NATIONAL AGRICULTURE, FOOD AND NUTRITION STRATEGY

A Change in Perspective

NATIONAL PLANNING DIVISION
MINISTRY OF FINANCE AND PLANNING
COLOMBO, SRI LANKA.

JUNE, 1984.

NATIONAL AGRICULTURE, FOOD AND NUTRITION STRATEGY

A Change in Perspective

NATIONAL PLANNING DIVISION
MINISTRY OF FINANCE AND PLANNING
COLOMBO, SRI LANKA.
JUNE, 1984.

PHOTO-TYPE-SET-& LITHOGRAPHED AT LOTUS PROCESS, COLOMBO 9

CONTENTS

Executive Summary

The aim of the National Agriculture, Food and Nutrition Strategy (NAFNS) is to assess Sri Lanka's agriculture and food situation and establish priorities for future sectoral development. The primary responsibility for the sub-sector strategy formulation rested with the inter-ministerial task forces on: (1) crop agriculture, (2) smallholder tea and rubber, (3) coconut, (4) fisheries, (5) livestock, (6) land and water resources development and (7) nutrition. The National Planning Division was responsible for the overall co-ordination of the Strategy. This document is presented for further discussion and review.

One limitation on agricultural development is the quantum and share of resources allocated for investment. In 1982/83, nearly two-thirds of the total development expenditures went to irrigation and land settlement; of this, almost ninety percent was taken by the Accelerated Mahaweli Development scheme. A conscious policy decision is now required to accelerate agricultural activities outside the Mahaweli areas to ensure balanced sectoral development and regional balance in resource allocation.

Sustained agricultural development requires a steady stream of innovative research. At present arrangements for deciding agricultural research priorities are weak and communication between researchers and planners/policy makers is inadequate. The research system must therefore be streamlined through a Council for Agricultural Research Policy to advise government on research priorities and the promotion of inter-institutional research projects.

The transition from subsistence to commercial agriculture needs improved rural credit. The institutional credit system has expanded its branch network and has been successful in mobilizing rural savings. But it has performed poorly in extending short and medium term agricultural credit. In fact, a scenario of high default, declining volume of loan advances in real terms and rigid collateral requirements restricting

small farmer access to credit still prevails. A major change in the rural credit machinery, including the incorporation of the informal credit network into the institutional mainstream, the review of collateral requirements and the extension of a network of regional and private banks is imperative.

Improvements in agricultural marketing must move in tandem with efforts to improve agricultural credit. Marketing of agricultural products suffers from insufficient liquidity for procuring increasingly larger product volumes and inability to invest in improved marketing infrastructure. Marketing could benefit from development of improved linkages between farmers, traders and credit institutions. A special marketing programme for rice in surplus districts and other selected products should be tested.

One of the major modalities in influencing changes in the agricultural sector has been the use of pricing policies, including taxes and subsidies. Government pricing policy will have to center on an overall scheme of economic liberalization that considers the reduction of subsidies on fertilizer and consumption and the establishment of a revenue collection system for irrigation water. In the sugar and dairy industries, some degree of price insulation from the international market is required to stimulate growth. Also, direct subsidy programmes in the plantation crops sector will have to continue in order to reverse the deteriorating sectoral trend. There is an increasing awareness by the Government of the need for systematic and co-ordinated review of pricing policies, since past policies have been generally ad-hoc, cropwise and unrelated to each other. Thus a Price Policy Monitoring Unit to collate and analyze essential pricing data must be set up. Future pricing policy must be attuned to ease the transition from a rice deficit to a rice surplus economy, to promote efforts towards self-sufficiency in selected agricultural commodities and diversification of agricultural exports.

Agro-industries are a key element in the generation of off-farm employment and form the basis for rural industries. This sector is hampered by high import duties on essential inputs, high risk attached to this form of investment and shortage of technological know-how. It is essential to identify specific and future potential areas, take advantage of techniques developed in the Far East and provide a conducive policy atmosphere for agro-industrial development.

Export promotion of agricultural commodities is often hamstrung by the lack of a co-ordinated market promotion/penetration strategy, inadequate market information and restrictive or inconsistent trade regulations. The first step in promoting a more competitive trade regime should be the progressive removal of institutional and regulatory barriers to trade. An Overseas Market Information Unit must provide up-to-date information on commodity trends to the public and the private sector, obtained through an international brokerage service. A schedule of joint public and private sector trade missions, to established and potential markets, must be regularized and actively promoted.

The unresponsiveness of agricultural institutions to effective development planning/management is a formidable obstacle in running an agricultural support service which could adapt to development requirements. Improvements must begin with the rationalisation of public enterprises if necessary, and enlisting private sector expertise where it could help. Improvements also depend on the provision of performance incentives for better management. Dynamic implementation of development programmes requires training of senior officials and entry-level professionals in rural management. Agricultural planning could be improved by a comprehensive programme to strengthen key central planning bodies to enable closer participation in policy analysis.

Sri Lanka is within reach of rice self-sufficiency due to increased cropping intensity, better water management, varietal improvement, the annual addition of 18,000 acres of new rice land and an environment of positive incentives. In the near future, the prospects for disposal of rice surpluses in external markets remain poor because of (1) low quality of domestic rice, (2) relatively high production cost, (3) the thin international market for rice and (4) high costs of entry into international rice trading. The best alternative for disposal of surplus rice seems to lie in the domestic market through the use of positive price incentives to encourage increased use of rice for wheat and the diversification of production in the well drained irrigated lands in *Yala* season (dry zone areas).

Even the rice production improvements are limited by sub-optimal water management in major irrigation schemes, poor input delivery systems in the minor schemes and lack of varieties suited to the micro-environments of rainfed zones. In irrigated zones, the main improvements needed are crop timing, better water and input supply delivery.

In the rainfed areas, varietal improvement adjusted to micro-environment is necessary.

Progress towards self-sufficiency in sugar should be a major objective of agricultural development. To accelerate import substitution, the Government favours growth through partnership with private companies who have the necessary technical and managerial expertise and financial resources to expand the industry. The other element of the strategy will be to grant a measure of protection to the industry, identify and develop areas suitable for expansion and promote cultivation of sugar cane on a combination of outgrowers and nucleus estate holdings. By mid-1990's sugar demand will be around 350,000 tons and the nation could hopefully supply 40% of its needs. This is an ambitious, achievable target for the next decade.

Many factors inhibit 'other field crops' development. For one, Government support services have had a traditional in-built bias in favour of rice, resulting in relative neglect of these crops. Yields are low, the research base is thin and price support policies have only marginally benefitted producers. A multi-faceted programme consisting of technological development, better extension outreach and marketing facilities is indicated for these crops. Their development should mainly center on the encouragement of regional specialization based on dominant crops within each region but under a farming systems perspective.

Investment in irrigation remains the cornerstone of agricultural infrastructure development. Future strategy in irrigation development calls for a shift in priority from the construction of new irrigation schemes to rehabilitation of existing schemes, greater emphasis on water management and recovery of operation/maintenance costs through fees. Completion of the ongoing downstream programmes under the Mahaweli Scheme must be expedited to reap its full benefits. Expansion of the network of small scale tanks and completion of major irrigation projects now underway without cost overruns is necessary. A sound plan and schedule for irrigation system maintenance and rehabilitation must be developed. Presently, there is minimal planning on watershed management, although large investments have been devoted to major watersheds. To protect these investments and ensure rational utilisation of land and water resources, there has to be co-ordinated watershed management. After completion of the Mahaweli Projects, opportunities

for land settlement will reduce. In the future, land consolidation and tenancy reforms are needed to improve agricultural productivity. Future agrarian reforms must not disturb rural investment activity.

The country's forest cover is fast diminishing and timber supplies cannot keep up with demand. The present rate of depletion will exhaust Sri Lanka's forest cover in 30 years and cause irreversible ecological damage. It is imperative to intensify forest management and conservation, for which purpose, strict adherence to the recommendations of the Forestry Master Plan now being prepared, is a must. Large reforestation programmes should be initiated after technical and managerial capabilities have been firmed up.

While fish production has increased substantially in 12 years, it is limited to coastal fisheries where future expansion is limited by available resources. Therefore, future development must be focussed on offshore, deep sea fisheries and aquaculture. High priority in the fisheries sector must be given to the compilation of suitable hydro-biological data, an inventory of fish resources, strengthening of the private marketing system as well as training of extension staff in techniques of fresh and brackish water culture. In order to improve operating efficiency, under-utilized shore facilities operated by the state should be leased out to the private sector on attractive terms.

The livestock sector should get high priority for future investment. The current subsistence-based production system must be transformed into a commercial system. The domestic dairy sector is constrained by the output-pricing regime which does not relate to the increase in prices of the main feed inputs. Development of suitable pasture and fodder systems has been slow and institutional arrangements for milk and milk products are at present relatively inefficient. Future development will involve institutional reform in the dairy sector, improvement of feed resources and development of integrated livestock management support services. Also, lines of credit to feed manufacturers to procure grains will be needed to improve feed availability. A mix of positive pricing signals plus some form of tariff protection to the dairy sector will have to be provided.

Smallholder tea and rubber plays an increasingly vital role in these two important agricultural exports, but the yield from smallholdings is

generally half the yield from the estates. For these crops, support services, institutional credit and fertilizer is difficult to come by. The extension services are over-burdened in distributing and administering development subsidies at the expense of extension outreach. Marketing outlets for smallholders are limited and they get low prices for their produce due to lack of competitive trade channels.

The institutional bottlenecks hampering the smallholders in the tree crops sector must be removed and an integrated tree crop extension system, freed from the trammels of administering development subsidies, should be formed. The institutional feasibility of this system will have to be tested. A smallholder processing improvement programme for rubber should be developed. Latex collection must be financed to facilitate the interface between the farmers and processors. For the tea sector, investments will have to be made in transport and on the tea infilling programme, while smallholders in areas with poor returns should be encouraged to diversify into other crops. For smallholder tea and rubber, subsidies will have to be rationalised and placed on a firmer footing by regular collection of production cost data. Also, alongside an output price incentive to smallholders, production subsidies will have to be reduced.

Yields from the coconut sector – a major source of foreign exchange and government revenue – have been declining with the rate of senility increasing and an emergence of quality problems in desiccated coconut which have lost Sri Lanka major markets recently. To revitalise this sector, private-producer companies undertaking marketing, credit and input supplies should be organized. After these companies are in position, a producer returns stabilization scheme could be tested. Investments are necessary to renovating the desiccated coconut processing facilities, along with requisite changes in the organization of the industry. To assist the coconut smallholder an active programme of coconut intercropping and a mixed coconut/livestock system should be encouraged.

An increasing emphasis on minor perennial crops (MPC) to reduce undue dependence on tea, rubber and coconut for foreign exchange is indicated. The main MPCs are cocoa, coffee, cinnamon, cardamom, pepper, clove and nutmeg – accounting for 5% of agricultural exports. Grown as they are in small units, the scope for development of production is limited. They also lack institutional support and the marketing out-

lets are weak. The future lies in an enhanced scale of production by encouraging more medium and large scale farmers to grow these crops. Village auctions and bilateral negotiations will promote marketing improvement. Another means available would be provision of incentives for direct purchase by exporters.

Historically, nutrition has been under-girded by subsidy whether through rice rationing or through food stamps. Future strategy to improve nutrition will hinge on expansion of employment in agriculture. It may become necessary to restrict the beneficiaries to the really disadvantaged, thereby helping to amplify the impact of the food stamps. This programme could also assist in future disposal of any surplus rice. The programme to improve nutrition should, from now on, have a regional focus in areas where agricultural activity is linked to nutritional deterioration. In such areas, the expansion of employment will have to be the principal means of nutritional improvement. In all other areas, food supplementation programmes should be emphasised.

The NAFNS has identified a tentative programme for the major new sectoral investments. It is displayed in the table that follows.

Prospective Major Investment: Estimated Timing (Year) and Total Cost
(Million Dollars)

Project	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*
(a) Tank Rehabilitation/Irrigation Management	55	...	...	75	...	...	...	...	75	...
(b) Agricultural Research Development	...	30	...	...	...	...	...	...	20	...
(c) Forest Resource Development/ Watershed Management	...	...	...	...		40	...	...		20
(d) Rural Credit	...	20	...	...	...	...	..	20	...	...
(e) Tree Crop/Agriculture Extension	...	...	25	...	...	...	...	...	15	...
(f) Dairy Development*	60	...	...	...	...	...	60	...		...
(g) Sugar Self-Sufficiency Programme*	...	...	...	...	40	...	...	60	...	...
(h) Off-Shore/Brackish water Fisheries Development*	...	...	20	...	...	20	...	...	...	...
(i) Minor Perennial Crop Development	...	...	...		20	...	...	...	...	...
(j) Agro-Industrial Promotion		...		15		...	...	15	...	...
(k) Technology Development for Other Field Crops	12	...	...	...	...	...	...	...		15
(l) Upland Farm Stabilization	...	...	...	...	...	...	25	...	..	...
(m) Marketing Improvement Project	...	...	15	...	...	...	...	15	...	...
(n) Smallholder Tea Development	...	...	...	20	...	...	...	...	20	...
(o) Smallholder Rubber Development	...	...	25	...	...	...	...	20	...	...
(p) Coconut Marketing and Institutional Reforms	...	...	...	15	...	...	...	...	...	15
(q) Coconut Intercropping	...	...	...	...	...	25	...	...	...	...

*main component is private capital

NATIONAL AGRICULTURE, FOOD AND NUTRITION STRATEGY

Introduction

Agriculture as the single largest productive sector in the Sri Lanka economy accounts for 27 percent of GDP. It employs 46 percent of the labour force and earns 58% of all exports, including traditional processed agricultural exports. Sri Lanka has recently rapidly diversified its export base; in 1971, agricultural exports formed 91 percent of export receipts which declined to 58 percent in 1982, reflecting the emphasis on export promotion.

Budgetary resources to agriculture doubled over the past decade, reflecting the importance attached to this sector. Heavy emphasis on resettlement and agricultural expansion accounts for the high budgetary provision for the Mahaweli Development Programme. Recurrent expenditure on agriculture nearly doubled in the last ten years but agricultural export duties as a share of total government revenue declined from 40% in 1979 to 16% in 1982, reflecting falling prices of primary product exports.

The importance of agriculture in economic growth has prompted the Government to define a National Agriculture, Food and Nutrition Strategy (NAFNS). The formulation of this strategy is set within the objectives enunciated by the government. These are:

(a) Achievement of self-sufficiency in basic foods – rice, milk, sugar, fish and pulses.

(b) Expansion of export capacity to increase contribution of agriculture to the balance of payments.

(c) Enhancement of incomes and creation of new employment opportunities in the rural sector.

(d) Improvement of nutritional status of the people.

In formulating the strategy, it became clear that a vast potential in agriculture to generate rural employment still exists. These opportunities exist in basic agricultural production, in agro–industrial processing and in ancillary services supporting agriculture. There are good prospects to raise incomes and improve nutrition of smallholders through removal of constraints to productivity, wider opportunities to produce and market their crops, and a more versatile and adaptive institutional framework to execute the required changes.

Rural development lies at the heart of the Agriculture, Food and Nutrition Strategy. It is a strategy that addresses the needs and aspirations of the rural community, by enlisting their involvement in measures to improve productivity. The more talented in rural society have migrated to the cities in search of opportunities seldom realized. The more prosperous in rural society also tend to live in urban areas. Thus, the rural society has been drained of its most enterprising elements. In the past, development has reached rural society mainly via agriculture and rural development programmes which will have to be intensified in the future.

Institutional and support services will be primed to assist smallholders who must be brought into the mainstream of development efforts, thereby initiating self sustaining changes within the rural economy. Since smallholders have proved to be responsive to policy stimuli, it is proposed to foster significant change in their production regimes and livelihood through proper pricing incentives, research, extension, credit and other forms of support.

Government policy relies heavily on private initiatives to bring about these changes. Through clear signals and financial support, the private sector will be encouraged to actively participate in the marketing of crops, the production and supply of inputs and all other facets of agricultural production. In realizing these objectives, harmonious cooperation between government and the private sector is essential, to help develop an agriculture consistent with overall economic and social objectives.

The following sub-sectors constitute building blocks of this strategy: crop agriculture, smallholder tea and rubber, coconut, livestock, fisheries, land and water resources and nutrition. The body of this

strategy report is a summary of the major findings contained in the individual sub-sector reports and is presented for further discussion and review. The sector wide strategies deal with the measures proposed to handle development constraints cutting across the subsectors. Those activities required to induce positive change within a particular NAFNS sub-sector are outlined. Certain areas, such as the Plantation Crop Estates and the Mahaweli Programme have been omitted because they have been the subject of exhaustive analysis elsewhere. The sub-sectoral strategies described are not a final investment programme. They are an attempt to evaluate sub-sectoral performance, identify pressing development constraints and suggest alternative ways to overcome them. These strategies provide the framework for future investment plans in the agricultural sector.

Section A

SECTOR—WIDE STRATEGIES

Resource Allocation Implications of the Mahaweli Scheme

In 1982/83, nearly two-thirds of government development expenditures went to irrigation and land settlement. Of this sum, approximately ninety percent was allocated to the Accelerated Mahaweli Development. Over the next decade, an average of 22,000 acres of land will be settled each year in this programme. From 1986 onwards, the bulk of the capital expenditures committed to the Mahaweli Development will be for downstream development, with the greater part of canal construction nearing completion.

Estimates of per-acre development costs in Mahaweli settlement areas range from approximately Rs. 150,000 per acre in system H to nearly Rs. 400,000 per acre in system B, with a median figure of Rs. 200,000 per acre. On the newly settled lands double cropping of paddy, at high yields of 200 bushels per acre per year will yield a net return of approximately Rs. 10,000 per acre per year. Consequently, the payoff from agricultural output alone will span a long time period. However, multiplier effects on employment and incomes in the construction and operation phase of irrigation schemes must be taken into account.

As a corollary, intensified attention must be paid to the other sectors of the agro-economy hitherto under-funded due to the pressing financial requirements for the Mahaweli Programme. Over the next decade, approximately another 200 million dollars, over the already committed budgetary resources for the Mahaweli Programme, will be required to complete systems A and B. Three quarters of that total is for system A activity alone. The anticipated excess funding requirements for medium term Mahaweli development activities already exceed the Finance Ministry's estimates of total resource availability for all new projects

in the period 1985 to 1987. A conscious policy decision is, therefore, required to accelerate agricultural activities, vis-a-vis the Mahaweli Programme, to ensure that there is:

(a) balanced sectoral development

(b) proper regional balance in investment allocation

(c) priority of investment for high-yielding projects and programmes

(d) institutional growth in non-Mahaweli supporting services

(e) adequate short-term growth in the agriculture sector to fuel long-term economic growth.

A pre-requisite to the successful implementation of the NAFNS is to revise priorities in agricultural development to reflect a more balanced funding of sector requirements.

Guiding Future Land Use

Topographical and rainfall characteristics of the wet zone offer the best conditions for tree crops cultivation. This zone is presently fully utilized and as a result, the various tree crops strongly compete for the available land resources. This is specially so in the low and mid country wet zone. Current subsidy schemes to promote the planting and replanting of tree crops have not given full weightage to this competition. As a sequel, the subsidy level of one crop is set independently of the subsidy level for the others, thus influencing shifts in land utilization patterns responsive to the subsidy level and not necessarily to a calculus based on optimum land use. In the future, the subsidy schemes will have to be regularly reviewed taking into account the relative profitability of the crops and designed to preserve the productive potential of land in regions running the risk of future soil depletion.

The agricultural frontier in Sri Lanka lies in the dry and intermediate zones. There are 2.3 million acres of rainfed lands in the intermediate, mid-country and dry zones that could come into production after more detailed study of their location and proper identification of the crops that could be grown. In addition, some of the 1.5 million acres of forest cover (outside the game reserves) can be agriculturally used after adequate forest management conservation measures are taken. Some 0.9

Extent of Available Rainfed Lands in the Dry and Intermediate Zone
('000 acres)

District	*Lands with immediate potential*	*Lands under forests with good soils*	*Future potential lands with technical advances*	*Lands with low agricultural potential*	*Irrigated lands*	*Permanent Crops*
Anuradhapura	395	232	12	353	198	324
Amparai	143	163	12	464	54	156
Badulla	124	—	—	180	111	185
Batticaloa	111	50	74	188	111	185
Hambantota	148	14	5	173	74	198
Jaffna	40	15	222	10	27	148
Kurunegala	235	—	—	54	25	662
Mannar	62	67	230	49	20	30
Matale	188	—	—	89	10	161
Moneragala	277	173	—	524	7	79
Mullaitivu	44	218	128	96	12	74
Polonnaruwa	27	97	—	346	198	86
Puttalam	198	53	180	188	7	230
Ratnapura	143	—	—	49	25	420
Trincomalee	99	177	20	116	62	94
Vavuniya	128	260	—	20	12	74
Total	2363	1519	884	2899	953	3105

million acres, for which technological development is the only barrier, await more productive utilization.

Agricultural Research

Agricultural research has been important in maintaining and improving productivity in a wide range of agricultural commodities. It has made conspicuous contributions to increasing productivity of rice, tea, rubber and coconut which have received the benefit of research backstropping for many years. Research has a continuing role to play in providing information to guide development decisions by government, to create new opportunities for producers to compete successfully in export markets, to replace costly imports and to improve income.

The agricultural research system, covering crops, livestock, fisheries, forestry and land resources currently employs about 500 research officers distributed in at least 11 research institutions in 7 Ministries, and there is further research capability in the 180 staff in the Faculties of Agriculture and Veterinary Medicine and Animal Science in the Universities. About 47% of the agricultural research scientists have received post-graduate training in research methodology and subject specialization which constitutes a sound basis for the growth of a well qualified research cadre. Reasonably good physical facilities have been built up over the years so that good research can be done at many research stations, but by no means at all stations or on all important research topics; new requirements to exploit modern opportunities constantly arise.

The determination of research priorities depends on the information needs of the client. The linkages between the government policy makers, producers, processors and the researchers are weak and must be strengthened. This is especially true of the critical linkages within the line-ministries, between the policy makers and the research stations. The special needs of the smallholder must be taken into consideration in the design of research projects. This should be accomplished by establishing inter-disciplinary, inter-institutional research ventures based on joint agro-economic and socio-economic research teams at the farm level.

There is currently no body or forum for developing national agricultural research priorities on a perspective wider than that of a single ministry. Inter-institutional co-ordination/consultation is very weak. A

Council for Agricultural Research Policy, representative of policy makers, research scientists, producers and consumers, will have to be established to strengthen these connections and to advise government on research priorities.

Implementation of the research programme requires appropriate financial resources, trained manpower and facilities for operations. The overall funding for agricultural research in Sri Lanka in 1983, at Rs. 180 million is about 0.77% of the Agricultural Gross Domestic Product which is higher than in many developing countries but well below the 2% recommended as a guideline by the World Bank. However, the average recurrent expenditure per research officer in 1983 at Rs. 245,000 (or Rs. 351,000 including capital) tends to be very low: in 1980 it was in the bottom three of a list of 67 developing countries, in which 26 countries allocated more than four times as much as Sri Lanka to research expenditure per scientist. The low level of 1.3 technical support staff per research scientist and very low operational funding at Rs. 118,000 per scientist severely reduces the scope for efficient research by well trained staff. Operational funds and numbers of support staff will have to be gradually increased to provide scientists with adequate resources to carry out high quality research.

Allocation for Agricultural Research System (1983)

Capital expenditure (Rs. mn.)	53.6
Recurrent expenditure (Rs. mn.)	124.0
Total expenditure (Rs. mn.)	177.6
Personal emoluments as % recurrent expenditure ...	52%
Operating costs as % recurrent expenditure	48%
Number of research scientists	506
Average total expenditure per scientist (Rs. thousand) ...	351
Average recurrent expenditure per scientist (Rs. thousand) ...	245
Average recurrent operating costs per scientist (Rs. thousand)	118
Average personal emoluments per scientist (and supporting staff) (Rs. thousand)...	127

The distribution of funding to the major agricultural commodities in relation to their production shows that research in livestock, forestry, fisheries and minor export crops has been underfunded in relation to the value of each: these research sectors will have to be allocated a greater share of research resources to redress this imbalance.

A systematic manpower training programme must be established. The distribution of specialised disciplines over the agricultural research community shows that there are important gaps. Candidates for training must be assigned to fill these gaps. A small number must be selected for special training in research management, and in modern emerging research fields so that Sri Lanka can take full advantage of new opportunities as soon as they are available. A vigorous training programme for technical support staff will also have to be pursued.

A system of programme-budgeting has to be introduced in all institutions to facilitate more efficient research planning and realistic evaluation of performance. Extra administrative and accounting assistance should be made available to directors of research institutions to help them pay closer attention to formulation and control of the research programme. Schemes of service and promotional criteria should be recast to reflect effective research performance.

Rural Credit

Sri Lanka requires an improved rural credit system to ensure successful agricultural development, and to use more effectively available land, water and labour resources. The country's realization of the attractive agricultural development potential will depend largely on availability of adequate rural credit at reasonable rates and terms.

The relatively small amount of rural credit is a major hindrance to agricultural development. In 1981, less than 15 percent of loan advances by commercial banks were for agricultural purposes. The bulk of institutional credit for smallholder agriculture is provided by the Bank of Ceylon and the People's Bank due to the low priority other commercial banks attach to this type of lending. It is estimated that these two banks provide less than 5 percent of the short-term financing needs for paddy cultivation, with the greater part of capital requirements met from savings and informal credit channels.

Per capita agricultural credit to the rural sector declined, in real terms from Rs. 7.39 per capita in 1969 to Rs. 1.66 per capita in 1982 (in 1968 it was Rs. 2). In poor crop years, total recoveries are as low as 25% of total loans advanced. Even in relatively 'good' production years, the recovery rate rises to only 75 to 80 percent of loan advances.

Rural Credit Performance

(Rs. Million)

	Total Loans Advanced	Total Recoveries	Recoveries as % of Total Loans
1973/74 ...	136.6	75.2	55
1974/75 ...	112.4	61.0	54
1975/76 ...	113.3	62.5	55
1976/77 ...	180.7	70.9	39
1977/78 ...	527.6	138.3	26
1978/79 ...	106.2	64.0	60
1979/80 ...	78.4	63.0	80
1980/81 ...	89.8	68.3	76
1981/82 ...	122.9	34.9	28

Institutional credit is extended primarily on the basis of policy directives irrespective of important agricultural development and credit considerations. Administration is ineffective because of inadequacy of agriculturally trained staff. There is a tendency by the banks to treat rural credit as a secondary activity, and they are progressively retreating from rural lending because of high default rates and the high expenses of administering and recovering small loans.

Institutional credit sources have been estimated to supply less than 25 percent of all small farmer credit; the number and amount of loans continues to decline each year as defaults increase. Institutional credit is especially difficult to obtain in areas where land holdings are remote and small and in dry areas where irrigation supplies are uncertain. Often farmers prefer to use private credit because (a) private sources are more convenient, (b) the procedures for obtaining bank loans are difficult and time consuming, (c) there is fear of legal consequences in the event of crop failure, and (d) many hidden costs of institutional credit such as travel make it unattractive.

More than 80% of institutional lending is for short-term cultivation loans. The rate of absorption for medium and long-term loans is very low due to problems of insufficient security, inadequate inter-agency co-ordination and improper credit planning.

Almost all rural credit schemes are conceived, designed and launched at the national level. Accordingly, banks are called upon to finance

projects with either little or no involvement in the formulation of projects. Similarly, the regional bank branches carry out credit disbursement by following the procedures laid down in instructions from the Bank's head office. At times, projects may not be suited to local conditions or regional banking personnel may be indifferent to the project directives advanced by the central offices.

The assessment of credit-worthiness of borrowers is an important determinant of the flow of institutional credit. The application of conventional banking norms pertaining to security and collateral excludes a large number of prospective rural borrowers. A client borrowing from a Sri Lankan bank is generally required to offer property, stock-in-trade or other tangible assets as security, or provide acceptable guarantors. If it is property that is offered, the owner must possess clear title to that property for a period of at least 35 years. The high degree of land fragmentation as well as the complicated land tenure patterns adversely affect the ability of the farmers to offer acceptable security to the banks.

The weaknesses in credit delivery are not due to a shortage of banking facilities in the rural areas. In 1981, there was a bank office – commercial and rural bank – for every 35,000 rural inhabitants and, with the establishment of rural bank branches and the Agricultural Service Centre branches of the Bank of Ceylon, the ratio of banks to rural inhabitants is 1 to 7,800 people. The poor performance in the rural credit sector, despite the availability of a large network of branches and the availability of attractive Central Bank refinancing support, points to a need for bringing about a change in the attitudes of the banks towards the problems of the rural sector.

Better integration of the formal and informal channels of credit are important to develop a sound rural credit structure. The non-traditional or informal sector comprises a wide variety of landlords, factory owners, professional money lenders, friends and relations. It is advantageous to try to incorporate the informal credit sector into the institutional credit network of Sri Lanka. The best means of linking the formal and informal credit networks would be for banks to appoint loan agents outside of the formal financial institutions. In such a system, the full authority for determining the eligibility and credit-worthiness of borrowers, as well as ensuring the repayment of loans will rest with the informal sector lenders. Thereafter, the main function of the financial institutions

would be to make capital available to the private lenders. Such a system would help to promote competition among the private lenders, reduce the interest rates charged by private lenders and improve the spread and scope of credit extended in the rural areas. On a pilot basis, loan agents should be selected from the informal credit sector to test such integrated rural lending schemes. Initial groups to select from would include tree crop factory owners that service smallholders, storage facility owners and respected commodity brokerage houses. In addition, the network of lending institutions for medium and long-term rural investment should be extended by granting government refinancing privileges to selected mercantile credit agencies and finance companies.

A significant deficiency in the rural credit system is the lack of concern about the forward and backward linkages required to develop successful projects. The most important neglected linkage in many a credit scheme is marketing. Lack of marketing facilities not only reduces incremental project income but also adversely affects the capacity to recover loans. Greater attention by the institutional lending sector to providing facilities for marketing, transport and storage is required. A pilot programme of marketing lending should be tested in the paddy trade sector.

The development of a rural network of regional banks specifically geared to support rural credit needs will supplement the institutional lending efforts of the state banks. To ensure that the credit is being efficiently delivered to the farm sector, a great deal of technical expertise must be marshalled for proper supervision of the credit programme. Strict supervision of a rural credit programme requires that a set of rules and guidelines for loan making, loan servicing, loan collections, record keeping, monitoring, reporting, evaluation and training be promulgated and adhered to. It is recommended that supervisory loan officers be provided until a ratio of one officer per 200 farmers/clients can be maintained. Future application procedures should be streamlined through the use of longer-period cultivation loans with the cultivators repayment record serving as security.

A credit plan is required. The banks should develop credit and savings mobilisation plans for each region/district, identifying and assessing the credit needs and then make suitable arrangements to finance those needs. District credit plans can serve as a means to establi-

shing meaningful linkages between the bank's lending and the government's development programme. In such plans, the intended beneficiaries of lending programmes must be carefully identified. At present, statistics on asset holdings of credit recipients are not tabulated or collected in certain cases. To facilitate future targetting of institutional credit, bank officials must be required to submit a beneficiary asset profile with their lending reports.

Another means of improving the flow of rural credit to the farm sector is through the establishment of a network of private rural banks. These proposed institutions would only be authorised to make loans when it is reasonable to believe that, with the assistance provided, production would be increased and the loan would be repaid as scheduled. These private banks would target lending to important rural and agricultural development endeavours. To induce the private sector into formal banking business in the rural areas, a set of positive incentives must be offered. This may include shared equity arrangements, liberal refinancing guarantees, preferential interest rate policies and the strict enforcement of debt recovery conditions. A private rural credit scheme should be fully designed and then implemented, as a pilot effort in a few regions.

Agricultural Marketing

Improving the agricultural marketing system should receive high priority in future plans for agricultural development. The marketing bottlenecks inhibit the effective movement of products and information throughout the nation. Inefficiencies in the marketing sector add to the cost of final products. Lack of adequate marketing facilities is a formidable barrier to the development of new cropping systems in remote areas. Problems of maintaining high quality standards for domestic consumption and export can be traced largely to improper handling, storage and transport of the highly perishable commodities. Special lines of credit will have to be developed to modernize marketing infrastructure in storage and transport. The feasibility of alternative institutional mechanisms to regulate the marketing system must be examined early.

There are three critical drawbacks to more effective marketing. First, shortage of working capital inhibits expansion of marketing of agricultural products and contributes to trade inefficiency. For example,

many paddy millers/traders face acute cash flow problems because of insufficient working capital for paddy purchases. Secondly, to the farmers, need for cash immediately after the harvest forces them to sell their crops to traders, often at fairly depressed prices. Finally, as was discussed previously, farmers face severe difficulties in obtaining institutional credit, primarily due to problems in putting up adequate collateral.

One means of breaking out of this cycle of insufficient liquidity and cash shortage is to develop special credit lines for product disposal. Thus, credit could be advanced to the trade community for the marketing of, for example, rice, 'other field crops' and perishable products such as fish and vegetables. While it would be desirable to expand the liquidity in the distributional sector, it will be most difficult to target the required increase in credit to specific crops or specific regions. Leakages from a marketing credit programme are likely, particularly since traders are often involved in several lines of business.

Another means of improving the marketing system would be through development of improved linkages among credit sources, farmers and traders. One solution would involve issuing special lines of trade-credit at the state banks. Farmers would be allowed to bring their products to a storage facility where they would receive a bonded chit for their produce. The farmers could, at a later date, choose to sell that produce at the prevailing market rate, less storage costs. In the meantime, traders could turn-over the grain in storage and collect the short-term profits. Basically, such a scheme involves an extension of short-term refinancing privileges to the private grain trade and storage network, similar to that which is offered to the Paddy Marketing Board. For such a scheme, a simple system of grades and standards, mechanisms for trade arbitration and adequate storage facilities must be first in place. This marketing improvement arrangement should be pilot tested for paddy in important surplus producing/trade bottleneck areas.

Agricultural Price Policy

Agricultural pricing policy is a powerful means of sending signals to producers and consumers to guide the allocation of scarce development resources. But to achieve this outcome, the signals must be clear. When pricing policies are indeterminate or imprecise, wrong signals will be transmitted throughout the economy and incorrect allocation decisions will be made. The same negative result will be obtained if through

controls, such as duties, taxes and subsidies, prices are kept in the wrong ratio to one another.

In Sri Lankan agriculture, there is a long history of direct Government intervention in pricing, which has traditionally been largely confined to rice, and agricultural inputs. For rice, the general thrust of pricing policy has been to maintain low consumer prices while subsidising the producers through input subsidies. Traditional export crops have been heavily taxed while only a fraction of the government revenue from the tax has been returned in the form of replanting subsidies, research and extension. Agriculture benefits from generalized subsidies, cross-sectoral in nature – particularly those on water and fertilizer. Historically, a variety of measures have been used to ensure an adequate supply of staple food to the poor at reasonable prices. Presently, the primary means of protecting the consumption levels of the poor has shifted from the use of the ration system to that of a food stamp programme operating through the normal market channels.

Post–1977 agricultural pricing policy has centred on an overall scheme of economic liberalization. In real terms, subsidies on fertilizer and consumption have been reduced. In 1984, a revenue collection system was established for irrigation water. At the same time, pricing interventions have been extended for a number of important commodities such as pulses and sugar. In addition, direct subsidy programmes continue in the plantation crops sector in an attempt to mitigate the alarming trends witnessed in this sector.

Direct intervention in rice procurement and distribution has formed the cornerstone of welfare policies for the past three decades. Since 1977, direct government participation in rice distribution, mainly through Paddy Marketing Board, has been virtually eliminated and its role in paddy procurement significantly reduced. Purchases of paddy by the Paddy Marketing Board dropped from 42 percent of total production in 1972 to 4 percent of total production in 1982, a period in which total rice production increased by nearly 70 percent. Its future role will have to be confined to supporting the floor price and operating at least a non-profit/no-loss buffer stock system.

Since 1977, rice prices were allowed to rise to world market levels. There have been dramatic increases in the open market prices for

paddy since 1979, which to some extent has been offset by increase in input costs. However, net returns to producers have remained relatively stable, and for this to continue, the ratio of paddy price to cost of fertilizer will have to be maintained at least at the level of 3:1.

The high dependence of the population on starchy staples in the diet, and their flexibility in staple choice affords the government powerful means to influence the mix of future grain consumption. In the future, the government favours influencing grain consumption through manipulation of the Guaranteed Price Scheme (GPS) for rice and the ex-factory flour price for wheat. An assessment of future grain supply and demand suggests that relative rice/wheat price manipulation can affect foodgrain imports, the timing and level of rice surplus and the composition of domestic foodgrain consumption. It also appears that manipulation of the rice to wheat price ratio will have little overall effect on rice output and on per capita grain consumption levels. The former is due to the relatively 'price-independent' acreage expansion expected in the Mahaweli areas, the already high fertilizer input levels and the widespread adoption of HYV's. Price forecasting, suitable procedures for strategic stockpile management and the use of pricing to divert more consumption towards surplus grains will have to assume greater importance.

The traditional export crops, tea, rubber and coconut provide a substantial share of export earnings. In 1978, the tree crops accounted for 73% of total export earnings and 47% of government revenue. By 1982 this dropped to 47% of export earnings and 15% of government revenue, reflecting the decline in production and market share of these commodities as well as the diversification of government financing sources. The major export earner is tea, providing Rs. 1.6 billion of government revenue in 1982, down from Rs. 3.3 billion in 1978. Rubber is the nation's second most important tree crop export; taxes on exports accounted for 10% of total government revenue in 1980 and have declined to 5% by 1982. The tea sector is taxed both through an ad-valorem tax and, of greater importance of late, through a specific duty. The rubber sector is subject to a sliding scale of duties on exports. Coconut is taxed on a sliding scale, according to the prices which obtain on the international market. However, for coconut, a prime objective of the government has been to ensure an adequate supply of coconuts at a reasonable price for domestic consumption. The burden

of the export duty as a proportion of export values for the major tree crops is as follows:

	1978	1979	1980	1981	1982
Tea (%) ...	51	48	32	30	25
Rubber (%) ...	52	52	56	53	37
Coconut (%) ...	27	20	18	17	13

These duties on exports are far higher than in the other tea and rubber exporting nations. There is a great deal of evidence to suggest that the high taxes on exports are largely responsible for inadequate producer incentives, decline in output and international market share and sub-optimal investment in processing and handling. In the future, government taxation policy should be rationalized in such a fashion that market penetration and producer incentive objectives are accorded a higher priority.

To counterbalance the high taxation level, the government has provided a wide range of development subsidy programmes. In 1975, the rubber replanting scheme covered 25% of total replanting costs. By 1984 this percentage had increased substantially to 62% of replanting costs. For low country tea, the replanting subsidy in 1982 was estimated at 28% of total costs (or approximately 80% of total non-labour costs) while the subsidy on coconut replanting in the same year was estimated at 16% of total cost. There are a number of subsidy programmes besides replanting such as new planting, infilling, underplanting, multi-cropping and land improvement. Subsidies are decided upon separately for each crop based partly on the expected benefits/costs of replanting and the fiscal resource availability. Future subsidy policies should be based on accurate cost of production estimates and should be closely geared to the taxation policy in order to ensure strong exports.

Recently pricing policies have been mobilised to support the Government's aim of future sugar self-sufficiency. Imports of sugar are taxed to support domestic production. In 1983, the average duty levied on imported sugar was Rs. 3,500 per ton, yielding 0.87 billion rupees to the Government. The total cost of importing sugar in 1983 was 1.58 billion rupees. Future development efforts in sugarcane will have to concentrate on providing an investment climate conducive to rapid

inflows of foreign skills and technology. Part of this will involve the provision of a guaranteed procurement price for sugar that will offset the high capital and technology transfer costs of the new foreign supported ventures. In 1984 the ex-factory price of refined sugar was equal to Rs. 11,000 per metric ton whereas the world market price, CIF Colombo, was equivalent to Rs. 6,600 per metric ton. At present, world market prices for sugarcane are depressed. However, it is likely that in the future Sri Lanka will continue to insulate its domestic price from the world market levels in order to stimulate production. Future pricing policy for this commodity should carefully balance the competing needs of domestic self-sufficiency and the provision of sugar at affordable prices. Careful attention must be given to this sector to ensure that the rent accruing to the foreign concerns for technology transfer is not in excess of the true costs of such transfer and that adequate incentives are provided for keeping productivity levels high in the refining sector.

Pricing supports were extended to 'other field crops' following the decline in domestic production after import liberalization. A floor price scheme exists since 1979 for most of these field crops. The scheme has had limited impact because only small quantities have been procured by the Paddy Marketing Board. To protect producer and consumer interests, the importation of 'other field crops' is controlled through the use of variable tariffs, controls and licenses. There has been a general decline in real net returns to other field crops' production over the recent years, with the possible exception of black gram and chillies. In the future, price support policy for 'other field crops' must be consolidated and focussed on a narrower group of commodities. To maintain producer incentives, suitable co-ordination between production and trade policies must be established, especially for chillies, onions, potatoes and cowpea.

In November 1983, the Cabinet directed that the National Food Policy Committee be reconstituted as the National Agricultural Pricing and Food Policy Committee. This reorientation reflects the recognition by the Central Government of the need for a carefully defined and well-co-ordinated pricing policy covering the whole of the agricultural sector. The limitation of fiscal resources, the need to manage impending surpluses of rice and the desire to maintain domestic prices at world market levels are three major factors that underscore the need for a continuous

monitoring of essential prices and the development of coherent and consistent pricing policies. In addition, it is understood that change in subsidies on fertilizer and irrigation water will have widespread effects on the economy.

Pricing policy must be used to ensure that adequate returns are afforded to domestic producers so as to stimulate further growth and technological transformation in agriculture. In the estate sector, pricing policy must be better co-ordinated with export tax policy to encourage the rejuvenation of this sector. Continuity and co-ordination are essential in pricing policy in order to ensure that development investments in research, technology transfer and capital formation do yield results.

A Price Policy Monitoring unit should be established to gather, collate and analyze essential pricing data in the agricultural sector. The high costs, and high potential benefits of the various pricing policy alternatives demand that a well trained highly motivated group be given the responsibility for such efforts.

Agro-Industrial Promotion

The agro-industrial sector is hampered by a series of impediments including (a) a relatively lower rate of return on investment compared to commerce and urban property, (b) a restrictive land policy that inhibits economies of scale, (c) high import duties on certain essential inputs, (d) a fairly high risk attached to this form of investment by both bankers and entrepreneurs, and, (e) a shortage of technological know-how about processing techniques. It is essential to identify specific and future potential areas for agro-industrial development. This will require feasibility studies of promising agro-industrial areas and detailed sub-projects within those areas.

It is now apparent that a significant amount of agro-industrial technology appropriate to the needs of Sri Lanka is available in many of the Asian Countries especially in the Far East For too long, Sri Lanka has relied on importing the knowledge and expertise of developed nations. It is opportune to take advantage of the techniques and skills developed in other Asian Countries, which can be transferred at a lower cost, to meet pressing agro-industrial needs. This would include, for example, many of the low-cost drying, processing and packaging methods for perishable commodities.

Soft investment credit windows must be opened to promote accelerated agro-industrial development. This is especially important in certain key investment areas such as desiccated coconut processing, smallholder rubber shed rehabilitation and latex collection, private factory tea processing, vegetable oil milling and fruit and vegetable processing.

A policy package for agro-industrial investment must be restructured to (1) provide clear support for guided private investment through price, credit, taxation and tariff policies, (2) remove procedural and administrative bottlenecks and (3) reduce the perceived risks attached to this form of investment. This is an especially important area for government attention because of the crucial linkage between generating off-farm employment and reducing the flow of migrants to urban areas.

Trade Promotion

A more diverse portfolio of agricultural exports must be developed to guarantee a stable supply of export earnings and to generate greater export multipliers in the domestic economy. Sri Lanka must also improve its comparative advantage position in the world market simply to maintain its share of the traditional crop export markets. The responsibility for the needed diversification of the export regime rests largely with the private sector.

Efforts to promote exports of agricultural commodities are often hindered by a lack of a co-ordinated market promotion/penetration strategy, inadequate market information and restrictive or inconsistent governmental regulations. The first step to promoting a more competitive trade regime will be the progressive removal of institutional and regulatory barriers to trade. The development of a strong trade regime can only come about if Sri Lanka is able to compete without excessive government subsidy on the international market. Within the government framework for export incentive promotion, agriculture should be given greater importance. This is so because of the great spread benefits accruing from agricultural exports.

In the case of those commodities where the nation is losing its share of the international market, such as in desiccated coconut, specific corrective plans must be developed to reverse the decline. In the case of desiccated coconut, a centrepiece of such a strategy would be the

improvement of quality standards through better processing, grading and packaging before export. Concerted efforts are called to regain lost markets and to penetrate new ones.

For commodities such as cinnamon that are sold to weak currency nations, arrangements must be developed for government to government trade. The government should be an active promoter and partner to trade balancing agreements but should allow for significant private sector participation in such trade to ensure efficient marketing performance.

Better information on international market trends is required. Public sector financing should be provided for an Overseas Market Information Unit for primary commodities. This Unit should include members from the public and private sectors. The Unit would collect and disseminate information relevant to the current and forecast status of selected international commodity markets. The secretaryship of the Unit should rotate on an annual basis between a public and private sector representative. Funds should be provided to the Unit to contract with an international brokerage service to provide up-to-date information on commodity trends. The Unit should also have the authority to select trade missions and to disseminate their findings through public and private sector communication channels.

Public sector financing should be provided for joint public and private sector trade missions to both established and potential markets. A regular schedule of trade missions and participation in overseas trade fairs must be established.

Crop Diversification

A programme of crop diversification and regional specialization will be encouraged to increase the profitability of farm enterprises, to improve stability in earning opportunities and to optimize the use of scarce agronomic resources. Attention should be focussed on the promotion of suitable farming systems for specific agro-ecological zones. Government services in research and extension will have to support this transition through the development of multi-disciplinary research and outreach activities. Particular attention must be paid to the introduction of profitable crop and livestock mixes suitable to the resources available

for the smallholder population. Diversification strategies must be developed for the mid-country tea lands, where minor export crops and fruits appear to be the most profitable avenues of land use. The production of 'other field crops' must be encouraged in well drained rice lands to obviate prodigality of water use and in certain areas sugar cultivation must be substituted for rice. In the coconut triangle, greater emphasis must be given to multi-cropping systems and mixed crop/livestock pasture production. Over the next decade, a major task will be the diversification of agricultural production.

Increased emphasis on crop diversification will require:

(a) institutional re-orientation of research, seed production and support service systems.

(b) redirection of resource allocation to selected crops.

(c) a marketing programme to ensure the commercial viability of the non-rice crops.

(d) greater attention to policy review and assessment of 'other field crops' to ensure that producer incentives are maintained.

Regional Orientation

The corpus of management and development resources concentrated on particular geographic areas must reach a critical mass to effect sustainable change. Previous development efforts often suffered from a country-wide orientation which, due to diffusion of scarce management and financial resources, was unable to generate sufficient impact to secure self-sustaining development. Future development activities will have to emphasise potential growth regions.

High growth potential areas have been identified in the sub-sectors. For example, the greatest growth potential for smallholder tea is in the low and up country areas of Galle, Matara, Ratnapura and Nuwara Eliya. (See also maps in the annex).

The Integrated Rural Development Programmes (IRDP) now operating in nine districts, have been quite successful at promoting regional development. However, a proper evaluation of IRDP programmes is required to assess their role as instruments of resource allocation, Future regional development programmes must be redesigned to focus on appropriate ecological zones, such as watersheds and potential agricultural growth areas for specific crop enterprises.

Improving Agricultural Planning: Future Options

In formulating the Strategy it became evident that planning capabilities within the agricultural sector are generally weak. Planning is still conceived of as project preparation. Priority is attached to developing new ideas into projects rather than carefully managing limited development resources. The planning offices have not been adequately staffed, its technicians not adequately trained and its analytical input into policy decision-making rather marginal.

In the past, too much emphasis has been placed on data collection and some training as a way to improving planning. There has been two basic problems with this approach. On the one hand, the urgent need to link planning to decision making processes within institutions has been ignored. On the other, although the volume of statistical data has appreciably increased, the extent of utilization of this information for policy analysis has not justified the expense of collection. In future, applied planning exercises will supply the unifying element around which data needs and training requirements will be more accurately specified. This calls for a strategy aiming at gradual build up of planning capabilities but not as an exercise which can be compeleted overnight.

Upgrade of Planning Quality. To make agricultural planning functional it is necessary to effect institutional changes. At the same time, planning units must be provided with better facilities and trained staff. In the area of institutional changes, the planning function will have to be upgraded to enable it to contribute to the policy formulation activities of line ministries. In regard to staff, the fact that planning necessitates a multi-disciplinary approach will have to be given due recognition.

Top-down vs. Bottom-up. The government's commitment to devolution of administrative and decision making powers to the district level underscores the crucial importance of establishing a planning system at this level. The interchange between central and district level officials is often inadequate and consequently, central level plans and programmes are prepared without proper information or feedback. Since the bulk of funding responsibility rests with the Central Government near and medium term planning improvement activities should be directed at improving the ability to plan. Efficient and effective communication

channels will have to be opened up among national, ministerial and district level planning systems.

Advance Plans to Programmes. The NAFNS has identified key areas for investment at only a very early stage of project or programme identification. Considerable project and programme development work is required before these projects can be considered as fundable. The process of transforming a project idea or concept into a proper fundable package often requires highly specialised skills. One area for future planning development would be the establishment of joint donor/ government project preparation teams that could develop project/ programme ideas up to the appraisal phase. A long term aim of a collaborative approach to project design would be to transfer the bulk of the design responsibility for new project efforts to the ministries.

Broaden Planning Activities. There are many areas where the public and the private sector can share resources to plan for future national development. Special funds should be set aside in future for the commissioning of joint public and private sector task forces to design, monitor and evaluate a wide spectrum of development programmes. Public sector support must be provided to the private sector to assist in developing export market development strategies and planning for agro-industrial ventures.

Assist Key Planning Areas. The areas of crop agriculture, smallholder tea and rubber and fiscal reform in agriculture all require special planning efforts. In all of these areas, basic gaps in the planning apparatus inhibit the design of effective programmes and policies to stimulate growth.

The area of fiscal policy in agriculture is one that requires particular attention at the central level. The review process for the various pricing, tax, subsidy and trade policies is largely commodity specific and is based on the short-term commodity supply/demand requirements and current fiscal constraints of the government. Often this leads to the promulgation of policies that run counter to overall government policy in a particular sector and may turn out to be counter productive in the long run.

Managerial Reform

The ability of agricultural institutions to respond to the call for effective development planning and management is a major limitation to

national development. The inability to properly design and manage the development of a responsive agricultural support service and a viable, efficient agricultural development programme is one of the principal draw-backs. A number of factors are responsible for this poor state of affairs in public sector management. These include (a) past policies of public sector employment expansion, (b) low salaries in public service compared to the private sector, (c) limited training for public servants in rural development management, and, (d) few incentives in public service to improve the calibre of management.

Skilled managers in the agricultural public sector are scarce. No local institutions capable of providing useful training to those holding top level managerial positions exist. What management training programmes do exist have an anti-agriculture and anti-rural bias. The poor quality of these programmes discourages top-level participation and support from potential students and faculty alike. Those in decision making positions lack the motivation (from considerations of prestige, increased earnings or significant skill acquisition) to pursue management training. This results in managerial void at the top of organizations.

A programme to improve management efficiency of the commercial agricultural support services must begin by identifying those areas where the greatest inefficiencies exist. Measures must then be taken to (a) rationalize the enterprise, if it can be demonstrated that private sector management would be more effective; and, (b) provide performance incentives for better management in the service, through the development of an effective performance signalling system.

A catch-up training programme for senior managers in the public sector who are in charge of various agricultural support services must be established. In addition, an appropriate rural development management programme must be provided to entry-level management personnel in both the public and the private sector. The training methods introduced should emphasize problem-solving activities specifically within the agricultural sector. A comprehensive management training plan is required to guide the implementation of the aforementioned strategy.

Section B

SUB-SECTOR STRATEGIES

Crop Agriculture

This sub-sector consists of the food crops component of domestic agriculture.

Paddy

Paddy production which stood at 35 million bushels in 1953, increased to 50 million bushels in 1964, 80 million bushels in 1977 and reached 119 million bushels in 1983 despite adverse weather conditions in that year. Two major elements in the steady increase in production are a 71 percent increase in the asweddumized extent over the last three decades and the relatively recent availability of high yielding rice varieties responsive to fertilizer application and good management in a favourable environment.

Paddy: Trends in Area, Yield and Production

	1970	*1977*	*1979*	*1980*	*1981*	*1982*	*1983*
Area ('000 acres) ...	1876	2046	2072	2087	2166	2086	2037
Yield (bushels/acre) ...	50.9	47.7	52.3	56.5	57.6	62.8	69.7
Production (mn. bushels) ...	773.	80.3	91.8	102.1	106.7	103.2	118.7

Some of the other factors that have contributed to the marked production increases since 1977 are the ready availability of quality seed of the high yielding varieties, adequate stocks of fertilizer and agro-chemicals, coupled to an enhanced institutional capacity to bring these inputs to the farmer, a more effective extension service, an attractive guranteed price for the commodity and the preparedness of the state to purchase marketable surpluses offered for sale at the guaranteed price.

Paddy cultivation is widespread and the 1.7 million acres of aswedduмised land is cultivated by some 0.6 million farmers. The existence of a large number of small independent parcels of land in contigous areas spells out the need for farmers to collectively organise and control the communal aspects of paddy cultivation, ensuring the timely availability of seed and other inputs and maximising utilisation of the scarce resource-water. It is quite significant that not all the findings of biological research have found acceptance with such small farmers whose incomes generally derive from a number of production activities. There is therefore a need for a socio-economic input into the research effort.

There are 625,000 acres of asweddumized land under major irrigation schemes. While per acre yields are relatively high on these lands, cropping intensities in these schemes are low due to the state of repair of the water system, lack of effective water management practices and limitations of farm power. In some areas the low cropping intensity is the result of the water supply instability.

The water supply in the 350,000 acres under minor irrigation schemes is unstable and a single crop of paddy is grown in years of adequate water supply. Unavailability of seed and other production inputs at the right time depresses the high yields that are possible. Each scheme in itself is small, commanding about 50 acres, and farmed by an equal number of families. Logically, institutions that service these schemes need to be organised round a cluster of minor irrigation schemes.

An estimated 725,000 acres of land are cultivated with paddy under rainfed conditions. Specific varieties and well defined management practices for reaping high yields on some of these lands do not exist. In addition some areas are subject to other physical drawbacks such as flooding and saline soils in the wet zone. For lands in the dry and intermediate zone moisture stress is a severe impediment.

Sri Lanka will probably achieve sustainable rice self-sufficiency within the next five years. Under an optimistic set of projections, rice production will expand to 147 million bushels in 1987 and to 170 million bushels in 1991. Based on projected population growth, income growth and past trends in milling and seed utilization, a high-to-optimistic forecast for rice consumption, in paddy equivalent terms, is 146 million bushels in 1987 and 158 million bushels in 1991. Hence

by 1987, Sri Lanka may be producing small surpluses of rice and these surpluses could expand considerably by 1991. This rice surplus forecast is based on. (1) adequate returns to rice production, (2) a rapid increase in cropping intensity resulting from improved irrigation management, (3) moderate yield improvement, (4) the annual introduction of 18,000 acres of irrigated rice land and, (5) the absence of major natural disasters. The government can only exert a varying amount of influence on factors listed above, yet the rate of growth in rice output is contingent upon the realization of all those conditions.

The future means of disposing of surpluses of rice must be evaluated. One alternative is through export trade. This is unlikely because the quality of rice produced in Sri Lanka has no market internationally and compared with other exporting nations, Sri Lanka is a high cost producer. Of a total world rice production of 400 million tons of paddy, only about 12 million tons of rice enter into world trade. Sri Lanka produces a long-grained chalky rice with high content of broken, bad odour and discolouration. Such rice has no market in international trade. If quality standards are improved, Sri Lanka could conceivably produce a low-quality, high-brokens, long-staple rice that could compete with the Burmese and Pakistani exports for the bottom-share of the international market. It is likely, however, that the cost involved in breeding and introducing new varieties, transforming the marketing and processing systems and establishing other facilities specifically geared for exports would be prohibitively costly in the near-term.

Alternative ways of disposing surplus rice would be to encourage greater domestic consumption. Unless rice is exported at distress prices or stock-piled, increased domestic consumption is the most sensible means of disposing of rice surpluses. In the near to medium-term there is much scope for substitution of rice for wheat in the diet. In the long term, rice production must be carefully monitored to avoid a collapse in domestic rice prices. The optimum means of obviating potential rice surpluses is through a programme favouring increased rice consumption and a simultaneous diversification of production in the major irrigation schemes.

These schemes facilitated the rapid break-through in rice production. On well drained soils of these schemes, paddy production is not the most economic use of the land, and its production will have

to be discouraged. The extent of these lands is estimated at about 150,000 acres and can be advantageously used for the cultivation of sugar cane, chillies, commercial vegetables, onions and bananas in the *Yala* season. Complementary market development strategies will be a crucial component to any programme of crop diversification in these areas.

Increased production efficiency through enhancing yields and reducing costs in the major irrigation areas must receive more attention. Steps must be taken to rehabilitate existing irrigation schemes and promote the development of viable self-reliant farmer organisations which will attend to all aspects of agricultural production including better water management practices. Measures will also have to be directed to ensure the timely availability of farm power.

Production under major irrigation will have to concentrate heavily on cropping intensity. Water stability is the principal factor influencing cropping intensity in the major and minor irrigated areas. Using water stability criteria, productivity increases under some major tanks will now have to be achieved by saving enough water to assure at least one good crop.

Institutional delivery systems will have to be suitably located to serve clusters of tracts under minor tanks to ensure seed, availability of fertilizer and credit. Vavuniya, Anuradhapura and Kurunegala have close to 60 percent of the total acreage under minor tanks and should be the focus for this programme, initially on a pilot scale. Attention should be paid to increasing the capacity for production in those areas where rice will continue to be grown by evolving varieties specific to these regions.

Sugar

Current annual consumption is in the region of 260,000 metric tons and the projected demand for this commodity by the middle 1990's is reckoned at around 350,000 metric tons.

Sugar manufacture is a relatively new venture and the sugar industry in Sri Lanka is technologically in its infancy. After twenty three years of operation, the two existing state factories are producing some 10 percent of the national requirement. In 1981 the Government invited the private sector to invest in sugar production. To date three private sugar companies

have been formed and three more proposals are under consideration. By the middle 1990's when all these projects are operating at full capacity, production will reach 150,000 metric tons or 40 percent of the estimated requirement in that year.

Trends in Sugar Production and Imports

	1970	*1975*	*1980*	*1981*	*1982*	*1983*
Extent Under Estate ('000 ha)	4.3	5.9	6.0	5.7	5.4	5.7
Factory Production ('000 tons)	8.5	18.0	23.5	23.7	23.4	22.1
Imports ('000 tons)	240	56	309	238	121	265
Import Value (mn. dollars)	29	38	122	147	40	67
Per capita Availability	19.9	5.5	15.8	17.4	10.7	18.6

Many factors inhibit the optimum development of the sugar industry. Average yields in the two state plantations are approximately 58 tons per hectare, well below the technical potential for the lands. The State owned sugar factories operate at half of installed capacity and crush at low efficiency levels.

The private sector which is prepared to invest and can readily recruit foreign expertise has approached development in terms of large sophisticated manufacturing units. Two major disadvantages in development on this scale have been the mustering of adequate finances and the lack of large tracts of cultivable land (arising inherently from the nature of the terrain) required to raise raw material for large factories.

Local cane cultivation is mainly based on the use of one major variety. Dependence of the industry on a single variety is fraught with serious commercial hazards. The most productive cane can be grown in the dry zone. However, these lands are scarce and cane must compete with rice and other irrigated crops for these resources.

A basic requirement to develop the sugar industry is to grant a measure of protection to the industry, utilising expatriate expertise in the early stages, assisting the existing and approved projects to achieve their potential expeditiously and identifying addi-

tional areas suitable for further expansion of the industry. The new factories to be established should be based on a combination of out-growers and nucleus estate holdings.

The formation of joint venture enterprises for the two state sector factories should be actively promoted. Initially, the employment of a competent organization to manage and progressively train local personnel should be pursued to bring about the desired production increases and set standards. Broadly, future expansion of sugar production should take place within a framework of private enterprise. State involvement in sugar production should be minimal.

Availability of suitable land for cane production in contiguous areas is a major determinant of the size of sugar factories. Given the orientation of sugar production towards the private sector, decisions on the size of plants will be their concern. However, where the allocation of State lands is required to set up plants, the government should favour medium and small size sugar factories.

In the short term, locations for growing cane which could be investigated immediately are:

i. some 7000 acres of well drained land, presently double cropped with rice on the right bank at Uda Walawe where water use is three to four times the normal requirement. A considerable saving of water and maximising use of land will result by bringing these lands under cane.

ii. some 10,000 acres of well drained lands identified under the Kirindi Oya scheme now under construction for which cane is a logical crop.

iii. about, 50% of the 7800 acres in the Huruluwewa scheme where water has always been an impediment for raising economic crops of paddy, are well suited for sugar cane.

iv. some of the new land in area 'H' of the Mahaweli Scheme is well drained and suitable for cane cultivation, but has already been alienated. The quantum of well drained lands in systems B and C are both highly scattered and limited. About 10,000 acres are suitable for sugar cane.

In the mid-term it will be necessary to identify:

i. in the dry and intermediate zone, irrigation schemes where the water balance and farm incomes will be enhanced by the cultivation of cane on well drained lands.

ii. undeveloped land in the intermediate zone suitable for rainfed cultivation.

iii. developed rainfed areas in the intermediate zone that are marginal in respect of the present cropping patterns but will support a cane crop.

iv. feasibility of cane cultivation on the deep latosols of the North West region either under rainfed conditions or utilizing the limited underground water resources for supplementary irrigation.

Other Field Crops

The term 'other field crops' embraces a wide and unrelated group of crops, including coarse grains, grain legumes, spices (primarily chillies and onions), oil seed crops and roots and tubers. Except for roots and tubers, all these are grown under rainfed conditions in the dry

Other field crops: Annual Extent Planted

('000 ha.)

Crop		*1974*	*1977*	*1980*	*1981*	*1982*	*1983*
Coarse Grains							
Maize	...	38.5	36.8	23.4	30.0	44.9	44.0
Kurakkan	...	28.9	25.5	8.0	13.8	16.1	17.5
Pulses							
Green Gram	...	10.7	12.6	14.2	17.0	21.2	29.8
Black Gram	...	1.4	13.8	8.4	10.1	9.9	10.6
Cowpea	...	3.0	30.4	25.5	30.2	35.8	52.5
Oilseeds							
Sesame	...	13.0	13.8	31.5	25.0	32.7	23.7
Groundnut	...	7.7	6.5	11.1	12.0	14.4	14.8
Soyabean	...	1.4	1.0	1.2	2.2	8.1	17.8
Spices							
Chillies	...	41.7	44.1	25.5	27.5	28.4	34.1
Onions	...	6.7	8.1	7.2	8.1	8.2	9.0
Roots & Tubers							
Manioc	...	91.3	54.5	27.0	37.1	26.0	26.7
Sweet Potatoes	...	23.1	11.3	6.4	8.9	5.5	6.2
Potatoes	...	2.2	3.2	5.2	4.6	5.7	5.8
Others*	...	5.2	5.9	4.6	6.9	5.5	6.6

**Sorghum, Meneri, Thanahal, Ginger and Turmeric.*

and intermediate zones under shifting cultivation or in home gardens, although some high value crops are grown under irrigation. Shifts in crop acreage are a result of farmer response to prices. Floor prices are now offered for some of these commodities and the extents cultivated have registered steady increase in the last three years. The main crops showing recovery were chillies, cowpea and maize for local consumption. The growth of groundnut, green and black gram in production indicate the emergence of export markets and in the case of soyabean domestic consumption has stimulated cultivation.

Roots and tubers are primarily crops of the wet zone although they are cultivated to a limited extent in other areas during the North East monsoon season. Cultivation of manioc and sweet potato have declined due to unfavourable prices while production of potato, now important in the local diet, have increased steadily.

A variety of factors inhibit development of these crops. On all accounts, government support services for these are weaker than for rice. Yields are generally low, the research base is rather thin, and price support has had a negligible effect on producer returns. Marketing institutions for these crops are weak. The quality of the produce marketed is highly variable and the storage and processing facilities for these crops are under-developed. Since liberalization in 1977, imports of selected other field crops have been permitted. These have, at times, offset serious domestic production shortages but in other cases, imports may have affected domestic markets for these commodities. The relatively high domestic price of some of these food crops reflects long trade linkages and distance from the terminal market, rather than excessive farm gate prices. In fact, these crops are grown largely for home-consumption and the return on market sale is quite low.

Much work is required to solve tillage and weeding problems for these crops. In addition, they suffer from high on-farm storage losses further reducing farmers' returns while adding to marketing cost. Certain constraints are specific to the different crops. For example, chillies and onions suffer from major pest problems. For legumes, the main problem is disease control. For manioc, the main constraint lies in developing varieties for industrial use and for oilseeds, better varieties are needed. These crops are biologically distinct and the technical solutions to their problems must be tailor-made to overcome these limiting factors.

The present focus on rainfed agriculture has been primarily crop oriented. It is becoming increasingly evident that a shift of emphasis has to take place within the framework of cropping systems and farming systems. This need to work in this way stems from the fact that in the upland areas of the dry zone and intermediate zones during the *Maha* season, when the range of possible crops is wide, about 50% of the farmers had a mixture of more than 3 crops. Mono crop-farmers constituted only about one fifth. In *Yala,* when the range of crops that can be grown under acute moisture stress conditions is limited, crop mixes are more restricted. Two-fifths of the farmers generally report a single crop, and 25% more than three crops.

Crop combinations under rainfed conditions

	No. of Families	*No. of Crops*				
		1	*2*	*3*	*4*	*5*
Maha	2114	495	607	513	300	199
%		23	30	24	14	9
Yala	1650	639	589	321	97	5
%		39	36	19	6	–

A stronger shift in promoting production under both cropping systems and farming systems perspective should have to be pursued. The preliminary findings of the rice-based cropping system studies have clearly surfaced a range of non-crop related problems pertaining to land resource specificity, hydrology, labour, seasonality, farmer aspirations, profitability and other aspects of on-farm resource management.

Over the last ten years, a distinct pattern of regional specialization has been developing in the country. This pattern of production exhibits some features that greatly facilitate marketing organization, servicing and even research and extension support. To take full advantage of these features, regional specialization will have to be encouraged. But the emphasis must not be exclusively towards a mono-crop type of regional specialization. Instead, under the various regimes, a dominant crop should be identified as the central crop and a farming systems perspective will have to guide regional specialization efforts.

The first priority in 'other field crop' production in the rainfed lands of the dry and intermediate zone is to ensure their production into farm units that generate enough income for an acceptable household

sustenance level. To this aim, the approach should be, firstly, to integrate livestock in the farm unit and secondly, the stabilization of yield through the development of drought tolerant varieties and appropriate cultural practices. Priority ranking for these crops will be grain legumes, coarse grains and oilseeds. The particular crop within each group which should receive priority ranking will have to conform to the particular regional orientation approach aforementioned.

Wherever commercial scale farming takes place as in the black gram region of Vavuniya or generally in the large farm holdings, the focus will have to be on intensifying monocrop production. To ensure this an improved support system (improved varieties, input supplies and marketing outlets) will have to be concentrated in selected regions of the dry and intermediate zones.

There are, however, several new and equally important areas in 'other field crops' development that warrant support services, research and development efforts. These include (a) integration of livestock and forestry within the farming system (b) on-farm storage (c) farm-to-market road development, and, (d) provisions of stable water supply for human survival – both ground water and surface storage in small tanks.

Fruits and Vegetables

The country's diversity of agro-climatic conditions enables cultivation of a very wide variety of fruits and vegetables. The production of fruits and vegetables is hampered by inadequate supplies of planting material and insufficient attention from research. On the marketing side, deficiencies are noticeable in the linkages between producers, wholesalers and dealers. Processing facilities are not well developed and result in recurrent seasonal gluts with deleterious effects on prices and production incentives.

Steps should be taken to bring the private sector into the field of production, import and distribution of seed and planting material. The research efforts should be intensified on specific crops on a regional basis, e.g. pineapple in Gampaha, Colombo and Kurunegala districts. In order to formulate a rational development programme of fruits and vegetables, the data base will have to be upgraded.

An important marketing strategy for fruits must be the development of agro-industrial processing. For this, the country should rely on drying, processing and packaging technology already available in other countries of the area. Moreover, the food technology unit of the Department of Agriculture will have to be strengthened to adapt and demonstrate agro-processing technologies.

Production of leafy vegetables should be given wider extension and research support on nutritional considerations. Extension will concentrate mainly on promoting their production and on transmitting research findings. Production technology for high value vegetables are well developed and will only require government support services.

Support Services for Crop Agriculture

In paddy, continued emphasis will be given to maintain the gains achieved so far. Varietal development will have to become more region specific and suited to micro-environments. In the longer term, plant physiology research must be stepped up to break through the yield ceilings observed in some of the available varieties.

Each regional research centre will have to evolve a farming system research programme suited to the dominant farming systems within its region and incorporating specific regional characteristics. An inter-disiplinary approach with social scientists closely participating in a farming system approach has to be set in motion to generate technology packages. It will be necessary to effectively share experiences through a national network of a farming system programme well co-ordinated and shared among the 9 regional research centres.

The efficacy of the extension service now depends on the quality of the technical programme fed into the system and the quality of the extension staff at the field level. With approaching self-sufficiency in rice, the extension system will have to pay increasing attention to other crops, in order to develop settled systems of rainfed farming, and ensure crop diversification on irrigated lands.

As farming becomes progressively commercialised and sophisticated, an increasing demand for improvements in farming technology will follow. This calls for a high level of technical competence in the extension service. The need for upgrading all levels of extension personnel in the

future is therefore clear. In addition, the extension service could require modification: the degree of specialisation may need to be changed, the deployment of field staff modified, the frequency of visits rescheduled and so on. Depending on the stage of development in each region, training will have to be invigorated and the extension approach accordingly modified. In the mediumterm, greater emphasis must be placed on creative use of the mass media as a vehicle for the transmission of information to the field.

As the farming situation changes, other facets of the extension organisation may require periodic modification. It is, therefore, proposed to establish a research unit within the extension division to constantly monitor, assess and evaluate modifications required for an effective transmission of new research findings to the farming population.

Regular in-service training is essential to keep the large field staff updated with new information and skills. The importance of in-service training has been recognised and six regional In-service Training Institutes (ISTI) have been set up to provide regular short term training to field staff. These centres are in their incipient stages of growth. They are not adequately staffed, funded, equipped and require greater support in order to provide quality training for the future. Each ISTI may have to move towards specialized areas, such as water management and dry land farming for example, depending on the specifics of the agro-ecological regions where they are located.

The publication programmes and the library services are the weakest link in the whole educational process to modernize agriculture. There is a need to develop and publish materials for training and extension activities. The major constraints in this regard are the shortage of trained manpower in editorial and publications work, facilities for printing and shortage of books and journals. In this regard, the establishment of regional information centres, as a means of gathering and disseminating material pertinent to their areas, should claim priority.

Varietal development, research, quality control, seed certification and foundation seed distribution will remain within the government purview. Government farms with land resources to produce certified seed must be encouraged to do so and operate on a profit basis. Simultaneously, full invovement of the private sector should be promoted in seed production.

Technical know-how in seed multiplication is already being supplied but it must be further expanded. Producers also need financial support to undertake cultural practices and purchase the necessary equipment to turn out quality seed. For this, the full support of the banking system, through special credit programmes to seed producers, will have to be enlisted to ensure the rapid spread of private certified seed production. A national seed policy will have to be developed and enacted to provide clear directives to public and private sectors in seed production.

Irrigation, Land use and Forestry

Land and water provide the basic natural resource requirements for agriculture. The total area now under cultivation is 5.90 million acres which is 36 percent of the country's land area. The south western and central parts of the country, agro-climatically classified as the wet zone, are extensively developed and are covered by tree plantations and rainfed paddy. The bulk of the island's population resides in the wet zone and this region includes most of the major urban centres of the island. Two-thirds of the land area in Sri Lanka are in the northern and eastern plains, which falls within the dry and intermediate zones. The potential for extensive agricultural development lies in this area, but the main hindrance to such development is lack of water. Thus, irrigation, which has played an important role in the development of the dry zone, will continue to play a vital role in the future extension and development of agriculture and settlement activity in this area.

Irrigation

The resource development programme of the last decade was based on the expansion of irrigated agricultural lands through large-scale government investment in irrigation works. The development of a mix of small, medium and large scale irrigation projects, scattered throughout the dry zone, was also included in the programme. However, the major investment emphasis was on the large scale projects, mainly the Mahaweli project and others such as the Mahadiulwewa, Muthukandiya, Kirindi Oya, and Inginimitiya projects. During the last three years, efforts have been made to improve small scale irrigation through projects such as the village tank rehabilitation project for 1,100 small village tanks, the medium and small scale projects under the Integrated Rural Development Programmes, the Anuradhapura Dry Zone Project and a number of smaller Decentralised Budget projects.

Irrigation development in the dry zone will open up large tracts of land for potential crop diversification efforts. By 1991, the Mahaweli Development Project will develop approximately 250,000 acres of land. Of that, 150,000 acres of upland and intermediate-level areas will be available for crop diversification. It is estimated that approximately 75,000 acres of that land could be cultivated with 'other field crops' and the balance could be put into sugarcane or cotton.

A number of major irrigation projects are under construction outside of the Mahaweli Scheme. The Nilwala Ganga Flood protection scheme and the Jaffna Lagoon schemes are both large drainage projects with a total combined cost of Rs. 555 million. Per acre costs of the drainage schemes are very high compared to other activities in the irrigation sector.

Major gravity irrigation projects include the Kirindi Oya project, the Inginimitiya project, the Gal Oya water management project, the Village Tank Rehabilitation project, a Seven Tank Irrigation Rehabilitation project and the construction of small and medium tanks under the Integrated Rural Development Projects. Many of these larger projects have been plagued by cost overruns, delays in implementation and inadequate monitoring and evaluation. In addition, a ground water exploration project is proposed by the Water Resources Board to extend ground water resource inventory assessment throughout the nation.

The utilization of the irrigation schemes, even those newly constructed, remains well below their operating potential. This is due to two related factors. First, as the pace of irrigation increased, the neglect of operation and maintenance activities led to physical deterioration of the irrigation structures. Second, inefficient water control and management resulted in waste of water. Actual water utilization rates are, in fact, twice the recommended rates. In the past, the irrigation systems were meant to mainly provide supplemental irrigation to wet season paddy and to supply a small amount of water for a *Yala* crop. These systems have not been designed for optimum usage patterns which require a more even distribution of water in both the *Maha* and *Yala* seasons.

Continued emphasis on major irrigation facility construction would be relatively uneconomical. Irrigation Department current estimates of costs for tank rehabilitation are approximately Rs. 10,000/acre for major tank rehabilitation, Rs. 7,500/acre for medium sized tanks and

Rs. 5,000/acre for small tanks. During the past decade, the emphasis on new irrigation facility construction diverted attention from the pressing problem of inadequate operation and maintenance expenditure on existing irrigation systems. A reorientation of irrigation policies in favour of rehabilitation has become imperative.

The future strategy in irrigation development should shift from new facility construction and drainage, to rehabilitation, to greater emphasis on efforts to improve water resource management and the recovery of operation and maintenance costs from user fees. A strategy of future expansion of irrigation facilities must be based on the construction and rehabilitation of small-scale village tanks. The low capital/labour requirements of these projects, their short construction duration and ease of design, makes them a feasible form of future facility development. The major thrust of the irrigation programme over the next decade will be to:

(a) complete the down-stream development initiated under the Accelerated Mahaweli Programme to reap its full benefits;
(b) discourage any new major drainage or gravity irrigation schemes over the medium term;
(c) expand the network of small-scale village tanks;
(d) concentrate departmental efforts on completing the major irrigation projects now underway without delay and cost overruns;
(e) Improve management on already established irrigation schemes: a water management programme will be extended to cover all of the major and medium schemes during the next decade;
(f) focus efforts on rehabilitating the major and medium schemes, with the development of a sound plan and schedule for future system maintenance;
(g) strengthen investigations of ground water resources.

In 1982, a Water Management Programme (WMP) was introduced in 24 major settlement schemes covering over 150,000 acres. It is estimated that, even without incurring additional expenditures for the rehabilitation of physical structures, an increase of about 20% in cropping intensity can be realized with better water management practices. WMP has been relatively successful in organizing cultivation according to a cropping calendar, operating water delivery schedules and encouraging

the formation of water user societies. In the future, better management of irrigation resources will be given precedence in all efforts in the water resources sector. This will be linked with the cost recovery programme for irrigation maintenance which is expected to create an awareness among the farmers that the provision of irrigation water is costly and scarce. The bulk of the responsibility for better water management necessarily rests with the cultivator. Consequently, future efforts must address the complex institutional requirements of improved farmer organization and the motivation for better water resource management.

Very few major irrigation schemes appear to be economically viable at present. This accounts, in part, for the shift in emphasis from new facility construction to rehabilitation. A rehabilitation schedule must be based on the experience of rehabilitation of existing irrigation infrastructure. These are: 15 years for small tanks, 20 years for medium size tanks and 25 years for large tanks. Over the next decade, the greatest share of government rehabilitation financing will be required for the large tanks. On the average 25,000 acres under large scale tanks, 5,500 acres under medium size tanks and 15,000 acres under village tanks should be rehabilitated per year. The total annual cost of rehabilitation will be Rs. 75 million for the small tanks, Rs. 50 million for the medium tanks and Rs. 250 million for the large tanks. Approximately 375 million rupees will be required each year for this rehabilitation programme.

Land Use

Outside the plantations, the State is still the largest landowner in Sri Lanka and the Ministry of Lands and Land Development and the Land Commissioner's Department are responsible for proper management and development for most of the state-owned lands. A large portion of these lands falls in the relatively under-utilised dry zone. As land/man ratios decline – and since the other sectors of the economy have not grown as fast as anticipated – fast maturing labour-intensive programmes are urgently required to meet the needs of a growing population. Failure to do so will escalate encroachments on state lands, resulting in wasteful practices that will weaken the nation's resource base and, in turn, retard future growth opportunities.

Outside of the Mahaweli Programme, there are a number of settlement activities undertaken by the Land Commissioner's office. These

include the six schemes for land alienation which are the Major Colonization Schemes, the Highland Colonization Scheme, Village Expansion Schemes, the Land Grants Special Provisions, the Youth Settlement Schemes and the Middle Class Schemes. The largest programmes are for settlement in the Major Colonization Schemes and the Village Expansion Schemes. Although land settlement in the major colonization schemes is a complicated affair, the major constraint to further colonization is the speed at which the Irrigation Department can provide irrigated land.

Under the Village Expansion Scheme, efforts are being made to systematically settle land for dwelling and agricultural purposes in the wet zone and in the densely populated dry zone areas. Most lands for this scheme are acquired from privately owned wet zone lands. Private land is acquired after ascertaining whether alternative land is available. But only a limited extent is available for wet zone village expansion. For the dry zone, future village expansion requires, extensive micro level planning to identify lands providing sufficient watershed cover for village tanks and other purposes before embarking on these programmes.

Many occupants of land do not enjoy security of title or tenure which reduces the chances of obtaining investment credit and discourages investment in land development. Certain sections of the amended Land Development Ordinance removed barriers to rapid land disposal and strengthened the security of title. The new provisions enable the allottee to sell his land to peasants, bringing more flexibility into the rural land market and also increasing the mobility of the rural peasantry to move in and out of farming.

Insecurity of the title and the overwhelming desire for new lands make encroachment on state lands a serious problem in land use planning. The Land Commissioner's Office has been involved in an encroachment survey and a programme of regularisation during the last four years. In the dry zone widespread encroachment on state lands of the order of approximately 900,000 acres has occurred over the last two decades. The Land Commissioners Department is hampered by the lack of properly trained and experienced staff and the managerial and technical expertise to carry out its programmes. Action is now being taken to decentralize most of the routine land administration matters to the district administra-

tion so that the Land Commissioner's office can devote more time to land use planning, socio-economic surveying and evaluating and reviewing projects and programmes.

At present, land use planning is seriously hampered by lack of sufficient data on the natural resource base, especially the lack of land capability and soil maps. Land use planning also suffers from a lack of trained staff and by insufficient co-ordination of the various other line agencies and ministries that plan settlement activities in an independent fashion.

Future land settlement programme should be oriented towards improving the utilisation of dryland farming resources. Experiments, such as the Muthukandiya Dry Farming Project, have shown that a systematic base for dryland cultivation alongside minor tanks can be developed, using *chena* cultivation as a base for further improvement. While more research is needed to determine the size of alienation units, the project should be extended into Amparai, Moneragala and Badulla District

At present, very little planning is done on the basis of watershed management, however large investments are being made at present to develop and rehabilitate major watersheds. In order to protect these investments, and to promote a rational utilisation of land and water resources in the future, greater attention must be given to planning for co-ordinated watershed management activities. This will require an inventory of watershed resource availability and the development of plans for protecting the resources of major watersheds. This will also help to establish a co-ordinated plan for future irrigation system rehabilitation and maintenance that takes into account the competing resource needs of the watersheds.

Over the next decade, the opportunities for land settlement, post-Mahaweli, will diminish. To prevent excessive land fragmentation, there is a need to embark on an extensive research programme to determine the means by which to encourage land consolidation, especially in the wet zone paddy areas, and to examine the costs and benefits of various forms of tenancy reform. In the future, land consolidation and tenancy reform may be needed to bring about higher productivity in the wet zone and to encourage greater sized village agglomeration in the dry zone. Future measures regarding agrarian reform must be carefully

planned and rapidly implemented so as not to disturb rural investment activity.

Forestry

The last reliable inventory of forest resources, conducted in 1956, gave a figure of 32.2 million acres, or 44 percent of the nation's land cover, as forest area. Since that time, rapid deforestation due both to planned agricultural use and uncontrolled exploitation, has resulted in a loss of nearly half the forest resources. This situation will be further aggravated by the planned loss of nearly 250,000 acres of forest land that is earmarked to be developed under the Mahaweli programme.

Timber demand is expected to increase from 727 million cubic feet in 1985 to 950 million cubic feet in the year 2000. Approximately 42% of the timber is used by the state sector and 35% by the housing industry, with the remainder used largely for furniture (19%) and industry (4%). A significant portion of the gap between demand and institutional supply is made up from village gardens, Land Development Ordinance allotments and from unauthorized felling. It is estimated that Sri Lanka will have a deficit of 200 million cubic feet of industrial roundwood by the year 2000.

Reforestation was started by the Forest Department in the 1940's on an experimental basis and gradually reforestation has expanded to a level of 17,300 acres in 1982. The number of regional divisions for better protection of forest reserves and for implementation of re-forestation programmes has also increased. The Department's main constraint is the lack of professional and technically trained staff. At present, the reforestation programme is operating at a target of 20,000 acres per year, which will have to be increased to meet the gap between demand and institutional supply. It is estimated that between 25,000 and 30,000 acres per year should be reforested to help close the long term supply/demand gap.

Five years ago, the Forestry Department initiated an accelerated reforestation programme through direct planting and the use of contract planting. The method of reforestation primarily used, up to that time, the cooperative or 'taungya' system was discouraged. Although progress has been good in the new reforestation approach, certain problems have

surfaced. The quality of the plants raised did not come up to expected levels and the already established plantations were neglected in favour of new reforestation projects, resulting in greater losses in the established areas. To correct these deficiencies the 'taungya' system has been re-introduced to supplement the department's efforts.

A number of measures will have to be taken to improve the quality of forestry resources and to help close the gap between wood supply and demand. These include:

(a) better management of the existing forest plantations.
(b) continuation of present conservation policies, keeping in view the needs of agricultural development and watershed conservation.
(c) introduction of laws to regulate felling of trees in private lands in environmentally sensitive areas.
(d) concentration on completion of on-going projects. For this, no new large projects should be initiated in the near future.
(e) improvement of extension efforts in forestry and heightening of public awareness on the importance of forest lands.
(f) increased efforts towards promotion of village forests.

Implementation of many of the aforementioned measures has been hindered by the lack of a proper plan for forest resources development. A Forestry Resources Planning Division was established in 1983, coinciding with the decision to initiate a forestry development project under IBRD funding. The main objective of the new planning division should be to prepare a Master Plan for forestry development.

To more effectively co-ordinate and supervise the Forestry Department, the State Timber Corporation and all other related agencies it is desirable to set up a 'Forestry Resources Authority'. Changing the incentives structure from harvesting to planting and improving inter-agency co-ordination are difficult operations but challenging enough to muster the concerted efforts of all the departments concerned with forestry resources.

Fisheries

Despite its relatively low contribution of only 2% to GDP in recent years and roughly about 1% the output of the agricultural sector, fisheries

represents an important area. The fisheries sector directly employs around 60,000 persons. Fish accounts for approximately 60% of all protein consumed in Sri Lanka. Per capita consumption of fish increased from 13.0 kg. in 1979 to 15.3 kg. in 1982. Total fish production has increased from 96,000 tons in 1970 to 214,000 tons in 1982, with the greatest growth recorded in coastal fisheries. Between 1972 and 1982 international trade in fish and fish products expanded considerably. 318 million rupees worth of fish were imported in 1982 against a total of 92 million rupees worth, imported in 1972. During that same period, the FOB value of fish exports increased from 11 million to 440 million rupees.

In the coastal fisheries sector, growth during the past decade has been substantial. During the period 1970 to 1982, coastal fishery production expanded from 85,000 tons to 180,000 tons. The annual sustainable yield from coastal fishery resources is estimated at approximately 250,000 tons, of which 80,000 tons are large demersal and semi-demersal fish. There are indications that coastal fish production is close to sustainable levels making it imperative to start seeking alternative sources of marine fish.

Inland fishery resources include about 300,000 acres of brackish water resources and lagoons and 344,000 acres of inland tanks and reservoirs. Present production in the brackish water fisheries is in the region of 4,000 to 5,000 tons. In 1982, fresh water production amounted to approximately 33,000 tons, the majority of which was from the large inland tanks. There is some evidence that the optimum level of exploitation in these tanks has been reached.

During the 1970/1982 period, offshore and deep sea fishery production registered a decline from 3000 to 1,000 tons. The magnitude of the offshore and deep sea fisheries is not accurately known: but an annual sustainable yield of 29,000 tons has been estimated. The poor production record of offshore and deep sea fisheries is due to delay in introducing big vessels and the minimal response of private investors. The non-availability of reliable information on the resource base and the difficult regulatory environment has contributed to the poor response of private investment in this area.

Government investment in the fisheries sector has been primarily directed to supplying the basic infrastructure for the development of

the industry. One of the major investments provided has been the establishment of fishery harbours. Provision of other facilities, such as boat yards, ice plants, net factories etc., has been left largely to the private sector with limited participation by the state. There are 64 boat yards in the country, two of which are owned by the government There are 16 freezing plants and 10 cold storage facilities in the Colombo district. The bulk of the installed capacity is owned by the public sector corporations and is operated at 10% to 15% of capacity.

Due to high fuel costs,the operation of 28' to 32' boats which supply 70 percent of the coastal catch has become relatively unprofitable. Use of traditional fishing techniques has lowered the potential catch, especially the demersal varieties. Profits on the traditional craft are significantly higher than on the mechanised boats although the volume of production on such craft is fairly low.

A factor constraining the development of inland fisheries is the uncertainity regarding the carrying capacity of inland tanks and the exploitation potential of brackish water resources. In addition, fish breeding stations are inadequately equipped and, in some, the water supply is erratic. There are also 14 inland fisheries stations, including three extension and demonstration centres, in different parts of the island, with 47 fisheries inspectors attached to these offices. Although the officers in charge of these stations are well trained in fisheries techniques, the second level of officers require considerable additional training in pond culture technology before meaningful extension work can take place. Also, management problems hinder the operation of the inland fisheries stations.

There has been very little expansion in the number of participants in the fish trade despite an enormous increase in the quantity of fish marketed. The procurement of fish by the Ceylon Fisheries Corporation is insignificant and therefore cannot effectively contribute to improving the competitive environment. Because of their small scale and individual based style of operation, the smaller fishermen must depend on middlemen to market their produce.

Extension has the dual responsibility of implementing development subsidy programmes and promoting and disseminating better fishing practices. This results in a heavy work load for the extension officers

and reduces their capacity as 'change' agents, In addition, the extension staff also collect the statistics for the ministry. Due to multiple responsibilities, the extension cadre has not developed a sound technical knowledge of fishing and processing techniques. Under present institutional arrangements research findings do not reach the fishermen through the extension system.

Planning work is often hampered by the lack of sound statistical information on which to base development decisions. For example, little information is available on fish marketing, consumption patterns, cost of fishing, the efficiency of the existing fleet, manpower requirements and many other socio-economic factors related to fish consumption and production.

Future prospects in coastal fisheries lie with demersal resources. In order to increase exploitation of this resource, new fishing methods such as bottom long lines, bottom set nets, high opening bottom trawls and the use of traps will have to be introduced and popularised. Trials with these new fishing methods are being conducted and to transfer them to the fishermen an appropriate extension programme needs to be initiated.

Stocking of large reservoirs for inland fish production appears to afford little scope for significant increases in production. Reservoirs being created in the Mahaweli area and seasonal tanks, which at the moment have not been fully utilised are the most promising source of future fresh water fish production. The total expected increase in inland fish is roughly 30 thousand tons. Thus, long term increases in the availability of fresh water fish can only be achieved from the intensification of cage, pen and pond culture, However, the profitability of these ventures is inconclusive. Also, scientific knowledge and management practices will have to be improved and demonstrated to support rapid development in this area.

To improve the profitability of mechanized craft in the coastal fisheries sector, the following measures will have to be undertaken:

(a) provision of credit facilities to fishermen to meet working capital needs.

(b) setting up of a Fishing Vessel and Fishing Gear Technology unit to study suitable designs of fishing vessels and other cost reduction measures.

(c) Introduction of appropriate modifications in the subsidy schemes away from exclusive emphasis on boat issues and more towards facilitating the adoption of cost reducing craft and fishing techniques.

To make sure that offshore and deep sea resources are brought into production private and foreign entrepreneurs will have be actively encouraged to enter into this field by:

(a) establishing regular resource surveys in the offshore and deep sea areas, preferably with foreign assistance and collaboration.

(b) providing attractive fiscal incentives to companies and individuals.

(c) offering liberal terms and conditions, in respect of fish catch, for the setting up of joint ventures.

Production of inland fisheries must be augmented through –

(a) development of aquaculture in seasonal tanks;

(b) increased production of fingerlings and stocking of water bodies;

(c) pond culture;

(d) introduction of additional fishing craft in selected major tanks to increase harvesting capacity. Moreover, hydrobiological surveys must be conducted in the inland water bodies to ascertain their productivity with a view to determining the stocking rates of different species. In the first instance, these surveys should be confined to the 74 major inland tanks, which cover an extent of 175,000 acres.

Resource surveys to determine the potential for brackish water development will receive high priority. Shrimp culture development will be sought through an attractive package of incentives to medium and large scale private investors. Introduction of incentives for entrepreneurs in these categories who could invest heavily on the required infrastructure facilities is necessary.

In order to improve the operating efficiency, underutilized shore facilities operated by the state, such as ice plants, cold rooms and work shops, should be leased out to the private sector on attractive terms. At the

same time, the Ceylon Fisheries Corporation will have to move away from being exclusively a supply stabilizer and be run as a commercially viable organisation.

Improvement in the quality of fish sold in the market is needed. For this, the fish trading activity will have to be expanded through a marketing credit scheme. A more competitive environment will have to be promoted by removing the financial barrier to entry into the fish trade, the setting up of fish auction centres and mini cold rooms at important landing sites.

Fresh water fish processing plants should be the tactical element in developing a market for and changing consumer attitudes and taste preferences towards fresh water fish. The accumulated knowledge of the Minneriya fish processing plant will be made available to potential entrepreneurs. Credit facilities, incentives and technical know-how on processing must be provided to the private sector to expand fresh water fish processing in the country.

In the medium term, the research emphasis will be on periodic identification and assessment of fish resources. This is considered a pre-requisite for the rational utilisation of resources and for attracting the participation of the private sector in fishing and fisheries culture ventures. Extensive oceanographic studies have been planned for the 1984–1988 period. In the first phase, the survey area will have to be restricted to 50 miles.

It is envisaged that, in the foreseeable future, the extension system will have to perform regulatory functions. Advisory role has been ignored and must be initiated. To bring this about some members of the extension staff should be relieved of their regulatory duties and be made to concentrate on the extension function under a separate extension and training unit. This proposal should be initially implemented in one or two coastal districts on a pilot scale.

Improved fishing vessels and new fishing techniques for the utilization of demersal fish require an improved extension system. Also, with the advent of inland fisheries and other kinds of fish culture, the extension staff need a new spread of scientific information on the techniques of culturing fish. This change in direction requires heavier reliance on the ex-

tension staff as change agents. Training is necessary for them to make transition from administrators and overseers of development subsidies to communicators of extension messages. A medium term extension training programme is urgently needed. Training is not only required on the techniques and technology of culturing fish and fishing methods but also on the techniques of planning and conveying extension.

The main function of the planning and programming division of the ministry has been the development of two master plans, yet little evaluative work has been done, particularly on the various subsidy schemes, fleet utilization and the economics of alternative fishing methods. Additional staff and data processing equipment is required to strengthen the planning unit. A planning advisory body should be established. The planning advisory body should serve as an improved link between planning and policy making within the ministry.

In the development of fisheries, the government must concentrate its attention in those areas that show the greatest fish production potential. These are:

i. To develop the coastal fisheries sector, priority attention should be put on the South West, the South East and the North East Coasts.

ii. Development of fresh water inland fisheries must be concentrated in Anuradhapura, Moneragala, Polonnaruwa, Batticaloa, Mullaitivu and Badulla districts.

iii. Brackish water fisheries will be concentrated in Puttalam, Gampaha and Batticaloa districts.

The state will minimise investing in the construction of new fishery harbours. Instead, development of small anchorages, which would require considerably lower investment, will be emphasised. As a substitute for new fishery harbours, heavy reliance will be put on beach landing crafts.

Livestock

The livestock sector will be a high priority area for future growth and investment. Government resources will be provided to encourage the transformation of a subsistence based livestock system into a thriving commercial sector. The primary focus of development efforts in livestock

must be geared to promoting (1) broadscale dairy development; (2) improved feed resources and (3) integrated livestock management support services. In addition, a number of small-scale programmes in improved draught animal production, goat, pig and poultry development will also be supported. Domestic demand for livestock products is growing rapidly – the market is forecast to expand at a rate of over ten percent per annum. The livestock sector is an attractive area for private sector initiatives, particularly in dairy and feed development. For the smallholder, the successful incorporation of livestock into the household economy provides a steady, stabilizing stream of income, a source of savings and an investment for the future. For the country as a whole, expansion of domestic milk, beef and poultry production will enable the substitution for costly imports and will be a source of higher income in the rural sector.

The dairy sector is dominated by landless and smallholders in the mid and hill country, smallholders in the lower wet zone and Jaffna and smallholders with communal grazing facilities in the dry zone. Production estimates vary from 400,000 litres per day according to consumer surveys to 670,000 litres per day, when calculation is based on numbers of dairy cattle and estimated average yields. The imports of milk powder currently run at 15,000 to 20,000 tons per year and provide in liquid milk equivalent another 300,000 to 400,000 litres per day at a cost of about Rs. 500 million per year. Milk collection increased gradually from 8 million litres in 1960 to 10.6 million in 1966 and then grew at a rapid pace to 62 million litres in 1979. Since then, domestic milk production has stagnated and stands at 54 million litres in 1983. The decline originated from lower collections in hill and mid country and the coconut triangle due to their reliance on commercial feeds which increased rapidly in price. The increase of collection in the dry zone, where milk production does not depend on concentrate feeding, was accompanied by the rapid expansion of the collection network.

Primary development activities in this sector have involved the importation of breeding stock, artificial insemination, development of breeding herds, improvement of veterinary services, pasture and fodder development programmes and dairy credit schemes. The government has also supported the rapid development and expansion of processing facilities and the distribution of fluid milk at controlled prices. During the 1970's various subsidy schemes for pasture development, milk

collection and production of compound feed were developed to stimulate production and hold down consumer prices. During this same period, however, the processing industry has become progressively more oriented towards the import and repacking of imported skim milk powder to take advantage of the high profit margins of such operations. The National Milk Board has had to absorb the responsibility for collection and processing of fluid milk at a high cost compared to the more import based processing operations.

The domestic dairy sector is constrained by an output pricing policy which has not kept pace with the increasing cost of production for the main feed inputs which are the byproducts of coconut, wheat and rice. The development of suitable pasture and fodder systems has been very slow and retards the development of a low cost feed industry. Competition for feed resources from the poultry and pig industry has kept the price of feed for cattle at a high level and consequently, has constrained the profitability of commercial dairy development. Although the current trend for dairy development is to extend it widely throughout the mid-country wet zone, the coconut triangle and dry zone, the required change to provide sufficient cross-bred animals suitable for the newer outreach areas has proven to be unsuccessful.

For the future, it will be necessary to offer the domestic dairy industry a minimum level of price protection from imported powdered milk supplies, to maintain producer incentives and to create incentives for integrated crop and dairy farming throughout the country. The organization of milk producers into effective operational units, i.e. at the village and milkshed level, is a major pre-requisite to conducting programmes of fodder production and animal health outreach. The participation at village level is essential in the organization and quality testing of the milk, the distribution of feeds, breeding stock development and animal health programmes etc. Participation at the milkshed level should guarantee the efficient transport and chilling of milk, processing or marketing of milk, the purchase and storage of inputs in bulk and the distribution of such inputs to the villages. The commercial grouping of dairy producers is essential to ensure that economies of scale are realized in milk collection. The development of a private sector dairy foundation, charged with the leading responsibility in the institutional coordination and technological advancement of the domestic dairy sector, is an important step towards the full-scale expansion of this

development area. At present the processing and repacking facilities for milk production are large compared to present utilization rates. To improve the efficiency of dairy processing, rationalization of the processing sector must occur.

The sales of excess stock and culls from the dry zone, mid and hill country provides the majority of the meat consumed in the towns. With the ban on the slaughter of buffaloes and female cattle, official production of meat remained at approximately 12,000 metric tons per year. Beef is traded largely through itinerant merchants and marketing accounts for approximately 60% of the final retail price for beef. Government attention to the beef sector has been in low profile for cultural and religious reasons; this has contributed to the neglect of this sector. Price, limits the lack of high quality slaughter and market facilities and the ban on slaughter of buffaloes and female cattle discourages development in this sector. Future government attention should be directed at: (a) lifting the ban on slaughter; (b) lifting the control price of beef (c) improving slaughter facilities at key towns and, (d) encouraging small-scale privately financed abbatoirs and livestock trade fairs in areas where such facilities are required and shown to be economically viable.

There is evidence that traditional feed supplies account for most of the herd nutrient requirements. Existing feed resources are at near full-utilization levels and must be expanded to facilitate the expansion of the livestock sector. Many factors inhibit the optimum utilization of existing feed resources, the most important one being the high cost of carrying stocks of feed ingredients (maize, soyabean etc.) for feed manufacture. Lack of finance and equipment inhibits the full-scale development of non-conventional feeds. The production of low-quality milled rice implies that important byproducts, such as rice bran, are not available for the domestic feed industry. Efforts to improve rice milling will have important spinoffs for the feed sector. Lines of credit for feed manufacturers to purchase and stock grains will greatly improve feed availability. A coordinated resource inventory for feed production must be conducted, particularly in the dry zone and in the coconut triangle, to assess the development potential of existing feed resources in these areas. This is a key element in domestic livestock development and priority must be attached to overcoming the constraint of feedstock availability.

In regard to small ruminants, emphasis should be given to goats, for they are more productive in a humid climate under fluctuating feed conditions than are the other small ruminants. The control on mutton prices should be lifted to provide producers with a greater incentive for commercial production and the creation of goat producers associations at the village level should be encouraged in order to improve goat husbandry practices. Production and distribution of improved varieties will also have to be given greater emphasis.

Implementation of a national breeding policy is required to promote the development of a superior stock of animals. A national animal breeding committee should be established (a) to compile an inventory of the genetic resources, (b) to advise the government and livestock organisations on a culling policy for cattle and buffaloes, (c) to make recommendations on the role of artificial insemination and natural mating. Improvement in animal breeding needs an increase in the number and efficiency of artificial insemination technicians, and reduction of number, stocking rate and extended functions of animal breeding farms.

The commercial poultry sector has grown rapidly over the past decade, primarily through private sector initiative. Future programmes should be geared to providing villages with improved management, cross-bred varieties and disease control methods. Improvement in the quality of feed will have a positive effect on the efficiency and performance of the commercial poultry producers. To overcome problems besetting the poultry industry, a joint venture between the Ceylon Oils and Fats Corporation, private poultry traders and the producers which, could help improve producer access to high quality feedstuffs and broaden the marketing channels for broilers and eggs, should be established.

In the future, the development support services of the government must be re-oriented from veterinary care to a livestock production cum management focus. Overall resources for the livestock sector must be expanded in line with the increasing contribution that this sector can make to the national economy. Development support must be geared to the promotion of integrated crop-livestock systems and greater emphasis must be given to the areas of feed production, herd management and livestock market support. This is not to recommend neglect of veterinary obligations, only their reprogramming to reflect a broader

concept of and a more balanced approach towards animal production and health.

Tree Crops

The tea, rubber and coconut sectors are in the midst of an acute crisis. The contribution of the traditional plantation crops to the economy were declining, production was dropping and management levels were rapidly deteriorating. This trend has been to some extent arrested through policy reforms initiated after 1980. The present subsidy on fertilizer allows these products to compete successfully on the world market and yield an important source of government revenue. As these subsidies are relaxed, it will be difficult to maintain output levels and there will be a fall in government revenue. Unless drastic measures are taken to rationalize the institutional support system for the traditional export crops, there will be a sharp decline in exports and a resulting deterioration in the balance of payments and in the budgetary resources.

The Contribution of Smallholders to Tree Crop Performance in 1983

	Tea	*Rubber*	*Coconut*
Production (mn.kg/mn. nuts)	46	90	1780
Area ('000 acres)	256	280	859
Exports (mn. kg/mn. nuts)	41	84	450
Government Revenue (Rs. mn.)	577	571	185

Several problems are common to all of the tree crops. Government planning and management and other support services are constrained by a lack of coordination among ministries and other government bodies involved in the regulatory apparatus. It will be necessary to consolidate the supervisory and support apparatus for plantation crops if institutional reforms are to have any effect.

Traditionally, the government support services and the private production and export programmes have been biased in favour of the plantations. At all levels, the provision of support service provided to smallholders is especially poor, compared to that which is provided to the estates. In this section, the special needs and strategies to improve productivity of the smallholders, keeping in mind the historical im-

balance in tree crop resource allocations in favour of estates, is discussed.

The tree crops are supported through a variety of subsidy programmes. The results from these programmes are mixed. One of the results of the proliferation of subsidy programmes is the near complete diversion of extension resources, especially manpower, to subsidy programme administration. To return extension to its rightful place requires that a clear division of labour be instituted between the dissemination of information and the administration and development work in each ministry. This can be accomplished either by (1) splitting the existing extension system into a development support/subsidy cadre and extension cadre or (2) forming a single tree crops extension cadre. It may also be possible to conduct tree crop extension through the Department of Agriculture's extension division. However, the Department is overburdened with its existing extension programme and the special agronomic features and institutional support mechanisms of the perennial crops differ considerably from the annual crops. The best option is unified tree crop extension service which would be cost effective, will reduce the number of visits by extension agents to the villages and serve to separate extension and regulatory work. Within this system, the extension agent is envisaged to tend to all tree crops at the village level. Subject Matter Specialists will remain in the specialized institutions providing training to the agent. However, this again would require considerable improvement in co-ordination among ministries responsible for tree crops. Institutional reform in extension is urgently required to improve the performance of the smallholder sector and to restore the confidence of the smallholder in the quality of the extension service.

Smallholder Tea

The area under tea is approximately 598,000 acres or 3.5 percent of the total land area of the nation. In 1982, tea contributed 15 percent of the government revenues and provided employment to 11 percent of the labour force. The smallholder sub-sector is a rapidly growing and important force in the tea sub-sector. The total tea area is distributed in three elevation zones, high (above 1200 m.) which accounts for 32 percent of the area, mid-country (600 to 1200 m.) which accounts for 39 percent of the area and low-country (below 600 m.) which accounts for the remaining 29% of tea area. Old seedling tea makes up

85 percent of the plants and only 15 percent of the total area is under improved (VP) clones.

The two State corporations, the Janatha Estates Development Board (JEDB) and State Plantations Corporation (SPC), manage 340,000 acres or 57 percent of the tea area, while the remainder comprising of smallholder sector is defined as including holdings under 50 acres without their own processing facilities. There are 160,600 smallholders occupying an estimated tea extent of 185,000 acres and the major concentrations of these smallholders are in the Kandy, Galle and Matara districts. About 65 percent of the smallholdings are under 3 acres. Since 1950, there has been a 100 percent increase in the number of tea smallholders.

Tea production in 1983 fell to 179 million kg. the lowest level in the past decade. In 1983, the smallholder sub-sector accounted for 32 percent of the made tea. Tea exports have declined from 200 million kg. in 1975 to 181 million kg. in 1982. With the high international tea prices in 1984, it is expected that tea exports will far surpass the 1975 level. However, there has been a persistent trend towards a lower quantity of exportable tea.

Per acre yields show downward trends and the impact of this decline has been most severe in the middle and up-country tea areas. During the period of declining production in these two areas, low-country tea production has increased moderately. Yields on smallholder fields are consistently lower than the national average yields. Although precise estimates are not available, a 1983 estimate indicates 790 kg./ha. which can be compared with 1150 kg/ha. for the estates. In spite of the rupee devaluation, the government revenue from tea dropped from Rs. 3.3 billion (1978) to Rs. 2.2 billion (1983). In 1984 the dramatic rise in international tea prices helped tea exports to regain some of their traditional buoyancy. The boom in tea prices contributed to a surge in the expansion of exchange reserves.

Several factors constrain the rapid growth and development of the tea smallholder sector. There is a sub-optimal application of fertilizer on smallholder fields, largely as a result of inadequate fertilizer distribution outlets and lack of ready capital. Competition with paddy, contributes to problems in labour availability for tea plucking. This

leads to problems in field maintenance and overall low quality of the crop. The short supply of high-quality vegetatively propagated (VP) high yielding plants has limited the pace and extent of replanting and infilling programmes for the smallholders. Finally, knowledge of the proper methods of tea culture appears to be lacking. This can largely be traced to a highly dispersed and poorly organized extension system for smallholder tea. The replanting and infilling programmes for smallholder tea have operated well below annual targets. Nearly 50 percent of the tea bushes are over 60 years old and the annual mortality rate is 2 per cent in high elevations and 3 to 5 percent at low elevations. The attrition rate of the participants in the replanting programme is estimated at 40% between the first and the second years and there is evidence that the long-term replanting targets have been set well below the optimum requirements because of the shorter economic life of VP plants compared to that of seedling tea.

Over 80% of smallholder tea is processed in private factories. In many areas, there are no factories within a reasonable distance to procure the tea. Transport shortages and lack of nearby factory facilities contribute to the low and insecure earnings received by the smallholders. Although tea prices are protected by a formula evolved by the Tea Commissioner, the price paid to the smallholder by the leaf dealer is often less than the minimum price stipulated for that quality of product. The Tea Smallholders Development Authority (TSHDA) plays the primary role in fostering and supporting activities directed at the smallholders. The TSHDA has concentrated a great deal of attention on the provision and management of new bought-leaf factories, although its primary mandate is to provide production, extension and marketing support to the smallholder sector. Tea research continues to be directed primarily to the needs of the estates, and little or no farm/adaptive research is conducted.

To improve the supply of VP planting materials, nurseries should be decentralised. Smallholders who have the potential to develop nurseries must be given technical and financial support. This will reduce the cost of plants as the smallholders will be able to produce plants at very low cost in comparison to the purchase price they now have to pay. The TSHDA should establish at least one nursery, the capacity depending on plant requirements of the area, for every Tea Extension Officer's range. In addition to supplying plants, these could serve as demons-

tration nurseries to educate smallholders. However, the economic viability of each TSHDA nursery must be demonstrated before they are established. The bought-leaf factories will have to be encouraged to play a much larger role in the supply of VP planting material to smallholders.

Fertilizer availability can be improved considerably if all bought leaf factories, both state owned and private, are induced to provide fertilizer to their leaf suppliers. This will have the following advantages:

i. economy in the use of transport facilities as the same vehicle used for leaf collection can be used for fertilizer distribution on the outward journey;

ii. assistance in implementation of fertilizer credit schemes and the problem of recovery will be made easier.

Leaf grower societies are the second channel through which fertilizer could be made available. But the poor management and legal basis of these societies will have to be rectified before such schemes are introduced. In addition, the TSHDA should establish fertilizer stores provided their economic viability is demonstrated.

Two areas that need immediate attention are the collection of smallholders' green leaf and the smallholder leaf manufacturing capacity. The former could be improved by providing subsidised loans for the cost of vehicles to (a) bought-leaf factory owners; (b) private transporters; and (c) grower societies. The price paid to transporters should be revised at least once a year by the Tea Commissioner so that the transporters will receive a fair return for their service. Direct factory purchase will improve the marketing position of the grower, since it will reduce the number of intermediaries handling the product before it reaches the final processing point. About 80 percent of smallholder tea is purchased by private factories which are in need of repair. Special lines of credit should be established for private factory rehabilitation efforts. The TSHDA should limit new factory construction to only those areas that exhibit a dire need for such facilities. The role of the TSHDA should progressively be shifted from factory management to smallholder extension and support service management.

TSHDA extension service must be improved by proper training for its officers through the establishment of training centres. Better links between extension and research must be forged and the extension res-

ponsibilities of tea must be separated from the regulatory and administrative responsibilities of the tea development programmes. Greater emphasis must be placed on adaptive research and socio-economic inquiry. For better planning of the sub-sector a computerised data base should be prepared.

Replanting and infilling targets must be revised and the annual subsidy for these programmes must be reviewed regularly based on cost of production data for smallholder tea. Tea replanting exhibits low rates of returns while returns are very high for infilling. A strategy of focussing on infilling, by providing higher subsidies and government support service attention, would be an important means of encouraging profit maximising behaviour in the farm sector. Replanting and infilling programmes should concentrate on the low-country tea regions, since these are the most profitable areas for future development.

Future projects and programmes in the tea sub-sector will have to be focussed on a regional basis that takes into account: (a) the economic viability of the production system, and (b) the feasibility of effecting sustainable change. For all intents and purposes, national level projects and programmes should be discouraged as these tend to spread scarce development resources and undermine management capabilities. In tea, the greatest market potential for production growth is in the low country and the high country. On a geographical basis, Galle, Matara, Ratnapura and Nuwara Eliya produce approximately 80% of the smallholder tea and have about 60% of the smallholders. The first emphasis in these areas should be on intensive infilling programmes and other measures to increase productivity. The second priority region will be the mid-country tea areas in Badulla and Kandy, where there is 15% of total smallholder tea production and 35% of the smallholder area. In this zone, the strategic emphasis for the mid-country tea should be on programmes to increase productivity and intercropping programmes for the neglected holdings.

Smallholder Rubber

Rubber is Sri Lanka's second most important tree crop next to tea. Rubber accounted for 13% of total foreign exchange earnings between 1980 to 1982. The peak contribution of rubber in foreign exchange was Rs. 2.9 billion in 1981. Export duties and cesses on rubber account for 8% of total government revenue. Sri Lanka's rubber production

increased rapidly in the 1960's, stabilized in the 1970's and has recorded an alarming drop since 1980.

The estimated extent of rubber is 508,000 acres although this may be an over-estimate. 31% of all cultivators of rubber have under 10 acres of land, 23% have between 10 and 100 acres and the balance or 46% are in plots over 100 acres in size. A broad definition of smallholders are those who privately hold rubber land under 100 acres in size. Since estates account for 33% of all rubber lands, the bulk of the lands are in the private smallholder sector. Estimated yields have recorded a marginal decline since the mid 1970's and smallholder yields (approximately 500 kg/hectare) are roughly one-half the yields from the estate lands.

Several factors constrain the development of smallholder rubber production. To begin with, rubber is produced generally by part time farmers who also engage in mixed farming. Since rubber production is a side-line only a minimum of attention is paid to proper cultivation techniques. Over 30% of rubber is senile, approximately 40% is in low-productivity clonal or unselected varieties and the yield difference between these and the budded varieties is nearly 100%. Replanting procedures are lengthy and difficult. Furthermore, cultivation practices are technically sub-optimal – only 5 percent of the farmers use fertilizer in the post-maturation phase and farmers widely over-tap to increase short-term returns. Nearly 40% of the cultivators tap at twice the recommended rate and another 40% tap at four times the recommended rate. Improper cultivation practices and the use of low yielding varieties partly reflects an inadequate extension network. In the post-replanting phase, the extension effort declines significantly. However, it is precisely in the post replanting phase that the problems of over-tapping and under fertilization occur.

Many smallholders simply lack proper processing know-how, utensils and equipment, as is evidenced by the use of impure water, inadequate or excessive doses of coagulation acid, excessive smoking and the production of thick and uneven sheets. Often the smallholder cannot afford to store the processed product because of his subsistence cash requirements and his need to meet his agricultural operating costs from his processing profits. The constraints that hinder smallholder based processing are compounded by problems in marketing. The lack

of group marketing institutions, aside from the Group Processing Centres, limits the bargaining power of the producer. However, 90% of the smallholder sheet rubber is handled by the private traders.

Yields on the research station fields are often around 2000 kg/acre compared to 600 to 700 kg/acre on smallholder fields. The reason for the large yield gap arises partly from a problem of poor vertical and horizontal communication between the research and the extension service. Research tends to be more geared to the needs of the estates than the smallholder. For example, the new varieties of clones, the 'RRI 100,' '101', '103' series, are designed for good management, cultivation systems and the standard tapping techniques. Further, there is very limited socio-economic research conducted on the smallholder sector.

Rubber replanting has grown from 7971 acres in 1978 to 12649 acres in 1982 due largely to the implementation of the Smallholder Rubber Rehabilitation Project (SRRP) and the progressive increase in the replanting subsidy. A regular review must be undertaken of the replanting subsidy, although it appears advisable to maintain the present level of about 60% of replacement costs. Computerization of the administrative procedures for the replanting programme must proceed in order to reduce time lags. Under management practices of smallholders, rubber trees have an economic life of 24 years. Serious consideration should be given to reducing the eligibility period from 30 to 24 years for the replanting subsidy programme after ascertaining its feasibility.

Extension coverage needs to be improved from a ratio of approximately 2000 cultivators per rubber extension officer (REO) to 1000 holdings per REO. The current re-demarcation of REO ranges is an important step towards an improved extension system. A re-evaluation of the work content of the REO is called for, with greater emphasis on the dissemination of information and less to development subsidy activity. The Rubber Controller's Department should assume an increasing share of the administrative and support responsibilities for the development subsidies, the supply of planting materials and agronomic inputs.

The provision of better quality planting materials is the most important factor to promoting increased smallholder rubber output. Private

nurseries must be encouraged to increase their production while submitting to regular inspection by the research and extension agency. A programme of regional nursery expansion should be encouraged to ensure that smallholders have access to public sector planting materials. However, the economic viability of each regional nursery should be demonstrated before it is established. Reliance will have to be placed temporarily on the two public corporations for supplying planting materials. Better institutional coordination will ensure that the smallholders receive adequate planting material from the estates.

Improved fertilizer distribution can be achieved by (a) extending those distribution arrangements in SRRP areas to the non-SRRP areas; (b) distributing fertilizer to group processing and collection centres; and, (c) expanding the number of distribution outlets. In addition, institutional credit for fertilizer use must be actively channelled through private factories to ensure that the smallholders' working capital requirements are met.

Inter-cropping on smallholder lands is essential to provide an income source during the replanting period. Previous experiments with on-farm inter-cropping, for example with passion fruit and banana, have not proved very successful due largely to the lack of terminal markets. The focus of inter-cropping work must be widened and coupled with attempt towards market development in the first instance.

To facilitate integration between the smallholder producer and the processing sector a network of latex collection centres should be established. These collection centres could serve different users. such as factories engaged in the manufacture of latex crepe, sole crepes, centrifuged latex and speciality rubbers. Special concessions should be granted to those firms and private factories that establish collection centres.

A better mix of primary rubber products is essential if the smallholders are to take advantage of the changing trends of the world market. The appropriate product choice depends on an active, accurate market information service which can communicate developments of the world market to the cultivator. It is suggested that the Ministry of Plantation Industries participate in a Market Information Service that maintains a contract with an international brokerage house for the

provision of timely and essential information on trends in the world market.

Applied research must be re-directed towards the particular needs of the smallholder. Future research must evaluate the appropriate densities and cultivation practices for smallholders, develop clones that can withstand high-frequency tapping, conduct more research on smallholders fields and strengthen the socio-economic aspects of the scientific investigations. Linkages between the research, extension and farm community are extremely weak and a more attention should be given to improving those linkages through appropriate investment in research, extension and institutional reform.

A census of rubber holdings is required to provide a solid foundation for planning purposes. In addition, more attention must be given to the regular collection of cost of production data, producer margins and trade costs.

The initial thrust of smallholder rubber development programmes has been concentrated in the 3 major rubber growing areas – Kalutara, Kegalle and Ratnapura districts comprising about 60% of operators and acreage in the private sector. Almost all other smallholdings are in Galle, Matara, Colombo and Gampaha districts, together accounting for one third of smallholder acreage. Future rubber development programmes will have to give emphasis to these seven districts in the allocation of resources.

Coconut

In coconut, the long term trends point to domestic demand outstripping domestic supply. Census estimates indicate approximately 1 million acres under coconut in 1982, representing a decline in planted acreage of 100,000 acres since 1973. The 1982 annual nut production has been estimated at 2.52 billion nuts.

100,000 smallholders produce coconut. The 1982 agricultural census reveals that 84 percent of cultivated acreage is accounted for by holdings of less than 50 acres. The main coconut products are copra, desiccated coconut, fibre and charcoal. 52 oil mills and 64 desiccated coconut mills clustered in the coconut triangle zone produced the bulk of the oil and desiccated coconut in 1982.

The value of coconut production in 1982 is estimated at Rs. 3,283 million and formed 3.6% of total GDP. Including processing and marketing would increase the contribution to approximately 5% of total GDP. In 1982, coconut products earned Rs. 1,496 million in foreign exhange or 9.5% of the total export proceeds. The export duty on coconuts accounted for 7.9% of total government export revenue in the same year.

Coconut is an important food staple in Sri Lanka. The 1982 Consumer Finance Survey indicates that the average household spent 9% of its total food expenditure on coconut and coconut oil. About 22% of the daily calorie intake of the population comes from coconut products. As a consequence of rising domestic consumption and falling production, the exportable surplus of coconut has declined from 59% in 1955 to 25% in 1982.

Several factors hinder the future development of smallholder coconut resources. The main causes of reduced production of smallholder coconut are inadequate fertilization, rising senility of the plant population, poor crop management, a high degree of price instability and low gross returns. Fertilizer use meets an 11% of estimated optimum needs. Increasing fertilizer use to the recommended 7 to 10 lb/tree level would increase productivity by almost 50% of the national average.

Slow replacement of senile palms is responsible for the gradual rise in senility of the palm population. Partly this is due to laxity in the replanting programme. This is also due to the lower economic returns to coconut than that for rubber, far lower than that for tea when subsidies of tree crops are taken into account. As a result of the 1972 land reform 11% of the best coconut lands, those accounting for 25% of total output, were nationalised. One third of those properties were redistributed to smallholders, and the remainder to public sector organizations. Management on both smallholder and public sectors lands has grievously suffered since 1972. The newer cultivators have lacked the financial and managerial resources required for proper crop supervision.

The installed capacity of the desiccated coconut manufacturing and oil mills are under-utilized due to the decline in exportable surplus over the past thirty years. During the 1977–1982 period, desiccated coconut production declined by 6%, reflecting a shortage of processing

material. Desiccated coconut quality has deteriorated substantially during the past decade. As a result, Sri Lanka has lost a substantial market share in coconut products to the Philippines. Between 1966/70 to 1976/80, Sri Lanka lost 25% of the world desiccated coconut market to the Philippines. International market performance has suffered due to insufficient output, lack of attention to product quality and end–use and the low margins resulting from high domestic tariffs.

The development strategy for the coconut sector will involve an integrated approach to stimulating production, improving processing efficiency and regaining lost international markets. To rationalize the marketing sub-sector and improve the institutional efficiency of farm cultivation, the smallholders should be organized into private marketing companies which will engage in group marketing, credit application and group processing. A special group marketing and credit system will have to be piloted with the regional branches of the banks to cater to the post-harvest cash requirements of the cultivators. A market intelligence service should be set up to provide both domestic and international market information to the small, but organized cultivators.

It is suggested that a producer return stabilization scheme be developed to buffer the producers from international price variation. The scheme can be financed by setting aside a portion of the variable export duty levied, during years of relatively high prices and strong exports. Greater net producer return stability will contribute to an investment climate conducive to long term growth. Producer companies need to be operative before implementation of this stabilization scheme.

A value cost ratio of 3 to 1 between coconut product and fertilizer is required to encourage adequate fertilisation levels and maintain producer incentives. Fertilizer use should be increased by (a) positively controlling fertilizer price input/output relationship, (b) expanding the fertilizer distribution network and vigorously encouraging fertilizer utilization. In poor crop years, the suggested producer return stabilization fund can be used to increase production subsidies so as to maintain aforementioned, attractive value-cost ratio.

In the long-term, governments' coconut sector policies are targetted towards maximising the incomes of coconut cultivators. Alternative income sources will have to be developed by encouraging multi-cropping

and mixed livestock/crop enterprises. An assessment of the resource base available in the coconut triangle suggests that not more than 15 to 20 percent of the potential area available for intercropping (300,000 acres) is actually utilised for that purpose. A major reason for the slow progress in intercropping is that the recommendations given to growers are too broad in an agronomic sense, with little emphasis given to specific rainfall regimes, soil types and shade requirements of the various crops. A preliminary resource inventory for multicropping in the coconut triangle has been completed with areas and crop recommendations identified on a disaggregated basis. A concerted drive should be initiated to promote mixed farming systems on the coconut lands to improve the utilisation of land and labour resources.

Improvement in desiccated coconut manufacturing should be achieved through restructuring the industry. Facilities should also be made available to the private sector to finance processing complexes. Within these complexes, integrated processing units should replace the network of low-efficiency desiccated coconut mills provided their economic viability is established. Soft credit windows will also have to be opened to modernise the existing desiccated coconut milling sector. In research, special attention must be drawn to improving biological pest control practices; the development of a network of decentralised seed garden to provide quality seed for replanting and the establishment of a coconut processing and development centre.

Future coconut projects and programmes should be confined to the most promising areas. These include the coconut triangle and the southern coastal belt including Galle, Matara, Hambantota and Kalutara.

Minor Perennial Crops

The term minor perennial crops (MPCs) refers to the five main spice crops (cinnamon, cardamom, clove, pepper and nutmeg) and the two beverage crops (cocoa and coffee). The share of MPCs in agricultural exports has been approximately five percent since the early 1970's. This share has remained moderately constant despite consistent increases in the export prices because of the slow increase in output since the mid seventies. In 1982, Sri Lankan exports totalled 12,640 metric tons with an estimated value of 36.8 million dollars. This is equivalent to 0.32 percent of world trade in that year.

The characteristics of the international market differ for the different MPCs. Coffee is traded under the International Coffee Organization quota and Sri Lanka has had difficulty in fulfilling its share of the quota. Cinnamon trade is under growing competition from cassia although this has traditionally been a high-value market for Sri Lanka. Nutmeg is a low quantity and value export from Sri Lanka with the higher value market controlled by Indonesia. The pepper trade has been hindered by erratic supplies from Sri Lanka, although the nation's exports receive a quality premium on the world market. The international cocoa market is shrinking due to changing consumption patterns and increased competition from other exporting countries and prices are expected to stagnate over the longer term.

Short run prospects for increased production in crops such as cardamom, coffee and cinnamon are limited because existing stands are old and not very responsive to fertilizer. For the other crops (pepper, clove, cocoa and nutmeg), fertilizer application is well below optimum levels. Area expansion and increased production of MPCs is hampered because these commodities often compete with paddy or tea for labour and other productive resources. Moreover, MPCs production is generally considered a sideline income source.

A government assistance scheme is provided for planting and replanting of MPCs. This has progressed at a slow rate because of the competition for farm labour, an astonishingly low survival rate of 10 to 20 percent for replantings and new planting, and logistics problems for processing of applications and issuing of planting material.

The marketing of MPCs is through a long chain of buyers to exporters. In the first transaction between the cultivator and the trader, the commodities are sold on the basis of volume with little quality gradation. Subsequent transactions involve a closer adherence to the prevailing price differentials for different commodity grades. Because the cultivators are generally unaware of the different grades and standards used by the exporters, they do not try to systematically improve the quality of their produce or try to capture the benefits of higher quality production. International MPCs buyers place a special premium on the secure and steady supply of high quality produce. Present production and marketing practices in Sri Lanka are not adequately geared to satisfying these exacting requirements. Moreover, domestic MPCs prices are closely

linked to the international market and instability generated there leads to great variations in producer returns.

Improved production and marketing of MPCs is hampered by the lack of an effective extension cadre. At present, MPCs extension is being conducted by the Department of Agriculture in agreement with the Department of Minor Export Crops. To date, this arrangement has been unsatisfactory since the Extension Agents of the Department of Agriculture must advise on a wide array of crops and can only give limited attention to the MPCs. No proper mechanism for the sharing of information between research and the extension system has been established. Consequently, valuable research findings are not transmitted to the farmers.

The medium size estates, including the state corporations, are in a better position to allocate labour and other resources to the commercial production of MPCs than are the smallholders. Production of MPCs on a commercial scale is a pre-requisite for the development of consistent and stable volumes of quality produce that foreign buyers demand. But at the same time, efforts will have to be made to improve the delivery of support services to the smallholders so that they can afford to cultivate MPCs on a full time basis. Greater incentives must also be provided to operators of medium size holdings to grow MPCs.

The present assistance scheme should be refocussed by targetting the government's efforts on a few crops in selected areas. Particular attention must be paid to those crops that exhibit a decline in production but represent a significant land area and crops which combine good market potential and widespread knowledge of how to grow them. Using these criteria, the focus of government MPCs assistance schemes should be confined to the following crops and districts: cocoa, cardamom (Kandy, Matale, Kegalle); cinnamon (Galle, Matara); coffee, pepper (Kegalle, Matale, Kandy, Ratnapura). The assistance scheme for MPCs will have be periodically revised to ensure that it maintains its relative position to other tree crops. Preferential treatment through higher subsidy should be given to applications for planting or replanting of contigous tracts of land in excess of 3 acres. This is the most expeditious way to promote commercial plantings which are seen as the cornerstone for ensuring a regular supply of MPCs. To improve the logistics of subsidy administration local banks should be involved in the payment of subsidies to growers.

A shifting of institutional responsibilities is required to improve the extension and outreach efforts for the MPCs. The establishment of a Tree Crops Extension system would be a step in the right direction towards greater emphasis on an improved outreach for the MPCs. In a joint Tree Crops Extension service, the Department of Minor Export Crops would have to play a more direct role in extension and outreach, most likely through the provision of Subject Matter Specialists for the different MPCs. Given the importance of marketing and post harvest technology in MPCs, the extension system needs to be re-oriented to provide post harvest technology and marketing extension.

In addition, vegetative propagation (VP) methods must be developed for cocoa for high yielding clonal varieties. For coffee, the major research thrust must be in transferring the improved varieties grown in the research stations to the farmers' fields and selection of varieties suitable to lands under different elevations. Varieties must be selected that are resistant to leaf rust and methods found to control the berry borer problem. For cinnamon, research must be conducted in varietal selection and better management practices. In the case of cardamom the merits of seed versus vegetative propagation must be explored, especially as the scale of cultivation increases. Finally, for pepper, the yield breakthroughs from the Malaysian and Indian varieties must be transferred to the cultivators and investigations into disease control must remain a high priority.

As a first step in quality improvement, local standards will have to be established. They should be simple to understand and must be related to the internationally accepted standards. Quality improvements could also be encouraged by the introduction of village level solar dryers to minimize drying on the roadside.

One means of reducing the marketing chain for MPCs is to encourage the private exporters to purchase directly at the farm gate. A series of taxation and other fiscal incentives must be provided to the private exporters to encourage greater direct MPCs purchase. In addition, the marketing power of MPCs producers can be increased by encouraging appropriate institutions for group marketing and by establishing a network of MPCs collection centres. Co-operation with the Ministry of Trade can also be fruitful in organizing village auctions. A regular calendar of village auctions can bring producers and buyers together and could result in

lower bulking costs for buyers and better and more competitive prices for sellers.

The government should initiate bilateral or multi-lateral trade discussions on cinnamon with Mexico and other importing countries of South America. The use of cassia as a substitute is increasing in many markets and Sri Lanka needs to protect the present cinnamon position by making a comprehensive evaluation of future strategy in respect of cinnamon. A component of this strategy will be to engage the services of a professional and reputed foreign promotional firm to advertise and search for markets for Sri Lankan cinnamon. A combination of private/public sector trade missions, commodity forecast contracting and market information outreach must be activated to translate international market signals into domestic incentives.

Future efforts to improve planning will require the development of a base-line data set and the formulation of a sub-sector master plan. For future planning purposes, an assessment of the inter-cropping potential of MPCs with tea, rubber and coconut must be developed. In-depth studies must be conducted on processing capacity, marketing organization and market information needs. A comprehensive plan is sorely needed to guide production in this sector.

Nutrition

There are many indications of deteriorating nutritional status of the population between the early 1970's and the early 1980's. The percentage of households with inadequate calorie intake has increased from 40 percent in 1969/70, to close to 55 percent in 1980/81. The degree of of deterioration was more pronounced in the estate sector because during the decade starting 1969/70, estates experienced an increase of 68 percent in the number of households failing to achieve calorie adequacy. In this same period, the allocation of household income to food purchases has increased from 52 percent to 70 percent. The high share of the household income going for food reflects the fragile position of many households to food price increases.

During the past decade, the cost of a minimal diet has risen rapidly. For the bottom ten percent of income earners, the cost of 100 calones has increased by approximately 500 percent. Low income households are highly sensitive to changes in real income and food prices. A combination of low income and high food budget shares makes these house-

holds reduce their calorie consumption in exactly the same proportion as fall in real income. Rapid increases in food prices—although beneficial to long term agricultural growth objectives – have serious nutritional implications for the low income households mainly through the reduction they cause on real income.

The main focus of this nutrition strategy is to ascertain the extent to which agricultural programmes can effect nutritional improvement. Occupational groups that appear to be most at risk are labourers, unemployed and agricultural and animal husbandry workers. Survey results have shown that nearly all the labourers earn a wage and that over 80 percent of them express a desire for more work. The combination of under-employment and low wage levels appears to contribute significantly to nutritional deprivation.

Those farmers who own relatively large parcels of land appear to be insulated from the effects of undernutrition arising from food price increases. However, the great majority of the farmers in Sri Lanka depend on the market for the bulk of their consumption requirements. Consumption survey results suggest that the smaller the landholding size, the lower the per capita calorie intake and the higher the extent of extreme poverty. It is clear that the agricultural labourers and farmers with miniscule holdings regardless of the type of land they hold or the crop they grow, are the group exposed to the highest risk of severe nutritional deprivation.

						over
Size of Paddy Holding (acres)	0	0–0.3	0.3–0.7	0.7–1.25	1.25–2.50	2.50
Households with severe poverty %	9.0	9.5	5.6	4.1	4.7	3.4

The nature of the nutrition problem in Sri Lanka and the characteristics of the affected population calls for careful consideration of regional disparities to deal with the problem. For this purpose, the incidence of malnutrition in homogeneous agro-ecological regions (evaluated by anthropometric measurements and calorie inadequacy) was compared to the opportunities of agriculture as an instrument for the amelioration of malnutrition. This comparison defines regional priorities for policy intervention for nutritional improvement.

	Regions*								
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
Composite ranking of nutritional deterioration (1 most urgent attention)	8	8	3	5	3	5	6	3	6
Composite ranking of nutritional level and agricultural oriented intervention (1 most effective)	7	8	8	2	4	2	4	4	5

(A) Colombo, Gampaha, Kalutara, *(B)* Jaffna, Vavuniya, Mannar, Mullaitivu, *(C)* Kandy, Nuwara Eliya. *(D)* Kegalle, Ratnapura. *(E)* Matale, Badulla. *(F)* Galle, Matara. *(G)* Kurunegala, Puttalam. *(H)* Moneragala, Hambantota. *(I)* Anuradhapura, Polonnaruwa, Tricomalee, Baticaloa, Amparai.

The largest income generating activities for the poor are to be found in the agricultural sector and agricultural production,* as the instrument to improve nutrition, will yield best results in Kegalle, Ratnapura, Galle and Matara districts. It can also be used effectively in Matale, Badulla, Kurunegala, Puttalam, Moneragala and Hambantota districts. Anuradhapura, Polonnaruwa and Amparai districts may also fall into this category. Further analysis may be necessary as data precluded further disaggregation. In all other districts, direct supplementation such as Food Stamps. Thriposha and school biscuits will need to be emphasized.

The major direct supplementation programme for the poor is the Food Stamps programme. In an effort to mitigate the deleterious effects of budget deficits, the government is committed to keeping the present funding levels for food stamp subsidies constant in nominal terms. To increase the beneficial effect of the food stamps programme, the number of beneficiaries should be considerably reduced to redirect the subsidy to those who are most in need and to provide them adequate food intake. At present there are 7 million food stamp holders. For more effective targetting, it is suggested that higher coverage be afforded to households who reside in the districts that show evidence of higher rates of nutritional deficiency.

A combination of an income level and landholding criteria should be used if feasible to screen those eligible for food stamps. While high rates of undernutrition persist, the government should ensure that the distribution of food stamp benefits is undertaken with maximum efficiency and that all leakages from the system are stopped. In the near future, the only means of protecting the consumption status of the ultra poor group, who depend on food stamps for over 80 percent of their diet, is

*Mobility and mortality associated with seasonality in agricultural production has not been considered.

to index the value of the stamps to some form of consumer price index for basic staples.

The food stamp programme has traditionally been viewed as strictly a device for transferring income and raising nutritional standards. With future surpluses of rice likely, it is important to consider the potential of the food stamp programme for surplus rice disposal. The food stamp programme should be linked to a price forecasting and surplus disposal disposal system for rice and the government support for 'other field crops. This will be a means of disposing of surplus stocks with a minimum of storage and trade costs and without disrupting the market economy. However, the ability of the government to use the Food Stamps programme for surplus rice disposal depends on its ability to accurately forecast production level and prices of essential commodities well in advance of food stamp programme allocations.

Section C

PRIORITY INVESTMENT OPPORTUNITIES

Growth in the agriculture sector is contingent on the creation of an attractive investment climate for private initiatives and on the creative use of government and foreign donor resources to stimulate technological and social transformation. It is expected that policy reforms favouring an expanded scope for private sector initiative will proceed hand in hand with measures taken to improve the efficiency of public sector service delivery and the introduction of new technologies to fuel growth and development. The NAFNS has identified a number of major project and programme investment priorities that conform to the above objectives. These are as follows:

(a) *Tank Rehabilitation/Irrigation Management.* In the irrigation sector, future emphasis will be shifted from new tank construction to rehabilitation of large, medium and village level tanks. Major priority will be the encouragement of appropriate forms of system management including better maintenance of the capital stock and higher productivity from the more efficient utilization of water and land resources.

(b) *Agricultural Research Development.* The government is obliged to invest in the development of new technologies for agricultural development. Agricultural progress will require greater attention and investment in research. Future efforts should involve improved coordination of activities through a Council for Agricultural Research Policy, sharper focus on multi-crop and multi-activity agricultural enterprises, as well as improved training and facilities for research and support staff.

(c) *Forest Resource Development/Watershed Management.* A co-ordinated programme of reforestation, resource inventory and land use planning activities will have to be strengthened on the basis of major watersheds.

(d) *Rural Credit Reform.* A major effort is required to improve the efficiency of rural credit distribution. Greater integration between traditional credit distributors and institutional sources should be encouraged. Efforts will have to be made to utilize the agro-processing sector as credit dispersal agents and pilot activities should be designed to promote better marketing opportunities for small farmers. Special short-term credit windows should be provided in key areas such as paddy and feed grains. Efforts should be made and incentives provided to encourage an attitude of development banking in all areas of rural credit. Medium and long term credit must be advanced to expand the stock for productive assets in the agriculture sector, especially in fisheries, tree crop processing, transport and storage.

(e) *Tree/Crop Agriculture Extension System.* Special efforts are required to revitalize the tree crops extension cadre and to provide a reorientation towards information dispersal and away from subsidy administration. A long term strategy should aim at the development of an integrated extension system to handle all of the tree crops, with special attention towards the particular needs of the smallholders. The consolidation and reorientation of the extension cadre should be conducted in several phases before a complete reorganization is attempted. The extension system for crop agriculture will also have to be upgraded through the provision of better training and support facilities to take on the new responsibilities demanded by the increased sophistication in agricultural production technology and the new emphasis on crops other than paddy.

(f) *Dairy Development.* The livestock sector has been targetted as an area of priority attention over the next decade in an effort to substitute for the rapidly rising milk imports. A major institutional reorganization of the dairy processing and producing sectors will be implemented with the transfer of the bulk of the managerial responsibility for the sector from the public to the private sector. The government will provide policy support appropriate to private sector growth and development.

(g) *Sugar Self-Sufficiency.* Major efforts are to be taken to promote production of sugarcane and the establishment of agro-enterprises for sugar production. Attractive incentives are being provided to joint foreign/local enterprises to establish sugar factories and nucleus sugar estates. Public sector planning activity is required to ensure that the

plants are located in the proper areas, that the efforts of the public and private sector in sugar production are properly integrated.

(h) *Off-Shore/Brackish Water Fisheries Development.* Continued growth and expansion in the fisheries sector requires government support especially in these highly capital intensive areas. The Government must provide policy guidelines, as is required to mobilize private investment– (a) allocation of land resources, fiscal incentives and technology support for brackish water fisheries; (b) credit, taxation and tariff policy support for coastal and deep-sea fisheries.

(i) *Minor Perennial Crop Development.* Specific programmes must be undertaken to encourage the development of medium and large holdings. In addition, the cultivation of minor export crops as part of inter and mixed crop rotations with the plantation and the food crops must be encouraged on a wider scale among all holdings.

(j) *Agro-Industrial Promotion.* A wide variety of efforts must be made to encourage a co-ordinated approach to agro-industrial development. Efforts must be made to modernize and improve upon the existing stock of agro-industries. Specific attention is needed to improve the quality of rice milling, fruit and vegetable processing and to encourage the replacement of antiquated vegetable oil processing equipment. New lines of agro-industrial products must be supported.

(k) *Technology Development for Other Field Crops.* A full range of technologies and extension practices must be developed for the non-rice field crops to guarantee sustainable crop diversification efforts. Intensive training and research is required in the near term in farming system approach to initiate a technology development process.

(l) *Upland Farm Stabilization.* Research and extension is required on upland farming to introduce cropping patterns that will stabilise *chena* cultivation. Stabilization practices also include development of suitable crop calendars, co-ordinated support service delivery and market development for newly introduced crops. Upland farm stabilization programmes must accompany new irrigation initiatives in the dry zone.

(m) *Marketing Improvement Project* Management of rice supply with the participation of the private sector must be the main component of

this project. Stock management will have to be improved by developing institutional and financial mechanisms to allow producers and traders to hold inventories with the assistance of the credit system. Farmers could bring their produce to storage facilities with the banks participating in the provision of refinancing privileges to traders. A unit must be established to monitor and analyse food price policies in order to ensure correct pricing signals. The potential for using the food stamp programme as a means of surplus rice disposal should be explored.

(n & o) *Smallholder Tea and Rubber Development.* Improved transport facilities, collection centres and rehabilitated processing centres must be provided for the smallholder plantation crop producers. Efforts to promote group marketing and input distribution through private factories are important institutional shifts which require special funding. Special attention is needed to improve the facilities and access to transport of the private bought-leaf factories and to generally rehabilitate small scale rubber sheds.

Prospective Major Investments: Estimated Timing (Year) and Total Cost
(Million Dollars)

Project	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*
(a) Tank Rehabilitation/Irrigation Management	55	...	...	75	...	...	...	...	75	...
(b) Agricultural Research Development	...	30	...	...	...	...	...	...	20	...
(c) Forest Resource Development/ Watershed Management	...	...	...	...	...	40	...	...	...	20
(d) Rural Credit	...	20	...	...	...	...	...	20	...	...
(e) Tree Crop/Agriculture Extension	...	...	25	...	...	...	...	...	15	...
(f) Dairy Development*	60	...	...	...	...	...	60	...	...	...
(g) Sugar Self-Sufficiency Programme*	...	...	...	...	40	...	...	60	...	...
(h) Off-Shore/Brackish water Fisheries Development*	...	...	20	...	...	20	...	...	...	...
(i) Minor Perennial Crop Development	...	...	...	...	20	...	...	...	...	...
(j) Agro-Industrial Promotion	...	...	...	15	...	...	...	15	...	...
(k) Technology Development for Other Field Crops	12	...	...	...	...	...	...	...	...	15
(l) Upland Farm Stabilization	...	...	...	...	...	...	25	...	...	...
(m) Marketing Improvement Project	...	...	15	...	...	...	...	15	...	...
(n) Smallholder Tea Development	...	...	...	20	...	...	...	...	20	...
(o) Smallholder Rubber Development	...	...	25	...	...	...	...	20	...	...
(p) Coconut Marketing and Institutional Reforms	...	...	...	15	...	...	...	...	...	15
(q) Coconut Intercropping	...	...	...	...	...	25	...	...	...	...

*main component is private capital

(p) *Coconut Marketing and Institutional Reform.* Extensive repair and rehabilitation of private desiccated coconut mills is required. Financing must also be provided to restructure coconut processing industry centres. Institutional organization of producers to form companies that will engage in supply of inputs, credit and marketing. A producer return stabilization scheme should be pilot tested.

(q) *Coconut Intercropping.* Efforts are required to develop suitable crop and crop/livestock mixes in the coconut triangle. The introduction of alternative cropping systems requires the development of new technological packages, multi-crop support services and complementary market development.

In addition, the NAFNS has identified a number of small and medium scale project and programme initiatives which require external financing. These are as follows:

1. *Seed improvement/seed certification:* Especially for high quality paddy and other field crops and vegetable seeds.

2. *Agricultural planning improvement:* Provide training opportunities to planners. Upgrade the planning infrastructure and improve institutional linkages.

3. *Rural development management training and reform:* Establish a training programme for senior and entry level managers. Institute a performance incentive structure in key commercial state ventures.

4. *Horticulture development:* Improve research and develop high quality planting materials for selected fruits and vegetables.

5. *Area specific rice breeding research:* Develop rice varieties suited for different micro environments.

6. *Strengthening regional and vocational training:* Expand and decentralize the in-service training facilities for extension staff and provide increased vocational training to farmers.

7. *Village tank management modelling/Conservation farming/Rotational cropping and micro-propagation technology development for crop improvement:* Provide the research and technology support base for specific areas in future field crop development.

8. *Aquaculture and mariculture development:* Provide research and demonstration for breeding. Expand marketing infrastructure.

9. *Marketing development for minor perennial crops:* Establish village level institutions for group collection and processing of key MPCs. Improve research and extension support for selected products.

10. *Poultry development:* Establish an integrated feed and marketing venture between the Ceylon Oils and Fats Corporation and the private sector. Provide improved breeds and support extension efforts.

11. *Small ruminant development:* Pilot level research and technology transfer to diversify farm incomes sources, plus institutional development of producers.

12. *Non-conventional feed resources development:* Improve research on non-conventional feeds' production (pilot plants).

13. *Small scale agro-industrial promotion:* Set up pilot processing plants for field crops and fruits and vegetables using semi-traditional techniques as demonstration centres and strengthening of the Food Technology division of the Department of Agriculture.

14. *Coconut development:* Set up processing research facilities, seed gardens and strengthen training centres.

15. *Tea and rubber development:* Strengthen support services for smallholders (clonal development, inter-cropping, socio-economic and adaptive research, and training and extension facilities). Expand processing research facilities.

16. *Large ruminant development:* Establish dairy training facilities, strengthen selected breeding farms and improve extension support for livestock production.

17. *Fisheries development:* Survey brackish water, offshore and deep sea, and inland water bodies. Set up fishing vessel and fishing gear technology unit. Strengthen extension and training.

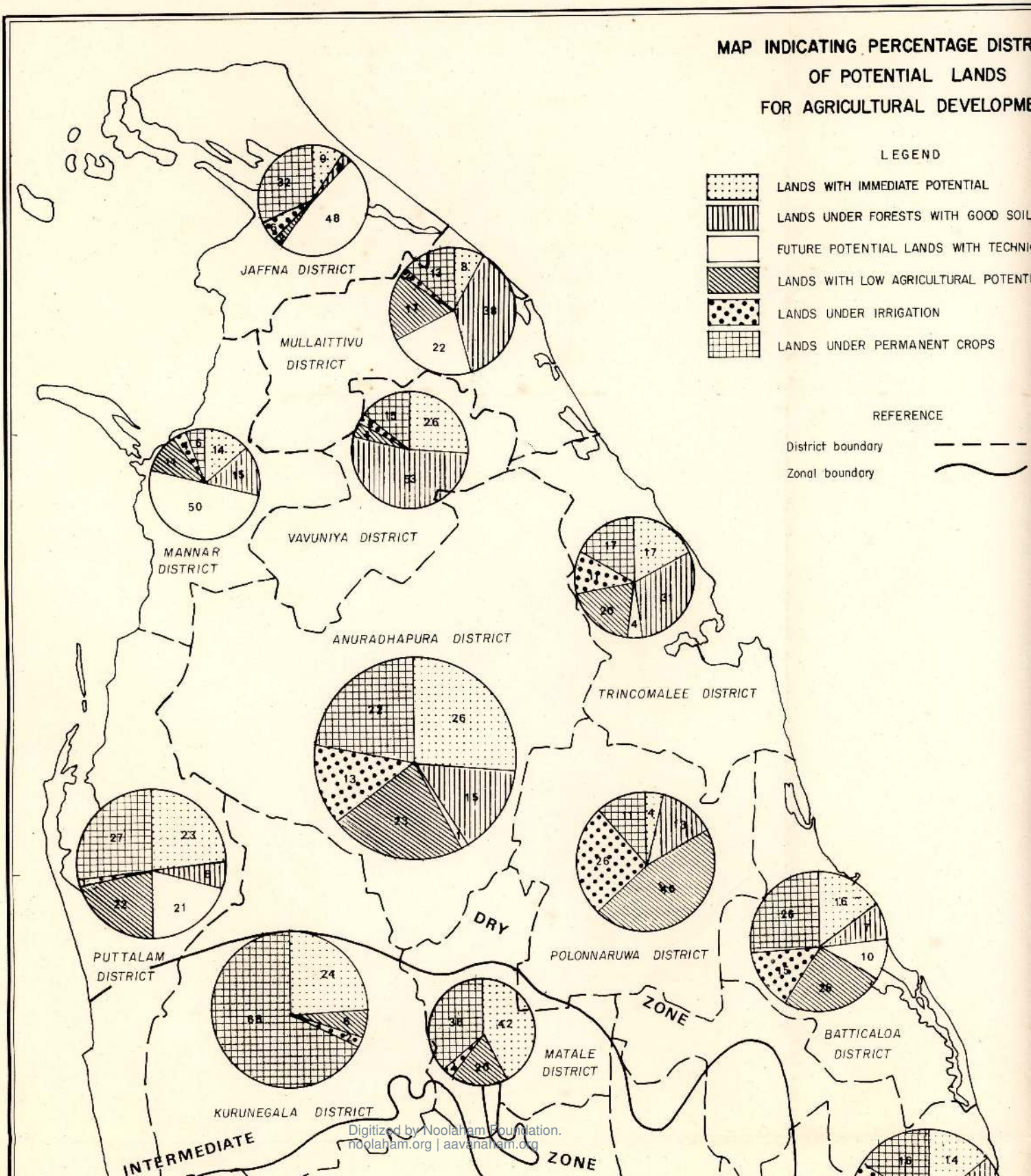
A number of special studies, surveys and feasibility assessments are required as prerequisites to several of the new project and programme ventures discussed above. These are as follows:

1. Irrigation Rehabilitation and Maintenance Plan.
2. Watershed Management: Resource Inventory for Key Watersheds.
3. Feasibility Analysis of Coconut Marketing Reform and Net Producer Return Stabilization Scheme.
4. Hydrobiological and Productivity Studies of Inland Tanks.

5. National Census and Comprehensive Plan for Minor Perennial Crops.
6. Agro-Industries: Sector Identification, Location Analysis and Overseas Missions.
7. Rural Credit: Survey and Programme Development in the Informal Sector.
8. Extension: Institutional Feasibility Analysis for Tree Crops and Manpower Development Plan.
9. Dairy Sector/Sugar/Off-Shore and Brackish Water Fisheries: Appropriate Policy Studies for Government Decision Making.
10. Other Field Crops: Improving the data base and Farming Systems Analysis.
11. Marketing Improvement Programme: (a) Feasibility assessment of crop/trade financing scheme; (b) Regular cost-of-production studies for tea, rubber, coconut, paddy and selected field crops; (c) Feasibility study of food stamps as food surplus disposal.
12 Tea/Rubber: Inventory of Private Factories Capital Stock.
13. Coconut Intercropping: Detailed Technical and Economic Feasibility Study.
14. Rubber: National Census.
15. Agrarian Reform: Land Consolidation Studies, Design of Improved Cadastral Registration Systems.
16. Land Use Planning: Land Capability Assessment especially for land with immediate potential for agricultural use.
17. Water Stability Studies for Crop Diversification in Major and Minor Tanks.
18. Study of the Legal Basis of Land Ownership Patterns in the Country.
19. Development of a Suitable Indexing Criterion for the Food Stamp Programme.
20. Development of a data base for the fruit and vegetable sectors.

The above listing is not an exhaustive guide to future investment in the agricultural sector. There are many other activities included within the body of this Strategy, and each specific ministerial sub-sector strategy report must be evaluated for future programme and project work. Periodic review and modification of government activities will form part of the sub-sector strategies. However, certain activities, such as those highlighted above will require donor support and assistance.

ANNEX



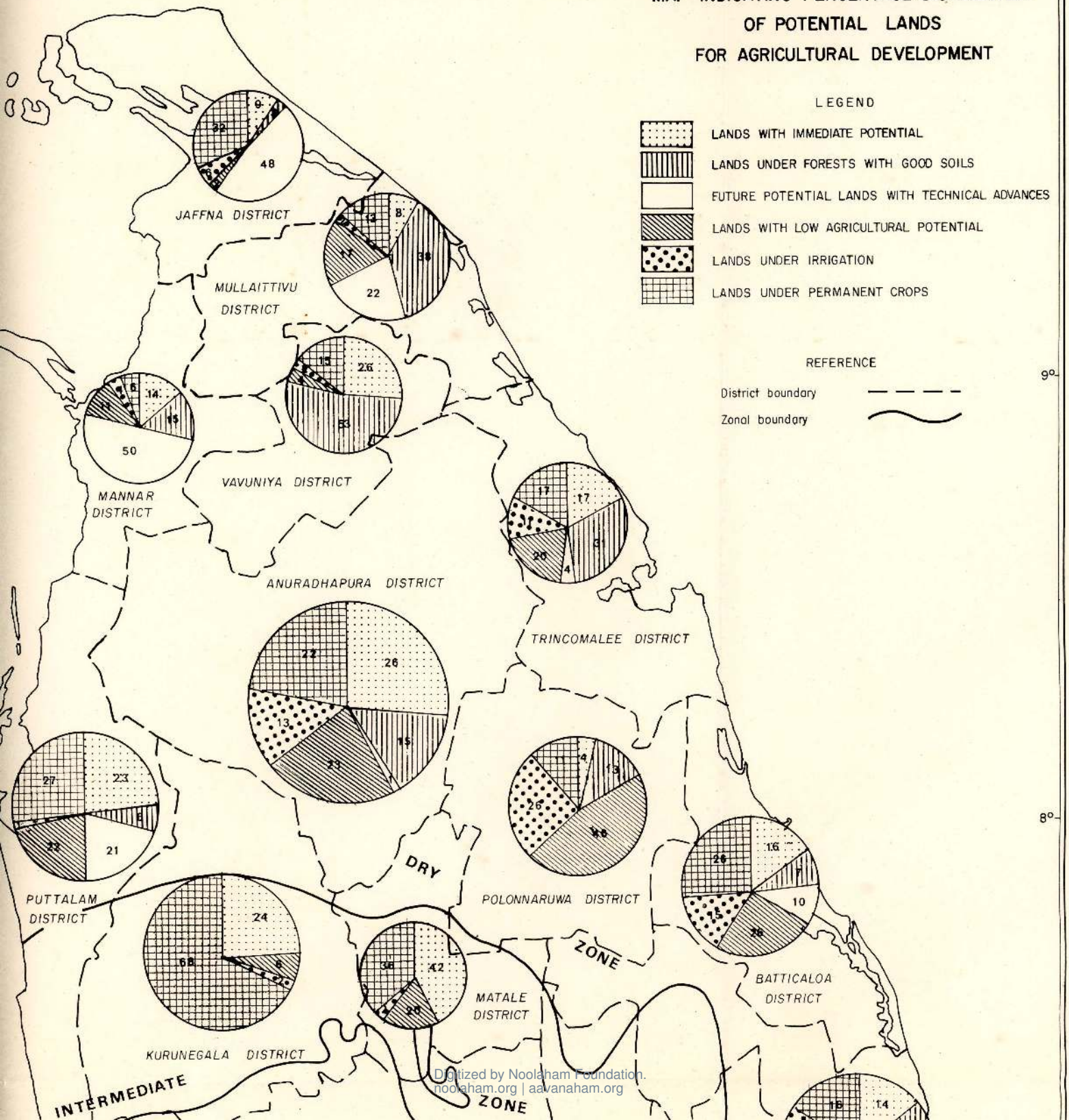
MAP INDICATING PERCENTAGE DISTRIBUTION OF POTENTIAL LANDS FOR AGRICULTURAL DEVELOPMENT

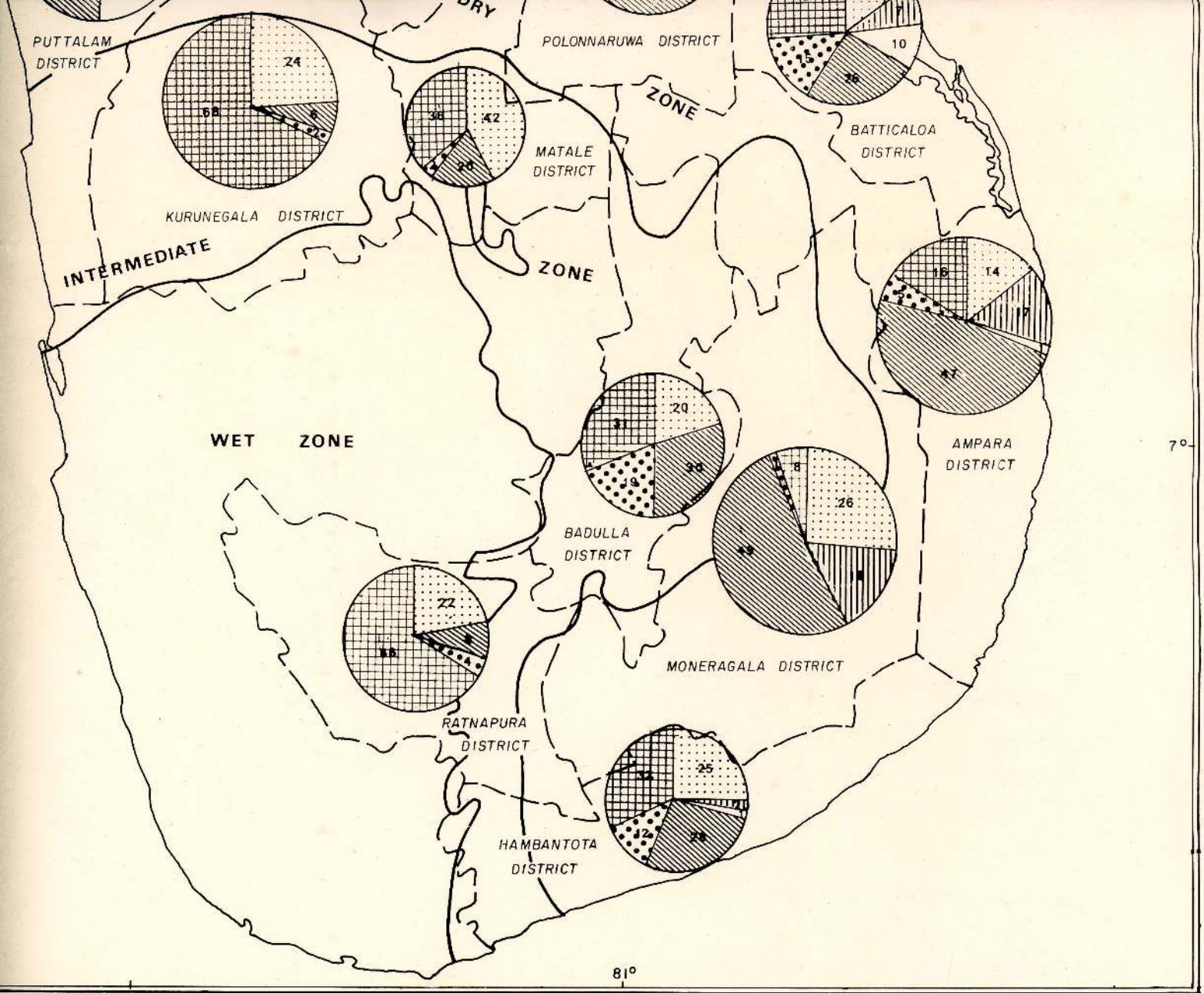
LEGEND

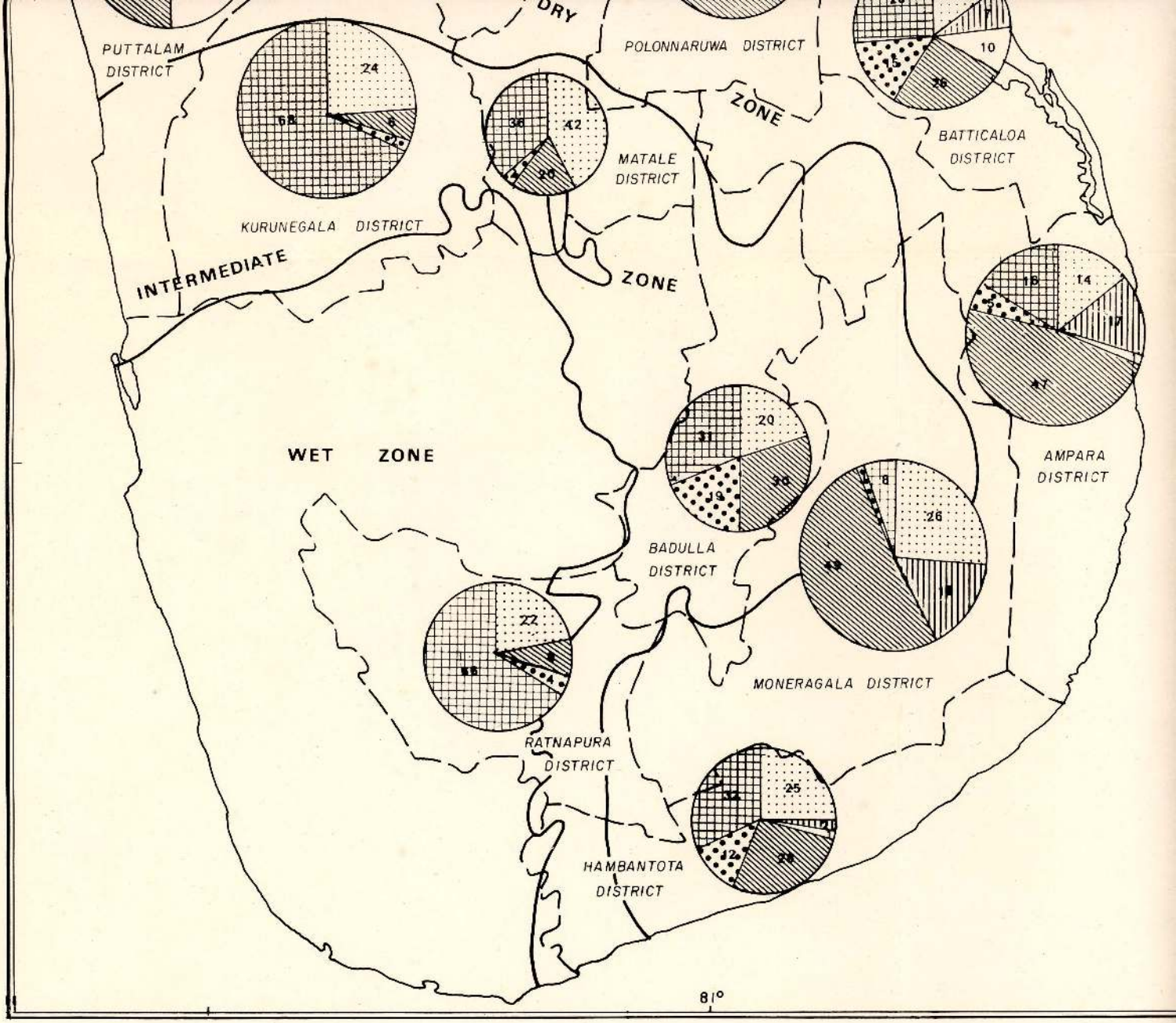
- LANDS WITH IMMEDIATE POTENTIAL
- LANDS UNDER FORESTS WITH GOOD SOILS
- FUTURE POTENTIAL LANDS WITH TECHNICAL ADVANCES
- LANDS WITH LOW AGRICULTURAL POTENTIAL
- LANDS UNDER IRRIGATION
- LANDS UNDER PERMANENT CROPS

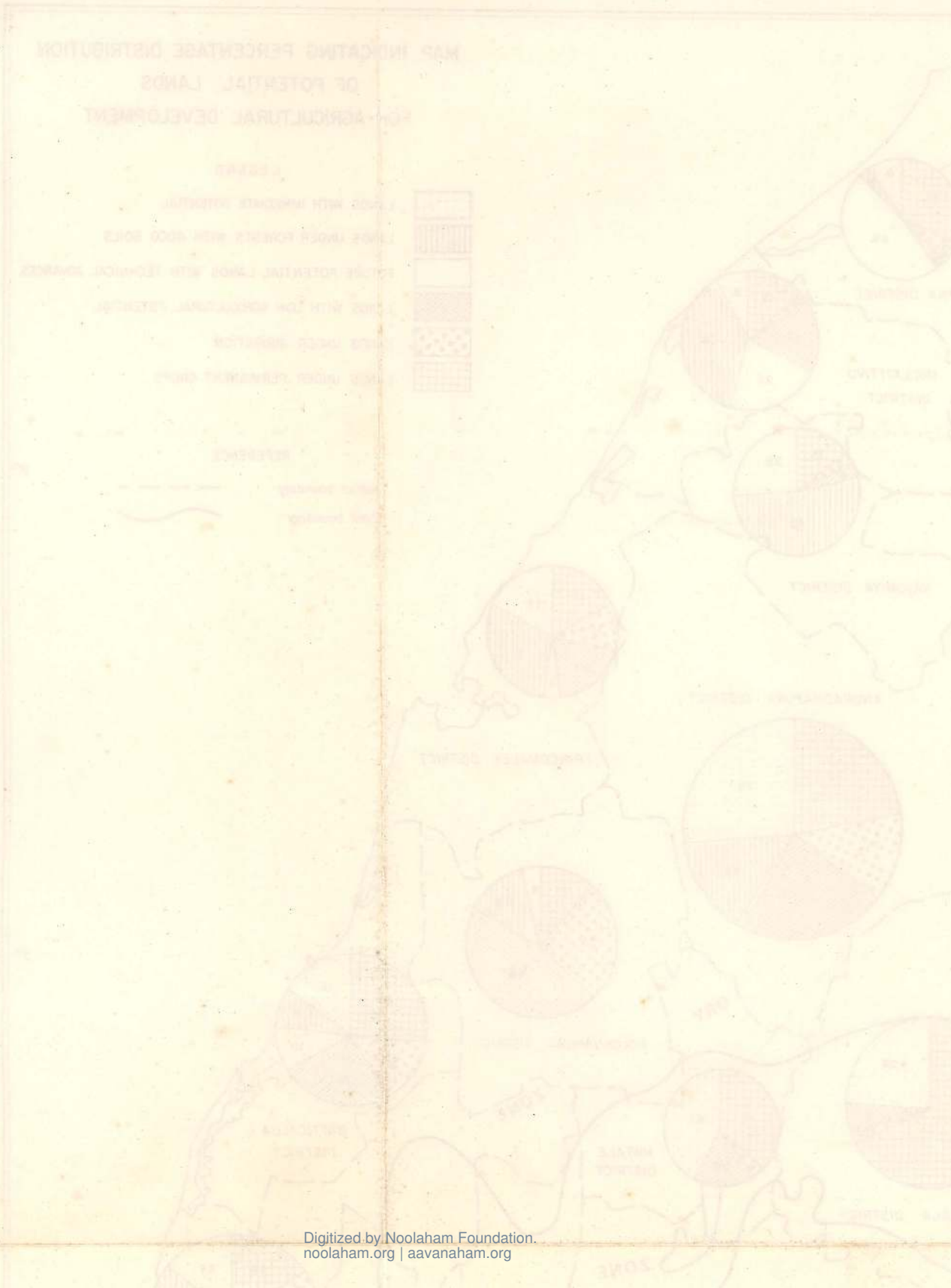
REFERENCE

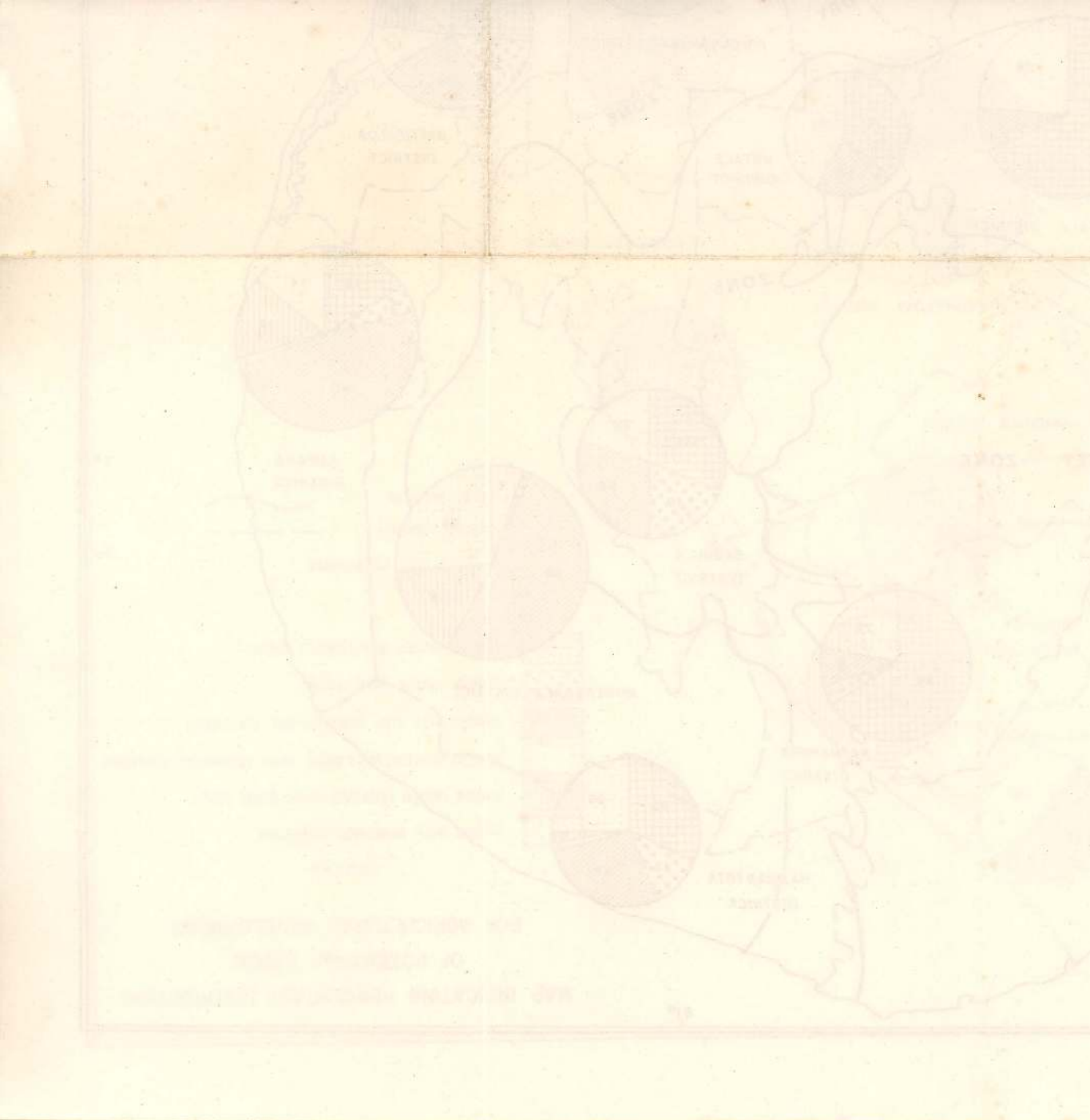
- District boundary
- Zonal boundary



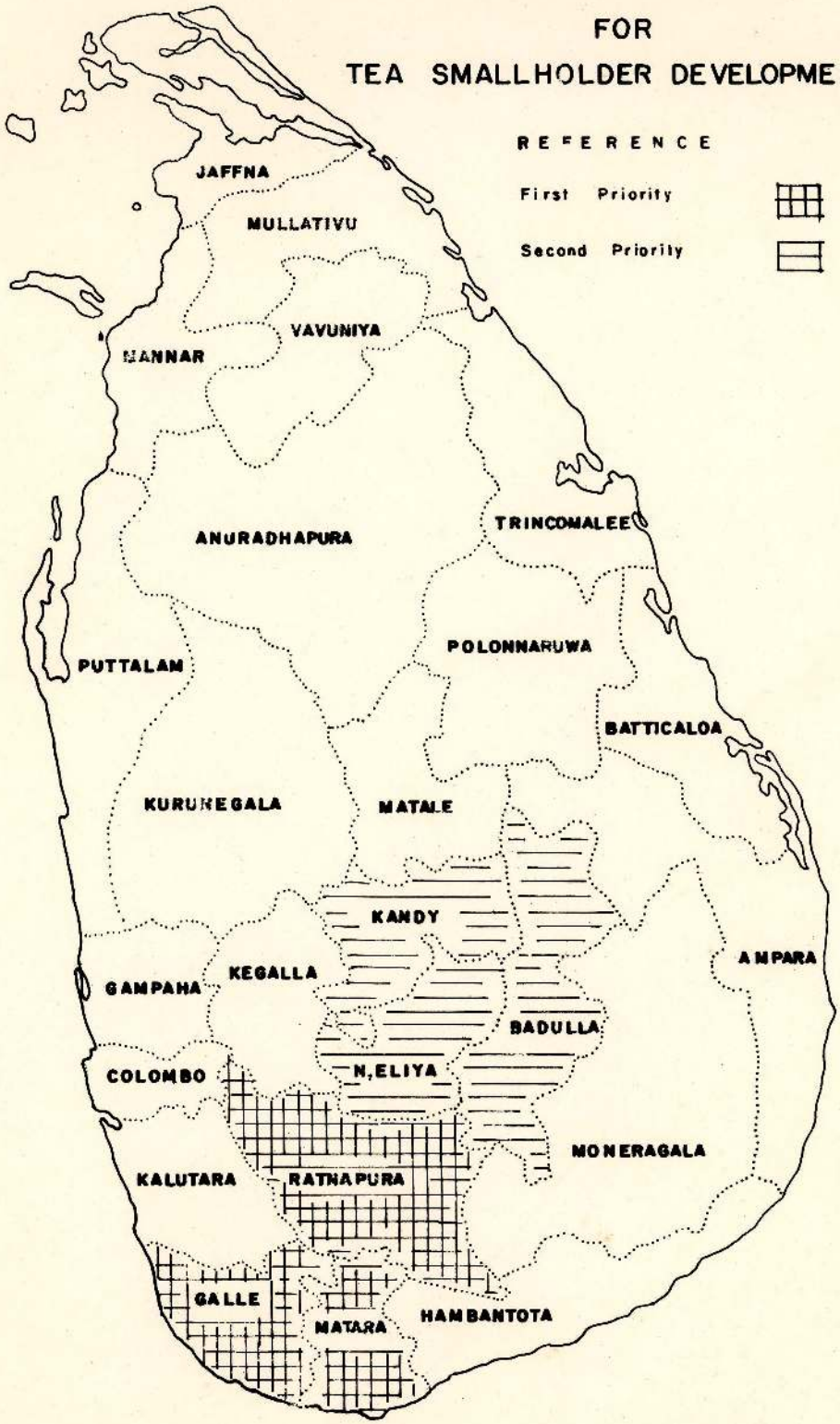


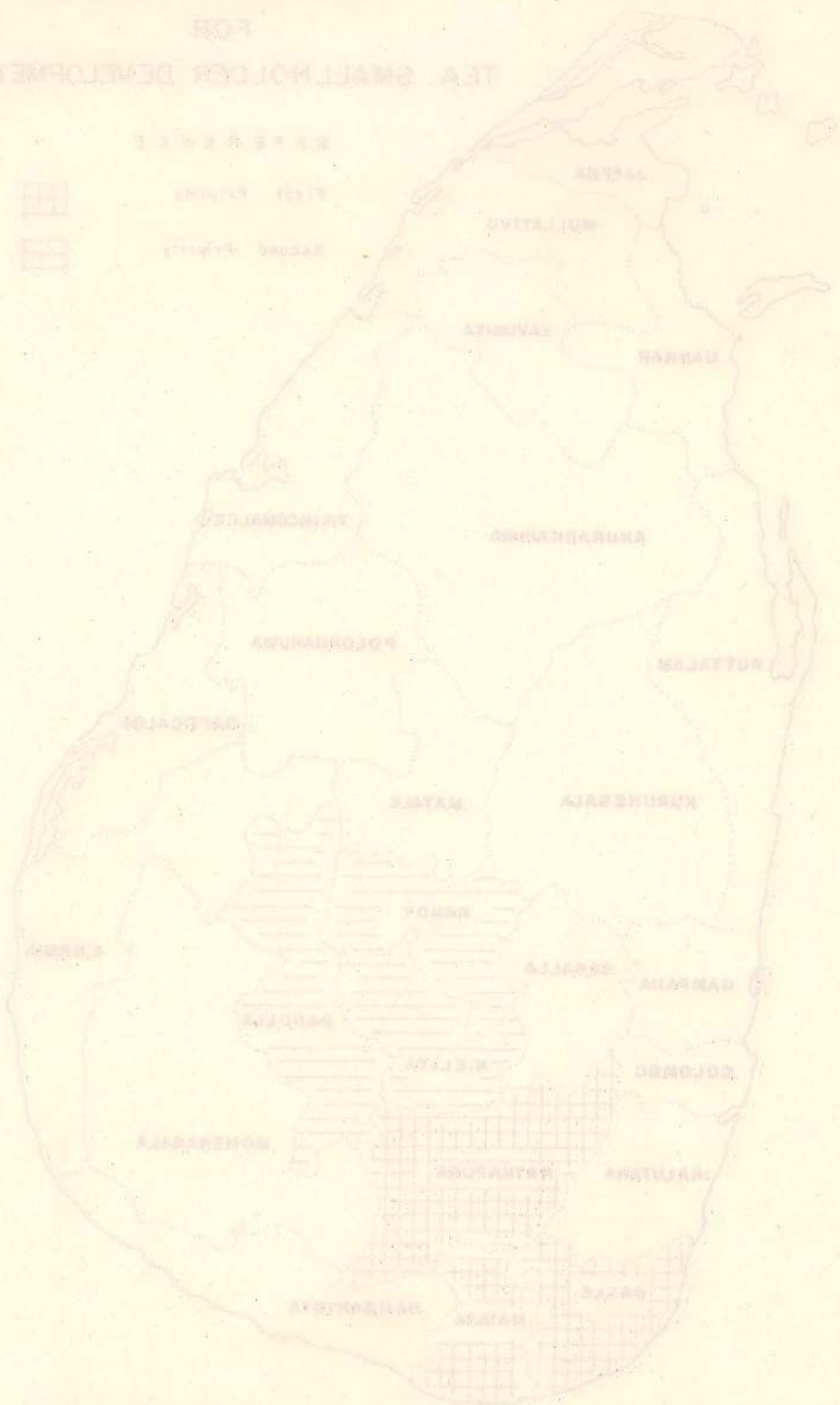




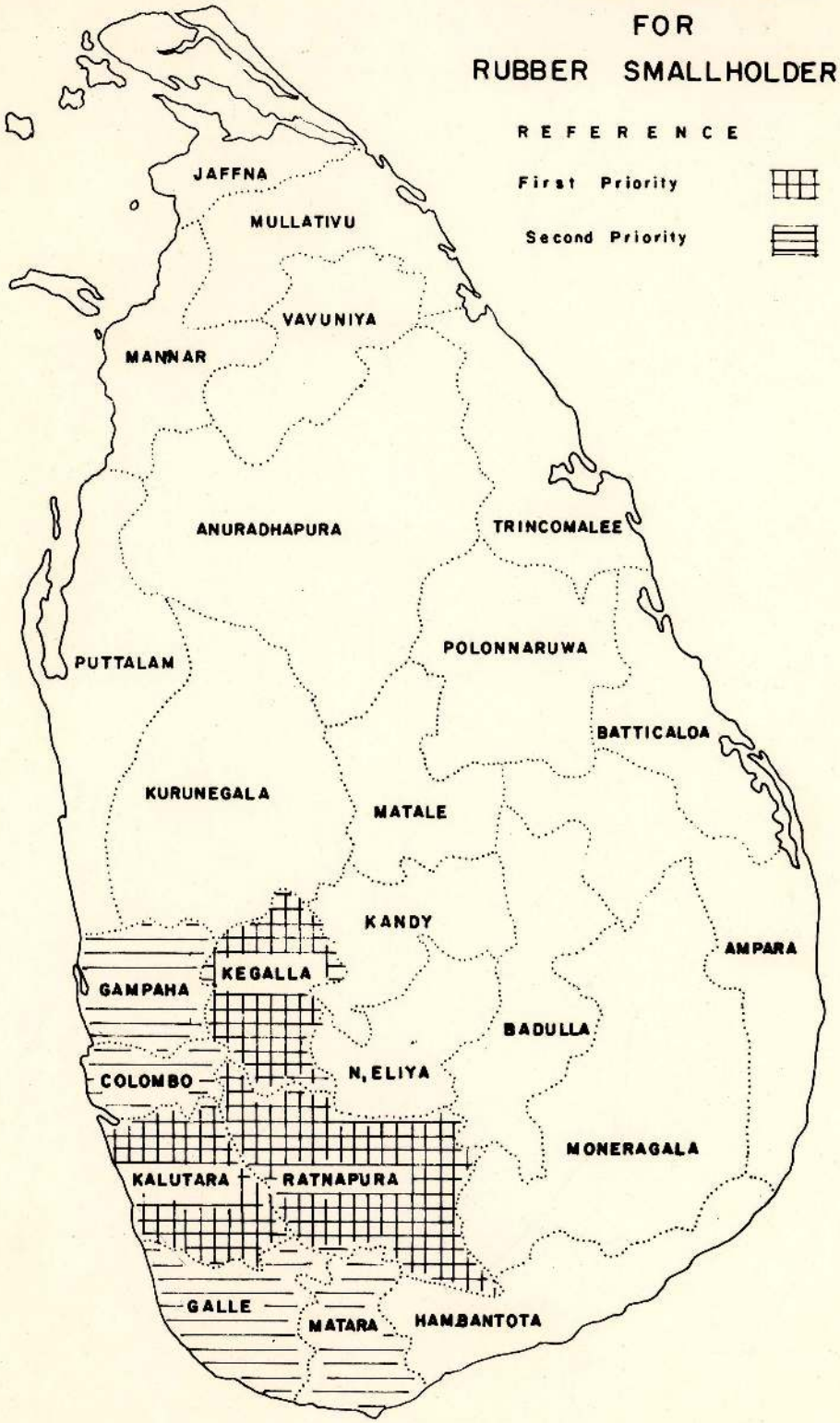


REGIONAL EMPHASIS FOR TEA SMALLHOLDER DEVELOPMENT

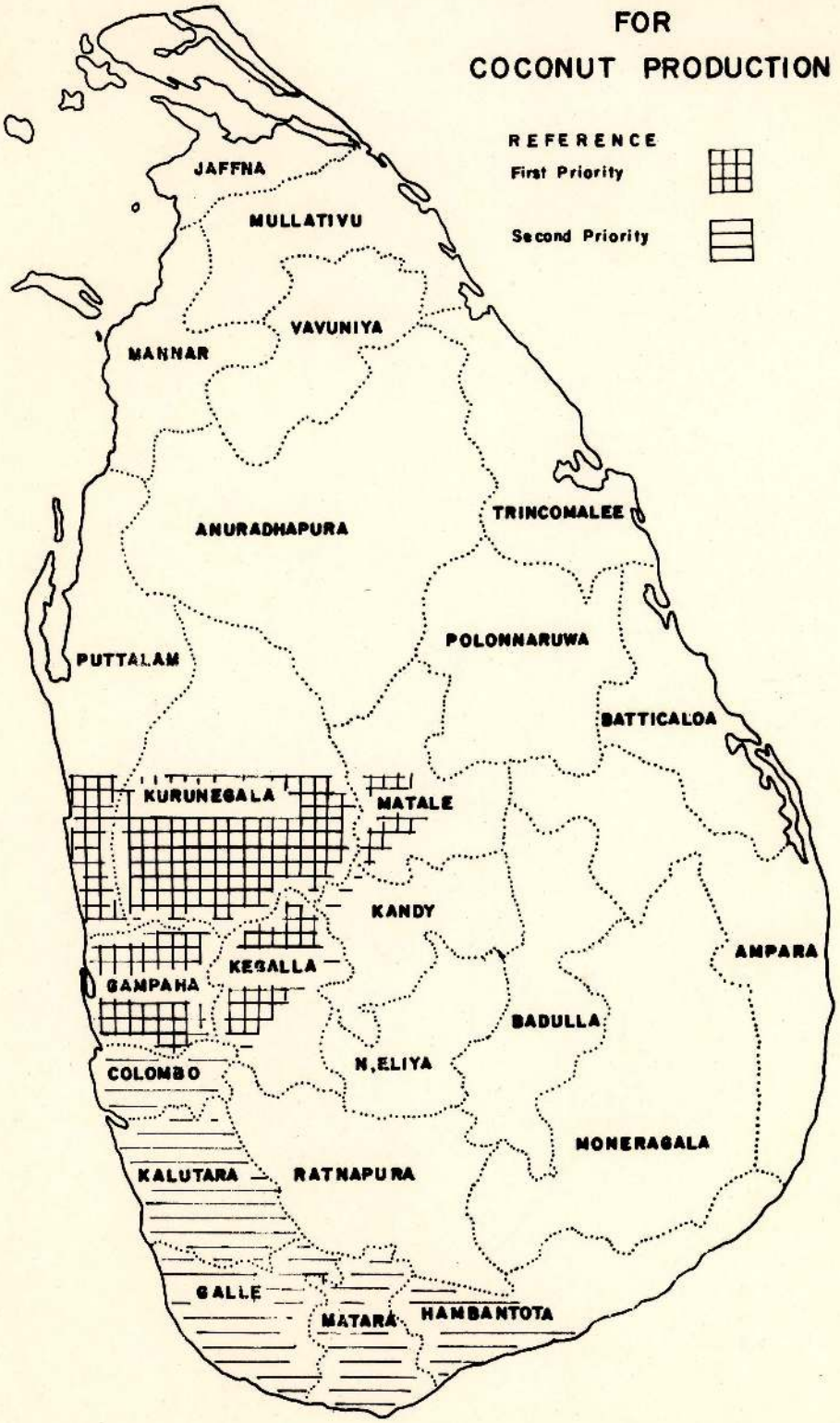


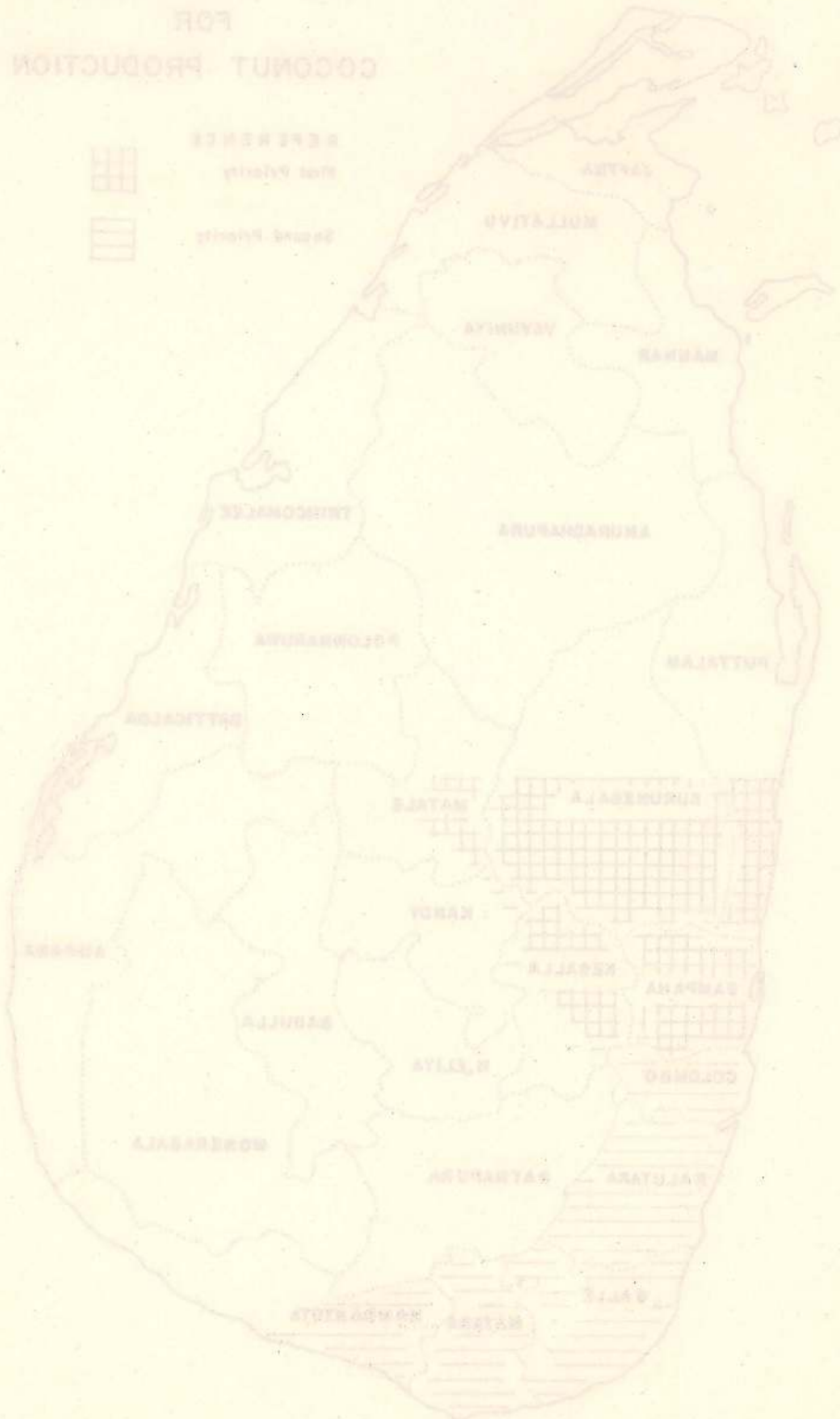


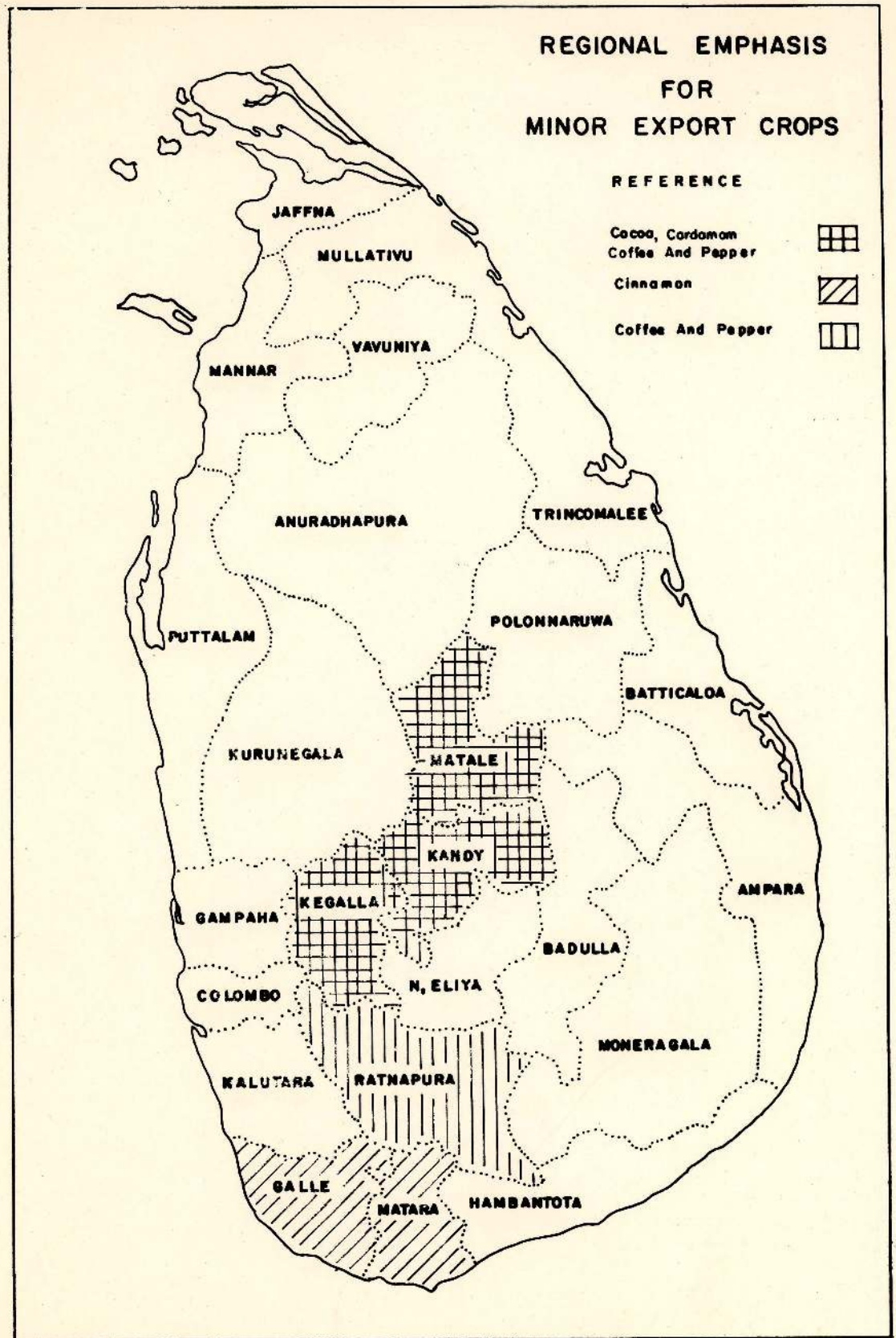
REGIONAL EMPHASIS FOR RUBBER SMALLHOLDER

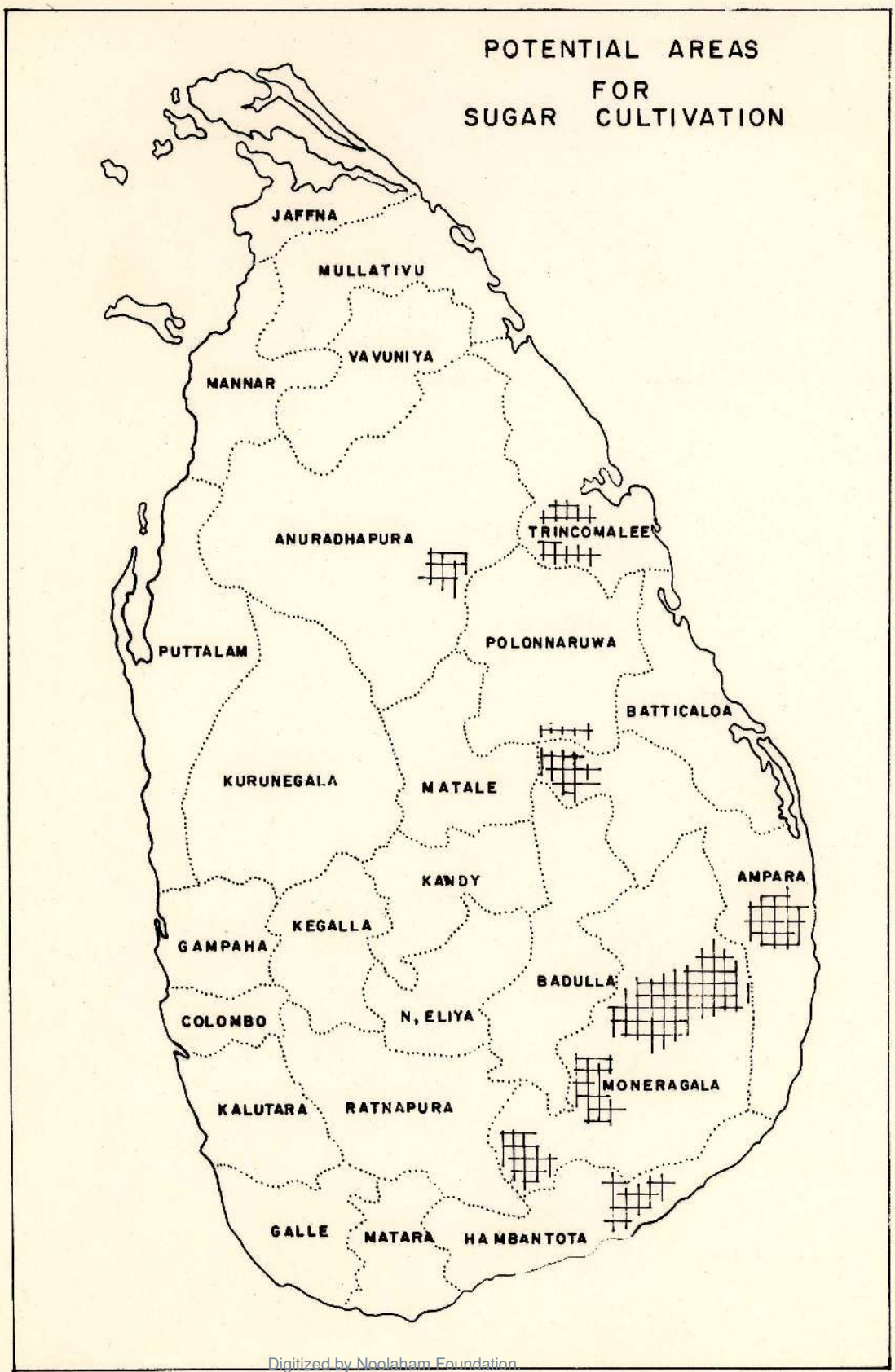


REGIONAL EMPHASIS FOR COCONUT PRODUCTION

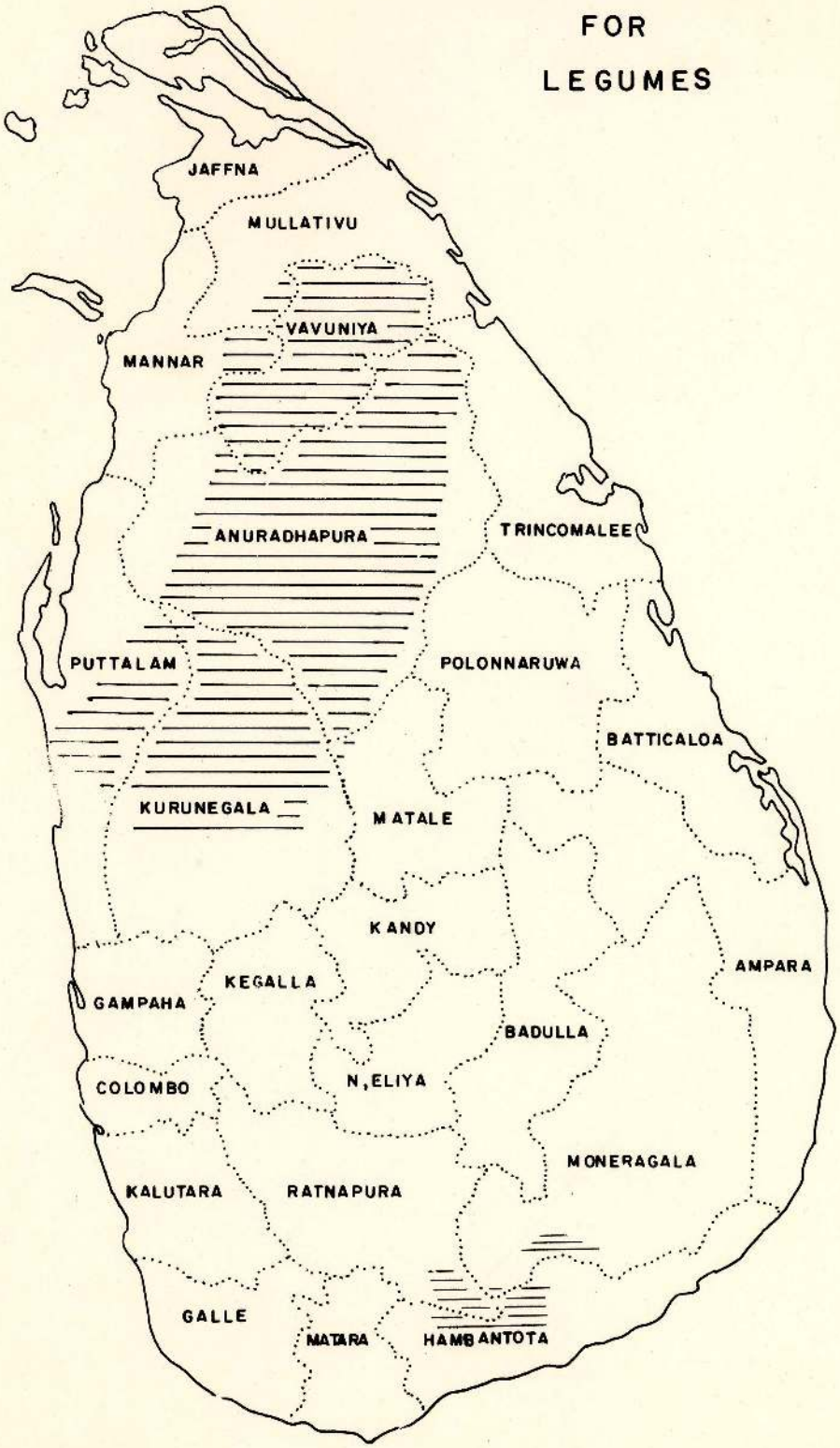


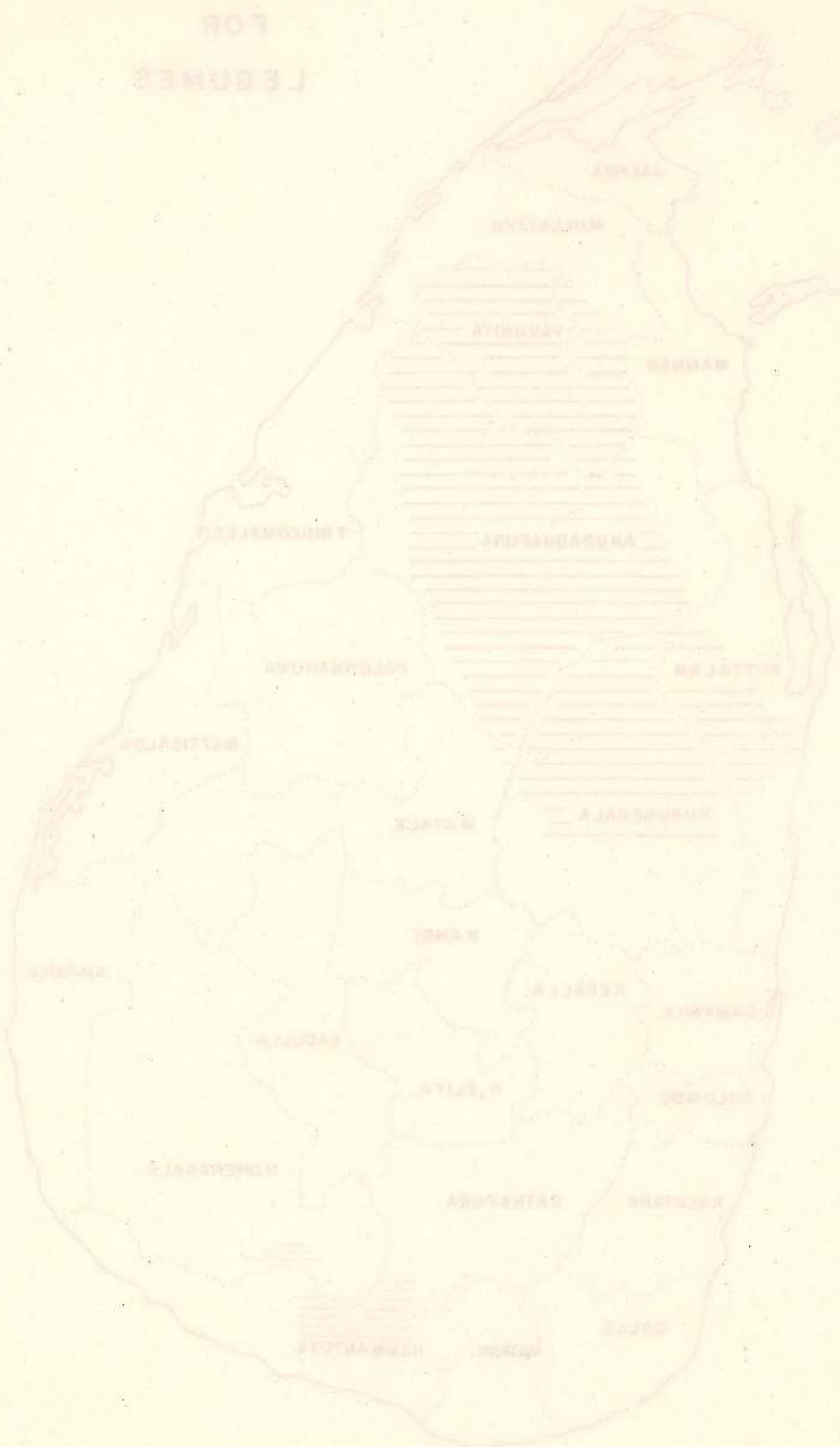






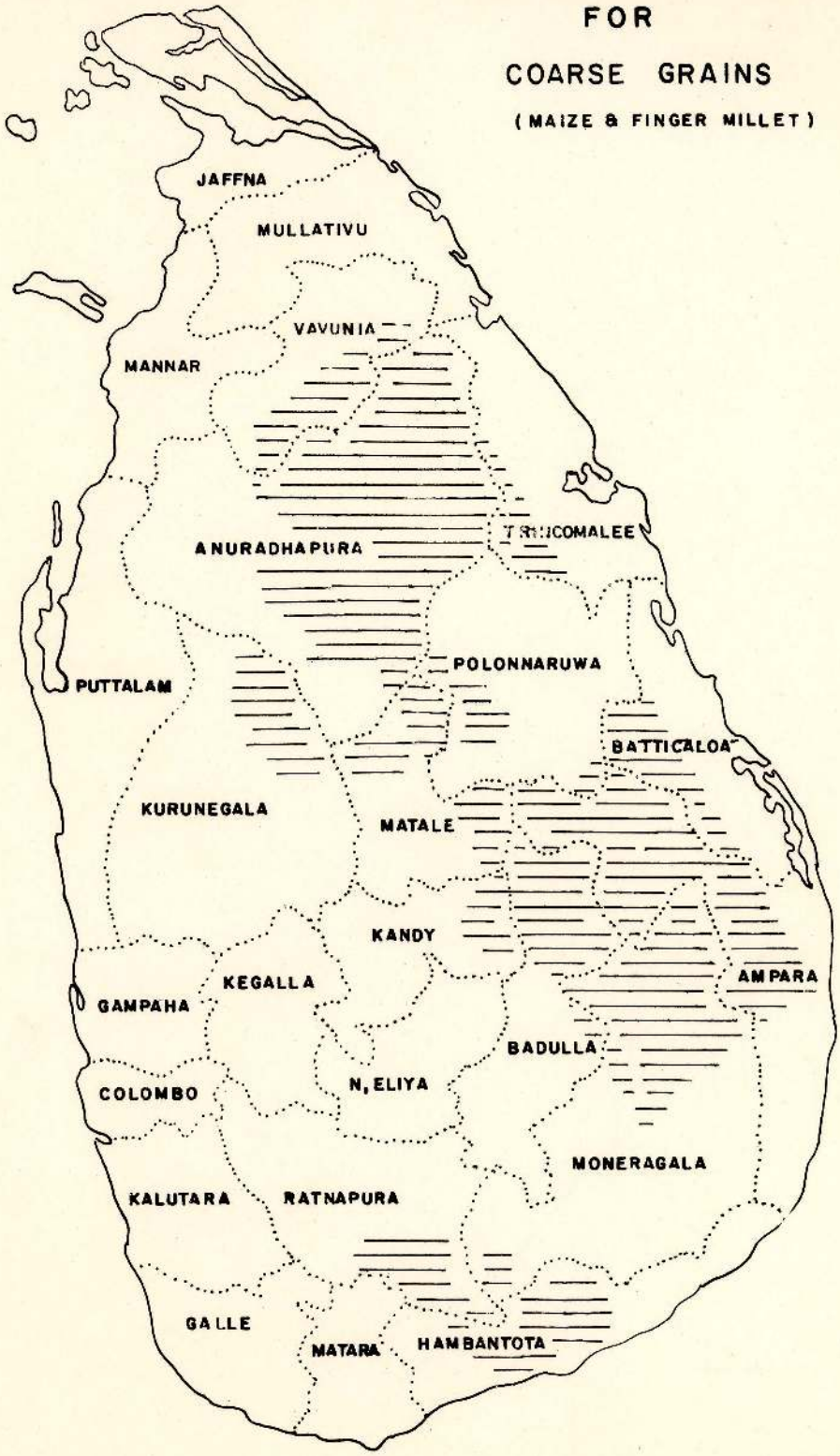
REGIONAL EMPHASIS FOR LEGUMES

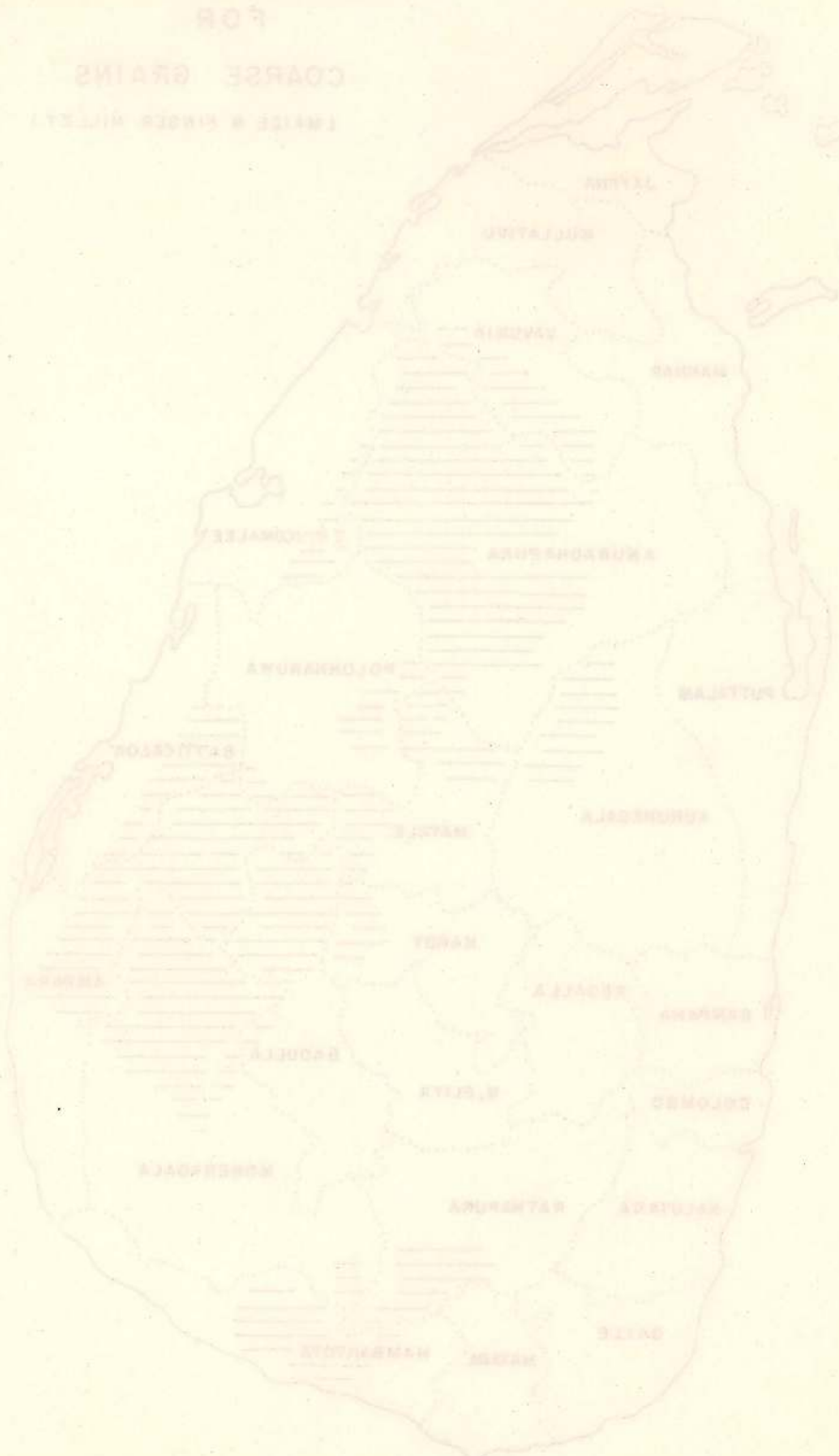


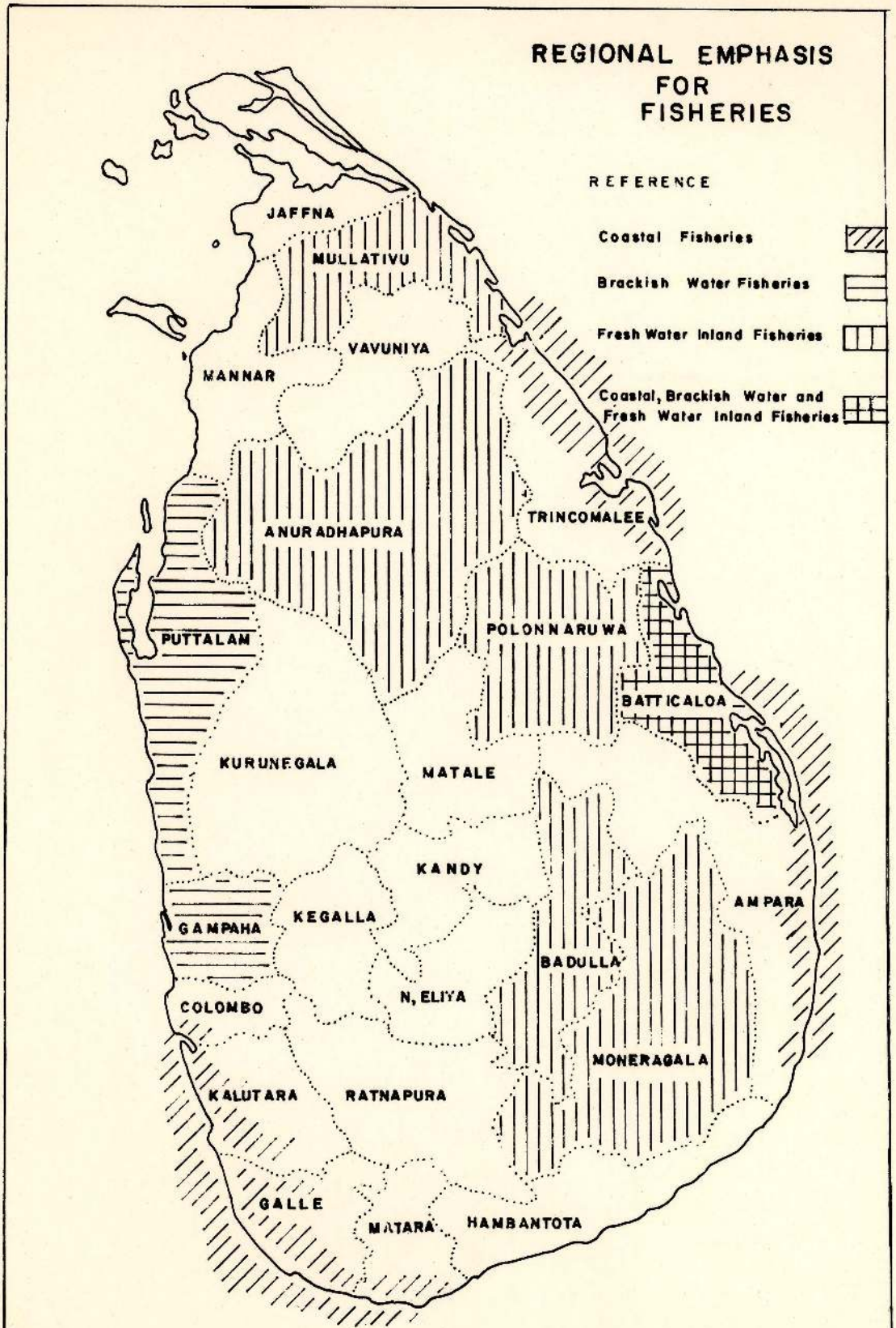


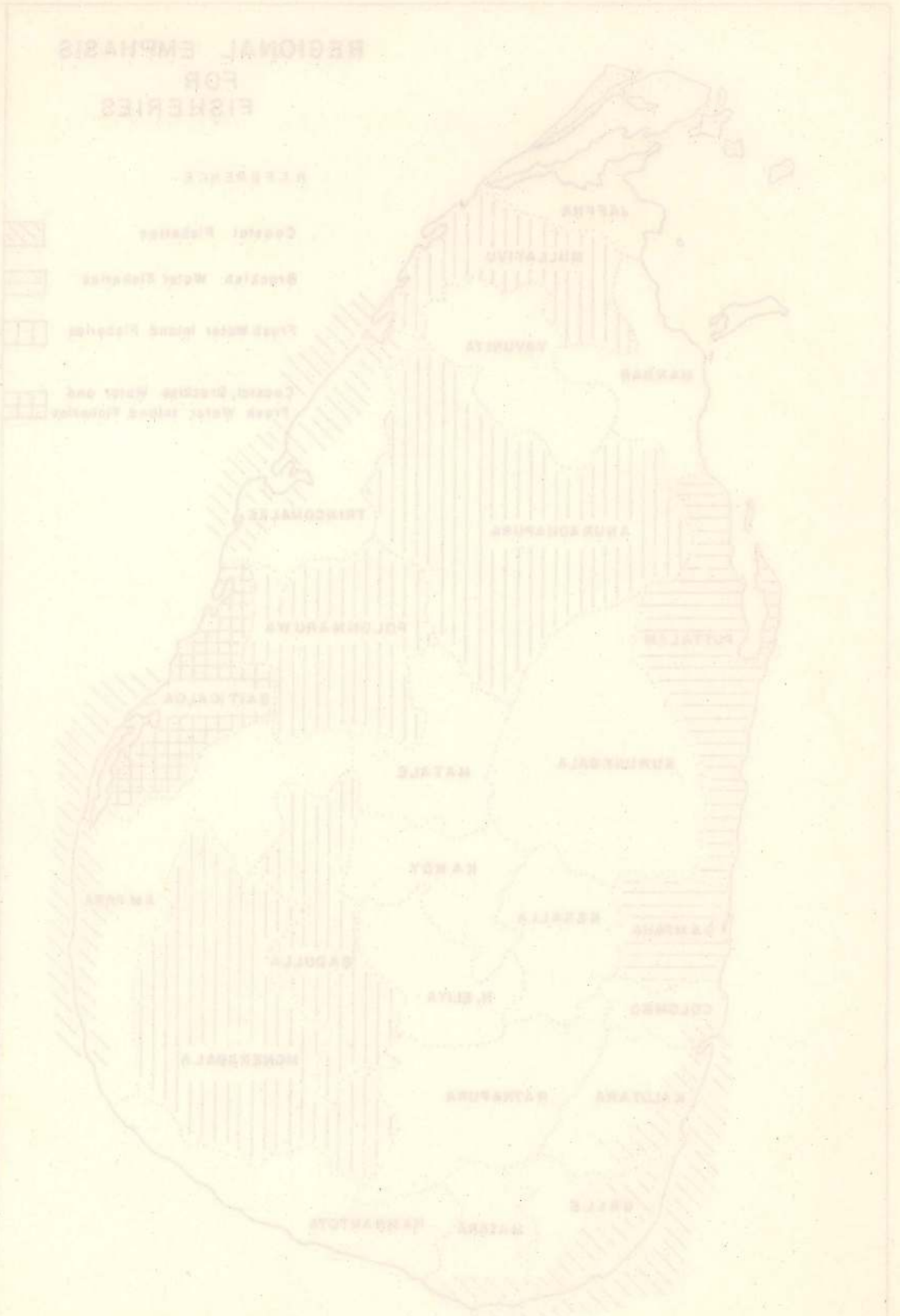
REGIONAL EMPHASIS FOR COARSE GRAINS

(MAIZE & FINGER MILLET)

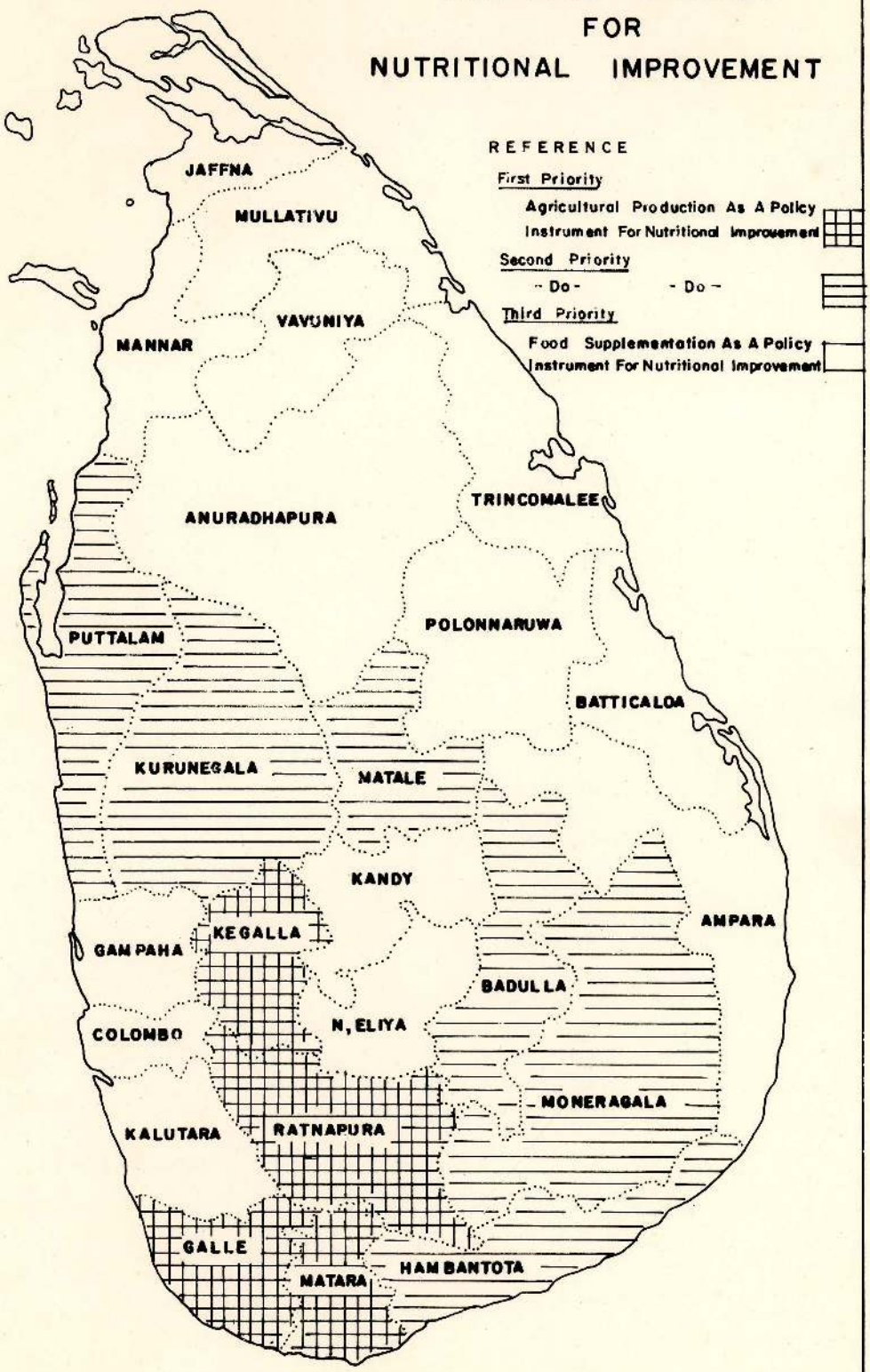


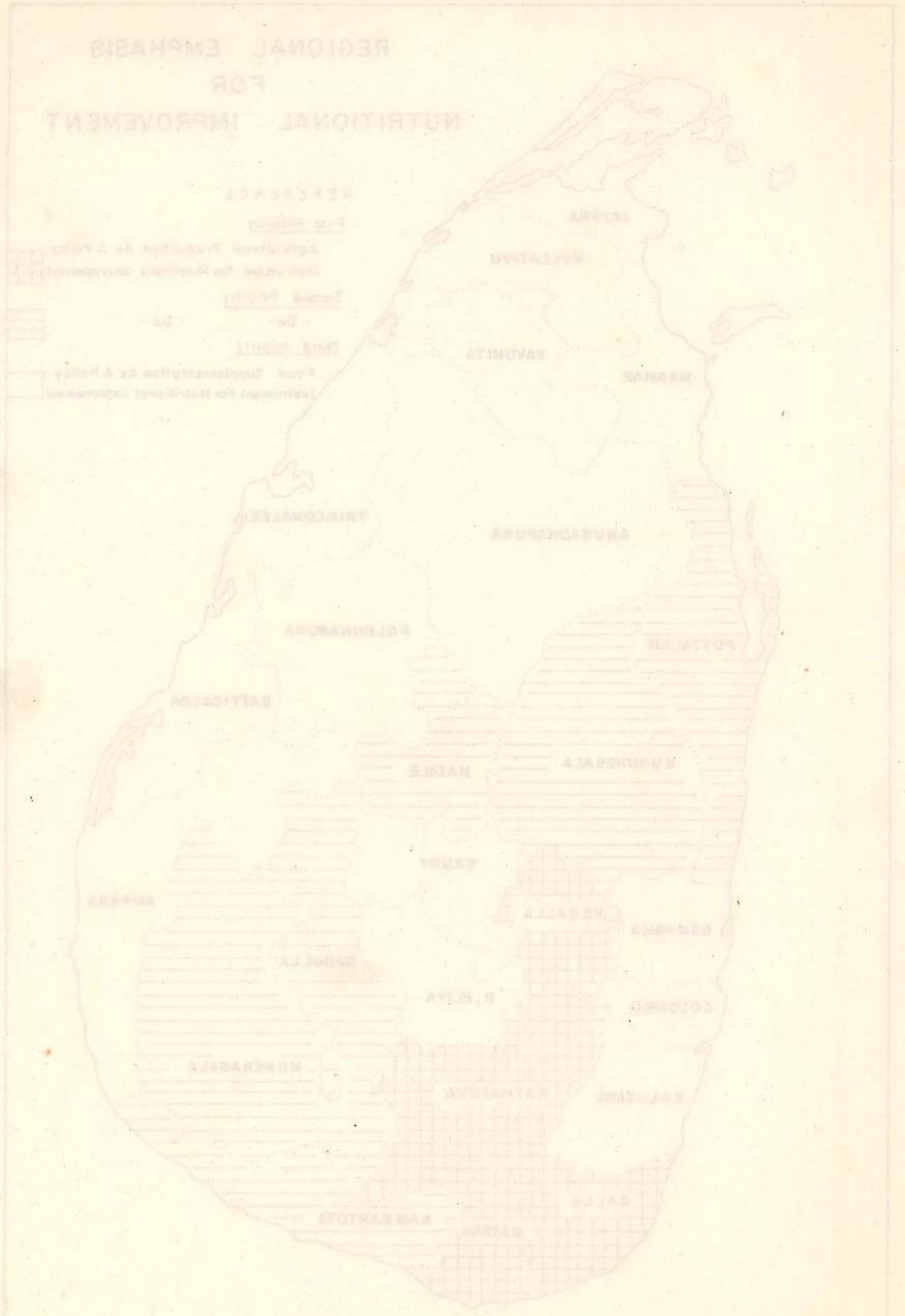






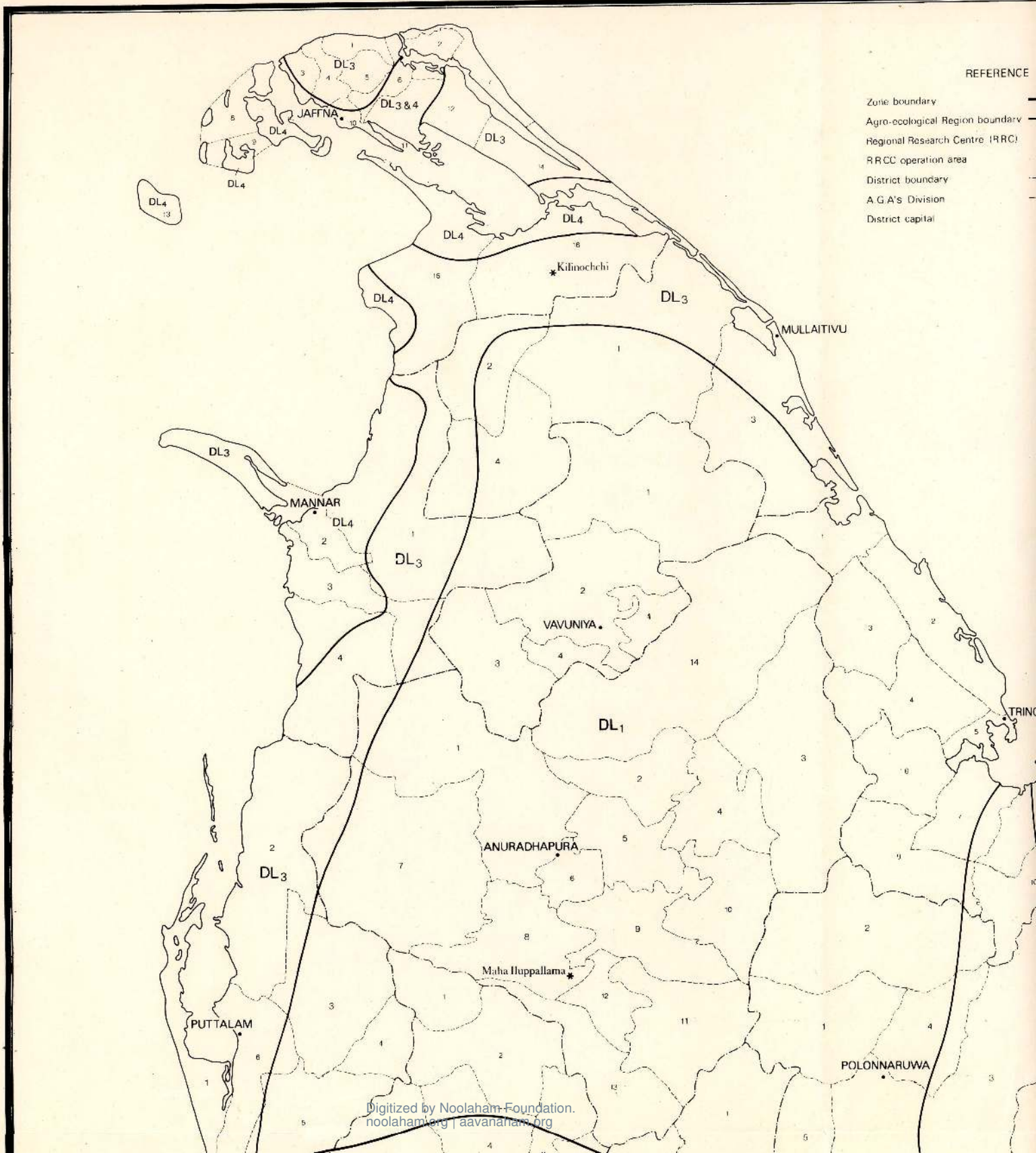
REGIONAL EMPHASIS FOR NUTRITIONAL IMPROVEMENT



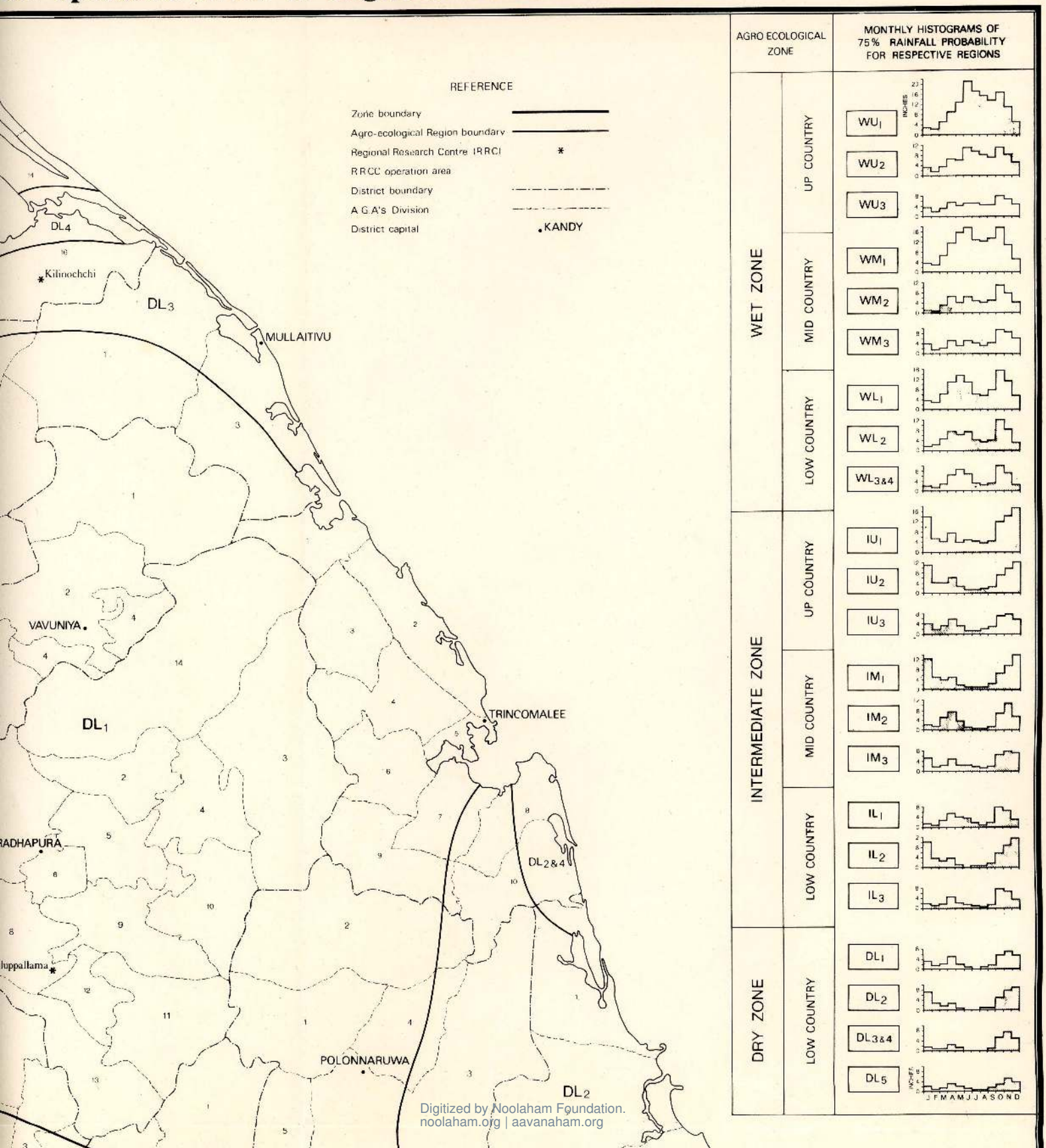


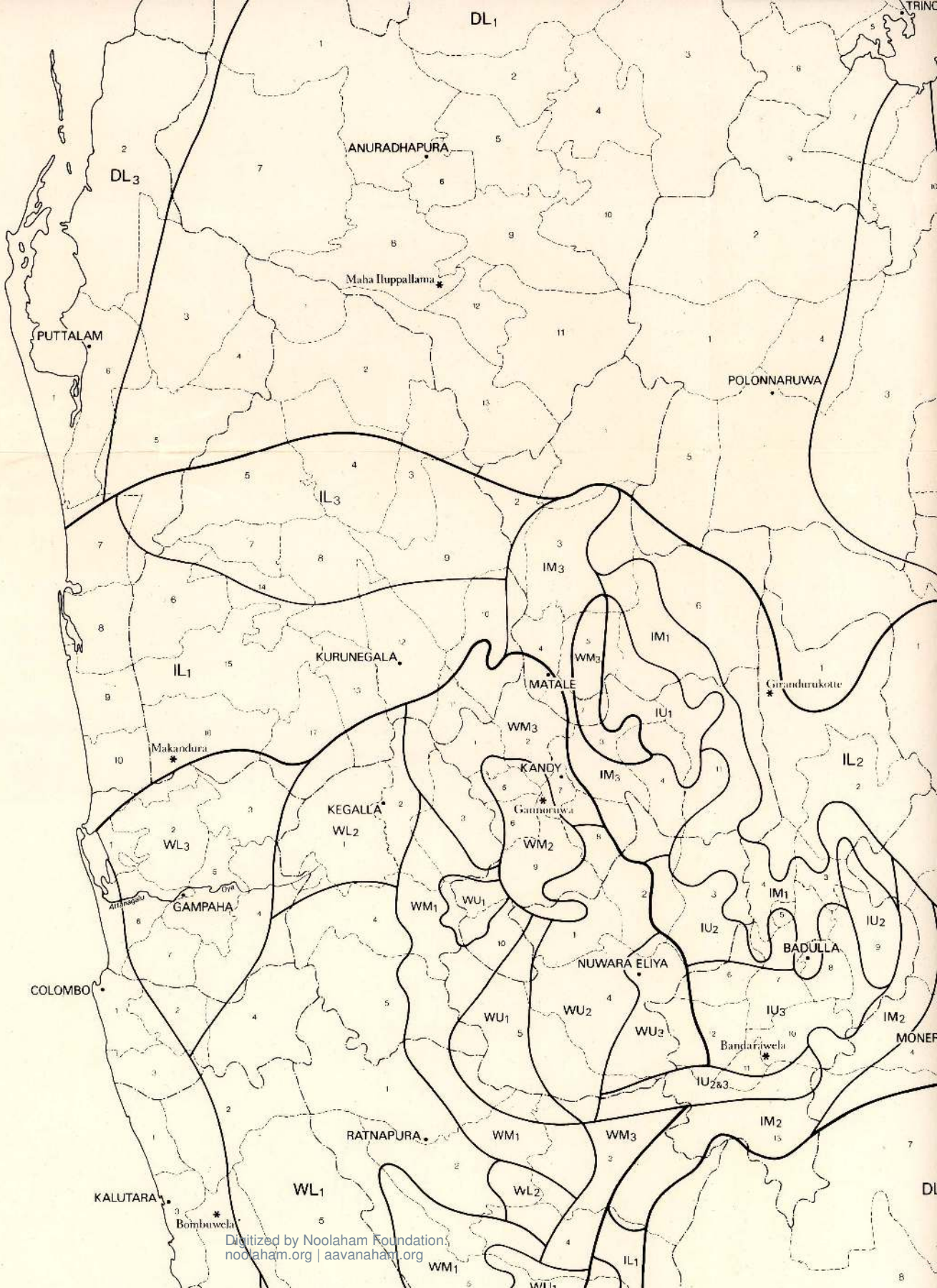
SRI LANKA

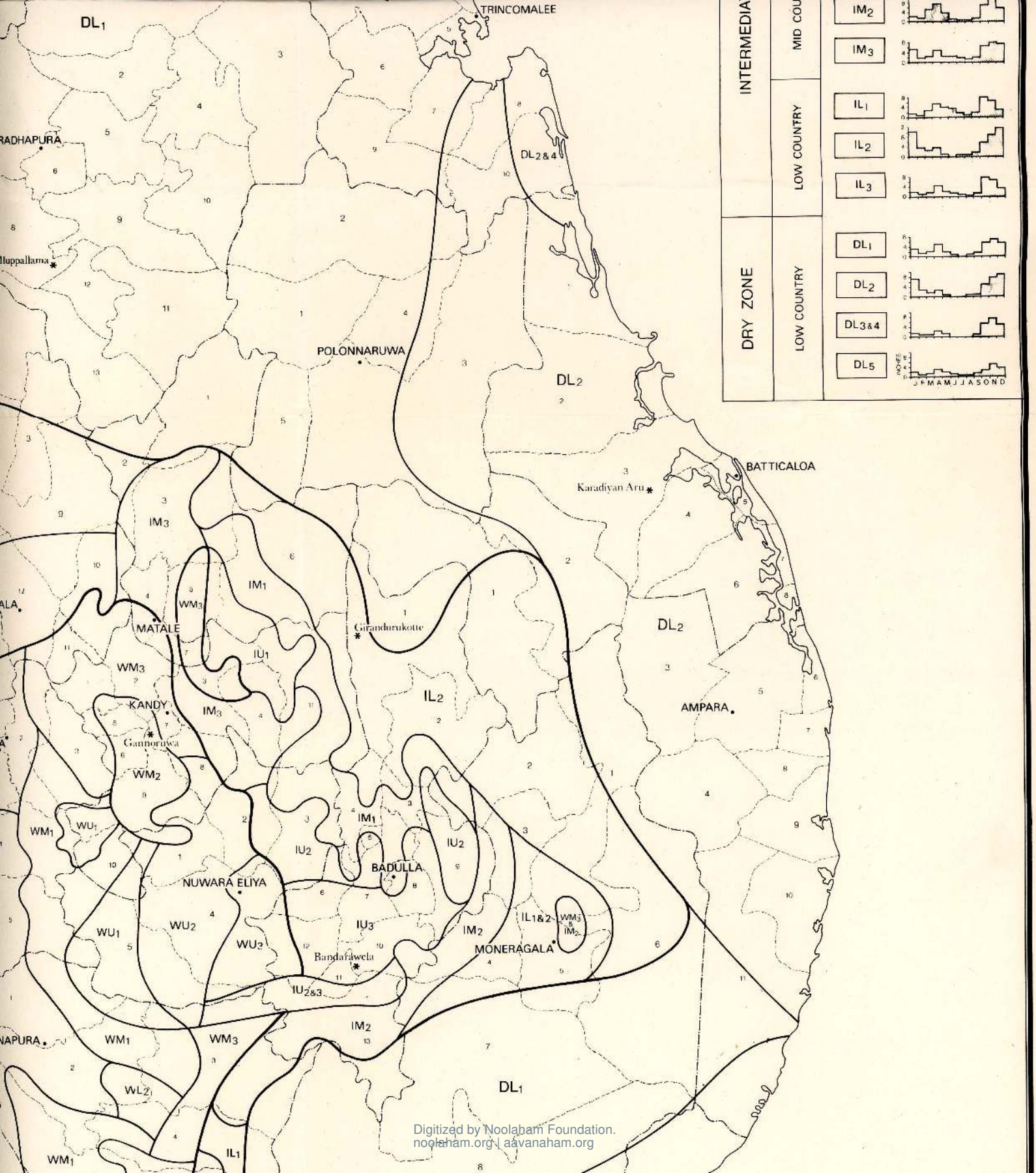
Agro-Regions and operation areas of Regional Rese

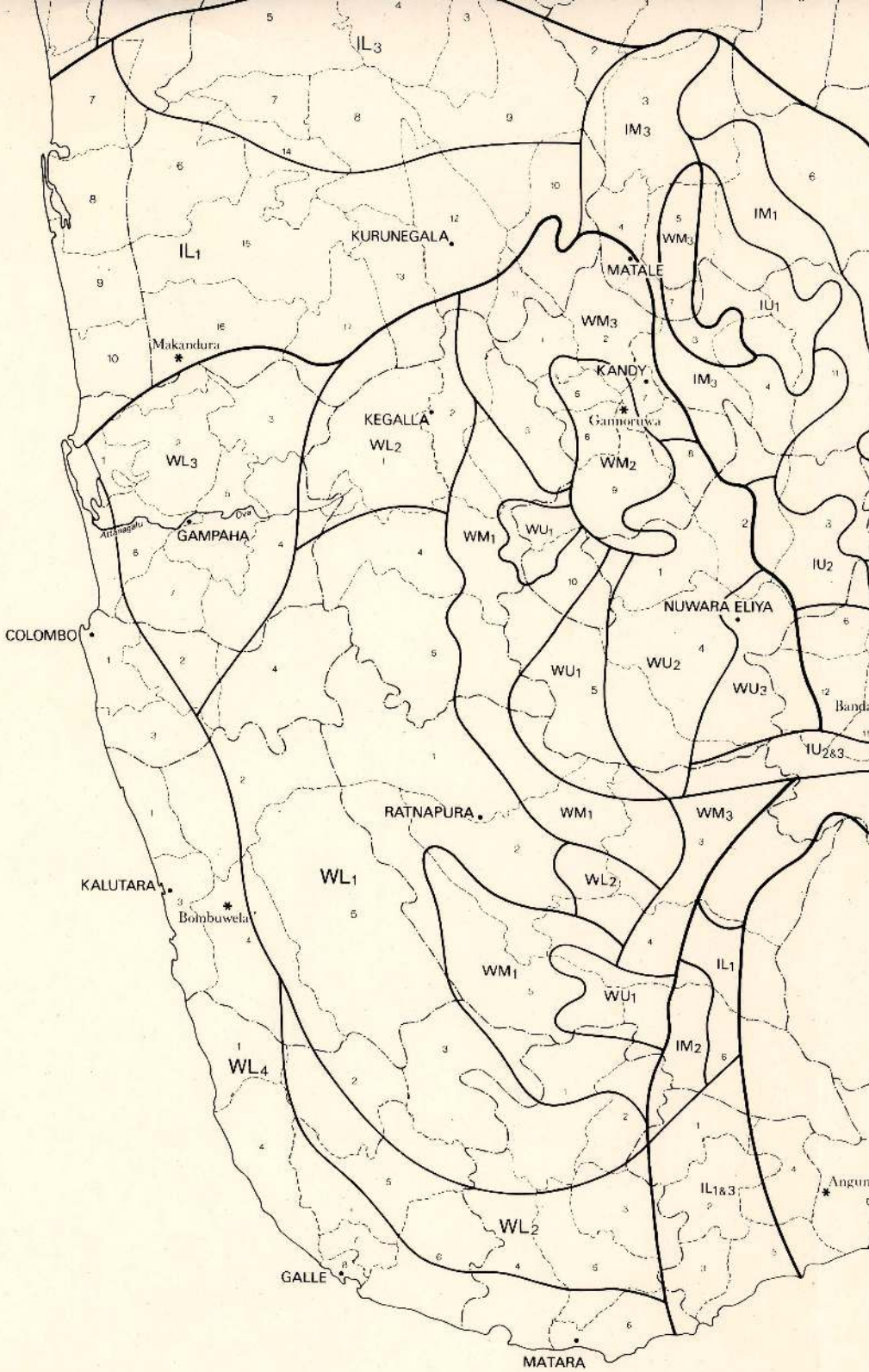


and operation areas of Regional Research Centres

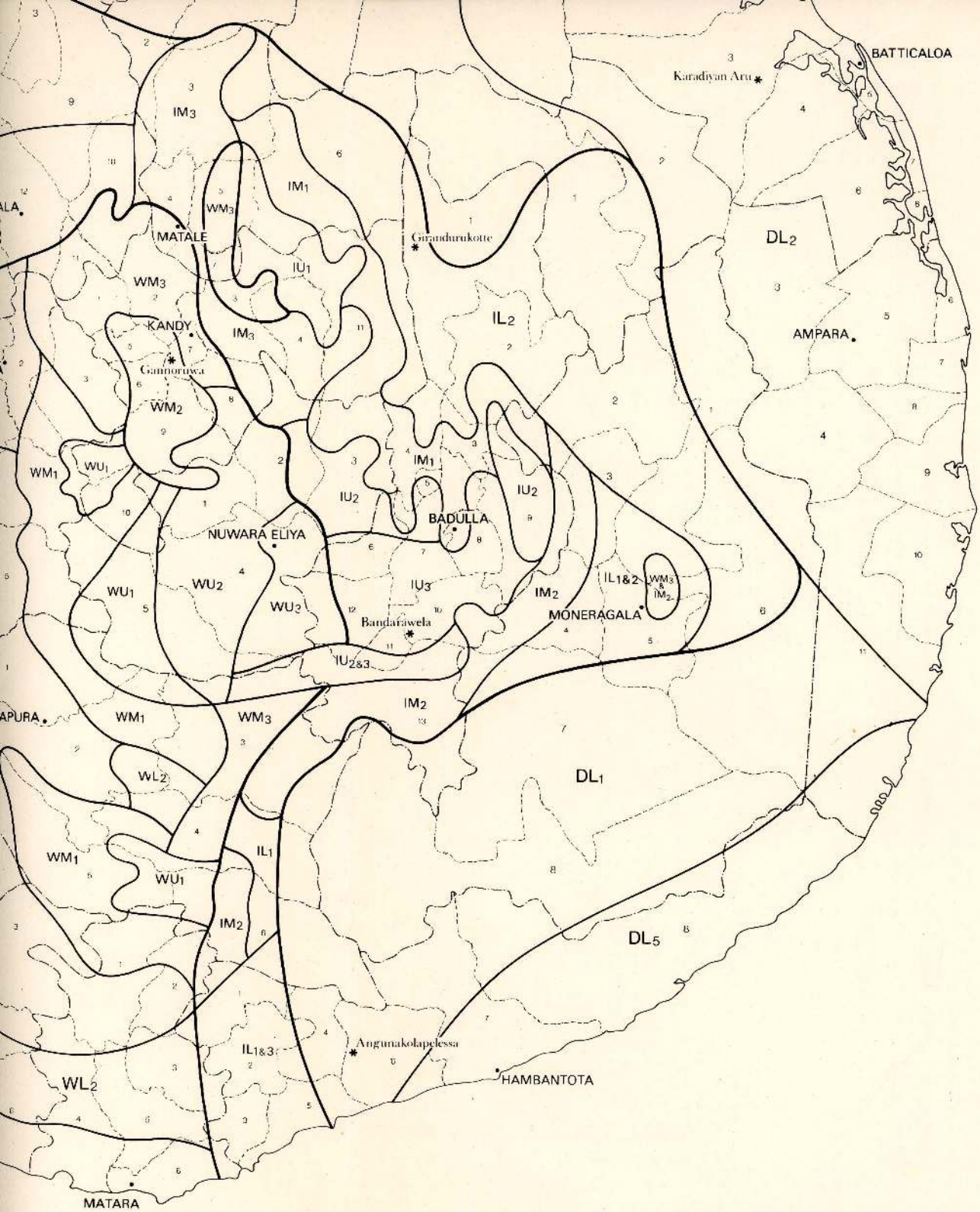




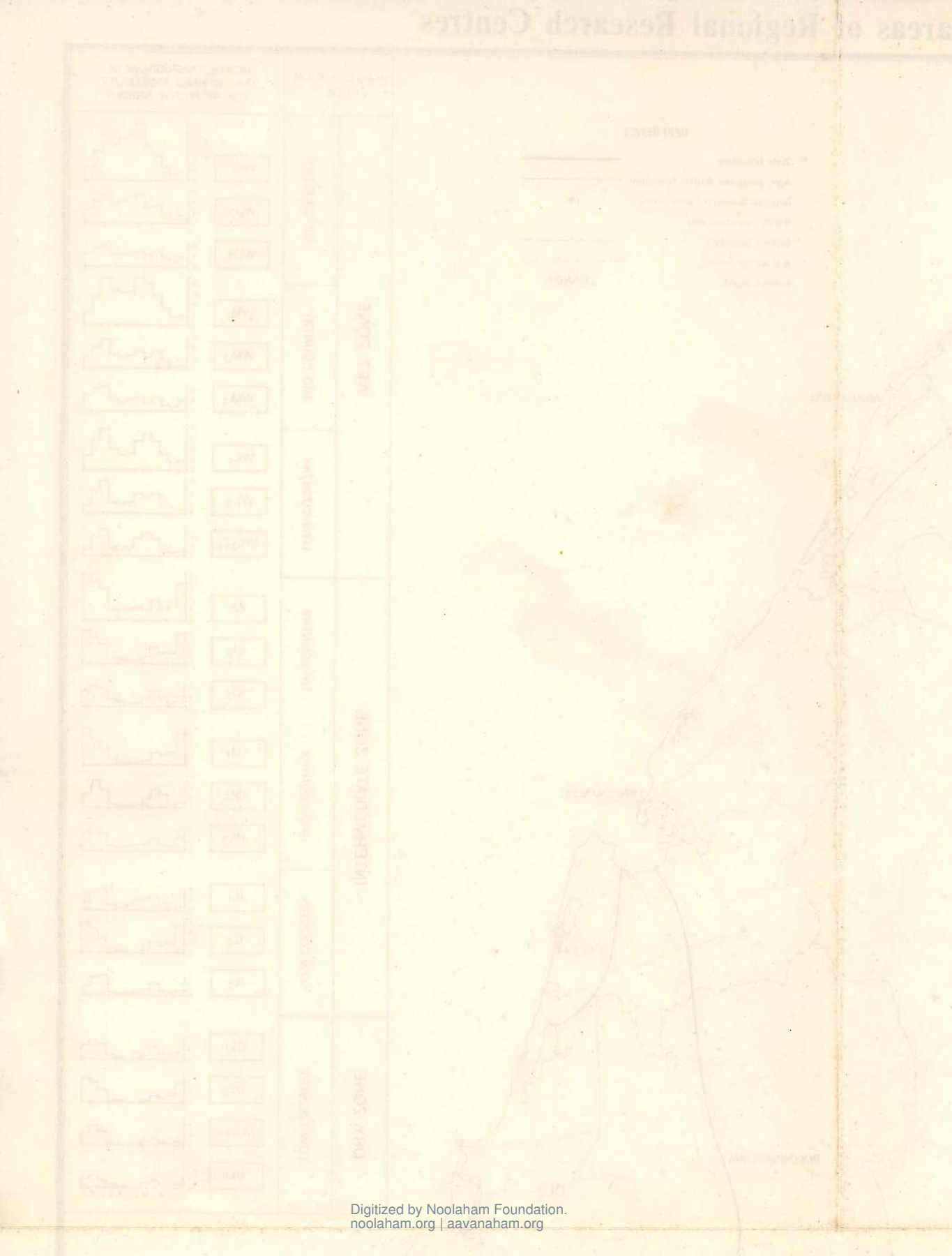


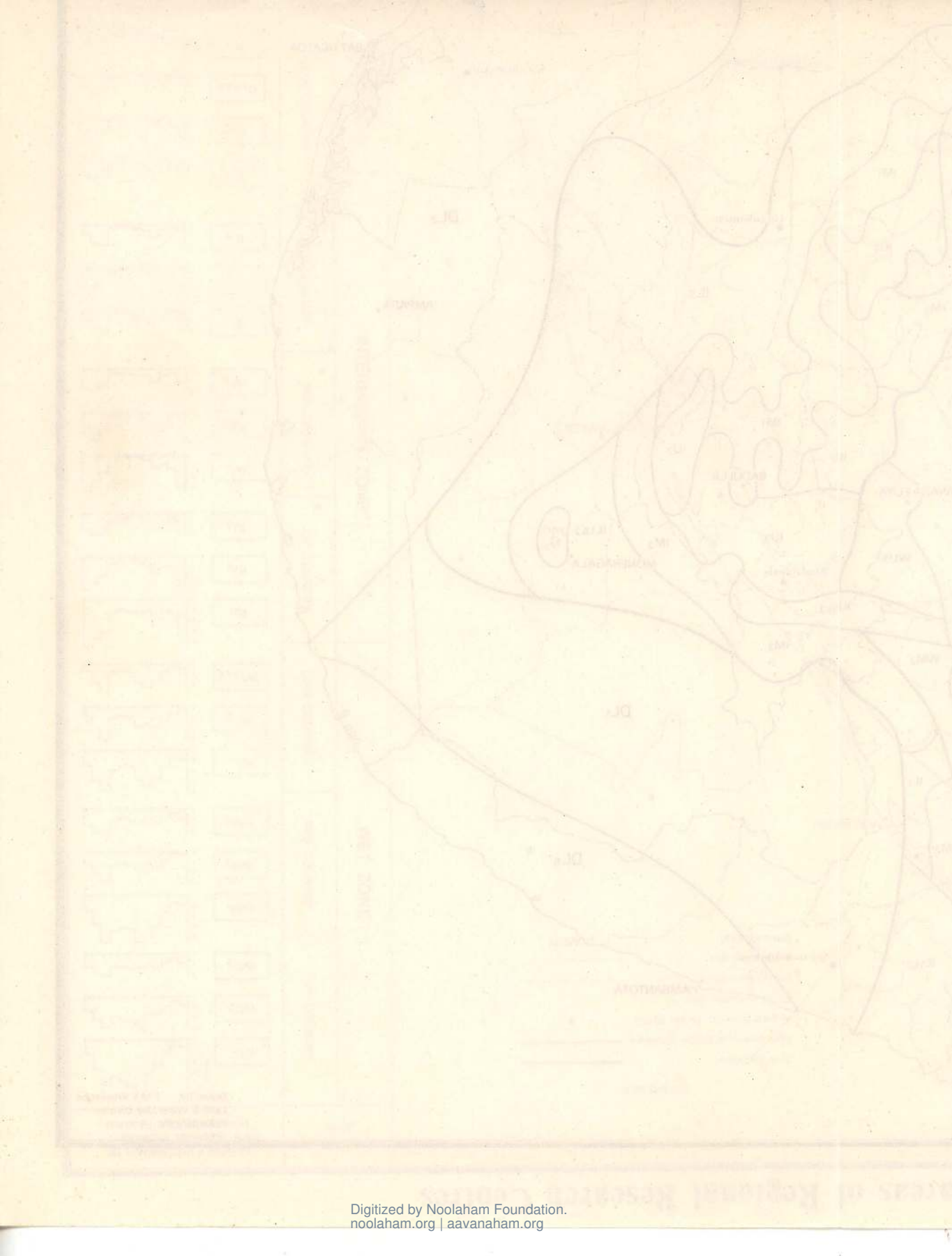


APRIL, 1984



Drawn by: T M K Wijesinghe
Land & Water Use Division
PERADENIYA





PADDY

Distribution of Holdings, Acreage and Production

Size Class (Acres)	*Number of Holdings ('000 acres)*	*(%)*	*Total Area ('000 acres)*	*(%)*
< 2	290	39	178	14
< 3	130	18	147	12
< 4	120	16	219	18
< 10	170	23	474	38
< 20	27	4	203	16
< 50	—	—	21	2
TOTAL	737	100	1242	100

Source: 10% Sample of Census of Agriculture, 1982

Region	*1977* *Gross Sown Area ('000 acres)*	*%*	*Production (Mn. Bushels)*	*%*	*Yield Per Acre*	*1983* *Gross Sown Area ('000 acres)*	*%*	*Output (Mn. Bushels)*	*%*	*Yield Per Acre*
Wet Zone – Low Country	431	21	11.2	14	33	313	15	12.0	10	48
– Mid and Up Country	349	17	15.1	19	53	316	16	17.1	14	67
Intermediate Zone	298	14	11.3	14	47	270	13	15.8	13	68
Dry Zone – Stable Areas	565	28	28.8	35	63	689	34	52.1	44	89
– Other Areas	402	20	14.5	18	45	449	22	22.1	19	58
Total	2045	100	80.9	100	49	2037	100	119.1	100	70

OTHER FIELD CROPS

Distribution of Holdings, reporting other temporary crops and acreage 1982

Size Class (Acres)	Maha 81/82 Number ('000)	Maha 81/82 Area ('000 acres)	Maha 81/82 %	Yala 1982 Number ('000)	Yala 1982 Area ('000 acres)	Yala 1982 %	Total Acreage
< 2	376	132	24	317	104	35	236
< 3	115	108	19	81	62	21	170
< 4	68	165	29	48	42	14	107
< 10	98	124	22	65	73	24	197
< 20	14	34	6	11	17	6	59
Total	671	563	100	522	298	100	769

*Includes Vegetables

Percentage of District Area on other Field Crops, 1982

District	Cowpea A	Cowpea B	Green-gram A	Green-gram B	Black-gram A	Maize A	Finger millet A	Sesame A	Sesame B	Soyabean A	Ground nut A	Sweet Potatoes A	Manioc A	Manioc B	Chillies A	Chillies B	Onions A	Onions B
Mannar	1	0	*	*	2	*	*	1	*	0	*	*	*	*	1	*	*	*
Trincomalee	2	*	1	*	2	9	1	*	*	1	6	4	4	1	1	2	7	0
Anuradhapura	13	2	6	1	17	17	26	1	41	86	*	2	5	0	26	3	*	1
Hambantota	7	3	20	2	*	2	6	32	1	*	14	2	1	2	11	6	*	*
Vavuniya	3	1	1	*	65	*	1	29	1	*	3	*	1	1	2	1	*	6
Mullaitivu	*	*	*		3	*	*	*	*	*	10	*	*	*	2	6	*	14
Jaffna	1	1	3	2	3	*	*	9	*	*	1	*	2	2	25	28	63	58
Polonnaruwa	1	1	1	3	0	3	2	0	*	*	1	2	4	1	1	4	*	1
Batticaloa	1	*	1	*	2	7	*	*	*	0	8	*	9	10	1	2	6	2
Puttalam	19	20	10	10	2	2	1	17	11	1	6	2	4	4	3	2	10	1
Moneragala	9	8	3	2	*	11	15	1	4	1	11	3	5	1	7	*	*	*
Amparai	3	2	1	3	0	20	3	*	*	*	27	1	7	4	*	*	*	*
Badulla	3	3	3	3	*	17	7	0	1	*	1	9	5	4	3	2	1	3
Matale	2	2	*	2	*	4	11	0	4	5	2	2	2	2	2	20	1	1
Kurunegala	32	46	43	65	2	2	9	7	34	1	4	15	12	0	5	11	*	1
Nuwara Eliya	0	*	*	*	*	2	5	1	*	2	0	6	5	0	2	1	6	6
Ratnapura	4	*	7	1	*	2	7	0	1	1	5	21	7	7	2	0	3	3
Colombo	0	*	0	0	0	0	0	0	0	*	0	2	1	1	0	0	0	0
Gampaha	*	*	*	*	0	0	*	0	0	1	*	5	15	0	*	0	*	*
Matara	0	0	*	*	0	0	*	0	0	*	0	5	2	8	*	1	*	*
Kandy	*	1	*	1	*	1	4	0	0	*	0	4	2	2	3	0	1	0
Galle	0	0	*	0	0	0	0	0	0	0	0	6	1	3	*	0	0	0
Kalutara	0	0	0	0	0	0	0	0	0	0	0	5	1	38	0	0	0	0
Kegalle	0	0	*	1	0	0	0	0	0	0	0	3	3	9	0	0	*	0
Total Acreage ('000 acres)	52	33	32	20	22	82	33	10	70	17	28	16	94	34	36	33	10	11

*Less than .05% A—*Maha*, B—*Yala*.

IRRIGATION

Number and Command Area of Schemes by District and by Size Class *('000 acres)*

	200 to 1500 acres		1500 to 2500 acres		2500 to 3000 acres		5000 to 10000 acres		Over 10000 acres		Total	
	No.	*acres*	*No.*	*acres*	*No.*	*acres*	*No.*	*acres*	*No.*	*acres*	*No.*	*acres*
Kandy	5	2.8	—	—	—	—	1	6.8	—	—	6	9.6
Matale	4	1.3	—	—	1	4.3	—	—	—	—	5	5.6
Amparai	16	6.1	3	5.1	5	18.5	1	5.7	1	122.5	26	157.9
Vavuniya	23	8.8	—	—	1	4.1	—	—	—	—	24	12.9
Mannar	9	5.7	—	—	—	—	1	5.3	1	35.7	11	46.8
Jaffna	6	3.2	2	3.5	2	6.4	1	6.4	1	22.0	12	41.9
Mullaitivu	13	7.1	2	4.2	—	—	2	13.0	—	—	17	24.3
Batticaloa	17	4.9	1	1.6	2	7.0	3	27.5	1	12.8	24	53.7
Polonnaruwa	11	4.5	—	—	1	3.0	2	16.5	3	55.0	17	79.0
Hambantota	22	10.3	3	5.6	3	8.8	2	13.6	—	—	30	38.2
Trincomalee	22	10.8	—	—	1	4.4	—	—	3	42.9	26	58.2
Galle	7	3.1	2	3.6	3	9.5	—	—	—	—	12	16.3
Matara	13	6.5	3	4.1	4	16.2	—	—	—	—	20	27.6
Puttalam	18	8.3	1	2.1	—	—	—	—	—	—	17	10.4
Badulla	10	5.5	5	9.3	1	2.5	1	5.0	—	—	17	22.3
Nuwara Eliya	8	4.1	—	—	—	—	—	—	—	—	8	4.1
Ratnapura	9	4.4	—	—	—	—	1	5.1	1	13.7	11	15.7
Kurunegala	2	2.2	2	3.2	2	8.6	1	5.1	—	—	7	19.0
Moneragala	2	2.0	—	—	—	—	—	—	—	—	2	2.0
Anuradhapura	1	1.0	1	2.0	3	7.5	3	19.0	2	25.4	10	54.9
Colombo	4	0.9	—	—	—	—	—	—	—	—	4	0.9
Gampaha	—	—	—	—	—	—	2	15.2	—	—	2	15.2
Kalutara	1	0.2	2	3.6	—	—	2	10.0	—	—	5	13.9
Total	223	103.7	27	47.9	29	100.8	23	154.2	13	330.0	313	730.4

FORESTRY AND LAND ALIENATION

Distribution of Forest Land

District	*District Extent (sq. km)*	*Forest Extent (sq. km)*	*Forest (%)*
Anuradhapura	7274	2083	28.8
Amparai	4604	1241	27.0
Badulla	2822	370	13.1
Batticaloa	2633	423	16.1
Colombo	695	11	1.6
Galle	1689	179	10.6
Gampaha	1399	—	—
Hambantota	2633	173	6.6
Jaffna	2158	341	15.8
Kalutara	1616	179	11.1
Kandy	2158	230	10.7
Kegalle	1663	101	6.1
Kurunegala	4776	105	2.2
Mannar	2013	1121	55.7
Matale	1995	332	16.6
Matara	1246	168	13.5
Moneragala	5660	2054	36.3
Mullaitivu	2066	1513	73.2
Nuwara Eliya	1437	480	33.4
Polonnaruwa	3449	1644	47.7
Puttalam	3036	856	28.2
Ratnapura	3239	472	14.6
Trincomalee	2714	1138	41.9
Vavuniya	2645	1104	41.7
Sri Lanka	65620	16318	24.9

Extents Alienated upto 1982

('000 acres)

Scheme	*No. of Allottees ('000)*	*Extent Paddy*	*Highland*	*Total*
1. Major Irrigation	90.7	247.5	236.7	484.3
2. Highland	9.8	—	33.2	33.2
3. Youth Settlement	7.2	0.7	18.7	19.5
4. Village Expansion	785.1	—	856.4	856.4
5. Long Term Leases ...	0.1	—	0.7	0.7
6. "Swarnabhoomi"	50.9	—	50.9	50.9
7. Regularization of Encroachments	345.6	—	481.7	481.7

FISHERIES

Estimated Number of Active Fishermen, Number of Craft and Production According to District Fisheries Extension Officers' Division, 1982

D. F. E. O. Division	*Estimated number of active Fishermen*	*Number of fishing craft*			*Coastal Fish Production ('000 tons)*
		Mechanised	*Non-Mechanised*	*Total*	
Colombo ...	1840	105	227	332	1.5
Kalutara ...	2670	308	501	809	6.7
Galle ...	4080	608	657	1265	10.1
Matara ...	3840	844	1014	1858	10.4
Tangalle ...	2260	382	835	1217	5.8
Kalmunai ...	7740	391	535	926	8.8
Batticaloa ...	7790	547	2370	2917	9.3
Tricomalee ...	4190	533	1061	1594	14.1
Mullaitivu ...	2010	850	747	1597	8.1
Jaffna ...	12930	3379	2563	5942	42.7
Mannar ...	3890	904	335	1239	13.1
Puttalam ...	14270	1635	1041	2676	15.6
Chillaw ...		1127	575	1702	12.5
Negombo ...	6820	1479	1538	3017	20.7
Total ...	74330	13092	13999	27091	179.4

Trends in Production

('000 tons)

Year	*Offshore and Deep sea*	*Coastal*	*Inland*	*Total*
1970	3.2	85.2	8.2	96.6
1976	0.5	120.8	12.3	133.6
1977	0.3	123.4	12.9	136.6
1979	2.1	146.5	17.1	165.7
1980	2.1	162.7	19.9	184.7
1981	2.1	172.3	29.1	203.5
1982	1.1	179.7	32.8	213.6

LIVESTOCK

Distribution of Holdings and Livestock by Regions, 1982

Regions	All Holdings	Holdings with Livestock		Holdings with Cattle/Buffaloes	
	No. ('000)	No. ('000)	%	No. ('000)	(%)
Coconut Triangle	456	160	35	111	24
Wet Zone – Low Country ...	377	58	15	37	10
– Mid Country ...	264	70	27	51	19
– Up Country ...	108	37	34	33	30
Dry Zone – North	133	90	68	50	37
– East	130	57	44	29	22
– Central	119	38	32	33	28
– South	114	26	23	19	17
Total	1701	536	31	363	21

	Cattle		Buffaloes		Poultry		Goats & Sheep		Pigs	
Region	No. ('000)	%	No. ('000)	%	No. ('000)	%	No. ('000)	%		%
Coconut Triangle	333	25	209	37	1245	33	41	16	17	71
Wet Zone – Low Country	90	7	34	6	579	15	9	4	1	4
– Mid Country	125	10	86	15	481	13	27	10	3	12
– Up Country	84	6	21	4	103	3	11	4	—	—
Dry Zone – North	250	19	5	1	780	20	115	45	1	4
– East	170	13	52	9	290	8	38	15	1	4
– Central	156	12	118	21	184	5	10	4	1	4
– South	100	8	38	7	135	3	5	2	—	—
Total	1308	100	563	100	3797	100	256	100	24	100

Source: Census of Agriculture, 1982 — 10% Sample.

TEA

Distribution of Smallholdings, Acreage and Production, 1982

(Under 50 acres)

District	*No. of Smallholdings ('000)*	*No. of Smallholders ('000)*	*Total Area ('000 acres)*	*Production (metric tons)*
Badulla...	13.2	11.3	17.7	3,527
Galle	36.6	29.3	32.7	20,088
Hambantota	0.6	0.5	0.5	83
Kalutara	1.8	1.6	2.1	964
Kandy	40.8	34.1	47.1	5,660
Kegalle	6.1	5.2	7.9	923
Kurunegala	0.2	0.2	0.4	22
Matale	1.6	1.4	4.1	379
Matara	28.0	23.7	32.5	21,667
Nuwara Eliya	13.7	11.9	15.8	2,614
Ratnapura	18.0	15.8	24.1	5,579
Total	160.6	135.0	184.9	61,506

Source: Census of Tea Smallholdings, July 1983.

Distribution of Acreage by Elevation

Organisation	*High ('000 acres)*	*Medium ('000 acres)*	*Low ('000 acres)*	*Total*	*%*	*Number of holdings*	*Mean Size (acre)*
J E D B	97	77	12	186	31	309	600
S P C	58	53	45	156	26	351	446
Land Reform Commission	1	3	2	6	1	33	115
Other Organisations ...	2	6	9	17	3	187	93
Private Estates ...	15	43	44	102	17	2,968	34
Smallholdings (under 10 acres)	19	52	60	131	22	136,269	1
Total	192	234	172	598	100	140,117	684

Source: Ceylon Tea Review, 1982.

RUBBER

Area by Growing Districts and Size Class, 1982

District	No. of Holdings ('000) (a)	0 – 10 Acres (a)	0 – 10 Acres (b)	No. of Holdings ('000) (a)	10 – 100 Acres (a)	10 – 100 Acres (b)	No. of Holdings ('000) (a)	Over 100 Acres (a)	Over 100 Acres (b)	No. of Holdings ('000) (a)	Total (a)	Acreage (b)
Colombo	25.3	26.3	9.7	0.7	16.1	5.7	26	15.0	12.7	26.0	57.4	28.8
Gampaha			5.7			4.8			0.9			11.4
Kalutara	48.2	39.4	34.5	1.1	25.2	25.2	122	52.2	60.1	49.4	116.8	119.8
Galle	19.7	15.3	8.2	0.9	10.6	11.3	45	24.9	22.5	20.7	50.8	42.0
Matara	4.7	6.5	4.4	0.7	7.3	7.0	20	7.0	6.0	5.5	20.8	17.4
Hambantota	—	0.1	—	—	0.1	—	—	—	—	—	0.2	—
Ratnapura	14.1	24.9	12.8	1.3	26.1	19.0	121	40.5	36.3	15.6	91.4	75.1
Kegalle	26.6	40.2	28.1	1.2	21.3	22.9	201	56.8	61.4	27.9	118.4	130.9
Kurunegala	1.3	1.7	0.5	0.2	3.2	2.5	26	7.8	4.7	1.5	12.7	7.7
Kandy	2.5	2.9	2.2	0.4	3.7	1.7	55	6.6	1.5	3.0	13.2	5.4
Matale	1.9	1.9	1.4	0.2	4.5	2.1	37	9.9	7.6	2.1	16.3	11.1
Badulla and Moneragala	0.2	0.4	—	0.1	1.1	0.6	41	8.7	7.9	0.3	10.2	8.2
Total	144.5	159.6	107.5	6.8	119.2	102.8	694	229.4	221.6	152.0	508.2	457.8

Source: (a) Rubber Control Department.
(b) Census of Agriculture, 1982.– 10% sample.

COCONUT

Area by Major Growing Districts and Size Class. 1982. *('000 acres)*

	Smallholder acreage (Under 20 acres)	*Estate acreage (Over 20 acres)*	*Total acreage*	%
Kurunegala	250	113	363	36
Colombo	21	3	24	2
Gampaha	129	29	158	16
Puttalam	75	56	131	13
Hambantota	45	5	50	5
Kegalle	46	4	50	5
Galle	27	4	31	3
Matara	34	6	40	4
Matale	15	6	21	2
Ratnapura...	26	2	28	3
Kalutara	28	2	30	3
Other Districts	69	24	93	9
Total	765	254	1019	100

Size Class (acres)	*Number of smallholders ('000)*	*Total area*	%
< 2	416	219	21
< 3	101	107	11
< 10	170	290	28
< 20	21	148	15
< 50	4	95	9
< 50	2	160	16
Total	714	1019	100

Source. Census of Agriculture, 1982.— 10% sample

MINOR PERENNIAL CROPS

Estimated Acreages by District

('000 acres)

District	*Cocoa*	*Coffee*	*Cinnamon*	*Cardamom*	*Pepper*	*Clove*	*Nutmeg*	*Total*
Kandy	10.6	4.0	—	6.2	3.6	4.0	3.9	32.3
Nuwara Eliya	—	1.0	—	1.1	0.3	0.2	—	2.6
Matale	14.9	2.1	—	2.2	2.6	1.1	0.2	23.1
Kurunegala	2.7	3.0	—	0.3	1.3	0.6	0.3	8.2
Badulla	0.8	3.4	—	—	0.7	0.6	—	5.5
Moneragala	1.9	0.7	—	—	0.1	—	—	2.7
Kegalle	0.8	2.0	—	1.2	1.6	2.8	0.9	9.3
Ratnapura	—	0.6	3.6	1.0	0.4	0.5	0.1	6.2
Colombo	—	0.5	2.6	—	0.4	0.2	0.1	3.8
Kalutara	0.1	0.1	2.1	—	0.3	0.2	—	2.8
Galle	—	0.2	12.0	—	0.3	0.4	—	12.9
Matara	—	0.9	16.3	0.1	0.3	0.5	0.1	18.2
Hambantota	—	0.2	2.8	—	0.1	—	—	3.1
Total	31.8	18.7	39.4	12.1	12.0	11.1	5.6	130.7

Trends in Volume of Exports

(mn. kg.)

Crop	*1976*	*1979*	*1980*	*1981*	*1982*	*1983*
Pepper	—	1.08	0.95	2.22	1.30	1.29
Cinnamon...	6.80	6.58	7.94	9.16	6.26	5.65
Cardamom	0.16	0.18	0.16	0.21	0.21	0.13
Coffee	1.71	2.60	0.91	2.03	2.92	3.12
Cocoa	1.11	0.60	0.90	0.90	0.14	0.73
Cloves	0.48	0.79	1.19	1.34	0.97	1.77
Nutmeg	0.32	0.36	0.28	0.41	0.35	0.26

ACKNOWLEDGEMENTS

This publication was made possible by the generous support of the Netherlands' Government.

The Strategy was coordinated by the Agriculture Unit of the National Planning Division with support from the Netherlands' Government and United States Agency for International Development. It summarises the technical reports contributed by the task forces of the various Ministries involved. Their assistance in this effort was invaluable.