase of only a few percentage points in the productivity of this sector would in all probability encounter severe obstacles in the general field of marketing: an insufficiency of offtake facilities, periodic over-production of specific crops and concomitant price fluctuations. Lastly, most *chena* farmers were in 1978 still encroachers, so that any development undertaking would have tended towards a *de facto* legalisation of the tenurial situation. Planners therefore avoided an issue, the political consequences of which would have been very far reaching.

3.2.3.3 Ongoing readjustments

The majority of the cuts referred to above were made before the plan for KIRDP became operative in 1979. Many of the proposals that were not axed - especially those relating to the social infrastructure - only remained as part and parcel of the project, because GOSL refused to relinquish them when the World Bank pressed for their removal. Had the Bank had its way, the project would have been confined to the construction of roads and the improvement of irrigation works.

A number of readjustments have however been effected in the course of implementation. Schemes for the purchase of tractors and pump-sets on credit have, for instance, been abandoned as it became clear that the farm power situation was rather more satisfactory than at first imagined and that the economic viability of small scale lift irrigation was far from proven. Similarly, the targets of the tank rehabilitation programme have been repeatedly lowered as inflation reduces the purchasing power of the budgetary envelope, which remains unchanged.

3.3 A PRAGMATIC APPROACH

From the preceding description of just how KIRDP was conceived it is evident that the declared concern with 'integration' paled into insignificance when planners had to come to grips with the realities of the situation. In the words of one of them, they were 'groping towards' a formula for district development without prior knowledge of what was economically feasible or even politically desirable.

There are no objections of principle to initial investigations being undertaken sector by sector. A subtle analysis of the results of these inquiries might have afforded insights such that the design of a series of mutually supportive, interlocking components could have been carried out at this stage.

However, this was precisely the point at which the first World Bank appraisal mission visited the district and gave its positive sanction to the key sector approach provisionally adopted. Indeed, a different outcome would have been improbable, since the mission comprised a number of subject-matter specialists, who worked more or less independently and confined themselves each to the confection of a sectoral plan based principally on the information provided by the earlier studies of the Development Planning Unit.

The mission leader referred to KIRDP as 'a prototype project'. The only novelty about it is that it entrusts implementation to existing agencies to avoid creating expensive new management structures. In all else it is rather less innovative or 'integrated' than many projects that the Bank has sponsored in rural areas of Africa* and perpetuates sectoral distinctions that can in the long run only result in patchy development.

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* E.g. the Project rural de Sedhiou in southern Senegal or the Minimum Package Programme in Ethiopia.

Chapter Four

THE IMPACT OF KIRDP IN A LONG TERM PERSPECTIVE

In this chapter we shall assess the impact of the Kurunegala Integrated Rural Development Project in a long term perspective. Using estimates initially put forward by the project's own design team, we shall examine what precisely it was intended should happen in the areas of production, income, income distribution and employment.

This analysis will subsequently enable us to evaluate the degree of efficiency shown by KIRDP in attaining stated goals. We will then be in a position to identify errors committed during the planning process and, finally, to suggest how an alternative planning methodology might have furthered the achievement of objectives.

4.1 THE PRESENT SITUATION OF AGRICULTURE IN THE DISTRICT

Our intention in this section is to make an orderly presentation of the available data base, from which we, later in the chapter, make projections by extrapolation.

4.1.1 Population, labour force and employment

Kurunegala district has, according to the 1981 census, a population of 1.21 million. Its total area is 477,600 ha. The district may be characterised as predominantly rural: 96% of the population is described as non-urban and 58% of those employed are engaged in agriculture. Ethnic homogeneity is very pronounced with Kandyan and Low Country Sinhalese counting respectively for

76% and 17% of the total. Religious affiliations closely follow ethnicity: all but 10% of the population declare themselves to be Buddhists.

The annual rate of growth between 1971 and 1981 was 1.7%. Since the rate of natural increase was 2.0%*, it must be concluded that there was a net out-migration of some 0.3% per year. This figure is in the Sri Lankan context relatively low.

The occupational structure of the economically active population (DAP) - defined as all those of both sexes between the ages of 15 and 64 (inclusive) - is presented in Table 4.1.

Table 4.1 - Occupational structure of the economically active population in 1981

Economically active population (EAP)	Number
Employed	352,000
Unemployed and underemployed	108,000
Total labour force	460,000
Housewives (not gainfully occupied)	167,000
Students, clergy, etc.	110,000
Total EAP	737,000

Sources - National Census 1981
Gunawardana *et al* 1981

Of the employed 257,200 (73%) are males and 95,100 (27%) females. The overall activity rate (i.e. $\left(\frac{\text{labour force}}{\text{total population}} \times 100\right)$) is at 38% quite high. This is due to the relative importance of female employment.

* Department of Census and Statistics 1980

Table 4.2 comprises a breakdown of employment by sectors. Unpaid family workers are included in the category of employed persons.

Table 4.2 - The distribution of employment by sectors in 1981

Main occupation	Number
Agriculture:	
Farmers	191,000
Agricultural labourers	13,000
Total agriculture	204,000
Industry (including construction):	
Selfemployed	15,000
Employees	2,000
Total industry	17,000
Tertiary sector:	
Government services	57,000
Private sector (including banks)	74,000
Total tertiary sector	131,000
Total employed	352,000

Sources - National Census 1981
Gunawardana *et al* 1981

Fifty-eight percent of the employed population - or 204,000 persons - are directly involved in agricultural production. Sixteen percent of the members of this group reported subsisdiary occupations both in-and outside the agricultural sector. Among the farmers 42% or 81,000 have insufficient land: 58% or 110,000 have adequate land.

Tables 4.3 and 4.4 analyse the structure of the unemployed

and underemployed population according to age, sex and educational level.

Table 4.3 - Structure of the unemployed and underemployed population according to age and sex

Age group	Male	Female	Total
15 - 19	17,000	16,000	33,000
20 - 34	34,000	26,000	60,000
34 - 64	2,000	13,000	15,000
Total	53,000	55,000	108,000

Table 4.4 - Educational level of unemployed and underemployed

Educational level	Number
Illiterate	8,000
Primary grades	48,000
Higher grades	52,000
Total	108,000

Sources - National Census 1981
Gunawardana *et al* 1981

The unemployed are most numerous in the age group 20-34, while women predominate among the over-thirty-fives.

In summary, it can be said that some 200,000 people are more or less gainfully occupied in agriculture, most of them as farmers, tenants or part-time farmers. There are few permanent agricultural labourers. Among those classified as unemployed it is probable that substantial numbers are in fact sporadically active

in agriculture. According to ARTI's survey (Gunawardana *et al* 1981) about 25% of the labour force in the category is occupied in this way.

Table 4.5 summarises the employment situation in the district.

Table 4.5 - Employment, occupational structure and unemployment in Kurunegala district (1980)

Category of household	Number of households	Labour force	Employed + underemployed	Unemployed
1. Landless, casual and permanent labourers in agriculture	40,000	80,000	40,000	40,000
2. Farmers with insufficient land	55,000	110,000	81,000	29,000
3. Farmers with adequate land	60,000	120,000	110,000	10,000
4. Non-agricultural	75,000	150,000	148,000	2,000
Total	230,000	460,000	379,000*	81,000

Source - Our estimates using National Census 1981 and Gunawardana *et al* 1981

* This figure exceeds by 27,000 the total number of persons described as 'employed' in Table 4.1., because it includes those who find only sporadic employment. This category of persons is in the first table lumped together with the jobless.

It must be stressed that the figures quoted in this section regard only the occupational status of different segments of the population. Questions of labour productivity and income distribution have not been broached. Such factors have not been taken into account, because they tend to affect employment in the agricultural sector in a manner which makes it difficult - if not meaningless - to compare the resultant figures with those relating to employment in other fields.

4.1.2 Income and income distribution

Agricultural household income:

The figures on household income presented below are based on data collected in the course of a survey conducted by ARTI in 1978-79. The results were not cross-checked in the framework of an economic analysis of incomes at the regional level and household revenues tend to be underestimated insofar as they are neither weighted to allow for the value of subsidised food items nor adjusted with a view to correcting the natural bias toward underreporting which always characterises this type of survey.

Table 4.6 - Sectoral breakdown of aggregate income of households in Kurunegala district (1979)

Sector	Aggregate income for all households (Rs. x 1m.)	% of total household income
Agriculture:	790	61
Paddy	410	32
Coconut	276	21
Other crops	69	5
Hired labour	35	3
Non-agricultural	505	39
Column totals	1,295	100

Sources - National Census 1981
Gunawardana *et al* 1981

The food stamp scheme makes a substantial contribution to the income of the poorer households, whose total annual earnings do not exceed Rs. 3,600. Almost half the island's population- that is, some 7.2 million people - are estimated to benefit under the scheme, each individual receiving on average the equivalent of some Rs. 220 per year.

In Kurunegala 65% of all households qualify for assistance under the scheme. A total of approximately Rs. 173 million is thus distributed annually in the district. This supplementary revenue should be added to the total for the first column of Table 4.6., thereby raising aggregate disposable income for all households to Rs. 1,468 million (cf. Table 4.7).

The number of households whose principal source of income is in agriculture can be estimated at 115,000. Of those family units without regular employment it can be assumed that 50% will depend for their livelihood on sporadic labouring in the agricultural sector supplemented by food stamps and informal aid from kinsmen. In this manner, the number of those households directly involved in agricultural production increases to a total of 135,000.

The average annual income per household in the agricultural sector can be estimated at Rs. 6,000 or Rs. 500 per month. This includes the value of food stamps. Households in the non-agricultural sector then have nearly Rs. 7,000 at their disposal, which is not substantially more. (These average household income figures are consistent with the total of household incomes for the district: 135,000 agricultural households x Rs. 6,000 plus 95,000 non-agricultural households x Rs. 7,000 = Rs. 1,468 million).

Income distribution:

The ARTI team that carried out the 1978-79 survey calculated income distribution at household level without taking the food stamp scheme into account. If the latter is regarded as a source of supplementary revenue benefitting 65% of all households - that is, the lower income brackets - income distribution may be estimated as in Table 4.7.

Table 4.7 - Income distribution in Kurunegala district

Households		% of aggregate household income for the district	Cumulative %	Average p.a. household income (Rs.)
Decile	Number			
1 and 2	46,000	8	8	2,600
3 and 4	46,000	10	18	3,200
5 and 6	46,000	12	30	3,800
7 and 8	46,000	21	51	6,700
9 and 10	46,000	49	100	15,600
Total	230,000			

Sources - Our estimates using various sources

The income groups correspond roughly with the categories of households mentioned in Table 4.5. The lowest two deciles comprise landless or almost landless people, who work as casual and permanent labourers in and outside the agricultural sector. The next two deciles include households with access to insufficient amounts of land, over 50% of whose income accrues from resources outside agriculture. The remaining households in the higher income brackets farm at least enough land to get by on or else earn a livelihood in the non-agricultural sector. The unemployed are spread over the various groups of households in the lower income brackets, as can be ascertained from Table 4.5.

4.1.3 Agricultural production

Paddy is the principal crop grown in Kurunegala district. The evolution of annual production levels is traced in Table 4.8.

Table 4.8 - Paddy production in Kurunegala district

Unit 1,000 tonnes

	Annual averages x 1,000				
Years	1960-64	1965-69	1970-74	1975-77	1979
Tonnage	135	167	165	159	249

Source - Department of Census and Statistics

1979 was an exceedingly good year. A realistic annual average production can presently be estimated at some 170,000 tonnes.

There has been a slight increase in paddy production since the beginning of the sixties. Nonetheless, at an annual rate of about 1% this growth in supply has not been able to keep pace with the increase in population, so that rice tends to be imported into the district in ever greater quantities.

Some ten years ago the district's annual consumption of paddy stood at around 165,000* tonnes. The district was more or less selfsufficient in paddy at that time. With consumption now annually attaining about 195,000* tonnes, 25,000 tonnes have to be brought into the district each year from elsewhere.

Coconut production constitutes the second most important enterprise in Kurunegala. But adverse weather conditions and slumping rates of fertiliser application have in recent years caused a noticeable decline in this area of agricultural activity. Despite local consumption of about 240 million nuts, Present production is estimated at 630 million nuts./ Kurunegala retains its place as one of the biggest exporters of this commodity among the island's districts.

Other crops cultivated, albeit on a smaller scale, are unirrigated cereals (maize, millet, sorghum), pulses (cowpeas,

* Figures based on an annual consumption per head of 160 kg of paddy.

green gram), sesame, tubers (cassava, sweet potatoes), vegetables (chillies, onions), coffee, cocoa, pepper, spices and fruits (jak, citrus, pineapple and mangoes).

4.2 THE AGRICULTURAL SECTOR IN THE YEAR 2000

In this section we trace the probable course of certain major socio-economic variables which will over the next two decades determine the problems to be faced in the development of Kurunegala district.

4.2.1 Demographic growth and employment

In formulating projections of population growth we follow two alternative hypothesis. The first of these, which we will call H, posits an overall real population increase of 1.7% *p.a.* This figure is the same as that observed between the census years 1971 and 1981. Our hypothesis h considers, on the other hand, that the rate of natural increase will fall to 1.6% (cf. ARTI/Wageningen 1982b) and that the rate of out-migration will remain constant at 0.3%, so that real increase will be no higher than 1.3% *p.a.* towards the end of the period 1981-2000.

Table 4.9 compares the demographic consequences in each case. Projections of the labour force are based on the probable evolution of the participation ratios exhibited by the age categories presently existing.

Table 4.9 - Projection for population and labour force in Kurunegala district (1981-2000)

Year	Hypothesis H		Hypothesis h	
	Population x 1,000	% Increase	Population x 1,000	% Increase
1981	1,213		1,213	
		1.7		1.5
1990	1,412		1,387	
		1.7		1.3
2000	1,671		1,578	
	Labour force x 1,000		Labour force x 1,000	
1981	460		460	
		3.05		3.05
1990	603		603	
		2.07		1.92
2000	740		729	

Source - our estimates

A falloff in the rate of net demographic increase will have no effect upon the rate of increase of the labour force during the period between 1981 and 1990. The reason for this is quite simply that persons coming onto the labour market during this decade have already been born (and are for the most part unlikely to disappear before the end of the century). As a result, the participation ratios will tend to increase till the end of the century. It is only after 1990 that the labour force will cease to expand so rapidly owing to the probability of a fall in the birthrate in the coming decade.

In 1981 23% of the labour force in Kurunegala are unemployed and 44% have agriculture as their principal occupation. We will now endeavour to forecast the future development of this employment situation in the different sectors of the economy.

According to the Kurunegala Integrated Rural Development Project *Staff appraisal report* (World Bank 1979) the annual growth of value added in the agricultural sector would, without the project, continue at 1.1%. Considering recent trends in agricultural production, this seems fairly realistic. The concomitant annual increase in labour requirements would not substantially exceed 0.5%. Thus, if there are, for instance, in 1990 214,000 persons whose principal occupation is agriculture, the number will barely increase to 225,000 in the year 2000.

Growth in the non-agricultural sectors is less predictable and several hypothesis can be formulated. However, it seems most unlikely that value added will progress at more than 8% *p.a.* in the foreseeable future. Even with very labour intensive methods of production this means that less than a 5% increment in employment will be generated each year.

The preceding assumptions concerning the evolution of the secondary and tertiary sectors are highly optimistic. They can nevertheless be used in conjunction with firmer data from the agricultural sphere to construct a picture of the changes in the employment situation that are liable to occur over the next 20 years.

Table 4.10 - Projected evolution of employment in the district without KIRDP

	1981		1990		2000 H		2000 h	
	x 1,000	%	x 1,000	%	x 1,000	%	x 1,000	%
Labour force	460	100	603	100	740	100	729	100
Agricultural sector	204	45	214	36	225	30	225	31
Secondary and tertiary sectors	148	32	230	38	374	51	374	51
Total employed	352	77	444	74	599	81	599	82
Unemployed	108	23	159	26	141	19	130	18

Source - our estimates using various sources

Until the year 1990 unemployment will increase in absolute as well as in relative figures. Only after this date will unemployment begin to decrease in relative terms. But in absolute figures the jobless will nevertheless then be far more numerous than in 1981.

It should be stressed that this constitutes even so a very optimistic picture of the situation, for it assumes high rates of growth in the non-agricultural sectors and substantial shifts in the structure of production within the district. Under such assumptions the future for employment remains bleak and shows little prospect for improvement upon the present dire state of affairs.

4.2.2 Incomes

In section 4.1.2 average agricultural household income in Kurunegala district was estimated at Rs. 6,000, there being no significant difference between figures for the agricultural and non-agricultural sectors. If development over the next two decades follows the pattern we have sketched out above, income distribution

will become increasingly skewed. Labour productivity in the non-agricultural sectors will develop much faster than in agriculture resulting in substantial intersectoral income disparities, that can be anticipated at around 1:1.8.

A reversal of the present situation will occur insofar as those dependent for their livelihood upon agriculture will become a major focus of poverty in the society as a whole. If the non-agricultural sectors perform less well than we have optimistically assumed, unemployment will become a problem of even greater concern.

Any failure to encourage the creation of jobs in these sectors would result in agriculture itself becoming a reservoir of hidden unemployment characterised by continuing low levels of labour productivity and income.

4.2.3 Output

Making projections on the basis of recent trends it can be estimated that, without KIRDP, paddy production would have increased in Kurunegala to some 190,000 tonnes in the year 1990 and to 210,000 tonnes by the end of the following decade. With population expanding at a hypothetical 1.3 to 1.7% *p.a.* the consumer deficit would have by the year 2000 reached the figures of 40,000 or 60,000 tonnes - according to which of the demographic growth rates is considered.

Similarly, coconut production will recover under current rehabilitation schemes and is likely to rise to 730 million units in 1990 and to 840 million ten years later. But in this case local demand will remain amply satisfied, while some 506-525 million nuts will in the year 2000 still be available for export.

4.3 PROBLEMS IN AGRICULTURE : A SUMMARY

The projections we have made bring attention to the inescapable fact that the agricultural sector will in the course of the coming two decades make no significant progress in terms of production, income generation and employment unless concerted action is undertaken.

The problems of greatest urgency are clearly in the areas of the deteriorating conditions of employment and concomitant low levels of income. By the end of this century the number of impoverished and under- or unemployed will attain dramatic proportions.

Development in the non-agricultural sectors will certainly contribute to reducing overall unemployment, but will at the same time foster increasing income discrepancies between different branches of the regional economy. It is thus evident that a systematic effort to develop the agricultural sector is fully warranted, because it will have far reaching consequences - particularly, if it is geared to employment generation.

In the next section we endeavour to assess the extent to which KIRDP constitutes a viable strategy for solving the major problems we have identified as obstacles to the district's development.

4.4 THE IMPACT OF KIRDP ASSESSED

The project document - also known as the *Staff appraisal report* (World Bank 1979) - makes explicit the increased levels of production, employment and income that were expected to result from implementation. But since this report was finally approved for publication in early 1979 numerous modifications have been thought necessary and the project as actually carried out has in several respects differed substantially from that planned. The most significant alterations have been to the tank rehabilitation programme, which has under the pressure of budgetary constraints shrunk to one-third of its initial size. Most other components have also suffered from reductions owing mainly to the effects of inflation. Assuming that only one-third of the benefits scheduled to accrue as a result of increased efficiency in paddy farming and half of those expected under the coconut component will in fact have been realised, the IRR will sink from a projected 30-32% (World Bank 1979:120. 58) to no more than 19% (cf. Annex I).

In our endeavour to appraise the real impact of KIRDP we will, however, base our calculations on the quantitative objectives set out in the project document, for there is now a strong

likelihood that the implementation period will be extended beyond 1983 and large additional investments made in order that initial targets may be fulfilled. We will therefore consider that benefits from the paddy and coconut components will not be felt in full until the years 1995 and 2000 respectively - that is, a decade later than anticipated in the *Staff appraisal report*. Benefits accruing from KIRDP in this time perspective are thus summarised in Table 4.11. The internal rate of return would in this case be 20% (cf. Annex I).

Table 4.11 - Incremental impact of KIRDP at three points in time

	1990	1995	2000
Production			
Paddy	29,000 t.	49,000 t.	49,000 t.
Coconuts	65m. nuts	106m. nuts	155m. nuts
Income			
Index of average farm income (1980=100)	120	130	140
Employment* (man-years)			
Labour at farm level	9,900	16,500	20,000

* In the initial investment phase from 1979 to 1988 annual labour requirements for construction and the replanting/underplanting of coconuts will be 3,200 and 2,000 man-years, respectively.

Source - World Bank 1979

Comparing figures in Table 4.11 with those quoted earlier in this chapter (i.e. Table 4.10 *et passim* we can conclude that KIRDP will, at full maturity by the year 2000, have induced the following effects:

i. With the project the district will be almost selfsufficient in paddy or even in a position to export, depending on the hypothesis of population increase adopted.

ii. The project will increase the availability of coconuts for export by about 3% annually.

iii. It will improve farm income by approximately 2% per year.

iv. Employment will be provided in construction and coconut sector rehabilitation work for some 5,000 people during a nine year period (i.e. for 4% of the total number of those who would otherwise have remained unemployed each year between 1979 and 1988).

Incremental labour requirements at farm level will, as a result of improved cultivation practices, reach an annual figure of 20,000 man-years in the year 2000. This is equivalent to 15% of the total number of those who, without the project, would have been unemployed in that year. Another 10,000 non-farm jobs may come into being as a result of backward and forward linkages attendant upon the increase in agricultural production. All in all, the employment impact of KIRDP will amount to generating work for 20% of those who would otherwise have been jobless in the year 2000.

v. The distribution of farm income will change little as a result of the project, though in absolute terms agricultural household revenues will rise considerably.

vi. The total number of households that stand to reap some benefit from KIRDP may be estimated at 155,000* - that is, some 40% of the households that will be living in the district by the end of this century. But the 65,000** farm families belonging to the category of those operating holdings of adequate size will enjoy a disproportionately large part of the overall long term benefits. Lesser benefits will accrue to those running farms not large enough to support themselves and their families. Controlling only 20% of the land and

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* This number includes all families operating an agricultural holding as well as those benefitting from employment generated by the project. The landless and almost landless who do not find employment in project related activities are excluded.

** Assuming an increase of the number of holdings in this category which approximately corresponds to the average increase in agricultural production.

obliged to seek supplementary income in off-farm activities these will number about 60,000* in the year 2000. To the category of those who are under-or un-employed KIRDP will do no more than supply an annual total of some 30,000 man-years of work over the two decades under consideration.

vii. Owing to the presently uneven distribution of land prevailing in the district, eighty percent of the gross incremental benefits (increased production less inputs) deriving from the project will thus go in the first instance to those farmers who already occupy a privileged position with adequate land resources. Some 10% of the value added earned by these households will however accrue to less favoured categories in the form of wages for hired labour. Expressed in incremental terms, this means that, as a result of increased marginal labour deployment, about 20% of the gross benefits will in fact be redistributed to labour, so leaving the wealthier households to share approximately 65% of the project benefits between them. The residual 35% will be divided up among the households we have classified as under or unemployed and those families with inadequate amounts of land, who at present belong to the poorest 40% of the district's population.

4.5 CONCLUSIONS

KIRDP must be regarded as a programme geared first and foremost to the achievement of increases in production. In this respect the targets set for coconut and paddy are realistic insofar as the assumed annual growth rates are certainly attainable and it seems quite possible to fulfil them with the material means and by the methods described in the *Staff appraisal report* - albeit at a later stage.

Improvement of the employment situation, incomes and living standards in the district appears only of secondary concern in the

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* Assuming an increase of the number of holdings in this category which approximately corresponds to the average increase in agricultural production.

project document. Sixty-five percent of the incremental benefits will accrue to only 65,000 households - that is, only 18% of the households living in the project area by the year 2000 and a category already in the highest income bracket - while 90,000 households at the bottom of the scale will receive only 35% of the accumulated advantages. But there are another 30,000 households in this same income category whose lives will be hardly affected by the project.

Concentration on improving coconut and paddy outputs, in a situation where large sections of the population have access to an insufficient production base or even to no land at all, will inevitably lead to the very poor being left out of the process of development. The planners who designed KIRDP could and should have addressed other areas of the rural economy as well to ensure a more equitable pattern of growth.

We are of the opinion that Kurunegala district has the agronomic and economic potentials which would have made such a proposition possible. Programmes specifically aimed at the poorest categories of the population could have been profitably incorporated in the overall design. In the next chapter we will suggest how this could have been done.

Chapter Five

METHODOLOGICAL SHORTCOMINGS OF KIRDP PLANNING

We gave at the beginning of this report a succinct description of the agricultural planning methodology already developed by the ARTI/Wageningen team for Matara district and subsequently expanded to incorporate experience gained in Kurunegala. Although it clearly provides no panacea, we would like to believe that the methodological framework proposed can significantly reduce the uncertainties otherwise attendant upon plan formulation.

To recapitulate briefly:

the methodology enables planners

i. to circumscribe socio-economic problems with some precision;

ii. to understand the internal structure of the agricultural sector viewed as a system of dynamically interrelated farm types; and

iii. to assess the complex array of economic motivations that different categories of producers display when faced with the potentials and constraints encountered within the context of specific farm types;

it further marshals the information thus accumulated

iv. to permit the systematic identification of potentially viable projects;

v. to appraise the impact of the development programmes mooted upon farm structure, rural incomes and employment; and

vi. to translate the probable results of plan implementation at district level into terms of production, income, income distribution and foreign exchange earnings in both the medium and the long term.

It is our contention that the Kurunegala Integrated Rural Development Project exhibits important omissions and even straightforward errors as a result of the dubious procedures employed during the course of plan formulation. We will attempt in this chapter to pinpoint these inadequacies, to demonstrate how recourse to the ARTI/Wageningen framework might have facilitated the avoidance of certain mistakes and to visualise the outcome had these methods been adopted.

We will take one by one each of the six planning precepts enumerated above and try to assess in each case the extent to which the designers of KIRDP have failed to conform. We shall subsequently show how lack of a methodologically consistent approach led to omissions and distortions in plan formulation at each of the six levels.

5.1 IDENTIFICATION OF SOCIO-ECONOMIC PROBLEMS

A rural development plan should be geared to the solution of the major socio-economic problems that beset a region. The first task in planning is thus to identify these areas of concern. They must be located in geographical terms, quantified and specified in relation to the human groups involved.

We will in this section analyse the manner in which socio-economic problems were identified in Kurunegala by IRD planners. They fall into three broad categories: those inherent in the production process and its structure, those pertaining to income and income distribution and, lastly, those attendant upon employment. We will deal with each separately.

5.1.1 Production process and structure

Statistical data on most of the major crops grown in Kurunegala were collected to document production over a number of years. These formed the substance of a series of preliminary reports (cf. 3.2.2.1.) and were later particlly published in the World Bank *Staff appraisal report*. It was intended that this body of data be used to assess general trends in agricultural output. It is however noteworthy that, with one exception (Hussain's 1978 survey of coconut cultivation), none of this material comprised a breakdown of production figures with a view to detailing the potentials of holdings of different sizes and structure. Nor was an attempt made to determine selfsufficiency rates for each of the main crops grown and consumed in the district.

The structure of production was not described as such: a sectoral analysis of the district's economy was not undertaken. However, a presentation of the global land use pattern in agriculture did permit the extrapolation of certain conclusions with regard to subsectoral composition.

Adoption of these procedures would suggest that KIRDP planners were principally concerned to determine overall production trends, so that it would be possible to appraise the probable outcome of the project with reference to a hypothetical 'without project' future situation. Little interest seems to have been taken in justifying project design on the basis of the contribution that could be expected as a result of developing specific crops.

It is no doubt for this reason that no effort was deployed to determine the characteristics of different categories of production unit (cf. 5.2.1. below), the magnitude of the role that each of these categories plays in the regional economy as a whole and the precise location of the various areas in which quite specific cropping patterns predominate.

For want of satisfactory data no thoroughgoing analysis of the agricultural sector was thus possible. The detailed evolution of future trends could not be foreseen, because the present situation

was depicted without nuance. A further major obstacle in plan formulation was the fact that the non-agricultural sector had been almost totally ignored during the fact-finding phase: adequate guidelines for district development could not be drawn up unless agricultural and non-agricultural (but complementary) aspects of the regional economy were treated as elements of equal significance.

So, without insight into the overall structure of production in the district, planners were unable to define realistic output objectives which would ensure accumulations of value added sufficient to warrant specific investments.

5.2.1 Income: levels and distribution

The project document presents almost no information relating to farm income. The meagre gesture that was made by planners in this direction is discussed below (cf. 5.2.1.). However, even if the attempt to bring together some data on the earnings that might be expected from different types of holding had fallen less conspicuously short of the mark, there would still have been no figures at all to account for off-farm earnings or the income of groups such as the landless and agricultural labourers. Without statistical materials of this kind there can be no assessment of the distribution of income among the district's population.

This constitutes one of the more serious omissions committed in the course of planning for KIRDP, for it effectively forestalls the design of components specifically intended to benefit indigent groups and makes it quite impossible to anticipate the impact of the project on income distribution. The consequences of this shortcoming vary according to the type of planning envisaged. But experience has shown that a failure to calculate distributional effects can with the key sector approach result in serious unbalance and a concomitant deterioration in the economic situation of large segments of the population.

5.1.3 Employment

Creating employment opportunities to give work to a significant proportion of the jobless is one of the stated objectives of KIRDP.

It is submitted that this be accomplished by boosting paddy and coconut production. The proposal makes two assumptions - firstly, that the pre-project employment situation in the district is known and, secondly, that there exists information on the capacity of paddy and coconut cultivation to absorb labour.

The *Staff appraisal report* makes no reference to investigations carried out to ascertain either. It is estimated that the agricultural programme will generate some 5,000 man-years of employment over the construction period and a further 30,000 man-years as a result of increased production. But the data base for these calculations is not specified and the extent of expected impact upon the overall employment situation remains unclear.

In the absence of any formal analysis of the employment situation it is impossible to judge whether the choice of paddy and coconut was in fact appropriate if the main aim was to generate more jobs. It may well be that other areas of the economy might prove more efficient in achieving equivalent or better results. But alternatives were not entertained by planners.

Such dead-reckoning is heavy with consequences. We demonstrated in the last chapter that the poorer categories of the population would in all likelihood reap no benefit from the project whatsoever. The reason for this is that no attention has been paid to levels of employment at the lower end of the social scale. The faith blindly placed in stimulating an overall increase in production has no power to generate jobs precisely where they are needed.

5.1.4 Unfounded options

The evidence would suggest that there was on the part of KIRDP planners little endeavour to identify the socio-economic problems of the district and less still to map out the manner in which problem areas articulated with one another. Strategies were not formulated: instead, options were arbitratily entered upon in the absence of supporting data to indicate their validity.

The project's objective is to raise 'productivity, employment, incomes and living standards of the rural population' (World Bank 1979:20). Although these aims were not ranked by order of priority, the emphasis on productivity per land unit is very clear from the components selected. We maintain, however, that this orientation is quite unjustifiable unless it is the outcome of a meticulous weighing of alternative courses of action.

It may be objected that the data base was entirely lacking in Kurunegala when planners were confronted with the task of making proposals for an integrated rural development undertaking. A small team did nowever spend almost two years collecting and sifting materials to this end. It is, to say the least, to be regretted that a small household survey was not carried out at this time. This would have enabled planners to gain some insight into the order of magnitude of the most prominent socio-economic problems.

5.2 THE AGRICULTURAL SECTOR ANALYSED AS A SYSTEM OF FARM TYPES

KIRDP planners passed very lightly over this crucial area of initial investigation. So minimal was their concern for the actual structure, degree of specialisation and distribution of different types of agricultural production unit that we will in this section have to concentrate more on what was not done than on what the design team actually achieved.

5.2.1 Construction of a typology

Nowhere in the series of feasibility studies carried out prior to project design are there traces of any serious endeavour to identify and classify the various types of farm existing in the district. There are, it is true, a few indications in the *Staff appraisal report* that some attention might have been given to the subject had adequate data been available.

There is thus a fleeting attempt to estimate the income generating potential of the project on farms of three different sizes in two climatic zones (World Bank 1979.51-52). The farm 'models' used are however quite artitrary in that the only parameter

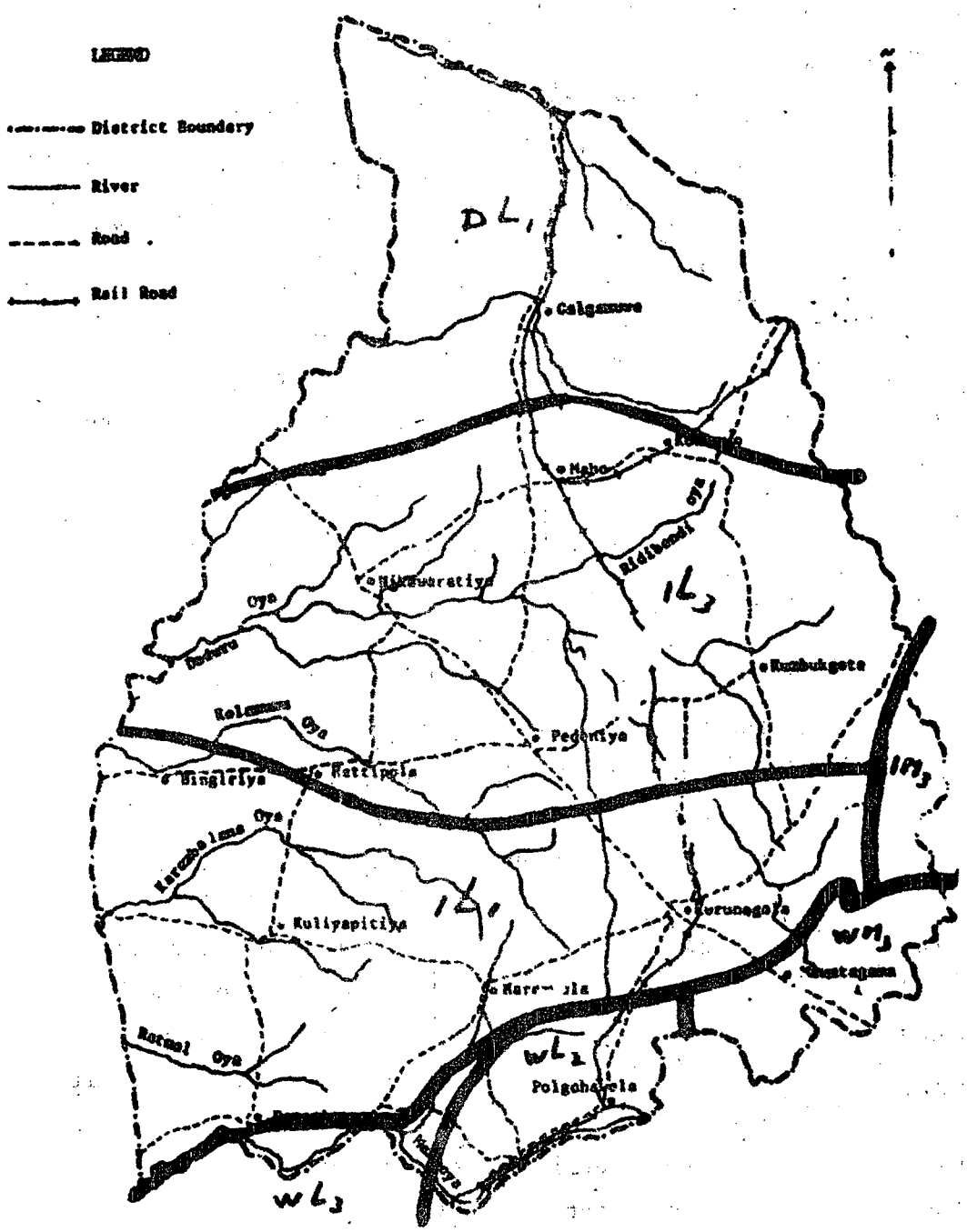
employed to distinguish between them is size. They are classified as small (1.01 ha), medium (2.02 ha) and large (4.9 ha). Income projections are made according to whether the hypothetical unit lies in the 'wet/semi wet zone' or the 'dry/semi dry zone'.

Apart from the fact that the enterprises and cropping areas of such farms are so schematically indicated as to appear thoroughly specious, the gross division of the district into only two climatic zones makes the whole exercise rather senseless. For there is in reality a sizeable intermediary zone, where cropping patterns are substantially different to those practised in either the north or the south of the district, while the extent of the truly Wet Zone (WL_2, WL_3 and WM_3) is on the other hand relatively speaking insignificant (cf. Map 2).

The extent to which this rough and ready binary division of the land area can lead to erroneous conclusions is nicely demonstrated by the recently published *Analysis of the pre-project situation*: the incomes of households located in the intermediary zone are not, as the *Staff appraisal report* supposes, situated at a halfway point on the continuum between figures for the wet and dry zones, but, on the contrary, *below* levels registered at either climatic extreme (Gunawardana *et al* 1981:51).

The *Staff appraisal report* includes a section on 'farm size and land tenure' (World Bank 1979:9), in which data from the 1973 Census of Agriculture are used to designate development target groups. But the authors of this document themselves admit that these figures have little relevance owing to subsequent changes that resulted from the implementation of land reform. However, even if the census data had retained their validity, they seem to have supplied project designers with very little information on the actual structure of farms. It is affirmed that 'larger holdings mostly consist of coconut plantations while small holdings contain mostly *asweddumised* land' (World Bank 1979:9). But the authors are in no position to quantify these assertions.

MAP OF KURUNEGALA DISTRICT



Scale : One inch to seven and half miles
1" - 7.5 miles

Prepared by Mapping Unit
Dept. of Census and Statistics Sri Lanka

When it comes to *chena* cultivation, they can do no more than assume that half the total land area not otherwise accounted for must be annually employed for the purpose of swidden agriculture - that is, 100,000 acres per year (World Bank 1979:8). Equally arbitrary is the expectation that *chena* yields will increase by 10-15% as a result of 'improvements in agricultural supporting services' brought about by the future project (World Bank 1979:50).

The *Staff appraisal report* contains absolutely no information as to how farmers at different levels of income, technological sophistication and manpower availability combine their resources in specific patterns of management to suit the climatic zone and soils of the area in which they live. No attention is given to the place of livestock in farm management*: there is no effort to make explicit the nature of labour bottlenecks due to competition between crops at precise moments in the annual cycle (such an analysis is particularly apposite in calculating the development potential for *chena* crops on farms simultaneously operating *asweddumised* land); nothing is apparently known of the relative importance of different enterprises within the same holding**: nor is there any precise information quoted on family manpower availability and the labour requirements of crops other than paddy and coconut.

In other words, KIRDP was planned on the basis of comparatively inaccurate macro-data with a total disregard for the micro-management dimension. Without some knowledge of tenurial relations, the timing of operations and cropping alternatives at farm level it

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* See Herath, Abeyratne and Bandaranayake (1980:105,121) for proposals as to how the problems of planning for the development of mixed livestock and crop farming might best be approached on holdings of different structure and size.

** Table 6 of Annex 2 in the *Staff appraisal report* provides hypothetical budgets for small, medium and large farms. But the acreages posited for different crops on the same hypothetical holding are purely conjectural and are based on no objective data sets.

is impossible to forecast farmer reactions to development proposals Without some idea of the distribution of draught power no calculation of the profitability of innovations under different farming conditions can be formulated.

It is for these reasons that a survey of farm types is necessary. The parameters for constructing a typology have been mostly mentioned in the above discussion of omissions committed in the course of drafting the *Staff appraisal report*. It is however perhaps necessary to stress that a typology is of scant use unless it is so conceived as to provide insights into the special needs of particular categories of holdings.

The parameters used to distinguish farm types must thus go beyond the purely descriptive. Acreage, cropping patterns, soils and equipment may superficially define holdings as belonging to one category or another. But it is important to analyse productivity as a function of tenurial arrangements, physical layout and manpower availability to ascertain whether these factors are not the hidden determinants of radically different patterns of decision making behaviour on otherwise apparently similar farms.

5.2.2 From micro- to macro- level

KIRDP planners were at pains to gather a wealth of information on yields, production, the acreages under specific crops, input utilisation, credit, employment and infrastructure. Many of the statistics so collected were however district aggregates not too recently compiled by officials whose purposes had been different to (if not sometimes at difference with) those of the project designers. Lack of manpower for field research presumably inhibited the collection of facts and figures at farm level.

We do not wish to imply that macro-data to be found in the files of the district subsidiaries of line ministries are of no use in planning for regional development. On the contrary, such materials, constitute an essential check on the quality of investigations carried out to permit the construction of a typology of holdings. For if the figures given as a result of field research

for each farm type are multiplied by the total number of units hypothesised for that category in the district at large and the product does not tally with administrative macro-data, something is obviously wrong.

The error may lie on either side, or on both simultaneously. The profile of a particular farm type may comprise a bias that can be corrected by further sampling: alternatively, district statistics may themselves be skewed or merely somewhat out of date. Whatever the cause of the discrepancy an effort must be made to gain a true picture at both levels. For agricultural planning can only be successful if the potential and motivations of the individual producer are effectively such that he is likely to offer a positive response to incentives designed to cater for them and thereby ensure plan fulfilment.

5.2.3 Dynamics of the farming system

Construction of a typology thus both affords a detailed summary of farming potentials and provides a means of ascertaining whether this series of schematic descriptions is consistent with realities at a higher level of analysis. The picture so generated is however static. It does not give adequate insights into those producer motivations in which perceptions of evolution through time play a major role.

To anticipate the response of a farmer to new opportunities it is necessary to understand the social processes and pressures that condition production. Principal among these are demography and the socio-cultural fact of inheritance. Fluctuations in the rate of population increase, the continual fragmentation or consolidation of holdings determined by social norms governing the intergenerational transfer of property, the leasehold market and changes in attitudes to farming that may crystallise as a result of education or ideological ferment - all these are factors that should be examined in the field and used to lay bare the dynamics of the farming system.

For this system is rarely stable. Alienation as a result of indebtedness, inheritance by unwilling heirs, the changing market value of specific crops, technological innovation and labour supply may lead to intensification on existing farms, to more extensive cultivation practices on consolidated holdings, to the opening up of new land or a general move out of agriculture into the modern sector. The typology must take these eventualities into account and an attempt should be made to map out the probable evolution of each farm type in response to them over the whole period for which planning is undertaken.

5.3 FARMER MOTIVATION

The construction of a typology of farms may on one plane be justified by the utility of such a tool for forecasting the long term impact of major public investments in agriculture. But in the last analysis, the typology is in fact little else but a reasoned catalogue of farm level constraints upon production. Seen this way round, its primary purpose is to simplify the design of programmes conceived to assist specific categories of farmers in overcoming particular difficulties encountered in achieving a greater output.

We wish to show in this section how a clearer perception of farm level constraints and the whole gamut of degrees of motivation attendant upon them might have helped KIRDP planners to identify components catering with more precision for the requirements of different segments of the farming community.

5.3.1 Outlay and risk

It cannot be assumed, as is done in the *Staff appraisal report*, that a large majority of those engaged in farming will be able - or will even wish - to maximise their productivity. There are numerous reasons for the persistence of practices resulting in less than optimal yields and the smaller the farm the more compelling (below a certain threshold) they tend to become. We will here deal with one of them.

Risk perception in agriculture is on the whole a function of three factors: the magnitude of seasonal outlays, the relative reliability of available tried technologies, and access to alternative sources of income in case of crop failure. All three factors loom larger for the small producer, particularly if a significant proportion of his harvest is to be used for essential home consumption. It follows that the innovations proposed by a development project may be initially more suitable for adoption by farmers of some substance or else that technological packages should be elaborated with different groups of farmers in mind.

This was never envisaged by the designers of KIRDP, whose only concession to the striking heterogeneity of farming conditions in the district was the decision to concentrate project activities on coconut in the south and on paddy production in the north. This distinction between two zones may have some sense at a macro-level of planning, but it hardly ensures that extension messages are tailored to suit farms of different structure and size. It does not, for example, allow for the fact that smaller farmers will in all probability be more concerned to diversify cropping patterns with selfsubsistence ends in view than wealthier producers, who tend to be more interested in obtaining the largest possible yields from the enterprises that it is most profitable to grow on their land. Nor does it take into account such factors as differential returns on investment, marketing costs and access to processing facilities, with regard to which the bigger farmer is usually much better placed than his smallholder neighbour. In all three areas greater absolute size of the farm improves the relative profitability of operations and diminishes risk.

A common risk avoiding strategy of small producers in Kurunegala is to intercrop a wide variety of cereals, pulses and vegetables on *chena* as a supplementary source of both food and marketable produce to hedge against failure of the paddy harvest. KIRDP not only totally ignores this area of economic endeavour but also neglects to spell out the necessity for extension activities to improve traditional intercropping practices. This is a serious omission insofar as it is now generally recognised by agricultural

scientists that intercropping both ensures more stable yields and, in most cases, actually increases the productivity of land in the tropics (Willey 1979).

Almost all field officers of the Department of Agriculture are aware that Sri Lankan peasants are inclined to give priority to *chena* cultivation over all other agricultural operations. Seasonal outlays are low, available varieties are well tested and resistant, while fertiliser and pesticides can be dispensed with. The techniques at present employed for cultivating *chena* afford singularly unimpressive yields. But complete crop failure on such land is rare. Farmers thus invest considerable energy in swidden agriculture.

Lack of attention to this fact by project planners may well explain the low level of enthusiasm among a majority of very small farmers for programmes that should, on the face of things, increase their incomes but which, when all is said and done, may involve substantial risks and a concomitantly strong possibility of their efforts going unrewarded. The risk factor is further reinforced as a disincentive to the adoption of innovatory cropping practices in Kurunegala by the rather modest scale of benefits that planners saw as accruing to the small farmer in the context of project sponsored programmes: calculations based on figures given in the *Staff appraisal report* reveal that the majority of production units (1.01 ha and less) can expect an increase of only 13% in remuneration of the man-day of family labour if project recommendations are faithfully adhered to by the farmer. It is not difficult to understand that perception of the risks entailed by modernisation might well cancel out the allure of such a relatively insignificant and far from certain gain in income.

5.3.2 Labour

The spices, coffee and cocoa interplanting programme constitutes a case in point. Initial inputs are not extravagantly costly, although manure and the subsidised planting materials do require a certain cash outlay. Since the land - already under coconut - is not the object of other competitive allocations, it would appear

that there should be no problems in ensuring widespread adoption of the very profitable technology proposed. There is however evidence to suggest that those farmers who have found the scheme most attractive are not among the smallest.

The reason in this instance for the scheme's not appealing to very small operators seems to lie less with the size of the monetary outlay than with the amount of labour necessary to guarantee, by hand watering, that plants survive the first critical eighteen months or so, during which they are particularly sensitive to drought conditions. Farmers unable to interplant more than a very small acreage appear to have thought that the effort and the risk incurred were not worthwhile in view of the potential benefits.

A timely appraisal of motivations at this micro-level by KIRDP planners would have forestalled disappointment in a programme unsuited to the needs of a large category of farmers and might have resulted in the conception of alternative schemes specifically aimed at them.

When labour is remunerated, it is relatively simple to calculate at what threshold of profitability an innovative technology is liable to become attractive to the farmer. Labour presents a real problem in agricultural planning when it is of family origin and it can be deployed in a variety of alternative manners, not all of which have an end product that can be expressed in monetary terms. This is the situation on most small farms.

The approach usually employed by agricultural economists is to give a fairly arbitrary cash value to the man-day and to elaborate potential crop budgets on this basis. This is however to make an abstraction of personal and cultural values, which can cause leisure or ceremonial activities to be given preference over directly productive work. It is thus extremely important to acquire some understanding of the value systems of the farmers in the target groups. For it may well be that a technology, that is extremely profitable by any standards, will be ignored because it demands a labour input which may be too gruelling or else is

regarded as demeaning: the physical nature of a task is to the man or woman who performs it as significant as the number of hours it takes to complete.

Project planners cannot afford to neglect such aspects of the agricultural economy. Yields per land unit and net annual income are in the long run less important to most peasants than revenue per man-day of family labour and, perhaps, socially more rewarding alternative allocations of time.

The micro-study of labour should however not stop there. Within the sphere of directly productive allocations it is necessary to distinguish priorities and the probability of there occurring labour bottlenecks on certain types of farms. In Kurunegala the very large areas under homegardens and *chena* cultivation absorb a significant fraction of the total available agricultural labour force at specific times of the year: conflicting demands upon labour are almost inevitable. But they are not documented.

Although it is generally known that the preparation of *chena* lands is largely responsible for the late sowing of paddy and the consequent release of excessive amounts of water, no effort was made when planning KIRDP to design a package of practices that would allow a more profitable articulation of these two areas of production. The most that was done was to encourage farmers involved in the pilot water management projects to begin clearing their *chena* earlier so that the water issue calendar could be advanced on asweddumised land. But even here no thought was given to the degree of risk to which a *chena* farmer was exposing himself by planting earlier than is traditional in the district.

Had the project offered a valid dryland farming package, in which the choice of short cycle improved varieties neutralised potential clashes with the paddy calendar, another kind of labour constraint might have arisen out of the programme's very success: the mere fact of doubling or tripling yields on stabilised *chena* might have demanded such an input of manpower at harvest time as to constitute a new unexpected bottleneck, albeit at a later date.

This has frequently been the experience with agricultural development programmes in the semi-arid tropics, where the short duration of growing seasons has made the precise timing of planting of crucial importance.

Any attempt to change a traditional cropping system must take the timeliness of operations and labour availability into account. In planning for KIRDP little thought was apparently given to this area of investigation, which provides information essential for the prediction of farmer reactions to innovatory cropping technology.

5.3.3 Off-farm activities

Labour bottlenecks within the holding may inhibit the adoption of new practices. Although off-farm employment has ultimately proved in the case of Kurunegala to be a phenomenon of very slight significance among agricultural families, it can in other circumstances take on proportions such that seasonal shortages of manpower do occur. In some parts of Puttalam district, where drought is a sporadic problem, it does happen for example that men prefer the security of life as permanent agricultural labourers on large coconut estates to all but the spare time cultivation of their own holding, upon which they nonetheless reside.

Extensive planting of slow maturing tree crops is elsewhere frequently a response to the existence of more attractive off-farm employment. To encourage intensification, proper pruning, an increase in the use of yield raising modern inputs, and inter-cropping with high value, labour intensive enterprises it is necessary in such circumstances, to carry out a very precise analysis not only of the risks involved in applying the recommended practices but also of the real competitiveness - in relation to off-farm opportunities - of the income so generated.

The analysis should give as much weight to the negative income, characteristic of the first years of any development programme for perennial crops, as to cumulative gain accruing to the planter over a period of time. For expectation of an initial fall in overall income can be decisive in family manpower opting instead for the relative stability of continued off-farm employment.

In Kurunegala, something was known of the levels and nature of off-farm employment before the project came into being. But no information was gathered concerning unremunerated off-farm activities that might have operated as a constraint in the design of innovative cropping patterns. That none were actually proposed outside the very modest coconut intercropping and water management programmes does not alter the fact that use of family labour in seasonal house repairs, animal herding, homegardening and so forth might contribute to the creation of temporary manpower shortages. The same is true in some areas where social pressures to donate alms in the form of corvee labour on temple lands could well make for bottlenecks on the smallholdings of those not wealthy enough to buy themselves off.

5.3.4 Institutional infrastructure

The propensity of farmers to respond favourably to agricultural development proposals is very strongly conditioned by the manner in which these are presented at field level and by producers' perceptions of the reliability of the supporting services offered by government agencies.

In Kurunegala it was rather readily imagined that the first of these problems would be solved by implementing the Training and Visit system of agricultural extension, which was in any case to be established throughout the island under a separate World Bank project. Unfortunately, T and V has proved for a variety of reasons to be most unsuited to the farming conditions met with in many areas of the country. Kurunegala district is no exception.

The basic difficulty is that the system posits a time-table of visits to key farmers who, in the Sri Lankan context, are frequently rather averse to being tied down in this fashion. It also takes for granted that farmers will be eager to impart their newly won knowledge to neighbours, whom they will voluntarily organise into groups to attend demonstrations on their fields. No prior study was carried out to ascertain whether members of the farming community would be in any way motivated to listen more attentively than in the past to extension messages presented through these new channels. Nor was much thought spent on formulating recommendations that differed widely from previous practice.

T and V has been a failure mainly because its authors have neglected to introduce extension packages with particular categories of farmer in mind. Unimpressed with the same messages tirelessly repeated and as inappropriate as ever to a majority of holdings, most producers have ceased to heed field officers of the Department of Agriculture whose almost exclusive preoccupation remains paddy, whereas advice on a wide range of crops is in fact needed.

Although T and V is supposedly a unified system of extension, in which specialists from all branches of agriculture are called upon to collaborate in a common effort, there is in reality almost no emphasis upon internal relationships between different enterprises within the same smallholder management unit. Great stress may, for example, be laid on the advantages of transplanting paddy, whereas the potential for other field crops and homegardening receives almost no attention whatsoever. Recommendations for rotational cropping and the integration of leguminous fodder crops into the paddy cycle, which would require an interdisciplinary approach, and the teaching to farmers of elementary management skills are similarly outside the scope of T and V as it has been implemented.

The intrinsic inadequacies of T and V are however compounded by striking shortcomings in the institutional infrastructure. Farmers experience considerable difficulties in securing short term institutional credit, because it is only granted if proof of crop insurance can be adduced. But insurance itself is extremely cumbersome to obtain, is only provided for paddy beside two or three subsidiary field crops, and is in any case a most unattractive proposition, since claims tend only to be honoured after several seasons, if at all. All in all the consequences are that the farmer keen to innovate is usually prevented from doing so by a scarcity of ready cash to purchase improved inputs and to pay for labour or better land preparation.

There is moreover a penury of all but the most common fertiliser mixes. Transport to outlying villages being mostly in private hands, the use of bulky modern inputs can prove prohibitively expensive in some areas.

So even if the Training and Visit system of agricultural extension had itself been more appropriate to conditions in Kurunegala district, constraints of an institutional and commercial order would still have had a strongly inhibitive effect upon farmers' willingness to change. The error of KIRDP planners was, in this context, to work at too high a level of abstraction in the belief that the general availability of 'more' - technology, inputs and credit - automatically signified that all farmers would be in a position to tap this new potential. A large majority of them were not, because scant attention was paid to their capacity to respond in the face of constraints that the project did little to attenuate or even identify.

5.4 SELECTING COMPONENTS

A regional agricultural sector plan comprises a number of distinct components. Each of these may be called a project. The process of project identification must be systematic; it must also ensure comprehensive coverage so that all promising potentials are given due consideration. Projects can be efficiently identified only when the following series of analyses has been completed.

i. land suitability classification and water resources inventorisation;
ii. determination of agro-economic potentials and a consequent priority ranking of crops and/or crop mixes;
iii. preliminary specification of target groups and geographical locations;
iv. appraisal of the field and management capacities of potential implementing agencies;
v. economic feasibility assessment.

5.4.1 Land suitability classification and water resource inventorisation

The irrigation component of the Kurunegala project was designed on the basis of materials collected in a serious attempt to draw up a detailed inventory of surface water resources in the district. Attention was concentrated on the potential of existing tanks and anicuts, while some new schemes were also identified for construction.

The sheer number of smaller tanks make it however impracticable to even enumerate all of them. It was found that sufficient hydrological data on seasonal fluctuations of the watertable and surface flows were not available. The extent of groundwater resources was quite unknown and was therefore scheduled for investigation under the project.

The subject of land suitability classification received, on the other hand, no such treatment. No survey of a comprehensive nature was carried out and no concern was even voiced as to the need for information of this type when selecting agricultural projects. A detailed land suitability study of a small area in the extreme north of the district (ITC 1979) was published independently, but too late to be of use to authors of the IRD project document. The fact that recourse has not been had to this publication as an aid to ongoing project readjustment in the two years since it became available may reflect the diffidence of planners with regard to the potential inherent in such an approach.

Lack of interest in land suitability mapping seems to have been due to two factors. These are, in the first place, the largely arbitrary decision to promote the two dominant crops in the district as the mainstays of KIRDP and, in the second, the somewhat facile belief that existing land use patterns must be nearly optimal. It is indeed possible that areas at present lying under paddy and coconut are ideally suited to these crops. Even so, diversification might prove financially rewarding if undertaken in combination with these staples. A land suitability survey could have established this, while the unwarranted notion of optimality has preempted the search for imaginative solutions. Experience in Matara and Nuwara Eliya has certainly shown that a thorough investigation and classification of land types can pave the way for profitable innovations.

5.4.2 Agro-economic potentials: determination and ranking

Since KIRDP is planned as an essentially bipolar thrust for the development of only two crops, an attempt to priority rank them would not have been very fruitful. Although the argument is not pressed in the *Staff appraisal report*, it may well be that paddy and coconut

would, after due analysis, have come out at the top of any list of enterprises ranked in terms of economic potential: ecological circumstances in Kurunegala are eminently favourable to both.

The economics of paddy cultivation were calculated on the basis of data gathered in the context of the Maha Illuppalama water management project. To establish the viability of coconut as the other lead crop the *Staff appraisal report* merely points out that current yields are so far below the genetic potential that improved husbandry, higher levels of fertiliser application and some rehabilitation of ageing plantations will suffice to bring about a considerable increase in production.

Insofar as the intercropping of coconut with spices, coffee and cocoa is concerned, the project document rightly points to the lack of local knowhow and experience, and stresses the need for an appropriate extension effort. But no agro-economic analysis was carried out to compare the relative merits of different enterprises and narrow down the field of possibilities, although the basic data for such a study were already available from the minor export crops research station near Matale. This omission may have quite serious consequences. For a recent, ground breaking piece of work on intercropping presents very strong evidence to the effect that pepper and bananas are on numerous counts economically more viable under mature coconut than any of the other enterprises at present recommended by the Kurunegala project (Etherington and Karunanayake 1981).

Proposals for the improvement of rainfed farming on *chena* land and in homegardens were not put forward by KIRDP planners. The very significant economic potential of this whole area of production was therefore not measured and a detailed ranking of the various crop mixes not attempted. Livestock development was similarly dismissed out of hand and the only activities undertaken with regard to animal production confined themselves to an improvement of veterinary services in the district. The project designers thus had no notion of the kind of benefits that might have accrued from investment in this sector.

So there was in the case of KIRDP no attempt to analyse the full range of cropping possibilities with a view to selecting the economically most viable alternatives. The instinct of planners was to select paddy and coconut for intensive development. Their choice may well have been correct. Though this in no way justifies their omitting to pay attention to the potential of innumerable other combinations.

But there are signs that even the analyses for paddy and coconut were somewhat hasty in their conclusions: an ARTI evaluation of the water management component (Gunawardana 1981) suggests that an initial missassessment of technical and institutional factors may limit the replicability of the model proposed and cause production increases to fall substantially short of the ambitious targets, which serve as a basis for calculating the economic rate of return in the *Staff appraisal report:* a failure to envisage the experimental introduction into Kurunegala of hybrid dwarf planting materials developed by the Coconut Research Institute also implies that planners did not explore every opportunity for optimising their selection of viable components.

5.4.3 Specification of target groups and areas

KIRDP programmes are not on the whole conceived to be group or area specific. Rehabilitation of irrigation infrastructure does, it is true, address a population dependent for a living upon the asweddumised land in the vicinity of the tanks and anicuts chosen. But the rationale for selection was of a technical order; social and geographical factors did not come in for consideration. Access to cultivation loans made available under the project for paddy, subsidiary food crops and coconut is restricted to producers operating no more than 4.05, 2.02 and 10.12 ha in each of these categories. Though here again it can hardly be said that the credit programme is aimed at identifiable groups, since the area of 90% of the holdings in the district does not exceed these ceilings.

One of the project's objectives is to increase the productivity of the smaller farmers (World Bank 1979.27). It is however difficult

to understand how this can be achieved without programmes specifically designed for and aimed at this group. Doubts concerning the ability of the project to meet the development requirements of the least well endowed producers in the district have been recently confirmed by an ARTI evaluation of the credit component (Gunawardana 1981), which analyses in detail the reasons behind a general failure to foster the habit of institutional borrowing among small farmers. The report also outlines the manner in which an approach more sensitive to the peculiar needs of this group would have in all probability ensured a higher level of farmer participation in the credit programme.

It has been commonly observed of agricultural development projects that programmes elaborated without a well defined target group in view normally tend to benefit only a minority, which not unusually comprises the more prosperous members of the farming community. By designing components without reference to specific segments of the population KIRDP planners have defeated their own objective of 'reducing intraregional disparities' (World Bank 1979.20). This remark applies as much to extension, coconut intercropping and input supply schemes as it does to the credit programme.

If attention to the needs and probable response of potential beneficiaries is important, planning to correct the imbalances born of geographical situation is hardly less so. It is infrequent that planners make special allowance for activities to be carried out in remote areas in which communications are poor. The result is that development, when it comes, is very uneven. This seems to have been the case in Kurunegala, where better provision for outlying areas would have certainly made for greater equity.

5.4.4 Implementation capacity

One of the basic principles of IRD planning in Sri Lanka is that responsibility for the implementation of components will fall to government agencies already existing at district level. The project authorities are required to coordinate the activities of

the local subsidiaries of line ministries, but are not themselves involved in carrying out programmes.

The Kurunegala project was designed along these lines. The operation of its administrative and management structures has been the subject of a lengthy evaluation performed by ARTI (ARTI/ Wageningen 1982b). A major conclusion of this study is that if the project has by and large been implemented on schedule*, this is to be attributed more to the personal resourcefulness and diplomatic skills exhibited by indivisual officeholders than to the appropriateness of the management structure as conceived by planners. Relations between key figures at district level have been good. Had the contrary occurred, serious difficulties might have arisen, because institutional channels for ensuring cooperation between implementing agencies in pursuit of project objectives are rather inadequate. Authority is furthermore so diffusely spread throughout the project that sanctions cannot readily be brought to bear against agencies held guilty of departures from plan.

Pre-project assessment of the actual implementation capacity of participating agencies was nevertheless in this instance quite accurate. Planners devoted considerable energy to this aspect of design in the project document. Measures for strengthening personnel at strategic points in the implementation structure, increasing the physical mobility of staff were worked out in great detail. In this respect, they can be said to have made a very commendable effort.

5.4.5 Economic feasibility analysis

The *Staff appraisal report* shows a healthy concern for calculating the economic rate of return of KIRDP and subjects the results to the usual sensitivity analysis. It may nonetheless be

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* It is true that irrigation rehabilitation work has not been completed at anything like the pace originally planned. This has, however, been due in the main to inflation and cost overruns rather than to lack of implementation capacity.

held that the IRR should have been computed for each component separately and that the different scenarios posited in the sensitivity analysis do not at all reflect a realistic range of instability in key variables. Even if recourse was had to the device of reckoning in constant prices, some extra allowance should have been made for a rate of inflation running at over 30% p.a. with its resulting distortion of relative prices.*. Estimation of cost increases at a mere 20% for the whole five year period was thus in such circumstances quite inadequate and two-thirds of the irrigation rehabilitation programme had consequently to be cut (cf. section 4.1.2 in ARTI/ Wageningen 1982b).

On a more abstract plane, it may also be objected that the economic feasibility analysis further fails to incorporate an assessment of the social costs inherent in income differentials increasing as a result of the project. Since it was anticipated from the outset (World Bank 1979:56) that the higher income categories would reap the largest benefits from KIRDP, it is regrettable that no attempt has been made to calculate the economic concomitants of this socially undesirable aspect of the project.

Given these reservations, it may be concluded that the internal rate of return calculated by planners is unwarrantedly high.

5.5 IMPACT APPRAISAL

An accurate assessment of the impact that the project will have during its lifetime upon smallholder farming constitutes an important step in the planning process itself. It is a procedure which enables component designers to forecast producer response and that provides a tool for analysing the extent to which benefits will be channelled by area and target group specific programmes to the intended recipients.

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* The project document surmises that the inflation rate would drop to a mere 7% p.a. in 1981 (World Bank 1979:30). There were absolutely no grounds even at that time for such optimism.

An enquiry into three factors is central to such an assessment. These are: the viability of different farm types given proposed changes in the cropping pattern and improved methods of cultivation; labour requirements of the improved technology to be made available; and the potential outcome of these factors combined in terms of farm budgets posited at different levels of modernisation on holdings of varying profile.

5.5.1 Viability of holdings

We have already drawn attention to the perfunctory manner in which KIRDP planners dealt with the structural characteristics of farms throughout the district. Diversity was virtually denied (cf. 5.2.1, 5.3.1 - 3), while farms were regarded as independent units and the nature of the socio-economic network of community relations in which they nest was not investigated.

Planners consequently had at their disposal absolutely no instrument that would enable them to foresee farmer reactions to particular development programmes. The water management and credit components proved particularly vulnerable to a design that did not take the probable responses of different categories of farmers into account.

Advanced fragmentation of holdings is a serious problem in certain parts of Kurunegala district. A minimum requirement for judging the appropriateness of several agricultural components would have been to establish a threshold of farm size, below which no conventionally conceived programme could entertain any hope of success. In order meaningfully to address this category of farmer it would have been necessary to deploy a good deal of imagination and effort for the elaboration of schemes quite specifically catering for the type of problems besetting them.

The overall viability of rather larger holdings is less crucial *per se* insofar as physical constraints tend to be less intractable and a change in the cropping pattern does not usually entail the introduction of practices that are technologically quite incompatible with existing methods.

Even so, it would seem likely that such farms constitute but a small proportion of the total number of production units in Kurunegala. If KIRDP planners unintentionally did produce programmes by which only this minority would stand to benefit, this is because they had no means of knowing what kind of proposals would appeal to farmers at the lower end of the scale.

5.5.2 Labour inputs and farm budgeting

Although the authors of the *Staff appraisal report* give only summary consideration to the identification of farm types (cf. 5.2.1), they do distinguish between the costs of family and hired labour. Their meagre heuristic postulate of only three sizes of production unit in but two sets of ecological conditions does enable them moreover to formulate apparently realistic projections for increases in productivity and labour absorbtion in the two spheres of paddy and coconut cultivation. Programmes designed as a result are valid and their objectives seem attainable *within the limitations imposed by the method.*

With only six farm types in all - in a district characterised by wide variations in ecology and agrarian circumstances - the results of such national planning on a basis of very incomplete information must however be of limited applicability indeed. The role of *chena* cultivation in the farming system is grossly underemphasised and the estimation of increased output expected from this sector is arbitrary in the extreme. Income from swidden agriculture and the labour intensity associated with it could reach levels of such significance that the farm budgets referred to above might be quite radically misleading. Farmers could consequently prove totally insensitive to extension messages pressing for greater human and economic investment in paddy cultivation, because *chena* activities preempt their resources.

Research carried out by ARTI over the past few years makes it doubtful whether Kurunegala farmers will be tempted to cut back on *chena* cultivation in a bid to go all out for increased

paddy production. A misapprehension of these proportions could be the cause of resounding failure of KIRDP to achieve on of its two principal objectives in the field of productivity. If paddy yields do not improve substantially, the internal rate of return will perhaps appear totally unjustified.

5.6 LONG TERM SOCIO-ECONOMIC EFFECTS

In the *Staff appraisal report* an endeavour is made to forecast the long term impact of the Kurunegala project on production, incomes, employment and the national balance of payments. To conclude this chapter we attempt to assess the validity of the assumptions made and the methods used in the formulation of these projections.

5.6.1. Paddy and coconut production

The designers of KIRDP rely heavily upon improvements in paddy cultivation for increasing the district's overall output in the agricultural sector. They posit that the best production potential lies with minor irrigation and estimate that 70% of the incremental output of paddy achieved as a result of project activities will accrue from lands under village tanks and anicuts. It is considered that the production of minor irrigation systems will progress during the project's lifetime at an annual rate of 7.4%. Under major irrigation and rainfed conditions the annual increment is more conservatively projected at a mere 3.2% and 2.3% p.a., respectively.

A recent assessment of the water management component of KIRDP (Gunawardana 1981) would indeed make it appear that the prospects for increased paddy production are - in a purely technical perspective - substantially better under certain types of minor tank than they are under major irrigation systems in Kurunegala. Expanding output was however hypothesised as a result of greater cropping intensities rather than rising yields. Increased paddy production would thus entail stronger demands upon labour at farm level.

The project document does not pause to consider that these manpower requirements must be satisfied from somewhere and that any intensification of paddy cultivation will in all probability conflict in this respect with patterns of labour deployment in other parts of the total farming system. Seen in this light, the prospects for a 7.4% annual increase in paddy output appear rather remote.

Insofar as coconut production is concerned, original projections seem to have been much more realistic. Yield increases are estimated by project designers at 2.7% p.a. But the latter do concede that a progress of some 1.2% p.a. would have occurred in any case, even if KIRDP had not come into being: increased availability of fertiliser and the gradual recovery of coconut stands from the ravages of prolonged drought in the 1970's would have made for a spontaneous improvement of this order. To ascribe a residual annual rise in output of 1.5% to project sponsored activities is thus hardly overoptimistic.

5.6.2 Incomes and employment

Projections for increases in farm income were made by KIRDP planners on the basis of the forecasts for paddy and coconut output. It was thought that the project would make no significant contribution to farmer earnings in other areas of production. The distribution of project benefits is thus, not unsurprisingly, almost identical to that of farm size. As a result, the poorer segments of rural society are expected to reap no more than one-third of the total benefits (cf. 4.4).

This outcome is correctly anticipated by the authors of the *Staff appraisal report*. But no attempt was made to quantify the deleterious effects of such a policy in terms of the number of households that the project would never reach.

On the other hand, the seemingly precise statement on page 54 of the *Staff appraisal report* to the effect that KIRDP would be instrumental in raising the income and the living standards

of some 170,000 farm families, whilst also providing them with more employment, is simply misleading and, furthermore, not founded on any serious calculation.

We have already demonstrated (4.4) that the maximum number of families to benefit under the project would not exceed 155,000 (40% of the total) by the time KIRDP attains full maturity in the year 2000 (cf. 4.4.). Similarly, we are far from convinced that the employment situation will improve to the extent suggested by the project document (20% and 30% higher labour requirements in paddy and coconut, respectively), if only because production in the paddy sector seems unlikely to expand at the rate hypothesised in the project document (cf. 5.6.1).

Planners entirely failed to assess the project's real potential for mitigating open unemployment. This we regard as a serious omission, since it may well be that the sector for which the most rapid expansion is foreseen - paddy - in fact has very little actual capacity for increasing employment outside the farm family itself. If the nature of increased labour requirements is such that these can be satisfied almost exclusively from within the cultivator's own household, additional jobs will not be created by the project for a considerable contingent of the landless, among whom the consequences of unemployment are far more grievous than among those who have the wherewithal to practise some measure of subsistence agriculture.

Chapter Six

BROADENING THE SCOPE OF KIRDP

We have analysed the methods used to plan the Kurunegala project. We have attempted to assess the levels of impact that could be expected were the objectives stated in the project document to be fully achieved. Whilst noting that performance as such has been by and large satisfactory, we have further endeavoured to identify the inadequacies in planning that have resulted in an induced development effect of rather too modest proportions.

In this chapter we will examine the roles that dryland agriculture, dairy farming and minor export crops in association with coconut might have played in a more comprehensive and ambitious plan for agricultural development. We will show how greater attention to the potential of these spheres of production would have substantially increased income and employment levels for the poorer elements of the rural population. For we are of the opinion that project designers have missed opportunities that would have made it possible to channel more benefits to the smaller farmer and to improve somewhat the plight of the landless and almost landless, who are all but ignored by KIRDP in its present formulation (cf. 4.5).

Before analysing the scope for an expansion of project activities into hitherto neglected or underexploited branches of production, we shall lay some stress upon the manner in which constraints inherent in the situation have notably restricted KIRDP's capacity to meet certain declared objectives. In a concluding section (6.3) we endeavour to quantify the consequences for the agricultural sector if the decision were taken to read just and broaden the project along the lines we propose.

6.1 COMPATIBILITY BETWEEN OBJECTIVES AND CONSTRAINTS

Agricultural development is a long term undertaking. This is particularly true in situations where perennial crops occupy a position of importance in the total farming system. One of the guidelines that informed the design of KIRDP stipulated that investments should be quick yielding (cf. 3.1.1).

Thus, even if the project has been successful in fulfilling most of the targets proposed, there still subsists some doubt as to whether this achievement constitutes a significant step forward. Short term targetry may well not guarantee a long term increase in production, whilst failure to plan at the outset for an equitable distribution of benefits usually results in the polarisation of resources and more inequality.

We will show later in the present chapter how the time horizons to which KIRDP planners worked were insufficiently broad to accommodate agricultural components, which require substantially longer periods before they attain full maturity and begin to yield an adequate return to investment. Let it suffice for the moment to underline the gravity of this problem in Kurunegala, where numerous agronomic and technical problems remain unsolved; there is a definite need for applied research in several fields, in which answers will certainly not be found before the investment period has come to a close.

The stipulation that KIRDP was to centre on quick yielding components was thus inappropriate in the circumstances. The study team maintains, moreover, that this requirement has been largely responsible for inhibiting the homegeneous spread of project benefits in terms of income and employment.

6.2 UNTAPPED DEVELOPMENT POTENTIALS

In our endeavour to pinpoint areas for further development we thus consciously searched for spheres of production that appeared to be endowed with considerable potential in the medium or long term. We were aware that all those identified would not be equally suited to the establishment of programmes conceived

with a view to improving the lot of the landless or very small farmers. But the capacity at least partially to satisfy these categories of the rural population did constitute an important criterion for selection when possible projects were screened.

Exploratory fieldwork throughout the district was thus guided from the start by a concern to identify development potentials that were as little as possible contingent upon prior access of the target groups to a scarce resource base. It was expected that such an approach would help to single out projects that would have a wide appeal for the poorer segments of the population. Projects so selected would, it was felt, enjoy the best chances of simultaneously satisfying equity requirements and registering a significant impact in terms of both employment generation and income distribution. In order to obviate the principal socio-economic imbalances attendant upon the current Kurunegala IRDP, a maturation period of some 10 to 20 years was further posited as the framework for component design.

Reviewing in the light of these criteria information gathered in the course of field inspections and conversations held with numerous officials, we were able to distinguish three areas of activity characterised by a significant development potential. These are rainfed smallholder agriculture, livestock farming and minor export crops. None of these demands large inputs of working capital even the smallest farmers can engage in one or the other activity according to the agro-ecological region in which they reside and the economic rewards anticipated for adopting innovatory technologies are in each case high.

The production of field crops on rainfed highland attracted our attention, in the first instance, by dint of the very large acreage involved: 40% of the total land area devoted to agriculture in Kurunegala district is used on a permanent or sporadic basis to this end. Dry cropping plays moreover a vital role in determining the economic viability of a broad range of smallholdings, while the gap between present levels of productivity and those which could be achieved with a slightly improved technology is certainly very wide.

Development potential in the sphere of livestock production appeared similarly very substantial. Milk output and the quantities marketed are at the present moment minimal in comparison with the growing domestic demand, which is increasingly met by imports of dried powder. Paradoxically, Kurunegala has a relatively dense cattle population, while thousands of hectares of land under coconut unsuited - particularly in the Intermediate Zone - to any other use are but rarely planted to high quality grasses or fodder legumes. Zero-grazing is hardly practised, although an extension effort to popularise stall feeding methods could significantly increase milk production by the smallest cattle owners even in the very short term and without diverting much land from alternative uses. Two projects of limited scope are beginning to exploit this potential in the southwest of the district. But much more remains to be done.

Coconut lands in the Wet Zone could be intercropped with pasturage, but far higher returns could be expected from a more intensive recourse to the interplanting of minor export crops which have already proven their economic viability in neighbouring areas of Matale district. The minor export crops component under KIRDP constitutes a step in the right direction. Its targets are however inordinately modest. A strong drive to involve coconut smallholders and the almost landless (who might be encouraged to grow substantial quantities of pepper and coffee in their homegardens) might greatly increase the revenues of the rural poor in the south and southeast of the district. The diffusion of an extension package stressing fertilisation, pruning and postharvest techniques would constitute the main thrust of such a programme.

In the following sections, we systematically explore the possibilities offered by each of the three areas of production that we have identified as promising given the socio-economic criteria stipulated at the outset.

6.2.1 Rainfed agriculture

KIRDP is almost entirely unconcerned with the whole area of *chena* cultivation*. We believe, however, that efforts rationally deployed to stabilise and spatially circumscribe what has until recently been a very extensive form of swidden agriculture would tap an extremely significant potential that might grow into one of the mainstays of the regional economy.

We will now endeavour to analyse the parameters of this potential and define the kinds of assistance necessary to ensure the development of production in this subsector.

6.2.1.1 The present situation

Table 6.1 summarises the data available for the district on the areas planted to certain highland crops, which are usually associated with *chena* cultivation.

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* In the context of Kurunegala, the word *chena* refers to non-irrigated highland areas sporadically or continuously cropped usually at some distance from the homestead. There is unfortunately some confusion in the statistics, which do not clearly distinguish between 'homegardens' in the immediate vicinity of the homestead and *chenas* originally carved out of jungle and upon which there is normally no permanent dwelling. This confusion is liable to increase as population growth causes more and more *chenas* to 'become' homegardens. The changeover is frequently marked by the planting of permanent tree crops on the plot and the establishment of a house built to last.

Table 6.1 - Chena areas cropped in Kurunegala

Crop	Hectares		Line totals
	Maha	Yala	
Cereals	2,600	1,000	3,600
Pulses	17,700	2,000	19,700
Tubers	3,600	7,600	11,200
Vegetables	1,200	2,100	3,300
Other	1,200	6,900	8,100
Total	26,300	20,600	46,900

Source: Department of Census and Statistics 1981

The precise area cropped in any one year varies as a function of rainfall. Forty-five thousand hectares would seem however a reasonable estimate of the annual average. No accurate information exists to document the patterns of land utilisation. Inthe plots surrounding the homestead year round cropping would appear normal. The more distant a field from the farmer's permanent residence the less intensively on the whole it will be cultivated. Fallow cycles of three to five years are quite common in uninhabited tracts of jungle, in which stumping usually never takes place and machine cultivation is therefore not a viable proposition.

Allowing for this more or less permanent style of occupation, it may be roughly estimated that some 150,000 ha. of highland in the district are either continuously or else sporadically used for rainfed agriculture.

Manioc and sweet potatoes are the tubers most widely grown. *Kurakkan* and maize are the principal cereals, whilst cowpea and

green gram are prevalent among the pulses. The major vegetable crop is chillies. In *yala* drought resistant sesame predominates over all other crops.

The yields expected from rainfed land are on the whole very modest. Statistical time series are not available. But farmers themselves agree that yields have been decreasing latterly as a result of progressive curtailment of the *chena* cycle and insufficient time allowed for soil regeneration under secondary jungle.

Table 6.2 Yields of some rainfed crops in Kurunegala

Season	Crop	Kg/ha
MAHA	Cereals	800
	Pulses	500
	Tubers	5,500
	Chillies (dried)	400
	Red onions	5,000
YALA	Sesame	200

Sources: District Statistical Office, Kurunegala, no date
Department of Agriculture 1978-1980.

Aligning the yields estimated in Table 6.2 and data on rainfed areas cropped, total production in Kurunegala district may be reckoned as follows: 2,900 tonnes of cereals, 9,900 tonnes of pulses, 5,600 tonnes of tubers, 1,300 tonnes of chillies, 740 tonnes of onions and 500 tonnes of sesame.

6.2.1.2 Cultivation methods and farm types

Chena farming was originally a classical slash and burn system with jungle fallows lasting from 15 to 20 years between

short periods of cultivation. Older rural inhabitants of the district recall that the occupation of any one site did not last more than a couple of years before it was abandoned and a new tract of jungle opened up in its stead.

Today this system has almost disappeared. Increasing population density and a growing interest in the production of marketable surpluses have been the causes of such pressure on the available land that most *chenas* have in the course of the past few years been 'stabilised' - that is to say, that the same plots are now more or less continually farmed by the same cultivators year in year out. The suppression of jungle fallows, combined with the fact that little or no recourse is had to either organic or inorganic fertilisers, has resulted in the very low yields already reported. Analysis of the production costs on *chena* land reveals that the largest input is still manual labour. The use of pesticides is not generalised and remains confined to pulses and chillies. The very high market value of chillies may cause them to receive an occasional application of fertiliser.

In the case of traditional swidden agriculture on a plot cleared from thick jungle relatively little energy was spent on preparing the land after the vegetation had been cut down and burnt. The tendency towards stabilisation of *chenas* has however brought with it major problems of weed infestation, which are dealt with by a superficial scarification of the soil using hand hoes. More intensive practices, such as digging and ploughing, are only rarely resorted to on those drylands that have a long history of permanent occupation. Row sowing is common for most commercial crops; and chillies are even frequently transplanted from nursery beds.

Hand weeding is the normal practice, although herbicides are being increasingly used on stabilised *chenas*. The risk of crop failure increases the further the location of the plot from the farmer's homestead. This factor of distance is reflected in

the consumption of modern inputs; the nearer the plot to the place of residence the greater the expenditure on both fertiliser and agro-chemicals and *vice versa*.

Chena cultivation in Kurunegala may be described as a low input/low output activity characterised by strong risk avoidance on the part of producers. As a farming system it is, however, not static and may be said to have recently entered a stage of rapid evolution. Farmers are very conscious of the need for more sophisticated techniques of husbandry to make good the deficiencies that have resulted from a shortening or total suppression of the fallow cycle and from a more exploitative style of agriculture in response to the growth of commercial outlets.

Dry farming on cleared jungle tracts was traditionally viewed as an insurance against the possibility of failure of the paddy crop on asweddumised land. The principal crops were then *kurakkan* and tubers for home consumption. This complementarity between *chena* and paddy was given formal recognition in the Land Settlement Ordinance of 1931, in which it is stipulated that the inhabitants of a village are entitled to operate a common block of *chena* staked out every two or three years in adjacent Crown jungle.

In the traditional purview *chena* cultivation was thus an integral part of a whole farming system which included paddy production on asweddumised land. Although dryland cropping is perhaps more widespread today than it ever was, the situation has changed somewhat in recent years insofar as large numbers of *chena* farmers are now encroachers, who do not have access to irrigated tracts upon which to grow paddy.

According to the Land Officer stationed in Kurunegala, the plots occupied by some 39,000 encroachers on 32,000 ha were 'regularised' in the course of 1981. Only those encroachers who do not possess land elsewhere were considered eligible to benefit from this measure. It is estimated that some 60% of the Crown Lands at present farmed by squatters have thus returned to a certain degree of administrative control exercised by the state(Land Commission,

Kurunegala 1981). It can therefore be tentatively concluded that a majority of the district's *chena* farmers do not have access to an alternative or complementary resource base.

Regularised encroachments may not exceed 0.81 ha (2 ac) in area. Given the present low level of yields on *chena* land, this category of farmers must be regarded as constituting the poorest segment of rural society in Kurunegala district.

In contrast, paddy farmers who also operate drylands in the vicinity of their tank or anicut based village enjoy much better prospects. There has been a tendency over the last few years for the wealthier among paddy farmers to invest in the summary clearing of jungle on encroached Crown Lands in the hope that symbolic occupation of quite large extents will later enable them to regularise their claim. In the meantime, they may rent out this land. The general trend is with increasing population for villagers in all income brackets to cultivate more highlands, where the average holding is now in the order of 0.81-1.21 ha (2-3 ac).

6.2.1.3 Prices and marketing

An attempt has been made in Table 6.3 to synthesise data on highland crop prices covering the past five years, which have been gleaned from three different sources. The information was not complete for Kurunegala. So in some cases, it has been necessary to substitute data collected in analogous circumstances but in other districts.

A reasonable degree of price stability has obtained in the case of most produce up to and including 1979. In 1980 the prices of all but two crops increased. But chillies and sesame which had already been selling well, stagnated and declined, respectively, in this latter year.

Floor prices were introduced by the government in order to guarantee that farmers receive a viable return on most highland

crops. At the present moment open market prices are well above those stipulated under the floor price scheme: demand is strong enough to keep them at a level favourable to farmers (Senanayake 1980). There is no significant divergence between domestic and economic prices for these crops. In this they differ substantially from coconut and paddy.

Table 6.3 - Producer prices for selected highland crops

Unit: Rs/kg

Produce	1976		1977	1978	1979	1980
	a	b				
Kurakkan	1.4+	1.2	1.0	-	1.6	2.9
Maize	-	-	1.1	1.1+	1.3	1.9
Cowpeas	5.4+	4.9	3.5	3.9	3.1	4.9
Green gram	5.7+	5.4	4.5	4.3	6.5	8.2
Cassava	-	-	0.5	-	0.6	1.2
Sweet potatoes	-	-	0.5	-	1.3	2.3
Chillies (dried)	22.1+	-	23.0	17.8+	22.2	22.4
Sesame	-	5.0	4.1	8.1+	9.9	8.2

a = ARTI

b = Department of Agriculture

+ = Price observed in districts other than Kurunegala

Sources: Department of Agriculture 1978-1980
Central Bank of Ceylon, no date

Most highland produce is sold by farmers to traders or directly to boutiques in the village or nearest small town. During the season traders frequently call at villages to collect produce for transport to urban centres. Although the marketing of vegetables is beset by certain problems of an organisational order, no difficulties are encountered in finding a commercial outlet for less perishable enterprises like tubers, pulses, cereals and so forth.

6.2.1.4 Income and employment

The significance of *chena* cultivation has not only grown over the last years in terms of geographical extent but also as a source of income and employment. Even where farmers divide their time between irrigated paddy and highland crops the latter generally provide the larger proportion of cash income. Several recent studies carried out by ARTI analyse the impact upon income and employment of the market orientation that increasingly characterises *chena* farming (Samad *et al* 1980).

Researchers found that the net annual value of produce from highland cropping on farms averaging 2.02 ha in total extent, only 0.81 ha of which was not asweddumised, ranged from Rs. 3,000 to Rs. 5,000. *Chena* thus accounted for from 40% to 80% of the net value of each farm's annual output. On a hectare basis, net returns vary enormously from Rs. 1,000 to Rs. 14,000 per year. Average returns are Rs. 4,000 for *maha* and a mere Rs. 1,000 for *yala*. The great width of range quoted is no doubt due to substantial differences in the degree of profitability of particular crops.

An annual average net return from *chena* cultivation can at present prices be estimated on the basis of these figures as Rs. 5,000 per hectare. The same sources give labour requirements on stabilised *chena* (where no preliminary clearance of jungle is involved) as 230 man-days/ha/year.

6.2.1.5 Scope for development

Given the unavailability of data for land suitability classification (cf. 5.4.1), it is difficult to determine with any degree of accuracy which are the areas in Kurunegala most appropriate for the development of rainfed agriculture. According to the ITC maps already referred to, which cover a very small tract of land to the east of Galgamuwa, sesame, maize, cassava, bananas, fruit trees and pasture would grow well in this subregion on 75% of the total land area.

Since Galgamuwa is by no means a typical of the Lowland Dry Zone parts of Kurunegala, it may be assumed that similar conditions prevail elsewhere and that the same range of crops would be equally suitable.

At present, only about 30% of the total area used for *chena* cultivation is cropped in any one year (although the overall CI is probably somewhat higher than 0.3, since a small proportion of the land is double cropped).

If the Galgamuwa study may be regarded as a sound base for estimation, it can be reckoned that elaboration of an appropriate technological package would make it possible to till each year as much as 70% of the aggregate area now only sporadically utilised for dryland farming. The area in the district suited for rainfed agriculture may thus be computed at well over 100,000 ha.

Gunasena (1981) suggests that with careful management highland yields could attain very high *potential* levels in the Dry and Intermediate Zones. A rather less optimistic interpretation of his figures might read as follows:

Crop	Yield (kg/ha)
Cereals:	
Kurakkan	1,000-1,200
Maize	2,000-3,500
Sorghum	1,000-1,200
Pulses:	
Cowpeas	1,000-2,500
Green gram	700-1,200
Tubers:	
Cassava	16,000-20,000
Vegetables:	
Beetroot	15,000-18,000
Carrots	20,000-25,000
Chillies (dried)	500-800
Lettuce	2,500
Red onions	14,000-16,000
Other:	
Sesame	600-750

Compared with the results attendant upon present standards of cultivation, the above figures indicate that yields could be doubled for cereals, pulses and vegetables and even tripled in the cases of cassava or beetroot.

Crops of hitherto marginal importance - like castor, cotton, kenaf, bananas and papaya - might be improved by selection for local conditions and cultivated with market outlets more consistently in view. Tobacco, groundnuts and chickpeas could likewise be grown on a considerably larger scale. In a purely commercial perspective tobacco, cotton and groundnuts offer the best prospects,

though only the former has been the object of a sustained, but modest extension drive to date. It should be stressed that none of these three crops can be hoped to catch on with farmers unless industrial interests can be persuaded to invest in the local construction or further expansion of processing and manufacturing facilities.

Pigeon peas look very promising as a long term drought resistant pulse for both forage and human consumption, which could bridge the very dry months between the end of December and the beginning of the *yala* rains. Within the *yala* season itself the uncertainly distributed rainfall of little more on average than 250 mm constitutes a major constraint. Cassava growing over from the preceding *maha* is, like pigeon peas, an obvious choice. With its very low water requirements, sesame appears to be the only feasible short term crop in the circumstances.

The yield levels indicated by Gunasena and slightly revised downwards by ourselves may still be somewhat optimistic. They refer however to maximum potential under rainfed conditions in a year round cropping system on improved erstwhile jungle soils. We summarise in the next section the principal prerequisites that would have to be satisfied in order to ensure, a successful transition from *chena* cultivation in a more or less traditional style to a balanced pattern of permanent dryland agriculture.

6.2.1.6 Towards a modernisation of rainfed agriculture

In the medium term, efforts to develop rainfed agriculture should centre on regularisation of the tenurial situation and on applied agronomic research.

Farmers will not readily experiment with any form of technological innovation demanding a higher level of inputs unless they are guaranteed security of tenure, so that benefits may be extracted from the cumulative or merely residual effects of investment in subsequent seasons. The process of regularising encroachments is

already well advanced in Kurunegala. As of mid-1981 some 80% of all encroached land eligible for regularisation had come under review and grantees had been selected.

Although land has thus been earmarked, little is apparently understood as to what 'regularisation' actually entails. Grantees have for the moment received only temporary 'permits' to cultivate the land allocated. But it should be stressed that such a move is definitely insufficient from the farmer's point of view, if the intention is to motivate him to invest. To exercise a positive influence upon productivity regulatisation procedures must be backed by unambiguous legislative texts that make quite clear the extent of the former encroacher's rights and obligations *vis a vis* the state.

Even if the farmer finally gains a satisfactory tenurial status, he will however still not invest unless the Department of Agriculture is able to propose a series of technological packages of proven value among which he can choose to suit his own peculiar circumstances. None at present exists for rainfed agriculture in Kurunegala, because no research has yet been carried out in this field.

The agronomic questions to be tackled would include the following:

i. weed control (with perhaps special attention to the potential offered by the IITA methods of 'zero tillage' and/or periodic leys planted to legumes);

ii. moisture conservation;

iii. feasibility of different cropping patterns centering upon efforts to make the best of traditional methods of intercropping already practised in the district;

iv. fertility and remedial fertilisation;

v. varietal selection;

vi. soil science structure, drainage, conservation.

Complementary research into agro-climatology, the location of land types in the different catenary sequences, the manpower requirements of alternative cropping systems, crop storage and marketing would enable planners both to formulate comprehensive recommendations and to calculate the probable outcome in macro-economic terms.

6.2.2 Livestock

Livestock development is not catered for as such under KIRDP. The Department of Animal Production and Health receives some assistance in the form of new vehicles to increase the mobility of veterinary personnel and has been allocated funds for a small building programme to improve its sparse network of field facilities. But neither the DAPH nor any other agency is called upon to develop production oriented activities in the livestock sector.

In this section we will review the potential for livestock development in Kurunegala and examine in some detail what could be done to encourage dairy farming. Beef production does not at present figure as a very attractive proposition. There are a number of reasons for this. The principal ones are however the reluctance of a mainly Buddhist population to breed animals for slaughter and the generally low level of cash incomes, which inhibits spending on relatively expensive, yet not essential items such as meat. Religious considerations similarly limit the propensity to consume pork, mutton, goat meat and poultry.

Although Buddhism is not the source of any objections to milk production and consumption, government policy regarding pricing does make it difficult to conceive a meaningful programme in the field of dairy farming: the cost of concentrates cancels out any profit that might otherwise be made from the sale of milk. This should be clear from the following input-output analysis calculated over a 12 months period for one cow equivalent (two head of cattle).

Outlay:

Concentrates	1200 kg	Rs. 3,600
Fodder (grass, zero grazing)	0.3 ha	Rs. 300
Labour (incl. mowing and pasture maintenance)	75 man-days	Rs. 1,500
Other costs (veterinary assistance, medicines, etc.)		Rs. 1,800
Total costs		Rs. 7,200

Returns:

Annual milk yield (3.5% fat)	1,500 litres	Rs. 3,750
Calf production (0.7 calves/CE)		Rs. 800
Total returns		Rs. 4,550
Net margin		- Rs. 2,650

Unless the proportion of concentrates in feed can be reduced, milk production must remain an unprofitable proposition. Since the Intermediate and Dry Zone areas of Kurunegala are subject to prolonged periods without rain - particularly during the inter-monsoonal months -grazing is hardly a year round substitute. It is thus no surprise to learn from the National Livestock Development Board that an increasing number of dairy farmers in Kurunegala have begun selling off their herds as a result of a recent rise in the price of concentrates.

Two factors limit the scope for raising milk prices. The first is competition from inexpensive imported milk powder*; and

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*This milk powder is exported at a subsidised rate by countries belonging to the European Economic Community. The subsidy is likely to be maintained for another 10 years at least, as it is one of the tools of the EEC's prevailing policy aimed at reducing agricultural surpluses.

the second is the very low level of consumer purchasing power. At mid-1981 prices a litre of liquid milk made from powder retailed at Rs. 4.00. An increase in retail prices for fresh milk above this level would be a source of loss to the national economy as a whole. Whatever the merit of this particular argument, the Government is reluctant to authorise an increase in the price of this basic food item because of the inflationary effect that such a move would have upon the cost of living, especially in urban areas. The demand for milk is liable to weaken as a result of negative price elasticity. Price increases would reduce effective demand and hence limit the scope for expanding production.

The input-output analysis presented above is based on an annual yield of 2,500 bottles or 1,500 kg per cow. The figure is indeed low, but little more can be expected under the agro-ecological conditions prevailing in Kurunegala unless the ration of concentrates per animal is made substantially larger. For the breed of cattle that predominates in the district is far from optimal for milk production and the concentrates available are of inferior quality: a daily addition of one kilogramme of concentrates to the animal's fodder ration is unlikely to produce a gain in daily yield of more than the same weight of milk.

To develop the dairy industry in Kurunegala it would thus be necessary in the long term to introduce a series of technical improvements. Improvement of the breed and of the quality of pastures is an undertaking of several years' duration. The establishment of a more favourable ratio between the cost of inputs and the sale price of milk would constitute a realistic short term objective which could be rapidly achieved by upgrading the quality of concentrates and reducing sundry production costs.

6.2.2.1 Herd structure

The total number of cattle kept in Kurunegala and the composition of this herd are detailed in Table 6.4.

Table 6.4 - Cattle in Kurunegala (1980)

Category	Species	
	Neat cattle	Buffaloes
Milch cows	25,000	4,000
Other cows	86,000	63,000
Bulls	54,000	54,000
Calves	51,000	38,000
Total	216,000	159,000

Sources: Department of Census and Statistics, 1981.

The most striking feature of the above table is the percentage of adult female animals that are apparently not milked at all: 77% in the case of milch cows and as many as 94% in that of female buffaloes. This would indicate that cattle are in reality mainly kept for purposes other than milk production. It may be surmised that principal among these are draft power and an undemanding form of investment-cum-savings.

There thus exists a large, as yet untapped potential for milk production. And it may be concluded that any attempt to develop dairy husbandry in the district should take this potential as its point of departure.

6.2.2.2 Yields, production and husbandry

Kurunegala is traditionally a milk producing district. Prior to 1971 and the enactment of Land Reform a considerable amount of dairy husbandry was carried on in coconut estates. With the nationalisation of most estates larger than 20 ha in extent milk production decreased greatly.

According to the livestock census already referred to in Table 6.4, the district's monthly output of milk is 620,000 litres for cows and 95,000 litres in the case of buffaloes. If these

figures are correct, animals kept specifically for milking produce on average less than one litre per day. It is however possible that the statistics refer only to quantities of milk actually marketed, in which event the productivity of individual animals would be substantially higher. Surveys carried out in other districts suggest yields of between one and three litres per day (FAO 1980).

There are no figures available to give a reliable picture of reproduction and lactation in Kurunegala. Some key indicators derived from the FAO survey of indigenous cattle in Galle district are nonetheless presented below:

	Neat cattle	Buffaloes
Calving rate	60%	65%
Calving interval	20 months	19 months
Calf mortality	13%	12%
Length of lactation	240 days	310 days
First pregnancy	24-30 months	24-30 months

Random observations made during field trips to different parts of Kurunegala tend to confirm these findings of the Galle survey. Most of the rearing of neat cattle and buffaloes for milk takes place in areas specialising in coconut production. The majority of milch animals do sporadically receive some concentrates, but by no means all the time. Their fodder requirements are mostly covered by grazing on roadside verges, on bunds and so forth.

6.2.2.3 Commercial outlets

The prices received by farmers from the Milk Board are Rs. 2.47 per litre for cow's milk containing 3.5% fat and Rs. 3.90 for buffalo milk at about 6% fat content.

However, the Board's collection centres will not accept less than about 23 litres (40 pints) a day from any one registered

producer. This means that small farmers can only sell their milk to middlemen, who are themselves registered with the Board. The intermediary makes a profit of about Rs. 0.40 per litre on this type of transaction. Even so, only part of the milk produced is marketed in this manner, the rest being either disposed of directly to village boutiques or else consumed on the farm.

Marketing problems constitute the worst obstacle to increasing production. Small farmers are particularly at a disadvantage. This is borne out by the tactics adopted by the Swiss firm Nestle in its ambitious programme to set up a milk processing plant in the south of Kurunegala district. With considerable experience gained in other parts of the tropics behind them, Nestle planners are convinced that it will suffice to guarantee direct purchase of even the smallest quantities for milk production to increase significantly in a very short time.

6.2.2.4 The institutional framework

Dairy farming in Sri Lanka is the province of several different bodies. The two largest are perhaps the Department of Animal Production and Health and the National Livestock Development Board. The latter is instrumental in setting up Dairy Producers Associations wherever there are enough cattlemen interested to warrant the formation of this kind of specialised cooperative society. The Nestle venture already mentioned is a very recent undertaking, but one which may have important repercussions in many areas of the country if it is successful. The Milk Board also occupies a position of some significance.

The National Livestock Development Board controls six large coconut estates in Kurunegala totalling 3,400 ha, on which it concentrates on the breeding of improved cattle for sale to stockmen. In mid-1981 farms had an animal population of some 2,500 neat cattle and 300 Surti milking buffaloes. The primary objective is to produce crossbred upgraded heifers. These are issued in the first instance to members of the Dairy Producers Associations. Any surplus can be purchased by other buyers.

In its neat cattle breeding programme the NLDB aims at producing crossbred cows capable of giving 5-6 kg of milk per day on a feed consisting of grass and silage alone. To this end Sahiwal bulls are crossed with local cows in the first generation and the progeny with Jersey stock in the second. In Kurunegala the percentage of European blood is deliberately restricted to less than half in all crossbreeds in order that indigeneous resistance to climatic conditions and diseases should continue at a high level.

The buffalo breeding programme does not centre on the improvement of local stock. Because of difficulties encountered in detecting the very transitory oestrus of indigenous females the decision was taken to concentrate on increasing the availability of purebred Surtis. This breed is neither as good a milker nor as powerful a draft animal as the Murrah. It does however offer the twin advantages of being more docile and more suited to work on asweddumised land, where the Murrah tends to bog down owing to its greater weight.

The Dairy Producers Associations were launched by the NLDB in 1977 on a pilot basis with IDA funding. The objective was to test under Sri Lankan conditions the model developed at Anand in India (Halse 1980).

An association organises the collection of milk at the farmgate from member farmers and provides them with a range of other services. These include artificial insemination besides the supply of concentrates, drugs and crossbred heifers in calf. At present, the DPAs still depend upon Milk Board chilling centres for initial processing. But the ultimate aim is to acquire their own plant and to go in for the production of cheese and more sophisticated dairy lines.

Farmers wishing to become members of a DPA must fulfil the minimum requirement of possessing at least one cow and 0.2 ha of land. Associations in Kurunegala were initially allowed to

use the infrastructure (transport, supply, veterinary services, etc.) of NLDB estates situated in the district. They are now fully constituted cooperative societies. There were, as of mid-1981, 34 of them in Kurunegala with 1,600 members producing a total of 120,000 litres of milk per month.

International Development Association funds are used to cover the costs of monitoring, veterinary assistance, extension and the construction of facilities. IDA will continue to offer financial aid until 1983, by which time it is planned that all DPAs will have joined together in a selfsupporting cooperative union.

The Milk Board already operates five collection centres in Kurunegala. A sixth is to be set up in the near future. Unlike the DPAs, the Board does not extend its activities to the collection of milk at the farmgate. Producers have to bring their milk to the centres where it is transported by bulk tanker in a chilled state to the Board's Colombo factory. As already mentioned above (6.2.2.3), deliveries of under 23 litres a day per farmer are considered uneconomic by the Board, so that only a minority of milk producers can sell directly to this organisation. There is no plan further to improve the Board's network of milk collection facilities in Kurunegala.

The Department of Animal Production and Health (Ministry of Agricultural Development and Research) has no activities in the field of dairying. Operations are confined to ensuring veterinary cover and to the upgrading of local stock by artificial insemination with the semen of foreign and crossbred bulls. However, the performance of even these basic tasks is seriously hampered by a lack of qualified veterinary personnel and the inadequacy of both travel and petrol allowances.

The firm of Nestle plans to set up in southern Kurunegala a spray drying plant to turn out powdered milk. The ultimate goal is to develop a capacity for processing 175,000 litres per day

within a ten year time span. Nestle estimates that present production of fresh milk does not exceed 25,000 litres per day in the target area. Project designers are nonetheless convinced that the establishment of a reliable farmgate collection system and more small scale chilling centres would suffice to stimulate an almost immediate 70% increase in production.

Nestle's activities are the subject of growing concern - especially for the National Livestock Development Board, which sees them as a direct threat to the success of the Dairy Producers Associations. As things stand, the latter would indeed appear to constitute the most appropriate vehicle for developing the milk industry in the district. The planned withdrawal of IDA support as of late 1983 would however seem premature and could well jeopardise the future of the whole undertaking. For if the DPAs are to launch into advanced processing operations, there will be a need for technical skills and a management capacity that do not at present exist and that it will prove extremely difficult to acquire in so little time.

The exact motives behind Nestle's bid to get into milk processing in Kurunegala are as yet far from clear. But it seems obvious that there is no room for the simultaneous presence of the multinational and the Dairy Producers Associations in this area. If the Government endorses Nestle's plans, it may well find itself confronted with a *de facto* monopoly and with no space for manoeuvre at a later stage.

6.2.2.5 Expanding production

There are by and large two distinct paths that can be followed for the development of dairy farming in Kurunegala. The first is to establish a series of large units organised along modern, high efficiency lines to produce optimal quantities of milk from carefully selected improved breeds. The NLDB is already pursuing such a strategy on its Haragama and New Zealand farms located outside the district.

The other alternative is to encourage the production potential of large numbers of smallholders owning milch animals of local breed. A successful example of this approach is provided by the network of dairy cooperatives operating around Anand in India.

From a purely economic point of view the first solution would appear preferable: the conversion ratio of inputs to milk output generally improves at higher overall levels of production per individual animal. Significant economies of scale are moreover associated with milk collection, the provision of veterinary services and the delivery of both fodder and concentrates in the case of large dairying units. The technical knowhow for setting up this kind of enterprise is available in Sri Lanka. Quick returns in the form of a substantial rise in milk production could thus be expected.

However, if social objectives are taken into consideration, the smallholder formula might prove a more desirable option. Unlike land, cattle tend in Sri Lanka to be distributed with some evenness among different income groups in rural areas. This has been shown to be the case in Kurunegala, where small farmers control most of the district's cattle.

The encouraging results initially attained under the DPA programme constitute a strong argument for pursuing the development of dairying along smallholder lines. Although no thoroughgoing economic analysis of the DPAs in Kurunegala has as yet been carried out, the longstanding experience of the Anand project would suggest that a viable level of productivity can be achieved if a local stock improvement component (by crossbreeding) is incorporated in the development programme. A further point in favour of extending the DPA model to cover new areas in the district is that it would help to attenuate the economic distress of low income groups, which we outlined in chapter four.

We therefore envisage a development programme centreing on the cooperative organisation of producers and the improvement by crossbreeding of their existing milch cattle. No exotic purebred

females would be imported and considerable effort would go into tapping the existing production potential.

The Nestle survey already referred to indicates that the present output of milk in southern Kurunegala could be almost immediately increased by more than two-thirds as a result of introducing appropriate forms of organisation for farmgate collection. Better veterinary care and feeding practices could further increase production by improving calving rates, reducing calf mortality and lengthening the period of laction.

Feed would thus have to be upgraded. The coconut growing areas of the district offer substantial scope for fodder cultivation. Continuous grazing in the numerous small plantations on selected grasses would be one alternative. Otherwise, zero grazing could be contemplated. In this case 0.3 ha of improved grassland would suffice to maintain a cow unit, if supplemented with concentrates. However, if silage were made with adequate care and with the right forage, concentrates could probably be almost totally dispensed with.

The area under coconut in Kurunegala is 165,000 ha. About 80% of this extent (c. 130,000 ha) could be used for fodder production. There are at present 180,000 cow equivalents in the district which, on improved pastures, would require no more than 54,000 ha. It can therefore be concluded that land is not as such a limiting factor for the development of dairy farming. The distribution of land among cattle owners does however constitute a major constraint.

It can be heuristically assumed that 50% of the milch cattle are owned by farmers operating less than 4 ha of coconut land.*

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* This assumption is based on the findings of the 1978 coconut survey carried out under the direction of Dr. Hussain and of the livestock survey of Kuliyapitiya electorate recently completed by the NLDB.

Approximately one-fifth of the total coconut area is in the hands of this category of producers. Twenty-six thousand hectares of coconut smallholdings out of the 33,000 ha aggregate are or could be made suitable for grazing. Since the 90,000 cow equivalents in small farmer ownership would need no more than 27,000 ha to satisfy their fodder requirements, land availability is not in this instance a major problem. Well endowed with potential grazing areas, larger coconut farmers would of course similarly experience little difficulty in developing their dairying activities. Access to adequate fodder poses a real problem only in the case of the landless or of those cattle owners who are tenants on asweddumised tracts and do not have any highland to speak of. Such milk producers would remain much more dependent upon an attractively priced and reliable supply of concentrates.

If, as a result of crossbreeding, improved fodder production and silage practices, 60% of the existing milch animals (neat cattle and buffaloes) could be made to yield an average of three litres per day each, there would ensue an overall increase in output of 196,000 litres per day (over and above the present meagre 24,000 litres). And it should be stressed that three litres per day per animal constitutes a very modest target indeed.

The development of dairy farming thus obviously presents an enormous potential in Kurunegala.

6.2.2.6 Preconditions for livestock development

Stock raising constitutes what is probably the most promising subsector of the regional economy in terms of development potential, growth rates and income distribution. This is however an area of production which requires considerable research and organisational inputs, besides a nucleus of highly skilled personnel at the outset. We will here summarise the most important pre-conditions that have to be met if a livestock development programme is to be successfully implemented.

We have pointed out (6.2.2) that the ratio of milk to concentrate prices is at present a major obstacle to any expansion of the dairy industry. In a national perspective, the retail price of milk might be increased to Rs. 4.00* a litre without harm to the economy. Even so, the prevailing cost of concentrates and the low quality of those available make milk production a rather unprofitable venture. The only solution to this problem is to devise ways and means of manufacturing concentrates of better quality at a lower price. That this is obviously within the realm of possibility is demonstrated by the fact that the NLDB already produces its own concentrates of adequate quality at Rs. 1,800 per tonne, while the price asked for supplementary feed of inferior grade by the Oils and Fats Corporation is Rs. 3,000.

A programme of experimentation must be undertaken to ascertain the optimal balance between fresh forage and concentrates: it might prove possible to reduce quite substantially the proportion of concentrates at present required were suitable forage mixes developed. Interesting results have already been obtained from an experiment involving the foddering of local milch cows on paddy straw enriched with urea+. The ensilage techniques at present only practised on NLDB farms also hold out some promise for cutting down on concentrates without incurring loss of milk production.

The grasses most commonly cultivated as pasture in Kurunegala are *brachiaria brizantha* and *brachiaria milleformis*. Yields and nutritional values could be greatly increased if better species were introduced. *Panicum maximum* and *setaria anceps* should be experimented with.

The success encountered by the Dairy Producers Associations would seem to warrant an effort to continue providing technical assistance beyond the date when the present IDA funded project

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* The 1981 retail price of liquid milk made up from imported powder, the CIF value of which is Rs. 3.34.

+ NLDB/Netherlands Dairy Development Project.

comes to a close. Farmers still need considerable backstopping in administrative and organisational matters, while a cadre of permanent employees should be trained in the technology of milk processing and cheese making. A husbandry component concentrating on the professional education of dairy cattle owners should also receive strong emphasis so that calf mortality is reduced and the productivity of milch animals improved.

It is urgent that a formal agreement be reached to exclude the possibility of the Nestle project entering into serious competition with the DPAs. Areas of activity must be clearly defined if early collapse of the Associations in the face of stronger commercial interests is to be avoided.

The network of milk chilling centres must be extended. To remain economically viable and cover collection costs each centre will have to serve an area capable of delivering at least 3,000 litres of milk every day. It will thus be necessary to carry out an operational research study to determine where the new centres are to be located and for it to be possible to specify intake capacity in each case.

Finally, information must be gathered to document the motivational aspects of dairy farm development. We have already drawn attention to the fact that a very large proportion of the cows in Kurunegala are apparently never milked with a view to selling the product (6.2.2). A socioeconomic survey would make it possible to understand the reasons underlying this type of phenomenon. An investigation into varying patterns of behaviour in this respect - as exhibited by large coconut operators, on the one hand, and very small farmers or the landless on the other - would no doubt prove quite instructive. The data accruing from such a study should be used to evaluate the potential for increasing smallholder production by supplying good quality concentrates. It might also serve to guage the resistance that absentee owners of large estates might put up to any dairy development scheme which demanded their personal presence in a managerial capacity on their farms.

6.2.3 Minor export crops

The minor export crop development programme planned under KIRDP is not very ambitious in scope: the aim is to extend the intercropping of coffee, cocoa and pepper with coconut to a mere 3,200 ha. It has been sought to justify the modesty of this objective in terms of the necessity to create at the outset a sound technological basis from which to launch, at a later stage, into further expansion. We will in this section discuss the potential for development in this subsector of the district's agricultural economy and try to define the prerequisites for success.

6.2.3.1 Present cultivated area

The areas under minor export crops in Kurunegala are detailed for the year 1980 in Table 6.5. Since minor export crops are nearly always raised under coconut, the extents listed refer to the areas upon which a specified minimum density of plantation has been observed by the farmer. The same crops are frequently grown elsewhere - notably in homegardens and hedgerows.

Table 6.5 : Areas under minor export crops in Kurunegala (1980)

Crop	Ha
Tamarind	90
Tumeric	400
Pepper	1,090
Cinnamon	30
Cardamom	110
Coffee	1,600
Cocoa	1,600
Cloves	90
Nutmeg	120
Citronella	10
Total	5,300

Source : Agricultural Statistics Unit, Department of Census and Statistics.

Although a fairly wide range of spice and beverage crops is grown in the district, three crops clearly predominate covering between them more than 80% of the total area devoted to the commercially oriented production of such enterprises. These are pepper, coffee and cocoa. Interplanting of these with coconut is confined to the Wet Zone and a small part of the Intermediate Zone. Only 4% of the total area under coconut is put to this type of dual management.

6.2.3.2 Output

Figures on yields and production are not at all reliable. But the poor standards of husbandry characteristically observed in Kurunegala would give credence to estimates as low as 300 kg per hectare for green pepper*, while 400 and 500 kg of clean beans would seem probable in the cases of cocoa and coffee respectively. Multiplying extents planted by these average yield figures, annual production (when all plantations are in bearing) can be computed at 330 tonnes of pepper, 640 tonnes of cocoa and 840 tonnes of coffee.

6.2.3.3 Husbandry and processing

The farmers in parts of Matale district have for some time specialised in minor export crops. In Kurunegala their intercropping on a commercial scale is something of a novelty, while traditional homegarden production is hardly a sophisticated affair. A 1978 survey reports barely 6% out of a total number of 100,000 coconut farmers as engaged in systematic spice and beverage intercropping in the district (Hussain and Perera 1978).

There is obviously little enthusiasm for these potentially very profitable enterprises. This may partially explain the state of neglect in which pepper, cocoa and coffee are generally left once they have been planted: varieties grown are not the

* On a basis of 170 vines trained one or two up the trunk of each coconut palm.

most suitable for ecological conditions in southern Kurunegala; pruning of both pepper and coffee, which is essential for the attainment of good yields, is almost never carried out; cocoa is planted in stands of mixed variety so that the quality of the beans harvested from any one plot is very heterogeneous; and processing is on the whole primitive, giving rise to a low grade product.

Robusta coffees of inferior quality are inefficiently processed by the dry method so that much of the silver skin remains anchored in the ventral groove of the bean. No control is exercised in cocoa areas over random hybridisation, with the result that the pods of even one and the same tree often contain beans of quite dissimilar types which ferment during processing at different rates. The commercial value is consequently very mediocre.

Indigenous pepper varieties are most widely grown. Their ongoing replacement by higher yielding cultivators from India should make this enterprise more profitable in the near future. Sun drying to make commercial grades of black pepper is however often carried out in conditions of excessive atmospheric humidity leading to the onset of mould and loss of quality.

6.2.3.4 Incomes generated by pepper, cocoa and coffee

The authors of a recent article on the economics of minor export crops interplanted with coconut have calculated the average profits that can be expected annually in the Sri Lankan context from each of the three principal enterprises. Income was reckoned taking into account the juvenile stage of growth between planting and first bearing. The figures are adjusted to accommodate amortization over time and eventual replanting. Present per hectare returns thus amount to Rs. 3,000 for pepper, Rs. 1,500 in the case of cocoa and Rs. 1,700 for coffee (Etherington and Karunanayake 1981).

These very low levels of profit are determined by equally low standards of cultivation on the part of farmers and an

unencouraging commercial environment. The whole field of minor export crops is such an unattractive proposition to would-be investors that total annual production for Kurunegala has a net value of no more than Rs. 8.5 million. This represents less than 1% of the district's global income.

6.2.3.5 Future prospects

The present rather dismal situation could improve very considerably in terms of yields, areas intercropped and quality of the final product.

Agronomists at the minor export crop research station in Matale feel that it is a mistake to have promoted the three principal enterprises outside the Wet Zone areas of Kurunegala district: unreliable distribution of rainfall has caused a high overall rate of failure in the Intermediate Zone, which has led to farmers expecting only very modest returns; low standards of cultivation and general neglect of interplanted crops in both zones have been the result. An extension effort which has not sufficiently distinguished between the ecological requirements of pepper and coffee, on the one hand, and cocoa, on the other, has been responsible for a marked lack of enthusiasm for planting the latter: whereas pepper and coffee can flourish under coconut at the present recommended density of c. 150 mature palms per hectare, cocoa needs substantially less shade in the early stages and may do best at maturity under conditions of full light exposure. Cocoa yields have consequently been very disappointing.

In the Wet Zone a total of some 17,000 ha is under coconut. No scientific data are available to indicate whether soils in the whole of this area are suitable for intercropping. Given the state of advancement of commercially oriented agriculture in this part of the district and the sheer number of qualified persons familiar with local conditions, it would however be surprising if all major edaphic constraints were not already common knowledge. It can therefore be assumed that there

remains substantial room for expanding the area devoted to minor export crops.

A difficulty often associated with the production of high value beverage and spice crops is securing a market. In the case of Sri Lanka the problem does not loom very large, for the country's share of the world market is at present very restricted indeed; about 1% for pepper and coffee, while the amounts of cocoa exported do not represent even a thousandth part of total world exports.

According to an UNCTAD survey published five years ago, prospects for pepper are quite bright, since consumption in Eastern Europe, the Middle East and Japan is expected to increase significantly during the 1980s (International Trade Centre 1977).

Insofar as cocoa and coffee are concerned the situation is quite different. The violence of fluctuations in supply has in the past been such that major producing countries have sought to stabilise world markets by subscribing to agreements imposing export quotas on all signatories.

In Table 6.6 we present data on exports of coffee, cocoa and pepper from Sri Lanka in recent years. Figures refer to the tonnage of processed beans for coffee and cocoa. In the case of pepper, white and black dried grains are aggregated to give a total overall weight.

Table 6.6 - Exports of coffee, cocoa and pepper from Sri Lanka
(Unit: tonnes)

Year	Coffee	Cocoa	Pepper
1975	1,255	1,058	95
1976	1,709	1,108	10
1977	906	1,323	632
1978	2,319	1,040	1,206
1979	2,603	600	876
1980	909	633	647

Source : Sri Lanka Customs

Output is generally very irregular. Only cocoa exhibits a fairly clear trend of declining production. But amounts exported are so small that this can hardly be interpreted as a response to diminishing world demand. On the contrary, limited production capacity would seem to be the main factor that at present keeps exports down.

The priority in coming years would seem to be a crop development programme that centres on the dual objectives of stabilising yields whilst at the same time ensuring that the end product is of a more uniform quality able to meet international standards. Once these goals have been attained thought can be given to ways and means of increasing production with the export market in view.

It follows, with regard to Kurunegala which comprises one of the major producing areas, that the first step is to introduce schemes that will diminish the extent of annual fluctuations in output and contribute to an increase in overall quality. The main thrust of any minor export crop development programme should be on causing yields to rise rather than an extension of the area planted. A two to threefold increase in production should be possible in existing plantations:

	Unit: kg/ha	
	Present situation	Potential
Coffee	500	1,200
Cocoa	400	1,000
Pepper	300	1,000*

However, an improvement in the quality of the end product would be the source of financial rewards just as significant as those resulting from an increase in quantities harvested per unit of land. The quality of processed coffee and cocoa beans as well as that of pepper is at present so low that more attention to this aspect of production could result in a rapid doubling of the prices at present obtained for these commodities on the export market.

It would be wise to refrain from policies aimed at extending the area planted to minor export crops until the objectives of increased yield and quality have been attained. Although the land under coconut in the Wet Zone parts of southern Kurunegala is certainly not all suitable for intercropping, it may be assumed that some 60% of the total, or about 10,000 ha could be employed to this end. Coffee and pepper, which are both less prone to stress in times of temporary drought, would be preferable to cocoa in the prevailing ecological condition.

Modern varieties of cocoa are furthermore best grown in pure stands once the trees have developed a mature canopy. An apparently feasible alternative is to intercrop cocoa with rubber planted at the very low density of less than 120 trees per hectare. This is a solution which has been adopted with great success in Malaysia. Research station results are however still to be released to confirm the viability of such an approach in Sri Lanka.

* Yield based on two vines per coconut palm planted at a density of 170 palms per hectare.

6.2.3.6 Prerequisites for development

We have seen that Kurunegala farmers have in the past exhibited no great enthusiasm for the possibilities offered by minor export crops. An essential preliminary to designing a development programme for this area of production would be to carry out an investigation into farmer motivations for resisting current attempts to get them to intensify their use of coconut lands by intercropping. A thorough enquiry into attitudes, allocations and constraints would indicate the kind of incentives most likely to elicit a more positive response in the future.

However, since the readiness of farmers to increase production is directly related to the economic potential of the crops concerned, agronomic research must be intensified to come up with varieties and techniques of husbandry that guarantee incomes per hectare which are simultaneously higher and more stable than hitherto.

Robusta coffees of indigenous origin have been traditionally grown in Kurunegala. They present the advantages of hardiness and resistance to fungal diseases that can cause havoc in plantations. But they afford an end product of very low quality for which there is not a great demand in the world market. If it proved possible to replace present cultivars with a suitable variety characterised by organoleptic qualities similar to those of Arabica, the value of the crop would be considerably enhanced.

Work has been in progress for some years at the Matale research station to select varieties with this end in view. A major constraint has been the low attitude at which most coffee is grown in Kurunegala. Arabica varieties do not normally prosper below the 1,000 metre contour line at this latitude. High hopes are however placed in the plasticity of a spontaneous hybrid of Robusta and Arabica from Timor and a Colombian variety called San Ramon.

The problems besetting cocoa production have been alluded to above (6.2.3.3). There is at the moment no land available for the

cultivation of improved high yielding varieties of cocoa in pure stands. Intercropping on the 4,000 ha devoted to rubber in southern Kurunegala is a definite possibility. But this could only be a long term solution insofar as it would be necessary to await the end of the economic life of existing stands of rubber before these could be cut down and replanted at a wider spacing congenial to the intercropping of cocoa.

Nearly all the cocoa trees now growing in Kurunegala will moreover have to be replaced by improved varieties of homogeneous origins. Replanting would go a long way to satisfying the double objective of increasing yields and minimising the occurrence of random hybridisation, which is so detrimental to the attainment of a high grade final product.

If a decision is taken to tackle these difficulties, a last obstacle to be overcome will be the propagation of planting materials. Present methods are unsatisfactory; expense is excessive, while plants leaving the nursery frequently die before they can be transferred to the field.

For all three crops the postharvest processing techniques traditionally resorted to are inadequate. Pepper and coffee would benefit greatly from the introduction of wet processing methods that give rise to a better quality product, especially in the case of Arabica coffee. For pepper the technology is very simple and the operation can be carried out at farm level. Wet processing of coffee is better done in bulk at an appropriate plant. The same applies to cocoa. To increase the economic profitability of all three it will therefore be necessary, on the one hand, to make a considerable extension effort to convince farmers of the necessity to adopt better processing techniques and, on the other, to set up the required plant on an industrial scale.

Finally, any strategy for the development of minor export crops in Kurunegala will involve a revision of existing subsidy schemes. These will have to be restructured to make the planting

of coffee, cocoa and pepper attractive in comparison with the other enterprises for which incentive payments are available. Not only will the total amount of the subsidies offered have to be increased, but an effort will also have to be made to rephase instalments so that they fit in better with the periodicity of farmers' needs for working capital in the years before the plants come into bearing.

Steps must further be taken to ensure that minor export cropping appeals to all categories of farmers enjoying access to the right type of land: there is at present a tendency for coffee, cocoa and pepper cultivation to be concentrated on the medium and larger holdings, while the smaller farmers frequently appear to be unaware of the conditions or even the existence of subsidy schemes.

6.3 AN EXPANDING AGRICULTURAL SECTOR AND LONG TERM CHANGE

In this concluding section we will endeavour to assess the impact that a full scale development of the agricultural sector to the limits of its present potential would have on the economy of the district as a whole. We wish to show how a rationally designed, concerted programme over a broader spectrum of crops than just coconut and paddy would have the power to generate a decent income for a very substantial majority of rural families. It goes almost without saying, however, that a successful outcome could only be achieved if investments continued beyond the life-span of KIRDP as it was originally conceived.

6.3.1 Cultivated area, yields and production

We make several heuristic assumptions. The areas in the district that are under paddy, coconut and rubber will not be extended in the long term. Output per hectare will increase and intercropping with coffee, cocoa and pepper will take place wherever possible. *Chena* cultivation will give way to a system of permanent rainfed highland agriculture affording significantly higher yields of pulses, cereals and tubers. In the field of

milk production, the establishment of a more profitable ratio between inputs and outputs is assumed to make dairying an attractive concern.

Given these postulates, the long term situation should resemble the picture presented in Table 6.7. The total cultivated area will increase from 285,000 ha in the early 1980s to 345,000 ha at full development. The growing significance of rainfed highland agriculture will account for most of the difference. The areas under coconut and rubber on which intensive intercropping is undertaken will expand to about 70,000 ha (60,000 ha of which will be devoted to fodder production for dairy husbandry). This estimate may however prove unduly conservative, if it is eventually discovered - as may well happen - that more plantation lands are suited to intercropping.

Our calculations insofar as minor export crops are concerned are based on an intercropping potential under existing coconut and rubber in the Wet Zone of 5,000 ha each for coffee and pepper and 2,000 ha in the case of cocoa. The area devoted to rainfed agriculture will more than double attaining some 100,000 ha as against approximately only 45,000 ha at the present moment.

Table 6.7 - Agricultural production: a long term projection under optimal conditions

Crops	Extent (x 1,000 ha)	Yield	Production
Paddy	73 (asweddumised)	2,700 kg/ha/ season	237,000 t
Coconut	166	6,000 nuts/ha	885 million nuts
Rubber	6	1,400 kg/ha	8,400 t
Minor export	12 (intercropped)	1,000-1,200 kg/ha (coffee, cocoa, pepper)	13,000 t
Rainfed agriculture	100 (in *maha*)	cereals: 2 t/ha pulses : 1.5t/ha tubers : 10 t/ha	cereals:80,000 t pulses :45,000 t tubers:540,000 t
Dairying	60 (pasture under coconut)	3,700 litres milk/ha	222 million litres

But here again further expansion may prove possible in the light of land suitability studies still to be carried out; and the overall output of pulses, cereals and tubers may thus be considerably greater in the long run. Our projection that dairy farming will take place on some 60,000 ha of improved grassland under coconut posits recourse to a zero-grazing system and no increase in herd size. A better performance in dairying could even so, with little effort, doubtless be achieved.

6.3.2 Socio-economic impact

The production estimates set out in Table 6.7 can be translated into terms of income and employment generated by different subsectors. The results of such a projection are given in Table 6.8. Present domestic prices are used as a basis for calculations except in the case of milk production, where an increase to the more realistic level of Rs. 4.00 per litre is assumed (cf. 6.2.2.6).

Table 6.8 - Income and employment potentials in the agricultural sector as a function of the future situation (Table 6.7)

Subsector	Production			Employment	
	Gross value	Value added		x 1,000	
	Million Rs.	Million Rs.	Percentage	man-years	Percentage
Paddy	569	338	11	49	18
Coconut	1,328	1,235	41	76	29
Rubber	76	61	2	6	2
Minor export crops	490	294	10	8	3
Rainfed agriculture	925	555	18	67	25
Dairying	880	533	18	60	23
Total	4,276	3,016	100	266	100

The agricultural sector as a whole could by these calculations generate some Rs. 3,016 million in value added per year. This is almost three times the present figure. A threefold increase in the demand for labour would be likely to ensue, so that some 270,000 people would be fully employed (at a rate of 250 days per year) with a per capita average productivity of some Rs. 45 per day. Exact figures for employment would however depend upon the labour absorption capacity of the agricultural technologies resorted to: the choice of cropping patterns and land use intensity would be the source of some variation in this respect.

It should be noted that coconut production will retain its present dominant position. But the paddy subsector will become relatively less important, rainfed agriculture and dairy husbandry increasing significantly in weight to become the most dynamic factors in the whole agricultural economy of the district.

Given these assumptions, the impact of the agricultural sector upon incomes and employment can be assessed as follows:

The present average household income in Kurunegala is about Rs. 6,000 p.a. If the target is to raise this figure to Rs. 15,000 (at constant prices) by the year 2000, it will be necessary to ensure a 5% annual increase in family revenue over the whole intervening period.

The greater extents of land cultivated and the improved levels of productivity posited in Tables 6.7 and 6.8 would make attainment of this target feasible for 195,000 families.

This would mean that 60,000 more households could earn a reasonable livelihood from agriculture than is at present the case (cf. 4.1.2 above). The problem of widespread unemployment now affecting Kurunegala district could thus in the long run be very substantially attenuated by the full development of agriculture along the lines proposed.

Such an outcome cannot be expected from the ongoing Integrated Development Project: the time span allowed is much too short, while the total omission of both rainfed agriculture and dairy husbandry as major scheduled components makes it virtually impossible to achieve significant impact among the lower income groups. The latter, which include the majority of landless people, would stand to gain greatly by a dryland farming programme aiming at increased productivity through the permanent attribution of encroached and as yet unoccupied Crown lands. Recent moves by the Government towards the regulation of tenure in such cases to constitute a step in the right direction. Dairy husbandry, which is already a predominantly smallholder sphere of activity, could be developed with even less privileged categories of producers in mind.

The development of rainfed agriculture and dairy husbandry would provide avenues whereby the poorest 40% of the district's population could generate an additional Rs. 5,500 of annual

household income*. This would counterbalance the present KIRDP emphasis upon coconut and paddy production, two-thirds of the benefits from which accrue to those who are already relatively well-off. It is the research team's belief that this change of strategy is necessary if the skew in income distribution is not to increase dangerously.

* We estimate that the value added accruing annually from rainfed agriculture and dairying will be Rs. 1,080 million by the year 2000. The income bracket corresponding to the poorest 40% of the rural population will then comprise some 130,000 households. On the assumption that the benefits deriving from a development of rainfed agriculture and dairying go almost exclusively to this socio-economic group, annual household income would attain Rs. 8,370 p.a. This would represent an improvement of Rs. 5,500 on the present figure.

Chapter Seven

SHORT TERM PRIORITIES

Our object in the concluding chapter is to review the concrete measures that would have to be taken in order to ensure the fullest possible development of the potentials we have identified.

Much basic information about the intrinsic constraints faced by farmers is, on the one hand, still lacking, while applied research has yet to be carried out before viable schemes can be designed. We shall therefore enumerate and detail the various categories of prior investigation necessary for project formulation and then take a brief look at the type of activities that might inaugurate the implementation stage.

7.1 SURVEYS

For Kurunegala there is at present very little data available in such fundamentally important fields as soil science, small farm structure and land use. Information of this sort is most economically gathered in the course of *ad hoc* surveys.

The Land Use Division of the Irrigation Department has personnel highly skilled in the techniques of land suitability evaluation and mapping. The entire territory of Kurunegala district should be covered by a land suitability survey of the kind which has already been performed in Matara, Nuwara Eliya and eastern Ratnapura by this group of professionals. This would provide planners with the factual materials necessary for localising agricultural projects and ranking different areas according to the viability and urgency of the solutions proposed.

A second type of physical survey should be run to determine the extent and nature of highland encroachments throughout the

district. Taken together, the results of the two surveys would pave the way for the design of programmes with a view to enhancing the productivity of highland agriculture.

One big unknown however remains: the structure of smallholder farms and the nature of the decision making process at this level. Elucidation of these would require the running of a further series of socio-economic surveys, which would address areas of enquiry as diverse as;

- the variety of farming systems (a typology)
- crop budgets
- household incomes (with particular attention to resources located outside the sphere of agriculture proper)
- the labour requirements of different crops and mixtures
- farmer motivations, and
- risk perception.

The thorough comprehension so gained of the constraining framework within which the smallholder operates would prove indispensable in the conception of sharply appropriate programmes for the development of rainfed agriculture, livestock in the coconut triangle and minor export crops in the Wet Zone.

7.2 SPECIAL STUDIES

Certain spheres of agricultural activity would qualify for indepth study to provide a factual basis for the taking of informed decisions as regards future development efforts in some fields.

A sector analysis of the dairy industry in the country at large might allow valuable insights for the formulation of policies that should be followed in pursuing milk production objectives. In this connection, a rigorous evaluation of the Dairy Producers Associations should be carried through in order to learn how best they might be continued after IDA funding ceases or, indeed, whether a completely different solution might not be more apposite.

The whole gamut of agricultural supporting services - from input supply, through extension and plant protection, to crop insurance - should be appraised to assess the scope for an improvement of rainfed highland farming and minor export crop production within the existing institutional framework. The weak points in the overall structure of government support in these two areas of agriculture should be clearly identified and the implementation of remedial measures secured before any programme for their expansion is finally tabled.

The place of processing industries in the regional economy should be carefully studied. Those based on raw materials derived from coconut production should be analysed with a view to quantifying their capacity to absorb surplus labour from the agricultural sphere, to establishing the periodicity of their demand for manpower and their precise contribution to value added at district level. Another line of enquiry might be to ascertain the potential for increasing installed processing capacity and the probable impact in terms of manpower availability in agriculture and of rural incomes.

Yet more significant might be a study of how coffee and cocoa processing is at present organised and the extent to which those who control the commercial outlets also exercise a strong hold over what is produced and by whom. There is, as we have seen (6.2.3.3), considerable room for the introduction of new processing techniques. On what scale and within what institutional framework these are to be made available can only be decided when it is known to what degree existing processing and marketing machinery will be displaced by innovation at this level in the chain of production. The possibility of there materialising some solid commercial opposition to the creation of new outlets should be gauged and some thought should be spent on ways of neutralising the hostility of traders who at present enjoy a situation of virtual monopsony in this field.

7.3 APPLIED SCIENTIFIC RESEARCH

The surveys and special studies outlined above are essentially intended to document the ongoing situation. By 'research' we understand scientifically structured enquiry into areas which seem to offer a potential as yet unproven and where no data are available merely for the taking. This means that usable results can only be obtained in these areas by formulating hypotheses and setting out to verify their validity by dint of objective experiment.

Into this category fall most of our recommendations in section 6.2.1.6 and some others to be found *passim* in the same chapter. In rainfed farming work should thus be undertaken to ascertain optimal tillage methods for soil and moisture conservation under different crops and mixes. Cropping patterns should be tested to maximise yields, minimise risk and provide answers to problems of weed infestation and insect borne disease, which increase wherever fallows are eliminated from the traditional swidden cycle. Rotations, intercropping with hitherto little known legumes, live mulch and remedial fertilisation should all be considered and their efficacy measured as possible alternatives to the low input/low output pattern that now prevails in the growing of field annuals on extensively farmed highlands. A substantial programme of adaptive plant breeding should be initiated and integrated with the more mechanistic approach detailed above.

In the sphere of livestock production, it is of primary importance to solve the problems posed by the inadequacy of the areas in the district set aside for grazing and the low nutritive quality of available fodders. Research must continue into the enrichment of low cost paddy straw, while high protein/low lignin grasses suitable for intercropping with coconut should be selected and efficient methods of ensilage developed through experimentation. The crossbreeding of local buffaloes with exotic milking stock should be presevered with despite the difficulties already referred to (6.2.2.4), since the existing programme concentrating on the issue of purebred Surti females

in no way caters for the farmer interested in the animal for the purposes of dairy farming.

The main thrust in minor export crops research should be towards final selection, with a view to lowland growing, among the numerous varieties introduced and developed by the international team working at the Matale facility. The accent should be placed on ensuring the adaption to Kurunegala low altitude conditions of coffee varieties which bear a high quality bean whilst maintaining positive yield characteristics and disease resistence.

A programme should be launched to define the precise parameters attendant upon the intercropping of cocoa with rubber. Although coconut is regarded in Sri Lanka as the optimal plant to associate with cocoa, other less conventional intercropping patterns should be investigated. The economics of cocoa with bananas evolving at a later stage, after canopy formation, into pure stands of cocoa might, for instance, be given some thought. Similarly, the interplanting of coconut with bananas and pineapple, not to mention the gradual replacement of individual senile palms by interplanted clove trees, all constitute solutions for the viability of which there is not yet sufficient empirical evidence.

7.4 IMPLEMENTATION

Before the various investigations we have listed are well under way it would, of course, be premature to stipulate exactly what development programmes should be promoted. A few priorities can nevertheless be adumbrated on the grounds either that enough preliminary work has already been carried out for them at least to appear eminently feasible or that they would themselves constitute action research, insofar as they represent pilot undertakings.

First steps could thus be taken in pursuance of the team's rainfed farming proposals and the creation of a market for enhanced milk production in southwestern Kurunegala. For a small group of

ARTI researchers, with some international funding and a little backstopping, has since mid-1980 been experimenting in the organisation of farmers' selfhelp groups in a substantial area near Galgamuwa. A certain familiarity with problems met with by smallholders in this area has already been acquired and the farmers themselves seem eager to collaborate in the process of modernisation. The region is furthermore at least partly covered by the ITC land suitability study referred to earlier (5.4.1). Building on these foundations it would be relatively easy to start field trials in innovatory methods of rainfed agriculture using complete farms as experimental units.

The Dairy Producers Associations at the other end of the district would similarly give a head's start to any scheme intent upon taking over where IDA funding leaves off at the end of 1983. Many stockmen are sympathetic to the DPA concept: and little would therefore have to be done to convince them to collaborate as more complex innovations are introduced both on the animal husbandry and on the marketing sides. But if it is clear that continuity is essential to ensure the success of the DPA formula, then very solid agreements will have to be reached with the firm of Nestle's to make absolutely certain that the commercial grass is not rapidly cut from under the very feet of the scheduled cooperative union of local Associations.

Although not priorities (in the same sense that some preliminary groundwork has already been carried out), pilot projects for the interplanting of rubber with cocoa and the further development of minor export crops in association with coconut must obviously be commenced at the earliest possible occasion. The reason for this urgency is merely that experimentation on tree crops demands a very long time before results can be announced with any confidence and schemes designed in consequence.

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ANNEX 1 - (to chapter four)

Alternative calculations of the project's internal rate of return (IRR)

Hypothesis 1 - a higher rate of inflation than that anticipated by planners acts to reduce the implementation programme, so that benefits derived from an increase in paddy output fall to one-third of the projected level and, in the case of coconut, to one half of that expected.

Unit: million 1979 Rupees

Year	Investments	Operation & maintenance	Incremental production costs		Gross incremental benefits		Total net incremental benefits
			Paddy	Coconut	Paddy	Coconut	
1. 1979	52	0	1	1	0	0	-54
2. 1980	72		2	2	3	0	-73
3. 1981	54		5	5	5	4	-55
4. 1982	42		9	8	13	9	-37
5. 1983	40		13	10	23	22	-18
6. 1984	10	4	18	14	33	34	25
7. 1985	13		21	16	44	47	41
8. 1986	10			17	52	60	64
9. 1987	8			18		68	73
10. 1988	5			19		73	80
11. 1989	4			20		77	84
12. 1990	0					80	87
13. 1991						84	91
14. 1992							
15. 1993							
16. 1994							
17. 1995							
18. 1996							
19. 1997							
20. 1998							
21. 1999							
22. 2000							
...							
30. 2008							

IRR = 19%

Hypothesis 2: the project is continued after 1983 and additional investments totalling 155 million Rupees are made between 1984 and 1995 in order to attain the level of benefits originally foreseen in the *Staff appraisal report*.

Unit: million Rupees

Year	Invest-ments	Opera-tion & main-tenance	Incremental production costs		Gross incremental benefits		Total net incre-mental bene-fits
			Paddy	Coco-nut	Paddy	Coco-nut	
1. 1979	52	0	1	1	0	0	-54
2. 1980	72		2	1	4	0	-71
3. 1981	54		3	2	8	0	-51
4. 1982	42		3	2	12	4	-31
5. 1983	40		7	5	16	8	-28
6. 1984	40	2	8	5	28	12	-15
7. 1985	30		14	8	39	17	- 8
8. 1986	22		14	8	55	30	31
9. 1987	19		20	10	70	43	59
10. 1988	10		20	11	85	55	88
11. 1989	13		25	13	101	68	119
12. 1990	10		30	17	117	81	136
13. 1991	8		35	21	133	94	159
14. 1992	5	4	41	24	139	100	162
15. 1993	4		45	27	145	107	171
16. 1994	4		50	30	150	113	175
17. 1995	0		55	33	156	119	179
18. 1996			62	35		136	181
19. 1997				37		145	193
20. 1998				39		153	200
21. 1999						161	212
22. 2000						170	221
30. 2008							

IRR = 20%