Table C.3.2 RESULTS OF LAND CLASSIFICATIN (UNDEVELOPED AREA)

Classification Unit	AD		D1		D2		Total	
	ac	%	ac	%	ac	%	ac	%
Upland Crop Type	5,510	31	13,100	30	3,780	26	22,390	27
Lowland and Upland Crop Type	5,215	29	16,520	33	0	0	21,735	26
Lowland Crop Type	5,020	28	14,880	30	10,550	72	30,450	37
Unsuitable to Crop Type	2,165	12	5,980	7	370	2	8,515	10
Total	17,910 (7,250 ha)	100	50,480 (20,430 ha)	100	14,700 (5,940 ha)	100	83,090 (33,620 ha)	100

FIGURES

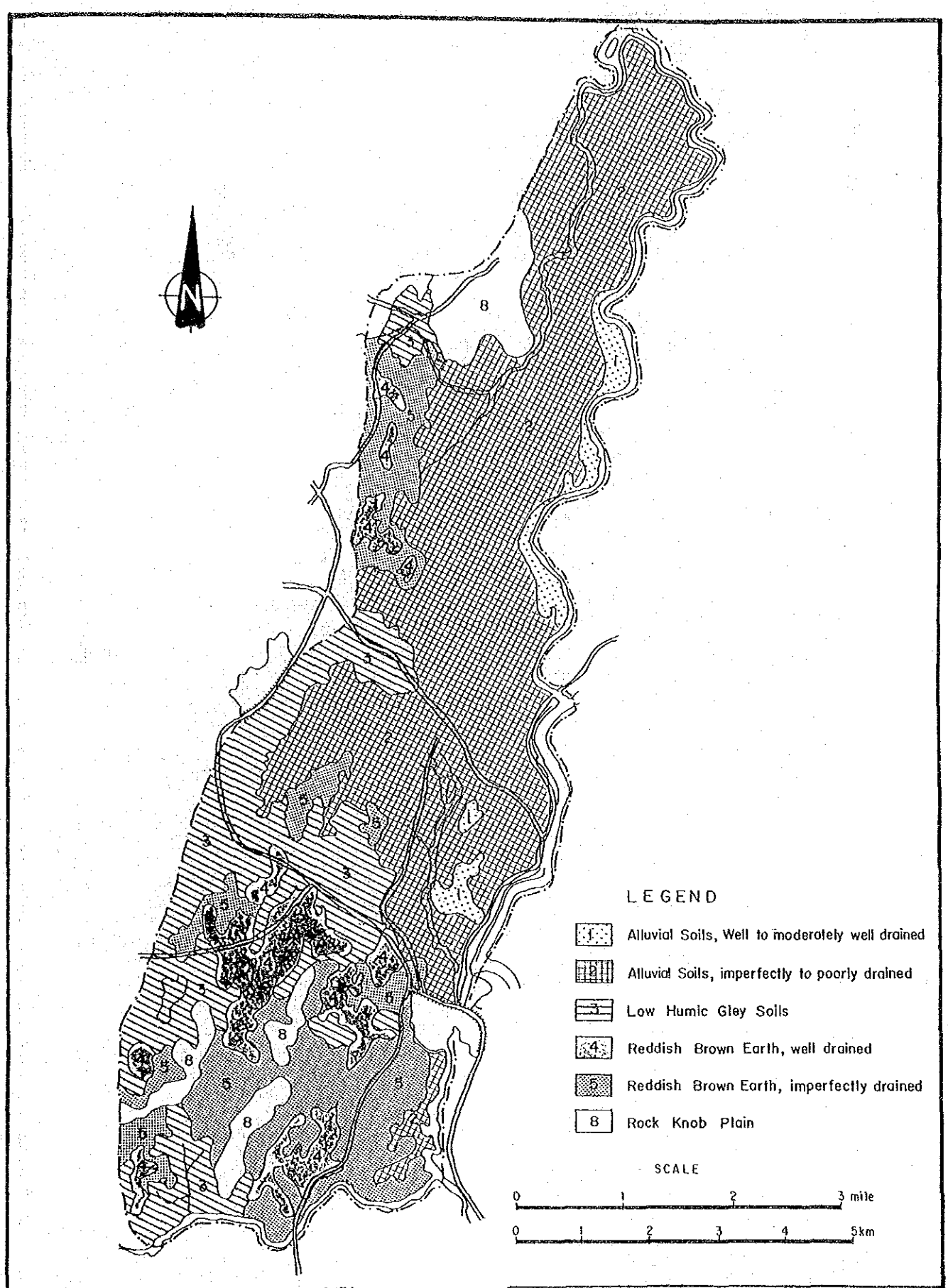

Fig. C.2-1 Soil Map (System A/D)

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. C 2-2.Soil Map (System D1 Undeveloped Area)

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

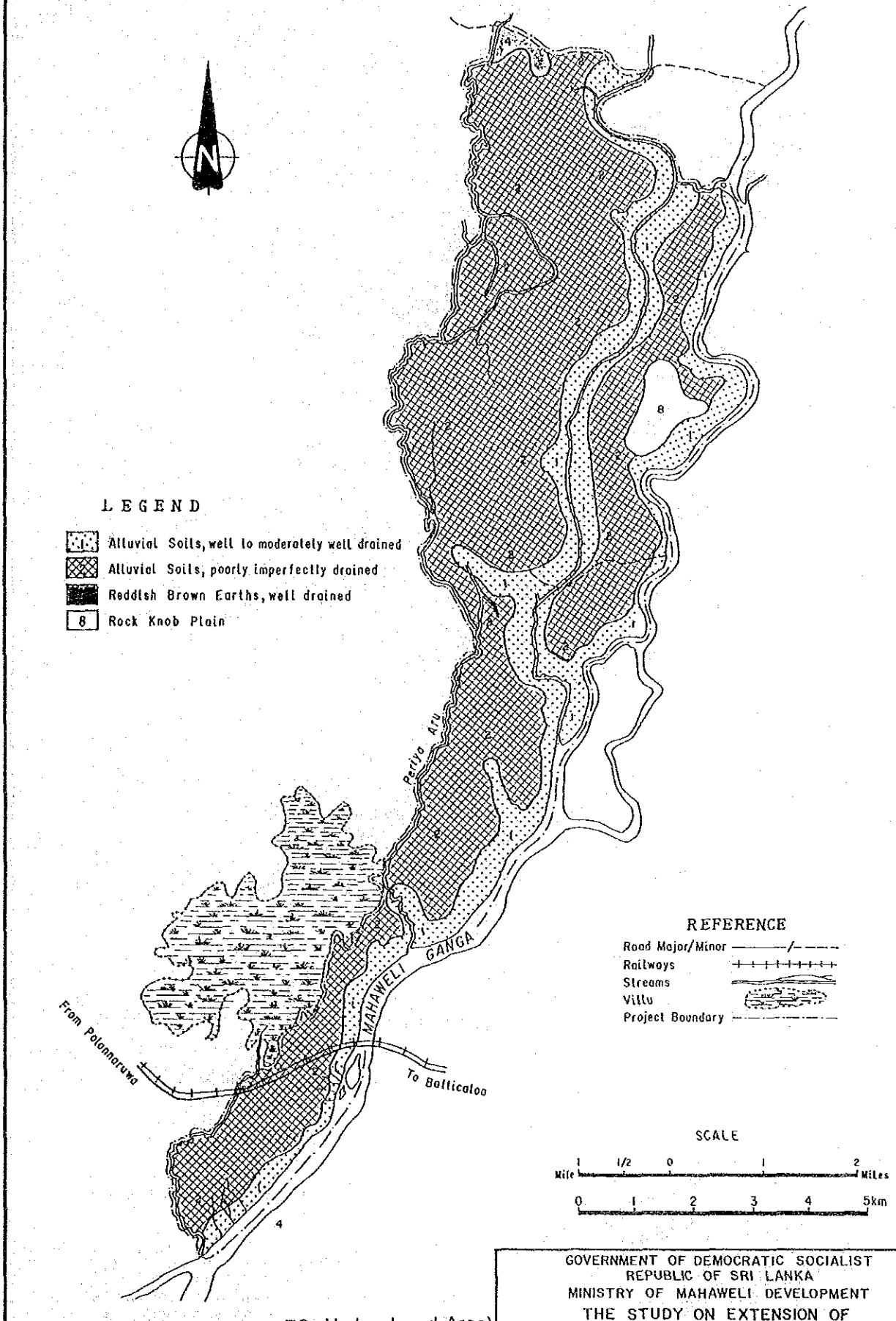

Fig. C 2-3 Soil Map (System D2 Undeveloped Area)

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL CO OPERATION AGENCY

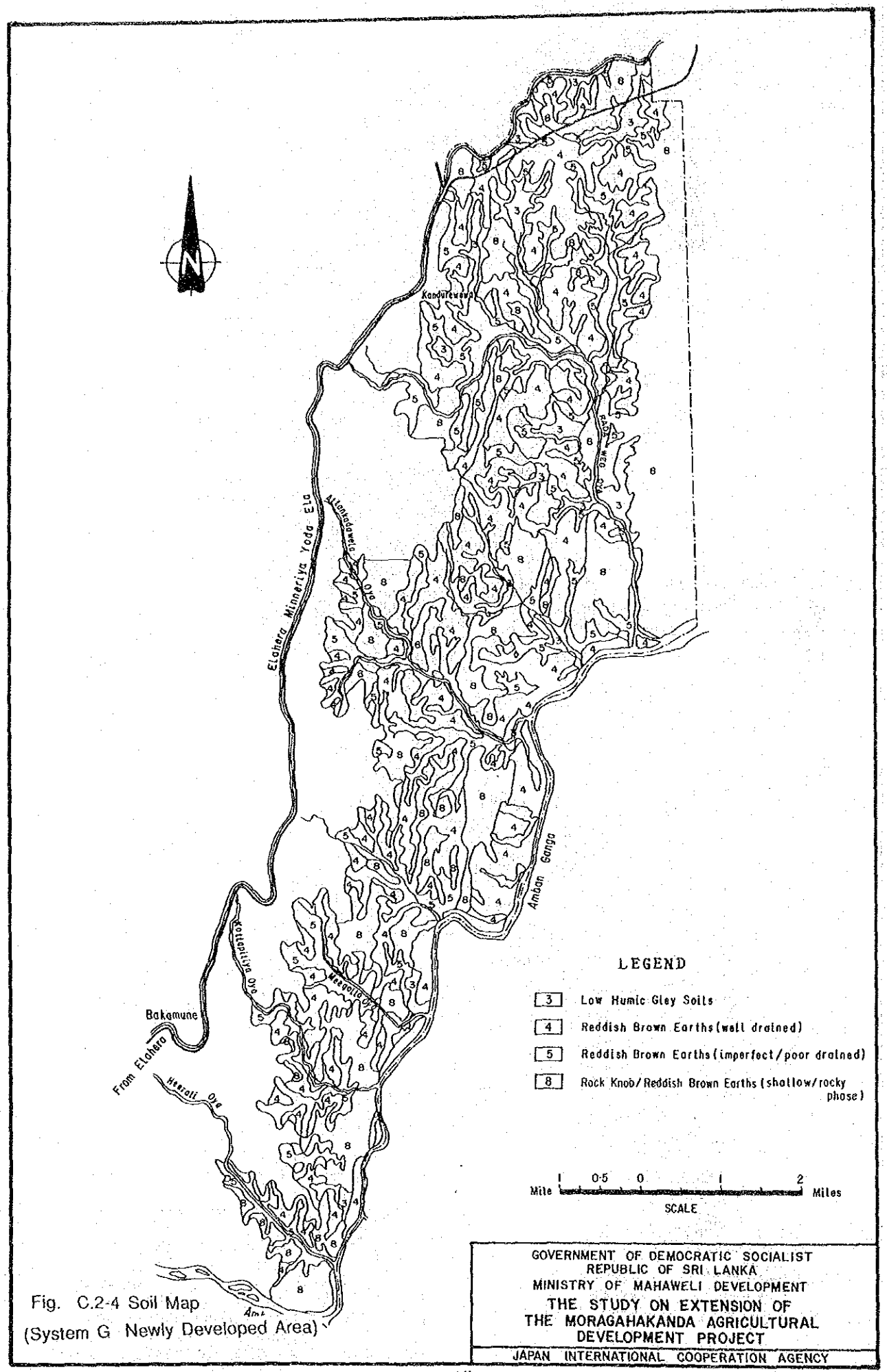

Fig. C.2-4 Soil Map
(System G Newly Developed Area)

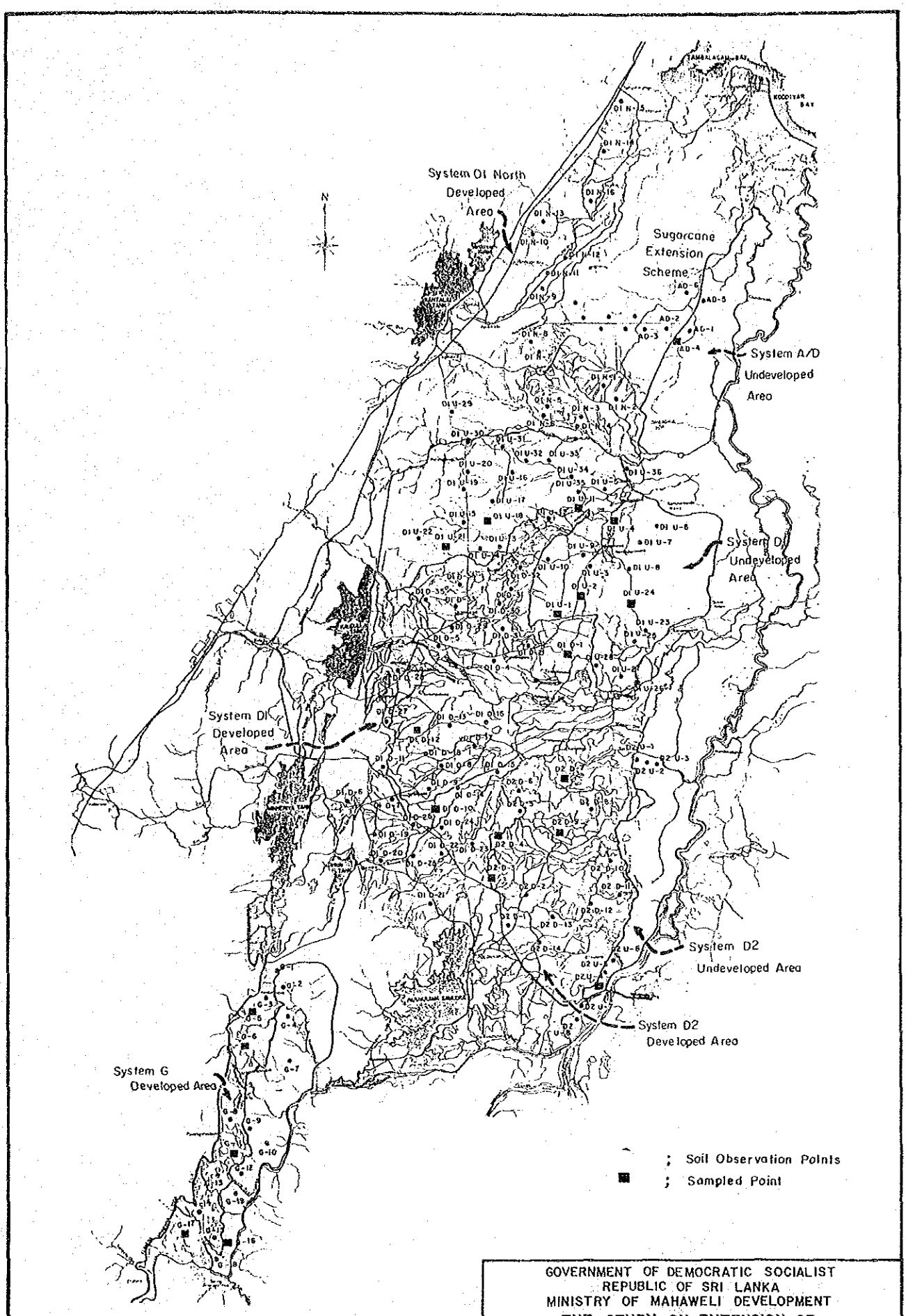

Fig. C.2-5 Field Observation Point

GOVERNMENT OF DEMOCRATIC SOCIALIST
REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF
THE MORAGAHAKANDA AGRICULTURAL
DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

ANNEX - D

SOCIO- AND AGRO- ECONOMY

ANNEX - D

SOCIO- AND AGRO- ECONOMY

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ANNEX-D SOCIO- AND AGRO-ECONOMY

D.1 SOCIO-ECONOMIC CONDITIONS

D.1.1 Population

A population within the project area was estimated at 176,775 in 1981 census year, as shown in Table D.2.1. Hence, the population is estimated as follows (refer to Fig. D.1-1): (1) a whole population in a GS division is counted in case that a whole area of the division is included in the project area: (2) in case that some portions of a GS division are included in the Project area, a project area population in the division is estimated in proportion to the rate of some divisional area covered by the project area to the entire area of the division. Of the total population in the project area, 161,651 or 92% is in Polonnaruwa District and 15,124 or 8% in Trincomalee District. Since Districts of Polonnaruwa and Trincomalee has population of 261,563 and 255,948 respectively, the project area population of each District is accounting for 1.8% and 5.9%, respectively.

There are 53 GS divisions, including 2 Town Centers which the project area concernes. Of the total, 49 divisions including 2 Town Centers are located in Polonnaruwa District and the other 4 GS divisions are in Tricomalee District. 53 GS divisions related to the project area had a population of 259,959 in 1981, as shown in Table D.2.1.

The average growth rate of the project area during ten years from 1971 to 1981 was 4.56%. Polonnaruwa District was 3.12%. Sri Lanka, however, was 1.58% during the same period. Thus, the project area and Polonnaruwa District have grown at a quite high rate as compared with the nation. This was because 50 x 10^3 of Polonnaruwa incremental population was immigrated from outside as well as the natural increase, as mentioned in ANNEX-A, Chapter 2.

The land area of the project area is 118 x 10^3 ha, as shown in Table D.1.2. It accounts for 17.5% of the two District areas of 601.6 x 10^3 ha, comprising 100.5 x 10^3 ha or 30.5% of Polonnaruwa District area of 329.3 x 10^3 ha and 17.5 x 10^3 ha or 6.4% of Trincomalee District area of 272.3 x 10^3 ha. With a population density in Polonnaruwa of 79 persons per km^2 in 1981, this density stood lower than that of the country of 245 persons/km^2. The project area, however, has higher population density of 167 persons per km^2 (or 1.67 per ha) than Polonnaruwa District whole area. Hence, the project area has already been an advanced area in terms of regional development.

Urban areas in the project area are limited to the following three areas according to the Census of Population and Housing 1981 (Ref. 002): Hingrakgoda Town Center, Polonnaruwa Town Center and New Town (No. 72B GS) division. An urban population was 20,495 or 12% of the total population. Since an urban population rate of the country was 25% in 1981, the project area as a whole is not urbanized in the nation.

In the project area of Polonnaruwa District Portion, there was 31,733 of household with a population of 90,741 in 1981, as shown in Table D.1.3. Therefore, a family size in the area is 5.0 persons per family, varying from 4.6 to 5.5 persons per family.

Once the project area is developed on the basis of this Moragahakanda Agricultural Develpment Project, 13,900 ha of new irrigable area would be brought into practice for agricultural production. For the sake of this agricultural activities, about 13,900 families should be settled in the project area in the assumption that each settler has one ha of net irrigated paddy field. However, people who are already living in newly developing area are thought to be eligible settlers, who are enumerated at 31 x 10^3 or 6,200 families in 1981. Provided that this number increased at the natural growth rate of 2.7% per annum up to 1995, 45 x 10^3 or 9,000 families would be existing in that area in 1995. Then, 4,900 of new families or 24,500 of population would be introduced into the area as new settlers.

As seen in Section D.3.2, 3,100 families or 15,500 of population would be required in newly developed area as servicing workers who support the agricultural activities of new settlers. Thus, by the completion of the project, 17,000 families or 85,000 people would come into the project area as settlers. Furthermore, existing population will increase at 2.7% per annum of the natural increase rate, so it will be 256.7 x 10^3 by the year 1995, 14 years later after the 1981 census. As a result, a population of 297 x 10^3 will live in the project area at the time of the Project completion, because new settlers are estimated at 40,000 population for both farming family of 4,900 and servicing family of 3,500.

D.1.2 Labour Force

In 1981 census year, an employed population registered at 84,113 in Polonnaruwa District, as shown in Table D.1.4. Of this total, 51,276 or 61.0% was engaged in agricultural work. This rate is considerably higher than the national rate of 50%. The others are broken down as follows: 8,762 or 10.4% in industrial work; and 14,565 or 17.3% in services' work. 89.7% of employed population is male and 10.3%, female. In agricultural sector, a composition of female was slightly small (9.0%). Workers of productive age from 15 to 54 occupies 89.7% of the total workers. This rate in agricultural sector was somewhat smaller (87.0%) than the rate of whole sectors.

Table D.1.5 shows labour force conditions in the project area in 1981 census year. Total labour force was 62,067, comprising 54,068 or 87% of male workers and 8,188 or 13% of female workers. Then, labour participation rate comes into 35.1%, broken down to 54.7% of male and 10.5% of female. Of the total labour force, 7,324 or 11.8% were unemployed. A female unemployment rate of 32.6% was much higher than that of male of 8.3%. 34,213 or 62.5% of the total employed worker is engaged in the agricultural sector. Participation rate in agricultural sector of male worker to the total male worker is 61.7%, which is higher than that of female worker of 52.0%.

D.1.3 Economic Profile

Polonnaruwa District is a typical rural area in Sri Lanka and its dominant industry is agriculture, especially paddy production. The District occupies 3,293 km^2 of administrative area or 5.0% of the national total land of 65,510 km^2 and 294 x 10^3 of population or 1.8% of the national population of 16,117 x 10^3 in 1986. Regarding paddy production, the District produces 243 x 10^3 tons in 1986 accounting for 9.4% of the national production of 2,588 x 10^3 tons, as shown in Table D.1.6.

In the District area, there are no plantation estates for major export crops such as tea, rubber and coconuts. However, owing to the agricultural development projects, the District has been attaining one of the most affluently paddy production districts in the country. District-wise performance of paddy in the District gets the third position, following the Districts of Kurunegala and Ampara. In terms of unit yield, the District attained the second biggest productivity in Maha (1985/86) and the fourth in Yala (1986). Thus, the District economy is sustained mostly by the paddy production.

Minor food crops are generally grown in scattered homestead gardens, so it has some difficulty to make a comparison among data. Among several minor food crops, however, chillies support the District economy as shown in Table D.1.6. Its production accounts for 6.5% of the national production. Although mustard seems to get a superior position of 16.1% in the national production in 1984 as shown in Table D.1.6, it recorded at only 1.5% before the previous year. Other minor crops do not attain a remarkable production in the District.

The livestock and poultry production relies on the crop production oriented farmers. A few farmers ventures into large-scale livestock and poultry breeding. Buffalo and cattle populations were 60,800 and 81,140 in 1982, accounting for 6.8% and 4.8% of the national population respectively, as shown in Table D.1.7. Thus, livestock and poultly subsector is also supporting the District economy in addition to paddy production.

Polonnaruwa District is one of the major districts with regard to inland fishery production. According to statistical handbook of Polonnaruwa in 1982, the District produced 3,397 tons of fresh-water fish from 31 lakes and tanks, as shown in Table D.1.8. This production accounts for 11.7% of the national inland fishery production of 29,100 tons in the same year, though it occupies Only 1.7% of the total national fishery production of 203,586 tons including coastal and deep sea fishery.

Concerning industrialization, the District is quite backward at present time. There are a few manufacturing industries of large and medium scale in the District. According to the survey of manufacturing industry in 1981, major manufacturing industry in the Ditrict is in only textile and leather production field, as shown in Table D.1.9. Its production recorded Rs. 65 x 10^6 in 1981, accounting for 2.0% of the national production of the same field. Then, it also corresponds to 0.3% of the total national production of the manufacturing sub-sector. The number of workers registered at 1,066, accounting for 0.7% of the total national manufacturing workers.

Besides major manufacturing industry, small scale and cottage industry is existing at unregistered level in the District. According to the survey of Industrial Development Board in 1981, there were 307 establishments scattering in many fields as shown in Table D.1.10. Major industrial type is production of food, bevarage and tobacco, accounting for 56% of total number of establishments. Most of this type is rice related factory and bakery. It occupies 89% of the district production of this industrial field. Second major industrial type is wood and wooden products such as furniture. Its production, however, is small as compared with food related type industry. The third industrial type is fabricated metal products making and repairing agricultural equipment and tools, though its production is also small but slightly bigger than wooden products type. Production of other types are negligible in the District.

D.1.4 Infrastructure

As of 1984, the existing public road in North Central Province including Polonnaruwa District summed up 2,688 km, as shown in Table D.1.11. Road density in the Province, i.e., total road length per total land area, was 0.26 km per km^2. This rate is two-thirds of the national density of 0.39 km per km^2. In Polonnarua District, railway services are supplied as a part of national railway network. However, the number of passengers and goods conveyed by the railway is going down. Its function is diminishing in accordance with the popularization of road traffic.

Municipal water supply system covered 1,161 families in Polonnaruwa District in 1981, accounting for 2.4% of the total number of families in the District, as shown in Table D.1.12. Most of families, 42,095 or 87.4%, are getting potable water from wells. Thus, water supply system in the District is still backward, as compared with the national average.

The District is also backward in electrification. Only 2,245 or 4.5% of the total number of families was covered by electricity for lighting in 1981, as shown in Table D.1.13. The national average is 14.9%, so the District is ten points less than the country.

In 1984, a total of 162 public and private schools were existing in the District, as shown in Table D.1.14. At that time, 64,536 pupils were registered, so the number of pupils per school was 398. This figure is not so much different as the national average of 366.

There are 16 hospitals and 648 hospital beds in the District in 1986, as shown in Table D.1.15. On the average, there is one hospital for every 18,375 population. This is in fairly better condition than the national average of one hospital for every 32 thousand population. However, 2.2 hospital beds per thousand population is not only lower than the national average of 2.86 beds but also much lower than the recommendation of the World Health Organization (WHO), i.e., 5 hospital beds per thousand population.

D.1.5 Settlement Standard

The new land which will be developed under the agricultural development project would be settled by new farming families. In order to support agricultural activities and to

prepare living circumstances, managerial assistance and physical supporting facilities are imperative for new settlers. Since MASL has excuted some settlement in Mahaweli project, the standards of settlement are established to standardize the development level for coming every feature. The following settlement policies are quoted and modified from "System C: Development Plan 1981".

(1) In addition of settlers, there will be non-farm families brought in under project management system, such as project-management staff and staff for schools, hospitals and other social infrastructure facilities. There will be further spontaneous settlers will form the agricultural labour force and will provide trades and services. Thus, sufficient land would be reserved to allow flexibility in the settlement system.

(2) Infrastructures for agricultural production and marketing and for social services have to be based on the norms adopted for Mahaweli areas. The national norms are of lower intensity in general. The phasing of such infrastructures is as critical as the level of services to be provided and is dependent on the programme for agricultural development.

(3) Settlement plan would take into consideration the impact of existing towns. The role of the new service centers would need to be assessed from the point of regional context view.

(4) The main framework of the physical plan is its grouping of settlers into several servicing areas leveled by a hierarcy of centers adopted in Mahaweli areas. The grouping of facilities in relation to the hierarcy is shown in Fig. D.1-2. Central place of each center is recommended to be established on the basis of the following norms.

Central Paces	Population of Total Farm Families	Size of Center (ha)	Distance Apart (km)
Urban Center	8,000-12,000	100	16-40
Arae Center	2,000	21	7-14
Village Center	1,000	8	4-5
Hamlet Center	250	6	2-3
Housing Group	8-15	-	0.5-1.5

D.2 AGRO-ECONOMIC CONDITIONS

D.2.1 Agricultural Population

According to 1981 population census, Polonnaruwa District registered at 51,276 workers for agricultural production, as shown in Table D.1.4. In the project area, agricultural workers were 34,213 in the same year, of which 31,767 or 93% was in Polonnaruwa District, as shown in Table D.1.5. Then, 62% of total agricultural workers in Polonnaruwa District is located in the project area.

Table D.2.1 shows the number of agricultural operators in AGA divisions related to the project area in 1982 agricultural census year. Hence, an agricultural operator means a person responsible for operating an agricultural land and livestock, who may carry out the agricultural operations by himself or with the assistance of others or simply direct daily operations. There were 38,058 of agricultural oeprators in the divisions. Of the total number, 29,359 or 77% is in productive age, i.e., less than 54 years old. This rate is smaller than that of agricultural workers of 87%. This is because people in the younger generation would be more difficult to be agricultural operators than the aged.

Among operator enumeration by ten year interval, operators during the age between 35 and 44 were the majority, as shown in Table D.2.1. The second majority was 25-34 years old. The total of two majorities occupies 19,731 or 52% of the total operators. The generation of agricultural operators in the divisions seems to be comparatively young.

In terms of educational attainment, agricultural operators in the divisions seem to be lower than both averages of Polonnaruwa District and the country, as shown in Table D.2.2. Both averages show that more than a half of persons 30 years old and over finishes the compulsory education, i.e., primary and secondary levels. On the other hand, about a half of agricultural operators attain only primary level, and persons who attain the secondary level are only 27.9%. However, no schooling people are fewer than both averages.

D.2.2 Land Ownership

According to the census of agriculture 1982, the number of agricultural holdings was 32,203 in Polonnaruwa District. 32,186 or 99.9% of the total holdings was under small holdings and 1.7 or 0.1% was under estates. Hense, a small holding means that an agricultural holding is less than 20 acres (8 ha) and under the same oeprational status. An agricultural holding of 20 acres (8 ha) in extent or more and under the same oeprational status is considered as an "estate".

In Polonnaruwa District, 14,712 operators or 46% of total operators of 32,222 own small size of the land holdings of less than 3 acres (1.2 ha). Regarding paddy field only, 16,276 operators or 51% of the total hold their own paddy field by themselves only, as shown in Table D.2.3. The total number of paddy holdings in Polonnaruwa District is 32,185 and their total area is 45,039 ha. Therefore, the average area of paddy field per

holding is 1.40 ha. Since the one in Polonnaruwa District is 2.7 acres (1.1 ha), it is 25% larger than the district average.

In the project area, there were 20,526 operators, distributing as follows in 1982: 3,422 in AGA Elahera division; 4,769 in Sinhara Pattuwa; 3,544 in Lankapura; 5,177 in Medirigiriya; 1,838 in Tamankaduwa; 1,346 in Kanthalai; and 430 in Kinnya. The number of operators broken down into GS division is shown in Table D.2.4. Of the total oeprators in the project area, 5,046 or 24.6% does not have any agricultural land and 4,162 or 20.3% has only home garden. Thus, 9,208 or 44.9% of the total is doing main agricultural activities in other lands which are owned by other land owners.

There is 60,538 ha of total agricultural land area in the project area which is owened by operators themselves. Of the total area, 4,134 ha or 6.4% is owned by small holding operators who own only less than 2 acres (0.8 ha), as shown in Table D.2.4.

D.2.3 Extension Services

Agricultural extension performs both an educative and advisory function. In order that the extension services function well, it is quite effective to communicate the results of research investigations, personal observation and experience in the form of appropriate "package" programme to the farming community. The adoption of these programmes leads to an increase in agricultural productivity. Therefore, extension services are an important part of the rural development process, for which adequately trained staff must be provided.

There are six major organizations concerned with extension services within the Government of Sri Lanka. These are:

(1) The Department of Agrarian Service (DAS) and the Agricultural Development Authority (ADA) of the Ministry of Agricultural Development and Research (MADR).

(2) The Department of Animal Husbandry Production and Health of the Ministry of Rural Development.

(3) The Mahaweli Authority (MASL) of the Ministry of Mahaweli Development (MMD).

(4) The Land Commissioner's Department and Irrigation Department of the Ministry of Land and Land Development.

(5) The Coconut Cultivation Board of the Ministry of Coconut Industries.

(6) The Ministry of Plantation Industry.

The Department of Agrarian Service is dominantly in charge of agricultural extension services in the country. It provides an assistant director of agro-service for each AGA division, as shown in Fig. D.2-1. The assistant director has a meeting once a month in principle to communicate extension programme to AGA division instructors. Then, an

Agricultural Instructor (AI) of AGA level has a meeting also every two weeks in principle to communicate the programme to Krusi Vyapthi Sevaka (KVS), GS level extension instructor. A KVS covers about 750 farm families as a unit through 12 to 18 Contact Farmers (CF). He holds a meeting or field instruction with CFs at a pitch of twice a week to instruct the extension programme for members of the unit. The Agricultural Development Authority (ADA) also provide agricultural extension services through Agrarian Service Centre (ASC). Under ASC, Cultivation Officers (CO) are trying to instruct agricultural cultivation directly to farmers, corresponding to KVS system of DAS.

From the point of agricultural operator's view, there are various ways for a operator to get information of agricultural extension. According to Agrarian Research and Training Institute (ARTI) assessment, these are:

(1) The most important source for agricultural extension is the Agro-Service staff. Most of farmers get new knowledge through KVS as the source of information leading to the adoption of high yielding varieties and fertilizer recommendations.

(2) Farm neighbours are also an important source of information. They have a particular influence on their neighbors at the adoption stage of any innovation.

(3) Demonstrations and Farmer Training Classes provides farmers with their information on improved agricultural practices. Many attendants of these training and workshop accept the information and adopt it in the field.

(4) The use of the media such as radio, television and written publications are valuable in that they provide a means of reaching a wide range of the rural population. Although the educational level in rural area is somewhat lower as seen in Section 2.1, the literacy rate has gone up to more than 90% in these days. Thus, most of farmers are able to accept these mass media to link up as agricultural extension services.

(5) The Training and Visit (T&V) system is now the most practical and popular way of extension services. The system contains: systematic visits by extension staff (KVS) to meet farmers on their fields; working through CF a simplified report system; fortnightly training of KVS and monthly research-extension dialogue; frequent in-service training facilities for KVS; and greater emphasis on on-farm adaptive research activities. A KVS works through a CF who is generally nominated by the KVS. The KVS meets CFs twice a week in obedience to a pre-arranged time table. At these meetings the KVS instructs CFs on the particular extension message based on the area, time of year, crop calendar, etc. The remainder of the community is set as "Follower Farmers (FF)". A number of FFs will also attend the regular meeting and demonstration. CFs are also expected to give instruction to FFs by the time for the next regular meeting.

As of 1987, the following instructors for agricultural extension services are provided through District offices of both DAS and ADA in Polonnaruwa District, as shown

in Table D.2.5: (1) 4 subject matter specialists, 9 AIs and 62 KVSs under the DAS; and (2) 9 Regional officers of ASC and 58 COs under the ADA.

Extension activity can not perform its function satisfactorily in isolation. It has to be interwoven with management training and other supporting services to agriculture. Therefore, in order that each extension service organization works effectively in agricultural innovation, an inter-organizational structure is necessary at the early stage in particular.

D.2.4 Agricultural Credit

Rural banking and credit sytem is implemented through two schemes, i.e., a cultivation loan scheme and a marketing loan scheme. The former scheme is a loan for a farmer to undertake the cultivation through commercial banks as a agricultural credit. The latter scheme is a loan for a marketing organization of agricultural products.

Agricultural credit system is generally implemented through the following four channels. These are:

(1) The People's Bank provides cultivation loans to farmers through the Comprehensive Rural Credit Scheme (CRCS) which has been in operation since 1973. The CRCS has been effective with a large volume of loans being granted to farmers for the purpose of cultivation. This scheme has been peroformed through the Multi-purpose Co-operative Societies (MPCSs or so-called Co-operative), which acted as channelling agencies of credit under the CRCS.

(2) The Bank of Ceylon provides loans through the Agrarian Servie Centre (ASC). It started agricultural credit services since 1973, when CRCS was implemented. Its service channel is small, so it does not cover the whole island of Sri Lanka.

(3) The Hatton National Bank provides loans directly to farmers under CRCS. Therefore, the service area is limited into large cities and their suburbs.

(4) In 1986, the New Comprehensive Rural Credit Scheme (NCRCS) is introduced in place of CRCS. A loan provided under NCRCS is not a crop specific loan. A farmer is allowed the flexibility to undertake the cultivation of any crop he prefers, taking into consideration the availability of water, the market prices of products and the profitability. NCRCS is performed through the Regional Rural Development Bank (RRDB) and Thrift and Credit Co-operative Societies (TCCSs).

The NCRCS has just started its service for farmers since Yala 1986. Its performance is still quite small (0.4% of the total loans in 1986 crop year), but NCRCS is expected to grant a large volume of loans to farmers for the purpose of cultivation. As shown in Table D.2.6, the total amount of paddy loans is still increase with some fluctuation, but the growth of credit for cultivation of minor food crops seems to increase somewhat higher than paddy loans. Thus, NCRCS would be effective for this tendency and for the crop divesification policy.

In Polonnaruwa District, the Bank of Ceylon as well as MPCS (Co-operative) have provided agricultural loans for paddy cultivation. Table D.2.7 shows the performance of paddy cultivation loans by the Bank of Ceylon from 1981 to 1986. In 1986, the Bank granted Rs. 33 million to 7,253 operators. Of the total amount, Rs. 8.5 million or 25% was not repaid as an outstanding credit, as of 1987. Before 1986, an outstanding amount has been almost 10% or less of granted amount.

D.2.5 Co-operatives

The co-operative system is still functioning in rural areas. Originally, Multi-Purpose Co-operative Society (MPCS) provided such services as credit, input supply, extension and marketing to its members, but it has been decreasing in its social role since implementation of free-market policy. As of 1987, there are nine co-operatives in Polonnaruwa District, as shown in Table D.2.8. They are expected to deal with the following services for its members in these days:

(1) to supply foodstuff and kerosene for low income people free of charge through the food stamps. Incidentally, food stamps are distributed by the Government for low income people to purchase basic foodstuffs and kerosene (for cooking fuel and lighting) to support their lives, as a social welfare policy of the country. In 1987, 150,042 of food stamps was issued, distributing as follows: 35,656 for 0-8 years; 69,810 for 12 years old and over; and 30,619 for kerosene stamp;

(2) to furnish a farmer with a cultivation loan through the Rural Bank, under CRCS. This agricultural credit system is still the most popular channel for rural farmers at present time.

(3) to supply household commodities for rural families. In undeveloped rural area, a cooperative is only one distributing channel of commodities.

(4) to function as information channel not only for living affairs but also for agricultural extension services. It is not officially interwoven with agricultural extension services, but it still functioning in quite rural area because of its long historical background.

According to the table, there are 29×10^3 members of cooperatives in Polonnaruwa District in 1987. Since there would be a population of 299×10^3 in the same year, about 10% of the population is affiliated to cooperatives, as of 1987.

D.3 PROJECT SUPPORTING SCHEMES

D.3.1 Agricultural Support Services

Agricultural support services are offered by the MEA just after completion of the first stage construction and at the beginning of the first settlement to the new settlement area. The MEA provides a project office to promote new settlers into the project site by means of offering appropriate agricultural support systems.

The project office will have the three service levels: a main project centre (Resident Project Manager: RPM); 5 block centre offices; and 41 unit offices, regarding agricultural support services as well as operation and maintenance of the created system. Agricultural supporting staffs are enumerated as fllows in every service level, as shown in Fig. D.3-1: (1) every unit office has a KVS, so the staff of this level aggregated 41 in the project area; (2) every block centre has 2 agricultural staffs, so 10 staffs in total; and (3) RPM office has 2 agricultural managers, one of which has 3 specialist for agricultural services such as marketing, credit and co-operatives and the other has 4 specialist for agricultural subject matter, so 7 staffs in total.

Extension services are executed by a KVS of each unit office by means of T&V system. Among 200-300 farmers in a hamlet, about 10 contact farmers (CFs) will be chosen to get direct extension services from the KVS. Other farmers except CFs are follower farmers (FFs), who get extension services through CFs and through demonstrations and farm training classes provided by the KVS and/or a block centre office. The KVS staff is dispatched to a unit office by DAS, in general.

Agricultural credit is available through the Rural Bank from the People's Bank, and through ASC from the Bank of Ceylon, which is performed to a farmer through the CRCS system. The Rural Bank is associated with co-operatives, as the same way as existing areas. A branch of co-operatives settled in every block centre, accompanied with the Rural Bank. The primary co-operative complex is provided in the Town Centre. The ASC is also provided in the Town Center. The NCRCS system will also be available through the RRDB or the TCCC which will be provided in the Town centre.

Co-operatives work as purchasing agents of Paddy Marketing Board (PMD) in paddy procurement. The CWE functions as a purchasing and distributing agent of subsidiary food crop in the public marketing channel. Rice millers, wholesaler and retailers handle most of marketed agricultural products in private marketing channels, who are scattered in all centres. The only PMB provides a large warehouse in the Town centre. The farmer will produce a variety of food crops linked to market demand. However, they have to conduct their marketing operations with many problems such as the smallness of marketable volume, perishability of products, non-availability of production and marketing credit, non availability of transport, lack of market information, low bargaining power of farmers due to lack of farmer organization and lack of adequate storage. Therefore, in order to lead farmers holding small crop field to work with confidence, the agricultural support services are introduced into the project area deliberately.

D.3.2 Settlement Plan in Agricultural Development Areas

D.3.2.1 Settlement Plan

To support agricultural activity of settlers in the project area, land settlement is prerequisite to good living circumstances for settlers. In Systems of B, C, H and G, land settlement has been planned under the settlement standard for Mahaweli schemes mentioned in Sub- section 1.5. In this project as well, the same settlement standard is adopted to create a settlement plan to the project area.

Under this settlement system, the settler brought in are made to live in a cluster of dwellings called a Hamlet. Each hamlet has a population of 200-300 farmer families, where each family is allocated a land of 0.2 ha for his homestead in addition to 1.0 ha farming plot in the low land. A service centre for the hamlet called a hamlet centre is the first element of social infrastructure constructed to the settlers. The settlement project at the hamlet level is implimented through the unit managers (UM) who is assisted by a field assistant. The unit manager is responsible for referring them to the next higher level, the Block Manager (BM), in case that the settler needs to get broad services.

A Block Manager division is to cover a settler population of 2,500-3,000 farmer families or 8-10 unit manager divisions. A block manager is provided with functional supporting staff in fields such as Irrigation and Water Management, Agriculture, Community Development and Marketing. At the initial stages of the project, an officer assists the BM in land administrative matters also. The BM's office is located at the Area Centre which could be considered as a township of lower level of services. The organization responsible for looking after the settlement of entire project is called the project office manned by the Resident Project Manager (RPM). The RPM administers the settlement scheme through BM/UM and controlls 3-6 Block Manager divisions. The RPM is assisted by the specialist in the fields such as Agriculture, Credit & Marketing, Finance, Water Management, Community Development, etc. The above system of management through Project Manager/Block Manager/Unit Manager is referred to as a unified system of Management. The implication of the management system is illustrated in Fig. D.3-1.

The first element of social infrastructure called a hamlet centre managed by a unit manager will have the following services provided by the Project Management and other governmental/non governmental organizations.

(1) Hamlet Centre

Project Management	-	Unit Manager Field Assistant
Infrastructure	-	Quarters for UM as a unit service centre and quarters for Field Assistant. Store building for food/fertilizer.

(2) Government Organizations

Health	-	Family health worker/midwife
Education	-	Primary school complex
Infrastructure	-	Quarters for family health worker/midwife
	-	Complex of school building for primary school and quarters for teachers

(3) Non Government Organization

Marketing	-	Retail co-operative outlet

A hamlet centre from a group of 4-5 centres is selected on its location with respect to the other hamlet centres in the group and is up-graded as a village centre. A village centre will have the following additional facilities:

(1) Post office with Post Master's quarters

(2) A grama sevaka division to incorporate 4-5 hamlet centres with grama sevaka quarters at the village centre

(3) The primary school in the hamlet centre may be up-graded to a junior secondary school for the village centre with more facilities

For 2-3 village centres, the next higher level of service centre is referred to as an area centre, where the office of the block manager is established. The services provided are as follows:

(1) Block office with housing for a Block Manager and his supporting staff

(2) A sub-post office

(3) A dispensary

(4) Storage facilities

(5) A junior secondary school with land provided for expansion to a senior secondary school

(6) A central dispensary with housing for a dispenser

(7) A large scale cooperative incorporating space for a Rural Bank

(8) Space for commodity transaction and space for commercial building development

The services to the settlers above the area centre level are provided through a Township. For the new development areas of Systems D1, D2 and A/D, it would be proposed to establish a new Town Center incorporating all facilities in the area demarkated in System D1-south. For the people settled in System D2 area, a new township is not recommended, but they may be served from existing Polonnaruwa town. For the people in System A/D, however, only a limited service will be available from the town centre due to the remoteness of the places from System D1.

Number of farmer families to be settled in each System and the service centres proposed are shown in Table D.3.1. In addition to farmers, about 50 non-farmer settlers will be allotted to each center, who work for the service activity such as trade, education, medical care and public services. These numbers are enumerated in Table D.3.1, too.

In the project area, there would be 3-5 hamdlet centres in each village center and around 2 village centres in each area center. Total 5 area centres would be developed in the project area. One Town Centre would be developed near the village of Migaswewa in System D1-south to serve the entire new irrigation area. The proposed location of centres is presented Fig. D.3-2.

In each centre, the basic infrastructure would be provided to promote an agricultural activity and to develop community in the settlement area. The infrastructure proposed for respective centre is summed up in Table D.3.2. Facilities provided for each centre are broken down in Table D.3.3.

D.3.2.2 Selection of Settlers

There are abut 900 families within the Moragahakanda reservoir area. After the construction of dam, these families shall be settled in and/or near the project area due to the inundation by the Moragahakanda reservoir. Therefore, the first priority should be given to these families to resettle in the new reclamation area.

All the new lands in other Systems are spreading in the downstream of the existing colonization schemes where substantial numbers of second generation colonists are being accumulated and most of them are under-employed. Under these circumstances, it would be proper to give the second priority of resettlement to the surplus population in the existing colonies to the new lands to be developed in their downstreams. If this principle is basically accepted, the likely sources of settlers into the new lands in Kaudulla, Kantalai and Parakrama Samudra would be from the existing colonization scheme in their upstreams.

Among the new lands, Kaudulla is exceptionally large in area and the existing Kaudula colony in its upstream is relatively underdeveloped. It might be possible to allow the surplus population in the existing Giritale and Minneriya colonies to resettle into the new Kaudulla, on the ground that Giritale and Minneriya colonies have no extra capacity to accommodate any additional population nor downstream extension unlike the other existing colonies. On the other hand, Kantalai colonization scheme seems to be less congested than Parakrama Samudra.

Settler selection policy as suggested in the above is along the basic guideline of the Project's downstream development which is chalked out according to the principle of a harmonious inter- relationships between the existing and the new lands which belong to the same irrigation system. This is also being reflected in the formation of project management units.

D.3.3 Resettlement Programme in Moragahakanda Reservoir Area

At a proposed resrvoir site, some areas are submerged under the reservoir after completion of the dam. Although land owners are compensated for submerged land before the construction starts, agricultural production foregone well take place immediately after the land being taken over by the implementing agency. This means that the production foregone has to be regarded as a negative benefit from the point of economic view. Besides production foregone, this section proposes a resettlement programme following items; (1) resettlement principle for people transferred from the reservoir area; (2) compensation for existing houses and buildings; (3) production foregone from the agricultural land, and (4) reafforestation.

(1) Resettlement Principle

Most of the population in the reservoir area will be resettled to the new irrigation development areas in principle. Some of them may settle somewhere in the area at their own, without organized assistance by Government agencies. Most of them, however, are deemed as new settlers in the proposed agricultural development schemes discussed in the previous section. Thus, resettlement procedure is considered to be included in the land settlement activity.

(2) Compensation for Buildings

In the reservoir area, the following buildings are existing as of 1988; (a) residential houses total up to 900; (b) schools, 6; (c) hospital, 1; (d) religious, 9; and (e) government facilities, 3. These buildings will be destroyed by the creation of the reservoir. Therefore, the compensation payments for private buildings and the reconstruction costs for public buildings as well as the resettlement costs can be taken as to represent the true costs of these losses to the economy.

(3) Production Foregone

Agricultural land submerged due to the inundation in the resrvoir would be compensated by compensation payments from the financial point of view in general. In terms of economic view, however, the production foregone would have to be counted as economic costs of the proposed project.

The present land use of agricultural areas submerged under the reservoir is as follows: (a) 1,050 acres (425 ha) of paddy field; and (b) 900 acres (365 ha) of upland cultivation land. Economic net production values per hectare of paddy and upland crop (represented by green gram) are Rs. 5,400 and Rs. 660, which are

discussed in ANNEX-E. The production foregone is derived from the sum of the net production value is obtained from the product of the land area and the unit value of the crop. The production foregone is estimated at Rs. 3.1 x 10^6 (US$0.10 x 10^6) per annum at present price level. Therefore, the production foregone for the project life of 50 years is estimated at Rs. 30.3 x 10^6 (US$0.99 x 10^6), discounted at the rate of 10%.

(4) Reafforestation

Reafforestation programme will be performed as environmental conservation of forestry and wildlife in the reservoir area. The programme is implemented by Forestry and Wildlife Departments.

REFERENCES

No.	Title	Issued on	Issued by
001	Statistical Abstract of the Democratic Socialist Republic of Sri Lanka 1985	Jan. 1987	Dept. of Census and Statistic MPI
002	Census of Population and Housing 1981 Population Data for Words and Grama Sevaka Divisions		Dept. of Census and Statistic MIP
003	Review of the Economy 1986		Central Bank of Sri Lanka
004	Economic & Social Statistics of Sri Lanka	Dec. 1986	Central Bank of Sri Lanka
005	Report on Consumer Finances and Socio Economic Survey 1981/1982 Sri Lanka Part I	Oct. 1984	Central Bank of Sri Lanka
006	Public Investment 1987-1991	May 1987	National Planning Division MFP
007	Central Bank of Sri Lanka Bulletin	Nov. 1987	Central Bank of Sri Lanka
008	Census of Population and Housing 1981 Polonnaruwa District Report Volumme 1 - Part XX	Apr. 1985	Dept. of Census and Statistics MPI
009	Census of Population and Housing 1981 Trincomallee District Report Volume 1 - Part XVI	Feb. 1985	Dept. of Census and Statistics MPI
010	Census of Agriculture 1982 Central Report	Dec. 1986	Dept. of Census and Statistics MPI

No.	Title	Issued on	Issued by
011	Census of Agriculture 1982 (Small Holding Sector) Polonnaruwa District Report	Oct. 1986	Dept. of Census and Statistics MPI
012	Census of Agriculture 1982 (Small Holding Sector) Trincomallee District Report	Aug. 1986	Dept. of Census and Statistics MPI
013	Seasonal Retail and Wholesale Price Analysis of Some Major Agricultural Commodities	July 1987	ARTI
014	Irrigation and Water Management in a Peasant Settlement Scheme of Sri Lanka	June 1987	ARTI
015	Agricultural Credit Schemes under the Kurunegala Rural Development Project: An Evaluation	Nov. 1981	ARTI
016	Input use Efficiency and Productivity or Rice Production	Feb. 1986	ARTI
017	A Study of Five Settlement Schemes Prior to Irrigation Modernization	July 1980	ARTI
018	Small Farmer Organization Project in Sri Lanka	Oct. 1986	ARTI
019	The Weekly Food Commodities Bulletin Series One, Rice	Apr. 1987	ARTI
020	System C: Development Plan	June 1981	Hunting Technical Services Limited
021	Price and Wage Statistics 1985	Feb. 1987	Central Bank of Sri Lanka

No.	Title	Issued on	Issued by
022	Mahaweli Development Plan: System C Volume 3, L: Marketing, M: Training & Extention, N: Health		Hunting Technical Services Limited
023	Statistical Handbook 1982 (Sinhalese)	May 1983	Polonnaruwa District Government Agent Office
024	Report on the Survey on Manufacturing Industry, Sri Lanka: 1981		Department of Census and Statistics
025	Housing, All Island Tables based on a ten percent Sample	Dec. 1985	Department of Census and Statistics

TABLES

Table D.1.1 POPULATION BY GRAMA SEVAKA DIVISION RELATED TO THE STUDY AREA (1/3)

District AGA Division GS Division	Division Population 1971	 1981	Percentage of Project Area (%)	Population of Project Area 1971	 1981	Average Annual Growth Rate (%)
I. Polonnaruwa District	140,643	221,419	-	100,992	161,651	4.82
(1) Elahera	15,860	28,860	-	7,265	13,358	6.28
70D Attanakadawala	1,979	5,830	63	1,247	3,673	11.41
70H Bakamuna	2,250	4,271	37	833	1,580	6.62
70C Elahera	2,280	4,329	39	889	1,688	6.62
70J Ihakuluwewa	3,080	3,335	38	1,170	1,170	0.80
70A Konduruwewa	3,961	4,290	55	2,179	2,360	0.80
70B Kottapitiya	2,310	6,805	41	947	2,790	11.41
(2) Sinhala Pattuwa	39,488	57,485	-	29,042	41,080	3.53
70 Giritale	4,596	5,120	23	1,058	1,178	1.09
71F Hingurakdamana	1,652	2,001	100	1,652	2,001	1.94
71E Hinguraka	2,221	2,690	50	1,111	1,345	1.93
71D Jayanthipura	2,134	3,851	100	2,134	3,851	6.08
71J Kumaragama	1,050	1,996	100	1,050	1,996	6.63
71 Minneriya	2,085	5,656	4	83	226	10.49
71H Pansalgodella	4,601	6,293	100	4,601	6,293	3.18
70E Tambalawewa	5,651	6,295	49	2,769	3,085	1.09
71G Ulpatwewa	1,498	4,063	39	584	1,585	10.49
70F Unagalavehera	2,850	3,175	100	2,850	3,175	1.09
71C Weheragala	2,172	2,971	100	2,172	2,971	3.18
71B Yodaela	2,375	4,515	100	2,375	4,515	6.63
71A Hingurakgoda*	6,603	8,859	100	6,603	8,859	2.98

Table D.1.1 POPULATION BY GRAMA SEVAKA DIVISION RELATED TO THE STUDY AREA (2/3)

District AGA Division GS Division		Division Population 1971	Division Population 1981	Percentage of Project Area (%)	Population of Project Area 1971	Population of Project Area 1981	Average Annual Growth Rate (%)
(3) Lankapura		28,330	41,344	-	24,007	37,057	4.44
76A	Gemunupura	2,014	3,988	100	2,014	3,988	7.07
73B	Kalingaela	2,667	4,373	100	2,667	4,373	5.07
78A	Kumadiya	2,902	4,721	100	2,902	4,721	4.99
73A	Kumbukakantulana	4,870	5,365	71	3,458	3,809	0.97
73E	Lakshauyana	2,079	3,408	100	2,079	3,408	5.07
75A	Onegama	3,088	4,200	100	3,088	4,200	3.12
75	Pudur	1,206	1,447	71	856	1,027	1.84
78B	Pulasthigama	2,301	3,743	100	2,301	3,743	4.99
78	Sungawila	1,782	1,079	9	160	97	-4.88
76	Talpota	2,391	4,734	100	2,391	4,734	7.07
77	Tambala	3,030	4,286	69	2,091	2,957	3.53
(4) Medirigiriya		27,697	50,897	-	19,368	36,206	6.46
68D	Ambagaswewa	4,281	8,799	100	4,281	8,799	7.47
68E	Bissobandara	1,856	3,816	80	1,485	3,053	7.47
68A	Divulankadawela	3,695	5,246	25	924	1,312	3.57
68C	Kavuduluwewa	4,825	9,918	11	531	1,091	7.47
69	Kelegama	4,241	7,827	100	4,241	7,827	6.32
68F	Kusumpokuna	3,290	4,672	100	3,290	4,672	3.57
68B	Medirigiriya	3,302	6,788	100	3,302	6,788	7.47
69A	Meegaswewa	1,161	2,143	81	940	1,736	6.32
79	Pilliyagodella	1,046	1,688	55	575	928	4.90

Table D.1.1 POPULATION BY GRAMA SEVAKA DIVISION RELATED TO THE STUDY AREA (3/3)

District AGA Division GS Division	Division Population 1971	 1981	Percentage of Project Area (%)	Population of Project Area 1971	 1981	Average Annual Growth Rate (%)
(5) Tamankaduwa	29,268	42,833	-	23,595	33,950	3.71
72A Alutwewa	1,727	4,727	100	1,727	4,727	10.59
73D Bendiwewa	4,295	7,137	50	2,148	3,569	5.21
74A Kaduruwela East	3,066	4,488	100	3,066	4,488	3.88
74B Kaduruwela West	276	404	100	276	404	3.88
72 Kotawella	2,819	4,288	3	84	129	4.28
74 Manikkampattiya	2,473	3,611	68	1,682	2,455	3.86
73C Palugasdamana East	2,594	3,443	100	2,594	3,443	2.87
73F Palugasdamana West	2,334	3,099	100	2,334	3,099	2.88
72B New Town	1,804	4,939	100	1,804	4,939	10.60
73 Polonnaruwa*	7,880	6,697	100	7,880	6,697	-1.60
II. Trincomalee	25,273	38,540	-	9,933	15,124	4.29
(1) Kanthalai	15,135	22,800	-	6,487	9,772	4.18
227C Agbopura	6,533	9,841	26	1,699	2,559	4.18
227B Rajaela	5,028	7,574	54	2,715	4,090	4.18
227D Wanela	3,574	5,385	58	2,073	3,123	4.18
(2) Kinniya	10,138	15,740	-	3,446	5,352	4.50
225A Kurunchakerny	10,138	15,740	34	3,446	5,352	4.50
Total	165,916	2S9,959	-	113,210	176,775	4.56

Note: Administrative boundary in 1975 is adjusted to the one in 1981.
Source: 002

Table D.1.2 ADMINISTRATIVE ABSTRUCT OF STUDY AREA: 1981

Item	Polonnaruwa	Trincomalee	Total
I. Study Area			
1. Study area (10^3 ha)	100.5	17.5	118
2. Percentage (%)	85.2	14.8	100
3. Number of AGA Division Concerned	5	2	7
4. Number of GS Division Concerned	47	4	51
5. Number of Town Center	2	0	2
II. Administrative Area			
1. Area (10^3 ha)	329.3	272.3	601.6
2. Percentage of the Study Area (%)	27.0	5.7	17.5
3. Number of AGA Division	5	9	14
4. Number of GS Division	6	48	54
5. Number of Town Center	2	3	5

Source: 002

Table D.1.3 POPULATION BY SEX AND FAMILY SIZE BY AGA DIVISION IN THE STUDY AREA: 1981

	District AGA Division	Population			Number of Household	Family Size (Persons/ha)
		Male	Female	Total		
I.	Polonnaruwa District	90,741	70,910	161,651	31,733	5.0
	Elahera	7,556	5,802	13,358	2,458	5.4
	Sinhala Pattuwa	23,225	17,855	41,080	7,517	5.5
	Lankapura	20,816	16,241	37,057	7,807	4.7
	Medirigiriya	20,003	16,203	36,206	7,821	4.6
	Tamankaduwa	19,141	14,809	33,950	6,130	5.5
II.	Trincomalee	8,115	7,009	15,124	-	-
	Kanthalai	5,373	4,399	9,772	-	-
	Kinnya	2,742	2,610	5,352	-	-
	Total	98,856	77,919	176,775	-	(5.0)
		(55.9%)	(44.1%)	(100.0%)		

Source: 002

Table D.1.4 EMPLOYED POPULATION IN POLONNARUWA DISTRICT: 1981

Item	Total		Worker by Sex		Worker by Age		
	Number	Percentage(%)	Male	Female	10-14	15-54	55 & over
1. Agriculture	51,276	61.0	46,664	4,612	679	44,601	5,996
2. Industry	8,762	10.4	8,388	370	51	8,297	414
- Mining & Quarring	820	1.0	788	32	5	788	27
- Manufacturing	4,530	5.4	4,307	223	42	4,273	215
- Construction	3,240	3.8	3,123	117	4	3,067	169
- Elec., Gas & Water	172	0.2	170	2	0	169	3
3. Services	14,565	17.3	12,474	2,091	103	13,803	659
- Transport & Communication	1,663	2.0	1,613	50	1	1,309	353
- Trade	5,533	6.6	5,214	319	59	5,411	63
- Others	7,369	8.7	5,647	1,722	43	7,083	243
4. Not Defined	9,510	11.3	7,909	1,601	198	8,716	596
Total	84,113	100.0	75,435	8,678	1,034	75,414	7,665
(Percentage (%))	100.0	-	89.7	10.3	1.2	89.7	9.1

Source: 008

Table D.1.5 POPULATION AND LABOUR FORCE BY AGA DIVISION IN THE STUDY AREA: 1981

District AGA Division	Population	Labour Force			Agricultural Worker	Participation Rate (%)	Unemployed Rate (%)	Percentage of Agr.Worker (%)
		Employed	Unemployed	Total				
I. Polonnaruwa District	161,651	50,658	6,925	57,583	31,767	35.6	12.0	62.7
- Elahera	13,358	4,910	491	5,401	3,769	40.4	9.1	76.8
- Sinhala Pattuwa	41,080	13,106	1,865	14,971	7,488	36.4	12.5	57.1
- Lankapura	37,057	10,600	1,640	12,240	7,231	33.0	13.4	68.2
- Medirigiriya	36,206	9,998	1,360	11,358	8,151	31.4	12.0	81.5
- Tamankaduwa	33,950	12,044	1,569	13,613	5,128	40.1	11.5	42.5
II. Trincomallee	15,124	4,085	399	4,484	2,446	29.6	8.9	59.9
- Kanthalai	9,772	2,903	330	3,233	1,450	33.1	10.2	49.9
- Kinnya	5,352	1,182	69	1,251	996	23.4	5.5	84.2
III. Total	176,775	54,743	7,324	62,067	34,213	35.1	11.8	62.5
- Male	98,856	49,603	4,465	54,068	30,626	54.7	8.3	61.7
- Female	77,919	5,519	2,669	8,188	2,871	10.5	32.6	52.0

Source: 002

Table D.1.6 CROP CULTIVATION IN POLONNARUWA DISTRICT: MAHA (1983/1984) AND YALA (1984)

Crop.	Sri Lanka					Polonnaruwa District					
	Cultivated Area (ha)		Production (tons)			Cultivated Area (ha)		Production (tons)			Share to the
	Maha	Yala	Maha	Yala	Total	Maha	Yala	Maha	Yala	Total	Country (%)
Paddy *1	527,329	310,401	1,688,651	900,311	2,588,962	33,073	28,725	142,563	100,155	242,718	9.4
Kurakkan (Finger Millet)	14,803	2,124	9,425	1,338	9,563	227	20	138	13	151	1.6
Maize	31,203	1,678	35,654	2,016	37,670	547	76	547	98	645	1.7
Sorghum	453	54	489	51	540	8	1	10	1	11	2.0
Green Gram	14,205	8,143	10,035	6,065	16,100	76	234	80	242	322	2.0
Cowpea	18,673	9,368	15,153	6,579	21,732	189	208	201	231	432	2.0
Gingelly	3,356	11,037	1,801	5,920	7,721	20	41	10	14	24	0.3
Ground Nuts	7,226	3,423	4,509	1,769	6,278	86	195	74	147	221	3.5
Manioc (Cassava)	32,579	24,194	408,776	273,678	682,454	1,205	395	12,969	4,770	17,739	2.6
Sweet Potatoes	9,025	7,337	77,649	69,411	147,060	112	61	612	542	1,154	0.8
Chillies	14,917	14,485	26,624	47,043	73,667	203	653	983	3,814	4,797	6.5
Mustard	1,185	228	578	98	676	171	-	109	-	109	16.1
Red Onion	1,989	1,878	13,210	23,470	36,680	12	14	105	209	314	0.9
Turmaric	3,112	-	16,744	-	16,744	1	-	1	-	1	0.0
Dhall	227	35	139	42	181	-	1	-	1	1	0.5

Note: *1 Data in 1986. Areas are not "cultivated area" but "cross extent harvested area"
Source: 001

Table D.1.7 LIVESTOCK POPULATION: 1982

Item	Sri Lanka	Polonnaruwa Distrcit	
		Population	Share to the Country (%)
Buffalo	879,200	60,800	6.9
Cattle	1,698,600	81,140	4.8
Goat	511,600	10,112	2.0
Swine	75,100	508	0.7
Sheep	28,000	-	-
Chicken	-	102,358	-

Source: 001 and 024

Table D.1.8 FISHERY PRODUCTION: 1981

(Unit: ton)

Item	Sri Lanka	Polonnaruwa District	
		Production	Share to the Country (%)
Coastal and Deep Sea	177,462	-	-
Inland	29,124	3,397	11.7
Total	203,586	3,397	1.7

Source: 003 and 023

Table D.1.9 INDUSTRIAL PRODUCTION AND NUMBER OF WORKERS IN POLONNARUWA DISTRICT: 1981

Industrial Type	Sri Lanka		Polonnaruwa District			
	Number of Workers	Production (Rs.10^6)	Number of Workers	Production (Rs.10^6)	Share to the Country (%)	
					Worker	Production
- Food, Beverage & Tabacco	20,353	3,499	-	-	-	-
- Textile & Leather	60,418	3,233	1,066	65	1.8	2.0
- Wood & Wood Products	6,632	283	-	-	-	-
- Paper & Paper Products	10,699	731	-	-	-	-
- Chemical Products	23,476	12,719	-	-	-	-
- Non-metalic Products	12,941	1,282	-	-	-	-
- Basic Metal	2,571	525	-	-	-	-
- Fabricated Metal	12,725	868	-	-	-	-
- Others	1,734	106	-	-	-	-
Total	151,549	23,248	1,066	65	0.7	0.3

Source : 024

Table D.1.10. MANUFACTURING ESTABLISHMENTS OF UNREGISTERED LEVEL INDUSTRY IN POLONNARUWA DISTRICT: 1981

Industrial Type	No. of Establishments		Production		No. of Employees	
	No.	Percentage (%)	Value (Rs.10^3)	Percentage (%)	No.	Percentage (%)
- Food, Beverage & Tabacco	172	56.0	22,550/1	89.1	552/2	49.7
- Textile & Leather	2	0.7	10/3	0.0	6	0.5
- Wood & Wooden Products	72	23.5	1,037/4	4.1	244/5	22.0
- Paper & Paper Products	1	0.3	25	0.1	3	0.3
- Chemical Products	-	-	-	-	-	-
- Non-metalic Products	12	3.9	267/6	1.1	74	6.6
- Basic Metal	-	-	-	-	-	-
- Fabricated Metal	47	15.3	1,394/7	5.5	229/8	20.6
- Others	1	0.3	19	0.1	3	0.3
Total	307	100.0	25,302	100.0	1,111	
Average	-	-	119	-	4.4	-

Note: /1 Total of 114 establishments
/2 Total of 136 establishments
/3 One establishment is lacking
/4 Total of 46 establishments
/5 Total of 57 establishments
/6 One establishment is lacking
/7 Total of 38 establishments
/8 Total of 45 establishments

Source : Industrial Development Board

Table D.1.11 EXISTING ROADS: 1984

Item	Sri Lanka	North Central Province	Share to the Country (%)
Length of Public Road (km) *1	25,446.7	2,688.0	10.6
Land Area (km^2)	65,609.8	10,472.5	16.0
Road Density (km/km^2)	0.39	0.26	66.7

Note: *1 Maintained from Central Government Funds

Table D.1.12 OCCUPIED HOUSING UNITS BY MAIN SOURCE OF POTABLE WATER: 1981

Item	Sri Lanka		Polonnaruwa District	
	Number	%	Number	%
Piped Water	496,808	17.6	1,161	2.4
Protected Well	1,469,730	52.2	23,076	47.9
Unprotected Well	580,226	20.6	19,019	39.5
River, Tank & Other Sources	195,751	7.0	4,171	8.7
Not Stated	71,324	2.5	756	1.6
Total	2,813,844	100.0	48,183	100.0

Source: 008 and 025

Table D.1.13 OCCUPIED HOUSING UNITS BY PRINCIPAL TYPE OF LIGHTING: 1981

Item	Sri Landa		Polonnaruwa District	
	Number	%	Number	%
Electricity	419,568	14.9	2,245	4.7
Kerosene	2,320,772	82.5	45,201	93.8
Others	11,835	0.4	24	0.0
None	9,192	0.3	100	0.2
Not Stated	52,476	1.9	613	1.3
Total	2,813,844	100.0	48,183	100.0

Table D.1.14 EDUCATIONAL FACILITIES: 1984

Item	Type of School				Total
	Government School	Private School	Pirivenas	Estate School	
Sri Lanka /1					
No. of Schools	9,556	36	307	14	9,914
No. of Pupils	3,539,096	58,658	26,925	1,218	3,625,897
No. of Pupils per School	370	1,629	88	87	366
Polonnaruwa /2					
No. of Schools	156	-	6	-	162
No. of Pupils	64,137	-	399	-	64,536
No. of Pupils per School	411	-	67	-	398

Source: 001

Table D.1.15 MEDICAL FACILITIES: 1981 AND 1986

Item	No. of Hospitals	Persons per Hopital	No. of Beds per 1000 Population	No. of Patient (1000)	
				In-patient	Out-patient
Sri Lanka					
- 1982	479	31,710	2.94	2,445	31,696
- 1986	497	32,429	2.86	30,247	32,561
Polonnaruwa					
- 1982	12	18,750	2.46	-	-
- 1986	16	18,375	2.20	-	-

Source: 003 and 023

Table D.2.1 AGRICULTURAL OPERATOR BY AGE GROUP AND AGA DIVISION RELATED TO THE STUDY AREA: 1982

District AGA Division	Less than 20	20-24	25-34	35-44	45-54	55-64	More than 65	Unspecified	Total
I. Polonnaruwa District	97	1,174	8,159	8,441	6,940	4,269	2,860	282	32,222
- Elahera	8	140	1,271	1,298	907	535	425	61	4,645
- Sinhala Pattuwa	32	185	1,275	1,395	1,437	1,094	814	44	6,276
- Lankapura	9	142	1,250	1,242	916	935	737	34	5,265
- Medirigiriya	23	371	2,313	2,396	1,980	823	355	103	8,364
- Tamankaduwa	25	336	2,050	2,110	1,700	882	529	40	7,672
II. Trincomallee District	18	247	1,508	1,623	1,152	759	468	61	5,836
- Kanthalai	10	111	897	1,028	731	517	340	34	3,668
- Kinnya	8	136	611	595	421	242	128	27	2,168
III. Total	115	1,421	9,667	10,064	8,092	5,028	3,328	343	38,058
- Male	96	1,311	9,035	9,082	7,011	4,292	2,825	317	33,967
- Female	19	110	634	982	1,081	736	503	26	4,091

Source: 011 and 012

Table D.2.2 AGRICULTURAL OPERATOR BY EDUCATIONAL ATTAINMENT BY AGA DIVISION RELATED TO THE STUDY AREA: 1982

District AGA Division	No-Schooling	Passed Grade				Higher Academic Qualification	Unspecified	Total
		5 or less	6 - 9	GCE(O/L) /1	GCE(A/L) /1			
I. Polonnaruwa District	4,610	15,414	9,131	2,526	315	141	85	32,222
- Elahera	694	2,508	1,018	351	56	14	4	4,645
- Sinhala Pattuwa	676	2,983	1,884	598	82	41	12	6,276
- Lankapura	716	2,546	1,538	395	44	19	7	5,265
- Medirigiriya	1,121	3,984	2,511	606	59	28	55	8,364
- Tamankaduwa	1,403	3,393	2,180	576	74	39	7	7,672
II. Trincomallee District	1,050	2,836	1,497	366	56	20	11	5,836
- Kanthalai	593	1,692	1,128	209	26	11	9	3,668
- Kinnya	457	1,144	369	157	30	9	2	2,168
III. Total	5,660	18,250	10,628	2,892	371	161	96	38,058
Percentage (%)	14.9	48.0	27.9	7.6	1.0	0.4	0.2	100.0
IV. Polonnaruwa Total /2	17.7	17.3	52.0	5.0	4.8	2.1	1.1	100.0
V. National Total /2	18.0	14.6	50.1	6.2	6.6	3.5	1.0	100.0

Note: /1 GCE stands for General Certificate of Education, which conducted by the government. O/L means Ordinary Level and A/L, Advanced Level.

/2 Figures include whole population of 30 years old and over, who are not only in agricultural sector, as of 1981 census year.

Source: 010, 011 and 012

Table D.2.3 NUMBER AND AREA OF PADDY HOLDINGS BY THE TYPE OF OWNERSHIP OF PADDY FIELD: 1981

District AGA Division	Owned by Operators only		Owned by Others Only		Owned by Operators & Others		Unspecified		All Holdings	
	Number	Area(ha)	Number	Area(ha)	Number	Area(ha)	Number	Area(ha)	Number	Area(ha)
I. Polonnaruwa District	16,276	20,524	7,679	5,251	715	1,498	7,515	17,766	32,185	45,039
- Elahera	1,667	2,019	1,853	954	224	310	890	2,997	4,634	6,280
- Sinhala Pattuwa	3,476	5,208	1,326	1,031	146	367	1,324	3,067	6,272	9,673
- Lankapura	2,845	4,650	1,775	1,140	98	283	540	3,238	5,258	9,311
- Medirigiriya	5,148	4,852	789	603	127	214	2,286	4,457	8,350	10,126
- Tamankaduwa	3,140	3,795	1,936	1,523	120	324	2,475	4,007	7,671	9,649
II. Trincomallee District	2,975	3,626	890	1,173	190	797	1,780	3,079	5,835	8,675
- Kanthalai	1,856	2,072	492	616	30	100	1,290	2,295	3,668	5,083
- Kinnya	1,119	1,554	398	557	160	697	490	784	2,167	3,592
III. Total	19,251	24,150	8,569	6,424	905	2,295	9,295	20,845	38,020	53,714
Average Area (ha/Operator)	-	1.25	-	0.75	-	2.54	-	2.24	-	1.63

Note: Figures are not within the Study Area but in the whole divisional area.
Source: 001 and 002

Table D.2.4 NUMBER OF OPERATORS AND AREA OWNED BY TYPE AND BY GS DIVISION IN THE STUDY AREA; 1982 (1/3)

District AGA Division GS Division	Number of Operators					Total Land Area of Operator's Owning (ha)	
	Not any Land	Home Garden Only	Home Garden & Other Land	Other Land Only	Total	Less than 2 ac.	More than 2 ac.
I. Polonnaruwa District	4,894	3,657	9,622	577	18,750	4,128	60,242
(1) Elahera	1,285	609	1,487	41	3,422	172	10,259
70D Attanakadawala	150	228	487	1	866	47	2,854
70H Bakamuna	344	116	148	3	611	26	1,651
70C Elahera	454	24	146	2	626	32	1,691
70J Ihakuluwewa	206	70	287	4	567	35	1,267
70A Konduruwewa	0	27	150	0	177	6	1,323
70B Kottapitiya	131	144	269	31	575	26	1,473
(2) Sinhala Pattuwa	1,276	670	2,623	200	4,769	1,292	17,438
70 Giritale	181	215	159	31	586	153	1,870
71F Hingurakdamana	-	-	-	-	-	-	-
71E Hinguraka	113	18	188	9	328	96	1,474
71D Jayanthipura	58	179	295	3	535	137	1,394
71J Kumaragama	220	5	81	34	340	120	959
71 Minneriya	95	45	72	2	214	200	384
71H Pansalgodella	27	64	552	48	691	97	3,369
70E Tambalawewa	122	1	148	0	271	69	751
71G Ulpatwewa	162	20	112	11	305	134	902
70F Unagalavehera	147	60	288	12	507	130	1,369
71C Weheragala	72	3	255	0	330	63	2,098
71B Yodaela	2	46	437	0	485	55	2,182
71A Hingurakgoda*	77	14	36	50	177	38	686

Table D.2.4 NUMBER OF OPERATORS AND AREA OWNED BY TYPE AND BY GS DIVISION IN THE STUDY AREA; 1982 (2/3)

District / AGA Division / GS Division	Number of Operators					Total Land Area of Operator's Owning (ha)	
	Not any Land	Home Garden Only	Home Garden & Other Land	Other Land Only	Total	Less than 2 ac.	More than 2 ac.
(3) Lankapura	1,027	473	1,842	202	3,544	1,038	14,542
76G Gemunupura	160	20	221	4	405	119	1,688
73B Kalingaela	21	117	392	58	588	51	2,297
78A Kumadiya	113	20	209	0	342	103	1,737
73A Kumbukakantulana	100	0	146	4	250	48	952
73E Lakshauyana	99	37	245	1	382	58	2,389
75A Onegama	192	-	156	-	348	173	1,879
75 Pudur	20	7	2	114	143	61	437
78B Pulasthigama	109	43	156	2	310	107	954
78 Sungawila	52	23	30	19	124	34	438
76 Talpota	138	98	179	0	415	172	1,263
77 Tambala	23	108	106	0	237	112	508
(4) Medirigiriya	790	1,697	2,566	124	5,177	1,005	13,168
68D Ambagaswewa	0	582	629	1	1,212	22	2,022
68E Bissobandara	183	3	243	14	443	66	1,306
68E Divulankadawela	97	343	250	3	693	336	1,554
68C Kavuduluwewa	-	-	-	-	-	-	-
69 Kelegama	73	491	383	7	954	225	1,884
68F Kusumpokuna	51	112	421	57	641	73	2,424
68B Medirigiriya	9	57	379	-	445	86	2,158
69A Meegaswewa	375	11	82	42	510	129	1,306
79 Pilliyagodella	2	98	179	0	279	68	514

Table D.2.4 NUMBER OF OPERATORS AND AREA OWNED BY TYPE AND BY GS DIVISION IN THE STUDY AREA; 1982 (3/3)

District AGA Division GS Division	Number of Operators					Total Land Area of Operator's Owning (ha)	
	Not any Land	Home Garden Only	Home Garden & Other Land	Other Land Only	Total	Less than 2 ac	More than 2 ac.
(5) Tamankaduwa	516	208	1,104	10	1,838	621	4,835
72A Alutwewa	18	-	67	-	85	43	121
73D Bendiwewa	24	70	214	3	311	64	745
74A Kaduruwela East	-	-	-	-	-	-	-
74B Kaduruwela West	-	-	-	-	-	-	-
72 Kotawella	73	57	224	2	356	116	1,206
74 Manikkampattiya	0	6	186	0	192	83	350
73C Palugasdamana East	289	41	233	1	564	229	1,459
73F Palugasdamana West	112	34	180	4	330	86	954
72B New Town	-	-	-	-	-	-	-
73 Polonnaruwa	-	-	-	-	-	-	-
II. Trincomallee District	152	505	720	399	1,776	6	296
(1) Kanthalai	119	499	720	8	1,346	5	283
227C Agbopura	0	163	274	7	444	3	117
227B Rajaela	119	33	235	1	388	1	158
227D Wanela	0	303	211	0	514	1	8
(2) Kinnya	33	6	0	391	430	1	13
225A Kurunchakerny	33	6	0	391	430	1	13
Total	5,046	4,162	10,342	976	20,526	4,134	60,538
(Percentage Distribution)	24.6	20.3	50.4	4.8	100.0	6.4	93.6)

Note Figures are not adjusted by the Project Area boundary, so they are the whole figures in every Division.
Source: Department of Census and Statistics

Table D.2.5 AGRICULTURAL EXTENSION SERVICE STAFF IN POLONNARUWA: 1987

AGA Division	Department of Agrarian Service		Agricultural Development Agency	
	AI	KVS	ASC	CO
Elahera	2	-	1	7
Sinhala Pattuwa	2	-	2	10
Lankapura	2	-	2	10
Medirigiriya	1	-	1	8
Tamankaduwa	2	-	3	23
Total	9	62	9	58

Source: GA office of Polonnaruwa District

Table D.2.6 AGRICULTURAL CREDIT IN SRI LANKA: 1976-1986

(Unit: Rs.mil.)

	Paddy				Minor Food Crop								
Year	Maha	Yala	Total	GR	Chillies	Red Onion	Potatoes	Vegetables	Other Minor Food Crop	Sugar Cone	Cotton	Total	GR
76/77	85.9	15.8	101.7	-	13.3	8.0	12.9	0.3	1.6	21.2	0.0	58.1	-
77/78	417.3	30.4	447.7	340.0	40.0	26.7	20.0	1.1	4.4	21.9	0.3	114.4	97.0
78/79	45.8	13.3	59.1	-87.0	2.5	2.0	12.3	1.1	0.4	0.4	0.1	18.9	-83.0
79/80	46.5	13.6	60.1	17.0	3.6	1.7	13.2	1.9	0.3	0.0	0.5	21.2	12.0
80/81	63.8	20.0	83.8	39.0	11.6	1.3	13.6	1.9	0.9	-	0.0	29.4	39.0
81/82	98.7	13.4	112.1	34.0	5.3	1.6	13.3	1.6	2.9	-	0.0	24.8	-16.0
82/83	121.1	26.4	147.5	32.0	6.6	1.4	10.7	1.2	3.2	0.0	-	23.1	-7.0
83/84	137.4	34.8	172.2	17.0	12.3	3.7	12.5	0.9	4.6	0.1	0.0	34.1	48.0
84/85	83.0	38.5	121.5	-29.0	11.6	4.8	13.0	1.0	2.3	-	-	32.7	-4.0
85/86	99.7	89.1	188.8	55.0	30.4	5.0	14.5	1.0	2.1	-	-	53.0	62.0

Note: GR stands for annual growth rate in percentage
Source: 003

Table D.2.7 LOAN GRANTED FOR PADDY CULTIVATION BY BANK OF CEYLON

Year	Granted		Outstanding	
	No.	Amount ($Rs.10^3$)	No.	Amount ($Rs.10^3$)
1981	600	3,763	66	175
1982	599	2,784	53	164
1983	1,105	6,252	191	701
1984	1,250	7,271	195	622
1985	2,730	13,164	450	1,513
1986	7,253	33,196	2,333	8,451
1987 (Yala)	4,154	18,686	4,154	18,686

Source: GA Office of Polonnaruwa District

Table D.2.8 CO-OPERATIVES IN POLONNARUWA DISTRICT: END OF 1987

Name of Society	Member	Employee	Number of Stores			Number of Rural Bank
			Wholesale	Retail	Petrol	
Polonnaruwa MPCS	3,717	108	2	23	1	3
Jayanthi Pura MPCS	2,358	62	1	15	-	3
Dimbulagala MPCS	3,767	82	2	40	1	2
Elahera MPCS	2,512	45	1	21	2	3
Kawdulla MPCS	1,975	39	1	7	1	2
Palugasdamana MPCS	4,230	81	1	21	-	3
Hingurakgoda MPCS	3,409	107	1	25	2	4
Vigtha MPCS	1,928	51	1	13	1	2
Medirigiriya MPCS	5,375	74	1	18	1	3
Total	29,271	649	11	183	9	25

Note : MPCS stands for Multi-Purpose Co-operative Society
Source : GA Office of Polonnaruwa District

Table D.3.1 PROPOSED NUMBER OF SETTLERS AND CENTERS

System	Settlers		Proposed Nos. of Center			
	Farmer families	Non-farmer families	Town center*1	Area center*2	Village center	Hamlet center
D1	9,100	2,000	1	3	4	22
D2	2,200	500	-	1	2	5
A/D	2,600	600	-	1	2	6
Total	13,900	3,100	1	5	8	33
Proposed O&M Office			System D Office	Block Office	Unit Office	Unit Office

Note: *1 Project center
*2 Block center

Table D.3.2 SUMMARY OF SYSTEM-WISE INFRASTRUCTURE DEVELOPMENT

	Moragahakanda Project Office	System D1	System D2	System A/D	Total
A. Town (Project) Center	-	1	-	-	1
B. Area (Block) Center	-	3	1	1	5
C. Village (Unit +) Center	-	4	2	2	8
D. Hamlet (Unit) Center	-	22	5	6	33
E. Infrastructure					
1. Schools					
Primary Schools	-	30	8	9	47
Junior Secondary Schools	-	4	1	1	6
Senior Secondary Schools	-	2	-	1	3
Teachers Quarters	-	99	22	30	151
Dormitories	-	40	10	13	63
2. Health Units					
Peripheral Unit	-	1	-	-	1
Central Dispensary with Quarters	-	2	-	1	3
Midwifery Clinic cum Quarters	-	7	3	3	13
Dispensary cum Quarters	-	7	3	3	13
Medical Staff and Nurse Quarters	-	22	-	-	22
3. Service Facilities					
Police Station	-	1	-	1	1
Police Staff Quarters	-	2	-	-	2
Constable Dormitories	-	4	-	-	4
Gramasevaka Office/Quarters	-	4	2	2	8
Post Office and Tele. Comm. Complex	-	2	-	-	2
Sub-Post Office cum Quarters	-	4	2	2	8
Townhall and Office	-	1	-	-	1
Milling - Storage Complex	-	2	-	-	2
Village Hullers	-	2	1	1	4
4. Management and Operational Facilities					
Project Office	-	1	-	-	1
Development Centre	-	1	-	-	1
Trainign Center	-	1	-	-	1
Cricuit Bungalow	-	1	-	-	1
Workshop & Warehouse	-	1	-	-	1
Stores - World Food	-	6	2	2	10
Stores	-	26	7	8	41
Fertilizer Store	-	1	-	-	1
Block Offices	-	3	1	1	5
Unit Office/Service Center	-	26	7	8	41
Staff Quarters	-	158	37	40	235
Dormitories	-	8	2	2	12
Wells	-	156	42	48	246
5. Moragahakanda Dam Project Office					
Project Office	1	-	-	-	1
Staff Quarters	50	-	-	-	50
Circuit Bungalow	1	-	-	-	1
Store	2	-	-	-	2
Workshop/Warehouse	1	-	-	-	1

Table D.3.3 INVENTORY OF PROPOSED INFRASTRUCTURE AND SETTLEMENT PROGRAM (1/2)

Items	Unit	D1	D2	A/D	Total
1. PROJECT CENTRE					
Project Office	No.	1	-	-	1
Quarters - Gr. V	No.	2	-	-	2
Quarters - Gr. IV	No.	10	-	-	10
Quarters - Gr. III	No.	10	-	-	10
Quarters - Gr. II	No.	10	-	-	10
Dormitory	No.	2	-	-	2
World Food Stores	No.	1	-	-	1
Fertilizer Stores	No.	1	-	-	1
General Stores	No.	1	-	-	1
Workshop/Warehouse	No.	1	-	-	1
Development Centre	No.	1	-	-	1
Circuit Bungalow	No.	1	-	-	1
Traing Centre	No.	1	-	-	1
2. BLOCK CENTRES					
Block Office	No.	3	1	1	5
Quarters - Gr. IV	No.	12	4	4	20
Quarters - Gr. III	No.	18	6	6	30
Quarters - Gr. II	No.	18	6	6	30
Dormitory	No.	6	2	2	10
Stores	No.	6	2	2	10
3. UNIT CENTRES					
Unit Service Centre	No.	26	7	8	41
Quarters - Gr. III	No.	26	7	8	41
Quarters - GR. II	No.	26	7	8	41
Stores	No.	26	7	8	41
Wells	No.	156	42	48	246
4. PROJECT CENTER SCHOOLS					
Sr. Secondary School	No.	1	-	-	1
Jr. Secondary School	No.	1	-	-	1
Primary School	No.	1	-	-	1
Teacher Houses - Gr. IV	No.	2	-	-	2
Teacher Houses - Gr. III	No.	13	-	-	13
Teacher House - Gr. II	No.	1	-	-	1
Dormitory	No.	3	-	-	3
5. BLOCK CENTRES SCHOOLS					
Sr. Secondary School	No.	1	-	1	2
Jr. Secondary School	No.	3	1	1	5
Primary School	No.	3	1	1	5
Teacher Houses - Gr. IV	No.	8	2	4	14
Teacher Houses - Gr. III	No.	20	5	9	34
Teacher House - Gr. II	No.	3	1	1	5
Dormitory	No.	11	3	5	19

Table D.3.3 INVENTORY OF PROPOSED INFRASTRUCTURE AND SETTLEMENT PROGRAM (2/2)

Items	Unit	D1	D2	A/D	Total
6. UNIT CENTRE SCHOOLS					
Primary Schools	No.	26	7	8	41
Teacher Houses - Gr. III	No.	26	7	8	41
Teacher Houses _ Gr. II	No.	26	7	8	41
Dormitory	No.	26	7	8	41
7. UTILITIES & SERVICE FACILITIES					
Piped Water Supply	No.	1	-	-	1
Rural Electrification	No.	-	-	-	1
8. HEALTH FACILITIES					
Peripheral Health Unit	No.	1	-	-	1
Central Dispensary & Quarters	No.	2	-	1	3
Mid-wife Clinic & Quarters	No.	7	3	3	13
Rural Dispensary & Quarters	No.	7	3	3	13
Medical Off. Quarters	No.	1	-	-	1
Staff Quarters - Gr. IV	No.	1	-	-	1
Staff Quarters - Gr. III	No.	20	-	-	20
9. PUBLIC SERVICE BLDG. & FACILITIES					
Police Station	No.	1	-	-	1
Quarters - Gr. IV	No.	1	-	-	1
Quarters - Gr. III	No.	1	-	-	1
Dormitories	No.	4	-	-	4
Gramasevaka Office/Quarters	No.	4	2	2	8
Post Office-Telecom/Quarters	No.	2	-	-	2
Sub-post Office/Quarters	No.	4	2	2	8
Townhall & Office	No.	1	-	-	1
10. SETTLEMENT PROGRAM					
1. Orientation & Trans.	ha	9100	2200	2600	13900
2. Assistance Inputs					
Housing	ha	9100	2200	2600	13900
Agricultural Tools	ha	9100	2200	2600	13900
Paddy Seed	ha	9100	2200	2600	13900
Tree Plantings	ha	9100	2200	2600	13900

FIGURES

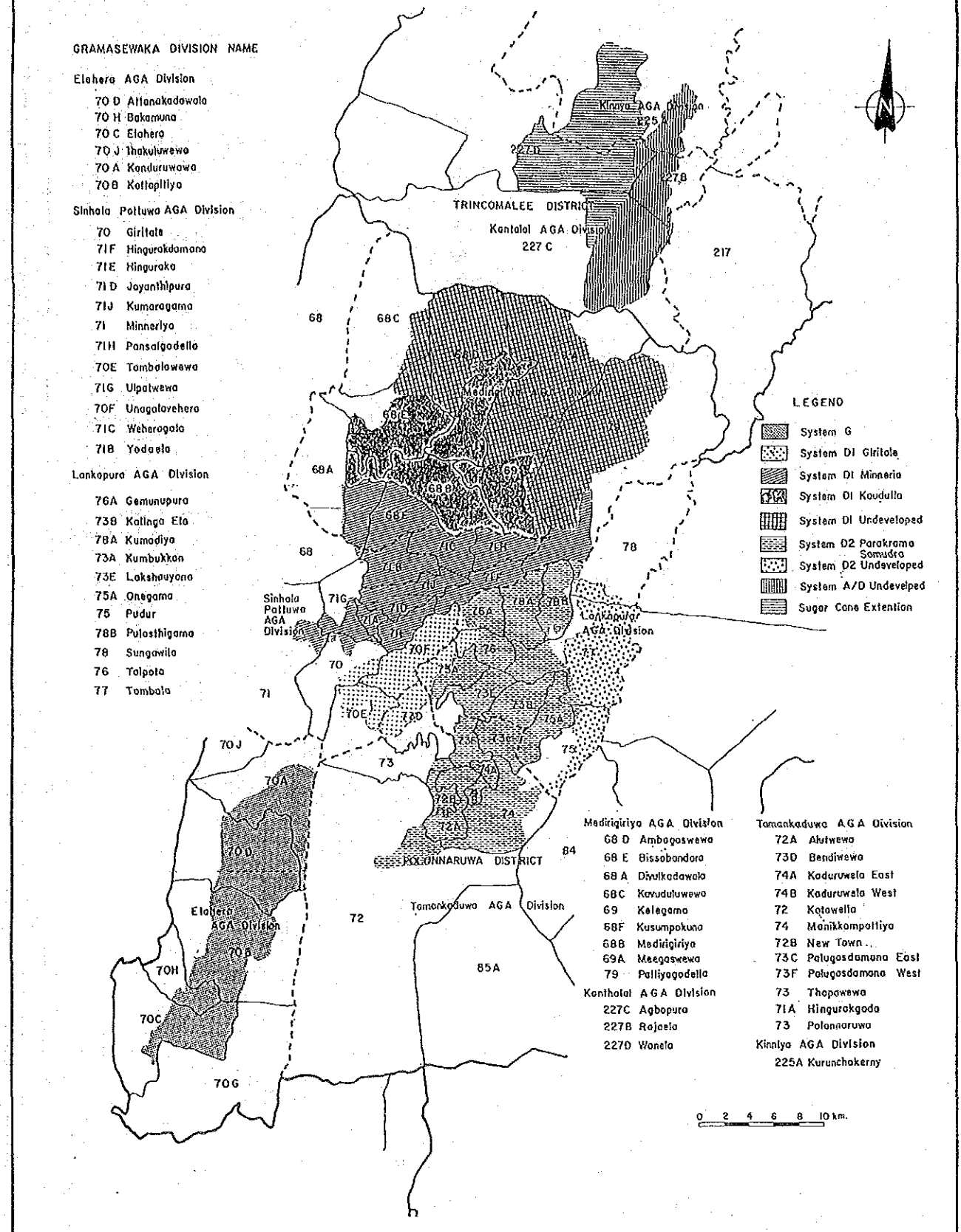

Fig. D.1-1 Administrative Division Concerning The Project (As of 1981 Census Year)

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

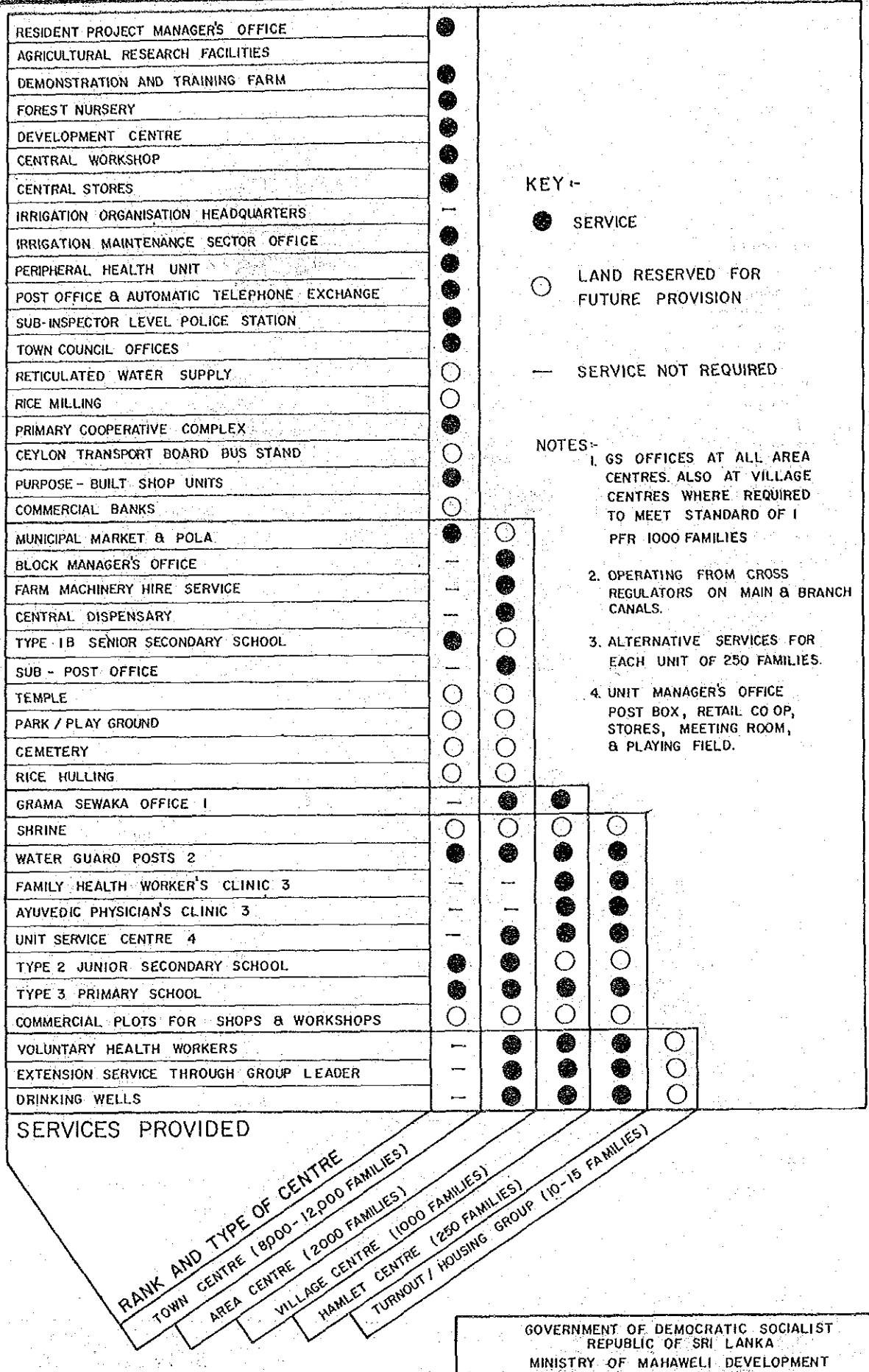

Fig. D.1-2 Distribution of Services by Rank of Centre

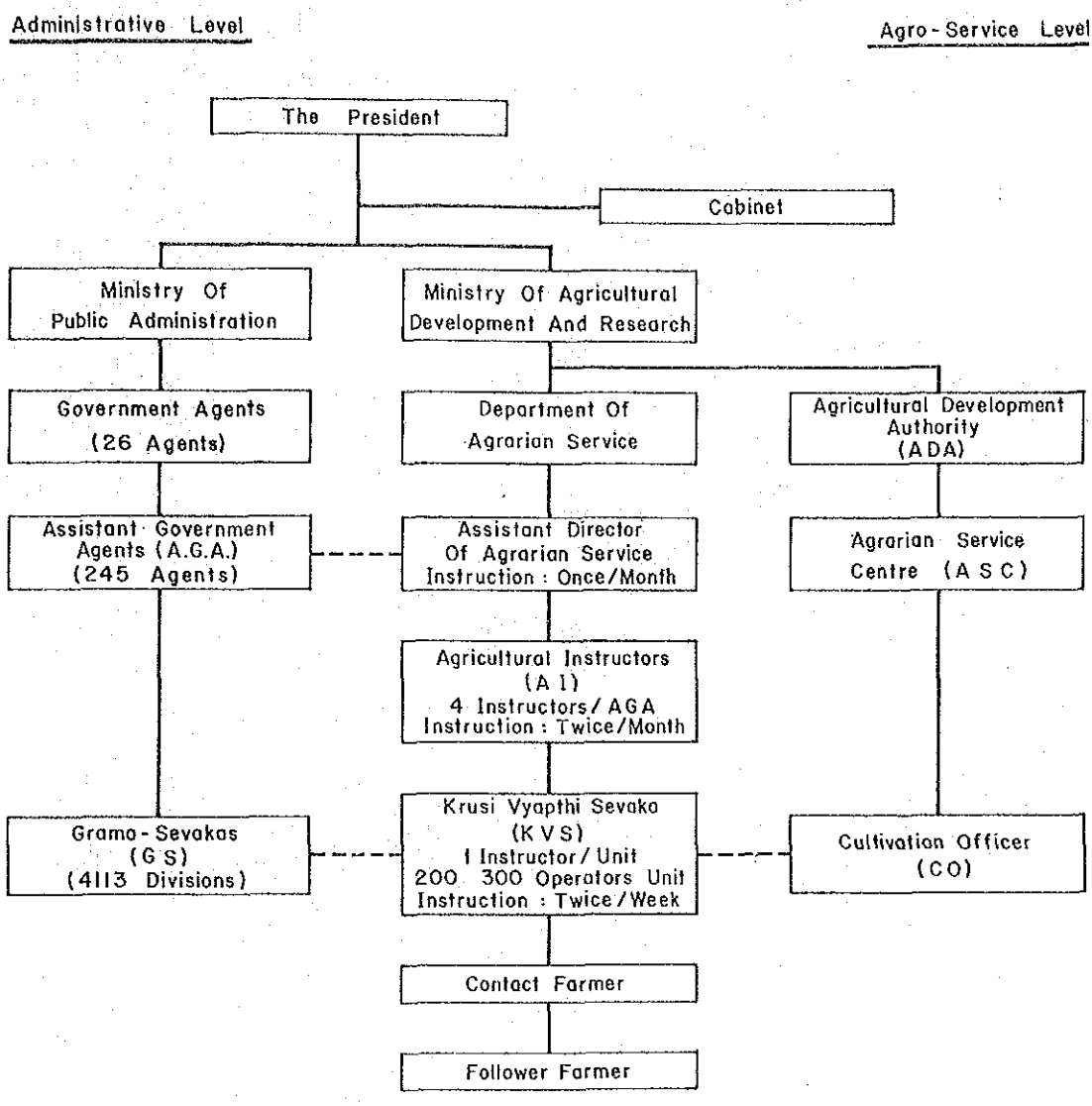

Fig. D.2-1 Agricultural Extension Service System

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

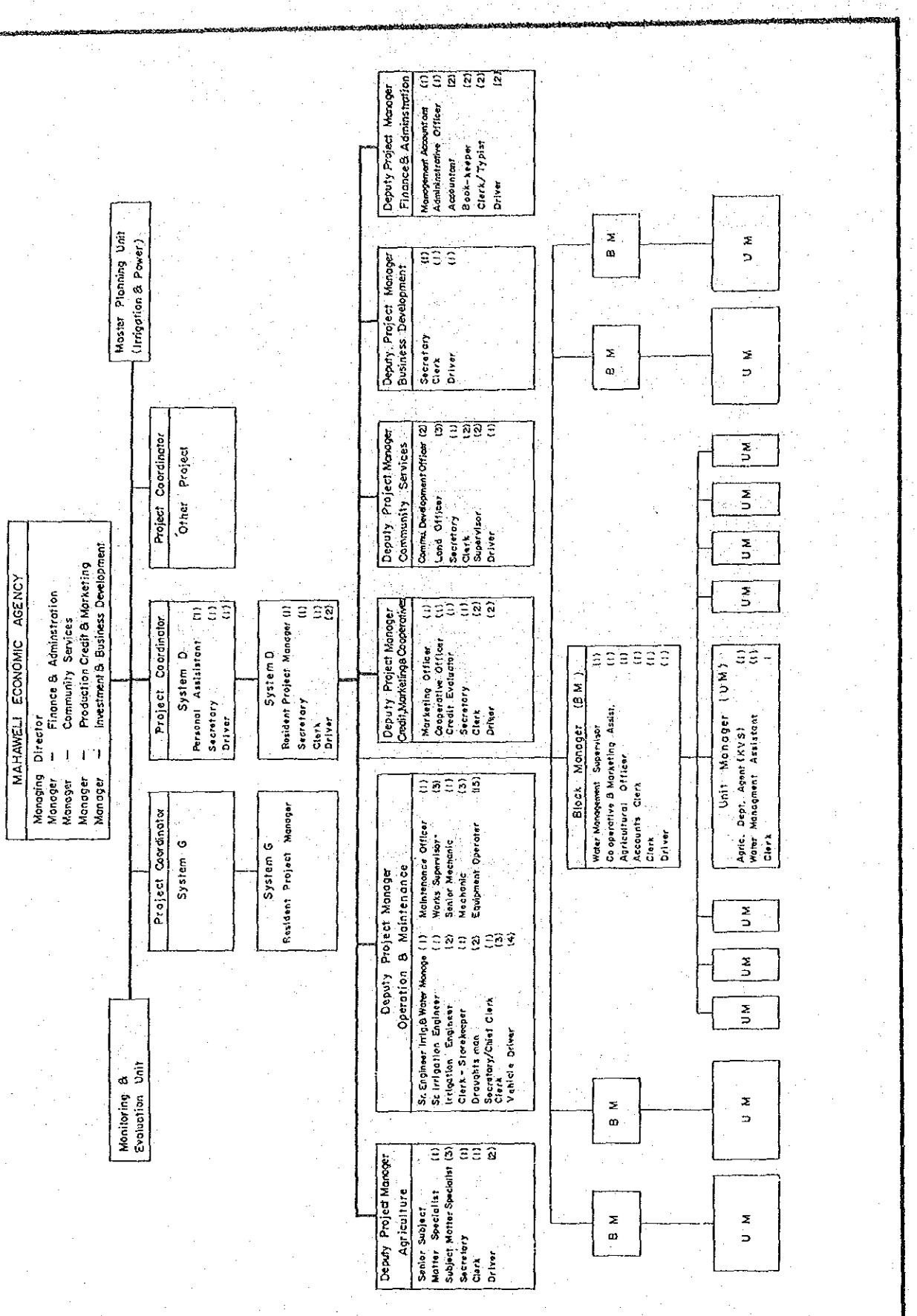

Fig. D.3-1 Detailed Organization of Project Centre(RPM) Office

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

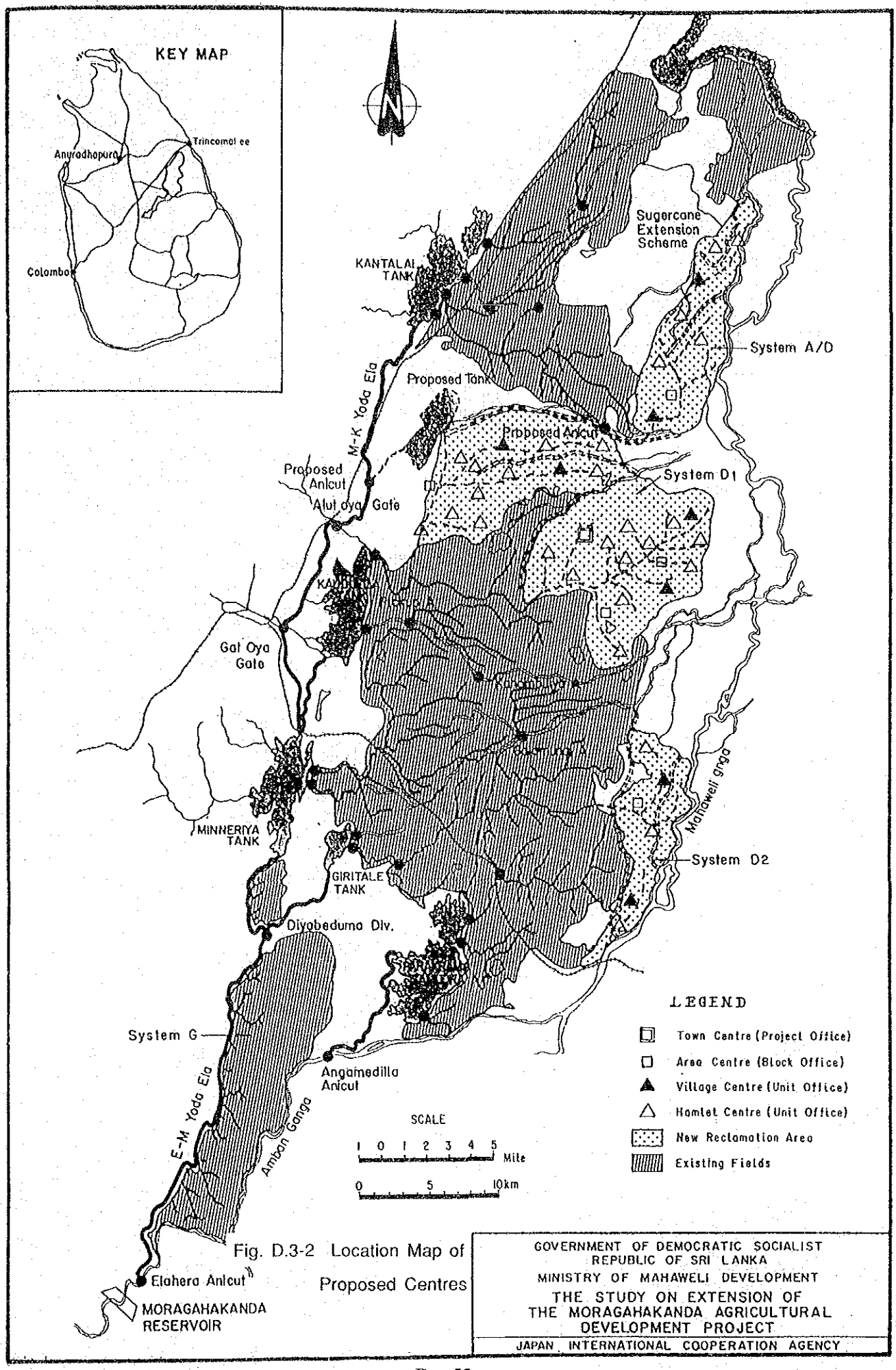

Fig. D.3-2 Location Map of Proposed Centres

GOVERNMENT OF DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

ANNEX - E

AGRICULTURE

ANNEX - E

AGRICULTURE

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E.1 PRESENT CONDITIONS OF AGRICULTURE

E.1.1 Present Land Use

The project area covers an area of 117,900 ha in Systems D1, D2, G and A/D delineated in the Master Plan prepared by UNDP/FAO. The predominant land use of the project area is paddy field and forest/bush land. The total irrigable paddy field extends to 41,400 ha, while, forest/bush/homestead land covers 73,500 ha. Irrigated sugar cane of 3,000 ha is also included in the project area as shown in the following table:

Land Use Categories	Area (ha)	Proportional Extent (%)
(i) Paddy Field	41,400	35.1
(a) Irrigable Paddy Field (Major Irrigation System)	(41,100)	(34.9)
(b) Irrigable Paddy Field (Minor Irrigation System)	(300)	(0.2)
(ii) Sugar Cane Field	3,000	2.5
(iii) Others	73,500	62.4
(a) Forest, bush, etc.	(53,800)	(45.7)
(b) Marshy/reservoir/tank	(2,800)	(2.4)
(c) Homestead	(16,900)	(14.3)
Total	117,900	100.0

E.1.2 Present Cropping Pattern and Farming practices

The project area has been advanced in paddy cultivation blessed with the large pond (tank) irrigation systems i.e. Minneriya, Giritale, Parakrama Samudra, Kaudulla and Kantalai systems, which have acient origins. The main crop of the project area is low land paddy.

There are two cropping seasons for the paddy, i.e. Maha (Oct.-Mar.) and Yala (Apr.-Sep.). Due to insufficient irrigation water supply, caused by poor water management, structure destruction (Kantalai), etc., the irrigable areas of the major irrigation systems are not fully planted. In Maha about 85% (34,200 ha), Yala 66% (26,670 ha) were planted by paddy and about 1% (350 ha) in Maha, and 100 ha in Yala by upland crops like green gram, chillies, cowpea, groundnuts from 1984/85 Maha to 1987 Yala (Table E.1.1). Sugar cane is grown with irrigation water from Kantalai tank in Kantalai Sugar

Estate by the Sri Lanka Sugar Corporation. The average area grown 1987 was about 2,200 ha, which corresponded to 55% of the irrigable area (3,000 ha). This low performance was attributable to the breakage of a dike of Kantalai tank in 1986, and the ethnic disturbance as well as irrigation water shortage. The present cropping pattern is shown in Fig. E.1-1. A cropping intensity between 1984/85 Maha and 1987 Yala averages 146%.

Crop production costs of the paddy and upland crops are published in "Cost of Cultivation of Agricultural Crop" prepared by Division of Agricultural Economic and Projects, Department of Agriculture, 1987. According to the report, crop production costs are:

- Paddy, irrigated, Maha	:	11,692 (Rs./ha)
- Paddy, irrigated, Yala	:	9,678
- Green Gram, irrigated, Yala	:	12,883
- Chillie, irrigated, Yala	:	28,463

Details of the costs are shown in Tables E.1.2, E.1.3 and E.1.4.

Production costs of sugar cane are estimated based on the various reports prepared by the Sugar Corporation. Production cost of sugar cane is estimated at Rs. 42,327/ha for Sugar Corporation cane and Rs. 24,623/ha for allottees' sugar cane. Details are shown in Tables E.1.5 and E.1.6.

Details of the existing cropping practices are given below:

(1) Paddy

Land preparation is done two to three weeks prior to transplanting or broadcasting. Ploughing is normally done twice by Buffaloes or two-wheel tractors or for 4-wheel tractors. Just after second ploughing either harrowing or puddling is done. High yielding varieties are used in most cases. Paddy is direct-sown or transplanted. During Maha season the crop is transplanted to a greater extent, but in Yala broadcasting method is practiced by most of the farmers. In Yala season farmers use short age varieties of paddy (3 months). During Maha season 4-4 1/2 month age class of paddy is used. BG-379-2 and BG-400-1 are the main varieties for Maha season and BG-34-8 and BG-276-5 are for Yala season.

Transplanting is done by hand. Only very few farmers use transplanters which is recently introduced to the area. Normally a spacing of 20 cm x 20 cm or 20 cm x 15 cm is given. Both random transplanting and row transplanting is done.

In row transplanted fields the weeder is used but in random transplanted fields hand weeding is common. Chemical weed control is practiced in broadcasted fields and also to a certain extent in randomly transplanted fields.

Fertilizers at the following rates, V1; 174 kg/ha, Urea; 149 kg/ha, TOM; 134 kg/ha are applied in total. Basal application of fertilizer is applied at the time of broadcasting or transplanting.

A first top dressing of urea is applied two weeks after transplanting or broadcasting. A second top dressing is applied 4 weeks after transplanting or 6 weeks after broadcasting. A third top dressing is applied 8 weeks after transplanting or 10 weeks after broadcasting.

Brown plant hopper, paddy bug, gallmidge, stemborers are the main insect pests of paddy in the project area. Carbofran 3% granule are applied to control gallmidge and stemborers. Harvesting is done manually when the crop is 80% mature. Threshing is done by buffaloes or tractors or threshing machines.

Harvested grain is cleaned and dried under the sun before they are bagged in gunnies.

(2) Green Gram

Green gram is grown as a rainfed crop during Maha season or as an irrigated crop during Yala season.

A ploughing with one or two harrowings is practiced. There are early maturing varieties (2.5 months) e.g. M1-4, as well as medium maturing varieties (3 months) e.g. M1-1. Early varieties are more suitable as rainfed crops and the medium maturing varieties are suitable for irrigated cultivation in Yala.

Seed is sown at a rate of about 30 kg/ha. Crop is planted either on ridges or on flat beds depending on drainabilities. Planting is done manually. Seeds are dibbled at a depth of 1-2 cm. Spacinig varies from 30-45 cm between rows and 15 cm within row. There is normally only one plant per hill. Fertilizers are applied at rates of 52 kg N/ha, 23 kg P_2O_5/ha and 14 kg K_2O/ha.

Weeding is done manually first at the 3rd week after planting and subsequently another three weeks later.

Beanfly, pod borer, pod sucking bugs are the main insect pests. Chemical spraying at 3-5 days after emergence for beanfly, 15-20 days after planting for leaf hopper and aphids, at flower initiation (30-35 days) for pod borer and thrips, at full blooming stage (40-50 days) for pod burer and thrips are pracitied.

Harvesting is done in several times when pods are matured.

(3) Chillie

Chillie is cultivated as a rainfed crop in Maha and also as an irrigated crop during the Yala season. Thorough land prepareation such as plowing and harrowing to

obtain a good soil drainage are practiced. MI-1 and MI-2 are popular varieties of about 150 growing days. As a Yala crop MI-2 is used in the irrigated areas. In Maha under rainfed conditions seedlings are transplanted in the last week of September to first week of October. Transplanting is done in May during the Yala season. Thirty beds of 3 m x 90 cm is made to plant one hectare of chillie. Seeds are treated with disinfectants like Captan before sowing. Seedlings are transplanted when they are 25 to 30 days old. A spacing of 60 cm x 45 cm is used for the MI-2 variety and a spacing of 60 cm x 60 cm is used for the MI-1 variety. Normally 2 plants are established per hill.

Fertilizers are applied at rates of 126 kg N/ha, 96 kg P_2O_5/ha and 57 kg K_2O/ha.

White fly, aphids, mites, thrips, pod borers are common pests of chillie. Regular routine spraying is done by the farmers to keep the pests under control.

Damping off, powdery mildew, bacterial wilt and fungal wilt are observed in plantations. Crop rotations and the use of fungicides like sulphur, captan are practiced to control the spread of these diseases.

Only the red ripened pods are picked. Harvesting commences 75-80 days after transplanting and continues for 3-4 months. Once they are picked the pods are heaped indoor to get a uniform red colour. The pods are sundried for about a week, they are flattered using a wooden plank on the 3rd day of drying which facilitates the removal of moisture from the pod.

(4) Sugar Cane (Plant Cane)

When the land is compacted after 3-4 year cropping subsoiling is carried out to loosen the soil. A ripper or a subsoiler is used for this purpose. Ploughing is done with a disc plough or a mould board plough to a depth of 30 cm. Ploughing followed by a harrowing. Furrowing is done just prior to plating. A spacing between raws is 105 cm. Depth of furrow is about 22 cm.

Seed cane is harvested from seed cane nurseries. The seed cane is harvested when the cane is about seven months old. The cane is separated into three budder pieces and are planted at the bottom of the furrow with about 10% overlapping. The seed canes are covered with soil manually.

The first irrigation is done within two days after planting. When 2.5-3 months old 76 mm water is applied per application. After this season irrigation water is almost doubled. The irrigation frequency within the first three months is at 1 day interval which will be later extended to a frequency of once in fourteen day interval after the third month. Irrigation is continued at these intervals until cane is scheduled for ripening. A month before harvesting irrigation is stopped to let cane to mature.

Three days after the first irrigation a pre-mergence weedicide i.e. Karmax (Diuren) is applied. After about a month an inter cultivation is done with a tiller which will

be followed by a manual weeding. Another manual weeding is carried out 2 months after planting. This is followed by an off-barring. Gap filling is done soon after the first manual weeding.

Fertilizers are applied at rates of 98 kg N/ha, 43 kg P_2O_5/ha and 60 kg K_2O/ha. The first topdressing of urea at 1 month after planting. A second top dressing of urea is at three months old. The topdressing is done on both side of the raw and is followed by an earthing up operation.

Harvesting is done in two ways i.e. green cane harvesting and the burnt cane harvesting. Harvesting is done manually. Topping of cane is done at the base of the second green leaf. The water shoots are excluded when the cane is being loaded.

(5) Ratoon Cane

Within 3-5 days after harvesting of the previous crop and when trash is dry cane is burnt.

Soon after harvesting the stubbles which are left are shaved to the surface level of the ground either by manually or mechanically by passing a disc harrow over the field on the direction of the row. The stubbles are then collected using a rake attached to a tractor.

The gaps are then filled in places when cane has got damaged due to mechanical operations at the harvesting time. Gaps more than one meter in length are replanted. Gap filling is done before the basal fertilizer application.

Off-barring is done after raking. This operation will remove excess shoots and roots of the previous crop and initiate formation of new roots.

Soon after the off-barring operation the basal dressing of urea, triple super-phosphate and Muriate of Potash is applied on both side of the row. A top dressing of urea is applied two months after the shaving.

The first irrigation is done soon after the basal dressing of fertilizer. Thereafter an irrigation frequency of once in 8-12 days is practiced.

Pre-emergence weedicides are sprayed within two to three days after the first irrigation. About a month after the spraying of weedicides an off-barring is done to control the weeds and then a manual weeding is followed to remove weeds within the rows.

Harvesting and loading is similar to that of the plant crop.

E.1.3 Crop Production

As stated in the preceding paragraph the project area is one of the most advanced areas in the paddy cultivation in the country. The average yield of paddy in the major irrigation systems in Polonnaruwa district between 1984 to 1989 was 4.0 ton/ha for Yala and 4.7 ton/ha for Maha, indicating higher yield compared to 3.8 ton/ha for Yala and 4.0 ton/ha for Maha in major, irrigation scheme in national level as shown below:

Yield of Paddy in the ExistingMajor Irrigation Systems

District	Yala					Maha				
	1984	1985	1986	1987	Mean	83/84	84/85	85/86	86/87	Mean
Polonnaruwa	4.0	4.4	3.9	3.8	4.0	4.0	5.0	4.9	5.0	4.7
Trincomalee	3.8	3.9	3.8	-	3.8	2.5	3.8	4.0	3.2	3.4
Sri Lanka	3.6	4.0	3.8	3.8	3.8	3.5	4.2	4.2	4.2	4.0

Source : Department of Census and Statistics, paddy statistics.
Remarks : 5 tanks except Kantalai are in Polonnaruwa district. Kantalai tank is in Trincomalee district.

The average production of paddy in the major tank irrigation systems in the project area between 1984/85 Maha and 1987 Yala season was estimated 164,100 tons for Maha and 106,700 ton for Yala, as shown in the Table E.1.7.

The minor irrigation systems in the project area is situated in Polonnaruwa district and is planted with low land paddy in Maha season irrigated by small tanks. The average yields was estimated at 3.8 on/ha in 1986/87 Maha season as shown in the next table.

Paddy Yield in Minor Irrigation System in Polonnaruwa District

(Unit: ton/ha)

	1983/84	1984/85	1985/86	1986/87	Average
Maha	2.7	3.0	3.1	3.8	3.2

Source : Department of Census & Statistics, Paddy Statistics.

Though present yield of paddy is relatively higher, paddy yield has not yet attained the potential yeild due to the following reasons.

- Insufficient irrigation water, particularly in Yala
- Existance of direct sowing method, Yala, in particular
- Predominance of paddy varieties of short growing periods for Yala paddy
- Insufficiency in fertilizer application, particularly of P_2O_5 and K_2O

Sugar production by the Kantalai Mill has been declining year by year as shown in the next table.

Performance of Kantalai Sugar Mill

	1980	1981	1982	1983	1084	1985	1986
Cane Harvested Ara (ha)	2,590	2,442	2,446	2,254	2,213	2,356	2,093
Yield of Cane (ton/ha)	51	53	46	48	43	41	41
Cane Harvested (ton)	132,750	130,655	111,988	107,331	92,758	95,843	82,947
Sugar Production (ton)	13,593	11,423	10,720	9,202	8,834	9,232	7,171

The low performance can be attributable to be the following reasons.

- Insufficient irrigation water supply to the cane field
- Ethnical disturbance
- Shortage of spare parts and difficulty of repairing because of a lack of uniformity in model or type of machinery and equipment

Fruit trees such as coconut and banana are grown in homesteads mainly for self-consumption.

E.1.4 Livestock

There are an estimated 132,000 bullocks and 79,200 buffaloes in the project area (Table E.1.8). The buffaloes are used for the levelling, puddling and threshing for the paddy cultivation, but are gradually replaced by machinery powers such as hand tractors and 4 wheel tractors. The bullock are used for transport of agricultural commodities. Farmers will not slaughter livestock because of religious reasons but some are sold for meat.

E.1.5 Agricultural Marketing

There are 6 major agricultural marketing bodies in Sri Lanka. These are:

1. Paddy Marketing Board (PMB)
2. Marketing Department (MD)
3. Cooperative Marketing Federation (Markfed)
4. Cooperative Wholesale Establishment (CWE)
5. Cooperatives
6. Food Commissioner's Department (FCD)

PMB was established in 1971 as the public organization to stabilize market prices of paddy, maize, chillies, soyabeans, and groundnuts by maintaining floor prices. While, FCD holds ceiling retail prices of foodgrain by importing and distributing at fixed prices. PMB's share of handling in paddy has been reduced to about 10% of the production due to the liberalization policy in agricultural marketing of the Government. PMB collects paddy through agents such as Cooperative Societies, Agrarian Service Committee and private traders and mills the collected paddy through rice mills on the contracts basis. The milled rice is sold to Cooperatives, army, navy, police, hospitals, etc., as well as the Rice Sales Centres for individual consumers.

MD involves in the marketing of the agricultural commodities particularly vegetables but MD's handling volume is small and have little impact on the market.

Markfed collects nearly 8-10% of the fruits and vegetables traded, through cooperatives and sells them in the principal markets in the cities. Markfed also handles chillies, pepper, potatoes, onions, rice, spices and fruits.

CWE is the most important state organization for the import, local procurement and distribution of chillies, onions and lentils. CWE distributes them through Cooperatives and its retail shops. Cooperatives are the most popular public sector organization in paddy procurement from farmers. Cooperatives work as agent of PMB in most cases in paddy procurement.

In private marketing channels, rice millers, village boutique owners, local assemblers, commission agents, wholesalers, and retailers play important roles. They handle about 90% of the marketed agricultural products. Rice millers are the largest market outlet for the paddy producers. In case of coarse grains, village boutiques are the biggest market outlets for the producers.

The local assemblers sell the collected produces to wholesalers through commission agents in cities or purchase agricultural producers on behalf of the traders in big cities. The largest outlet of the marketed fruits and vegetables are local assemblers. The local assemblers sell their produces to commission agents who operate as wholesaler in the big urban markets.

Farm gate prices of the major agricultural produce in 1987 were:

Paddy	-	4.4	Rs./ha
Green gram	-	14	Rs./ha
Chillie	-	31	Rs./ha
Sugar cane	-	500	Rs./ton
Red Onion	-	8.3	Rs./kg

The Sri Lanka Government has been implementing a guaranteed price scheme for paddy and a floor price scheme for subsiding crops since 1948 to stabilize prices. Fertilizers have been subsidized since 1967 to promote it's use for the increment of crop production. In 1988 36% of retail price of urea, 52% of TSP price and 28% of MP price

are subsidized. The details of government support prices of agricultural commodities are shown in the next table.

Government Support Pries of Agricultural Commodities

	Government Support Price in 1987	
Paddy	3.35	Rs./kg
Maize	4.00	Rs./kg
Groundnuts	7.00	Rs./kg
Chillies	28.00	Rs./kg (Grade I)
	26.00	Rs./kg (Grade II)
Cowpea	8.50	Rs./kg
Red onion	3.05	Rs./kg (Vethalan)
	2.30	Rs./kg (Local)
Urea	2,990	Rs./ton
TSP	2,990	Rs./ton
MP	2,890	Rs./ton
Certified paddy seed	6.3	Rs./kg

E.1.6 Farm Economy

According to the 1982 Census of Agriculture the average holding size of a farm in the project area is about 1.1 ha and the planted areas of crops are calculated at 0.9 ha for Maha paddy, 0.73 ha for Yala paddy 0.01 ha for Maha upland crops and 0.003 ha for Yala upland crops. Agricultural income of a typical farm is estimated at Rs. 14,200/year.

E.2 AGRICULTURAL DEVELOPMENT PROGRAMME

E.2.1 Basic Concept

As stated in the preceding chapter, and analysed in water balance study the project area suffers irrigation water shortage, particularly in Yala seasons. This water shortage restricts the increment in paddy yields as well as development of the newly irrigated agricultural areas, even there is vast un-used arable land along Mahaweli river bank and in-between Kandala irrigation system and the Kantalai sugar estate. Fertilizer application to paddy seems not to be sufficient in respect to P_2O_5 and K_2O in particular. With sufficient irrigation water, farmers can increase with less risk the fertilizer amount to obtain the higher yields.

Crop diversification has been the major agricultural policy of the country. Chillie is one of the most profitable as well as deficient agricultural commodities due to decrease in production in the Northern province caused by ethnical problems, and the Agricultural Department in Polonnaruwa is promoting the expansion of chillie cultivation in the project area, which has suitable vast irrigation systems for the successful cultivation of chillies. Onion is also profitable and deficient crops and importing 30,000 to 60,000 tons per year in recent year.

In the above mentioned context, the following principles for the agricultural development plan are formulated.

1) Expansion of irrigable area to 62,200 ha from existing 41,400 ha (New area is 13,900 ha)

2) Increase of annual cropping intensity of paddy field to 200% (180% for paddy, 20% for upland crops)

3) Expansion of chillie cultivation to 3,100 ha, of onion to 2,900 ha, and of sugar cane of 4,200 ha

4) Increase in amounts of fertilizer application to paddy from 116 kg/ha to 120 kg/ha for N from 43-52 kg/ha to 80 kg/ha for P_2O_5 and from 48-53 kg/ha to 80 kg/ha for K_2O

E.2.2 Proposed Land Use

Future land use is projected based on the land use plan of on-going or planned projects, i.e.: Irrigation System Management Project, Major Irrigation Rehabilitation Project, and the Expansion plan of Kantalai Sugar Mill, as well as on the new land reclamation plan proposed by the present study team.

New development areas for gravity irrigation are selected to the maximum extent for irrigation rice cultivation as studied in chapters on soils and irrigation. Future land use is planned for without project and with-project conditions as follows:

Change in Land-use

Unit: ha

Land Use	Present (Without-project)	Future (With-project)
Paddy field	41,100	55,000
Sugar cane field	3,000	7,200

E.2.3 Proposed Cropping Pattern and Farming Practices

Crop selection for the Project was made taking the following factors into consideration:

- Agronomic sutability,
- Marketability,
- Profitability,
- Farmer's familiarity, and
- Risk/uncertainty

Selection was made from a practical view point. Too ambitious plans snuch as expansion of export-oriented crops were not considered because of their high risk and uncertainty involved. The present project is the capital investment project in principal for the construction of dam and irrigation/drainage facilities, etc. Economic justification of the investment should be based on conservative benefit generating plans.

All the following 7 crop categories selected are grown in the project area and don't have big problems in agronomic suitability, and farmer's familiarity.

- Paddy
- Sugar cane
- Chillies
- Onion
- Pulses
- Sweet potatoes
- Vegetables

Pulses, sweet potatoes and vegetables are not so profitable to grow and were selected as crops to be consummed in the project area. Paddy, sugar cane, chillies and onions are cash crops and were selected as crops to be marketed nation-wide.

Targetted respective food demand of chillies, onion, pulses, sweet potatoes and vegetables in 2000 which is set as the target year of the project was calculated taking population in 2000, per capita consumption in 1985, annual income increase in the future, income elasticity of demand and recovery rate of food portion beside waste, seed etc. into account the calculated demands in 2000 will be as follows:

- Paddy	:	4.2	million tons
- Chillies	:	77,600	tons
- Onion	:	172,000	tons
- Pulses	:	2,610	tons
- Vegetables	:	35,850	tons
- Sweet potatoes	:	4,500	tons (Table E.2.1)

Targetted planted area of chillies was estimated at 3,100 ha assuming a share of Polunnaruwa district in 1987/88 targeted production set by the Ministry in of Agricultural Development and Research will be covered by the project. Targetted planted area of onion was estimated at 2,900 ha assuming a half of the balance between demand and supply in Sri Lanka to be covered by the project. Targetted areas of pulses, vegetables, and sweet potatoes were set at 1,700 ha, 3,000 ha by the project and 300 ha, respectively. Targetted planted area of sugar cane was set at 4,200 ha based upon the expansions plan of Kantalai sugar mill. A planted area of 4,200 ha will produce 357,000 tons of cane, equivalent to 30,400 tons of sugar. The incremental sugar production will be able to be easily substituted with imported sugar, e.g. 340,000 tons in 1987. The remaining area of 44,000 ha in Yala will be covered by paddy. Details of the targetted areas are shown in Tables E.2.2 and E.2.3.

The major design criteria of proposed farming practices are given below:

(1) Major Design Criteria of Proposed Paddy Farming Practices:

Varieties	:	BG-379-2, BG-400-1,
Growing period	:	BG-379-2; 4 months
		BG-400-1; 4.5 months
Planting method	:	transplanting
Seed sown	:	107 kg/ha
Nursery period	:	20 days
Planting space	:	15 cm x 15 cm
Fertilizing	:	120 kg N/ha
		80 kg P_2O_5/ha
		80 kg K_2O/ha
Labour requirement	:	87 man-days/ha
		(26 for family labour and 61 for hired labour)

(2) Major Design Criteria of Proposed Chillie Farming Practices:

Varieties	:	MI-1 (150 days), MI-2 (150 days)
Planting method	:	transplanting
Seed sown	:	1.85 kg/ha
Nursery period	:	25-30 days
Planting space	:	60 x 60 cm or 75 x 60 cm (MI-1)
		60 x 45 cm or 60 x 45 cm (MI-2)

Fertilizing	:	150 kg N/ha 100 kg P_2O_5/ha 100 kg K_2O
Labour requirement	:	229 man-days/ha (147 for family labour, 82 for hired labour)

(3) Major Design Criteria of Proposed B. Onion Farming Practices:

Varieties	:	Poona red or early grand
Growing period	:	3 months
Planting method	:	Transplanting
Seed sown	:	8.4 kg/ha
Nursery period	:	1.5 months
Planting space	:	15 x 10 cm or 10 x 10 cm
Fertilizer	:	104 kg N/ha 108 kg P_2O_5/ha 92 kg K_2O/ha
Labour requirement	:	552 man-days/ha
(Family)	:	408 man-days/ha
(Hired)	:	144 man-days/ha

(4) Major Design Criteria of Proposed Sugar Cane Farming Practices:

Variety	:	CO-775 (Indian variety)
Growing period	:	plant cane; 12 months ratoon cane; 11 months
Ratoon usage	:	2 seasons
Seed cane	:	12.4 ton/ha
Planting space	:	105 cm between rows
Fertilizing	:	98 kg N/ha 43 kg P_2O_5/ha 60 kg K_2O/ha
Labour/machinery power requirement	:	18,565 Rs./ha equvalent

(5) Major Design Criteria of Propoposed Long beans Farming Practices:

Variety	:	Top Crop, Kentucky Wonder, Lanka Nil
Growing period	:	1.5 to 3.0 months
Seed sown	:	41 kg/ha
Planting space	:	Bush type; 0.6 x 1.5 m Pole type; 0.9 x 0.9 m
Fertilizing	:	28 kg N/ha 199 kg P_2O_5/ha 74 kg K_2O/ha
Labour requirement	:	346 man-days/ha
(family)		(230 man-days/ha)
(hired)		(116 man-days/ha)

(6) Major Design Criteria of Proposed Greem Gram Farming Practices:

Variety	:	MI-5, IPEM-79-13-45
Growing period	:	75-90 days
Seed sown	:	26 kg/ha
Platning space	:	30 x (7-8) cm
Fertilizing	:	25 kg N/ha,
		60 kg P_2O_5/ha
		60 kg K_2O/ha
Labour requirement	:	229 man-days/ha
(family labour)		(174 man-days/ha)
(hired labour)		(55 man-days/ha)

Proposed cropping patterns are shown in Fig. E.2-1.

Proposed cropping calenders of each crop are the same as the present cropping calenders. Yala paddy growing will start in middle of April and end in middle September. Maha paddy growing will start in the biginning of October and end in the end of March. Chillie growing will start in the beginning of April and finish in the end of September. Plant cane growing will start in the March and will last 12 months and then will be harvested. Ratoon cane growing will start in April and will be harvested twice and will be replanted with plant cane.

E.2.4 Anticipated Crop Production

As stated in the preceding sub-sections, with the introduction of irrigation water supplied by the Project, farmers will be able to diminish the dependence on unreliable irrigation water, rainfall or river flow for paddy growing and be able to increase the farm inputs to the optimum level with less risk. The anticipated paddy yields are estimated at 6.0 ton/ha for both Maha and Yala seasons in full development stage of the Project. This yield is the same yield attained in up-stream reaches of Galamura Area where abundant irrigation water is available.

The unit yield of paddy in without-project condition is estimated at 5.0 ton/ha for Systems G and D except Kantalai System, and at 4.4 ton/ha for Kantalai system. These yields are targetted yields of the on-going Irrigation System Management Project and the Major Irrigation Rehabilitation Project. The unit yield of upland crop represented by green gram is expected to increase to 1.5 ton/ha from 1.0 ton/ha at the full development stage of the Project. Chillie yield is expected to increase to 1.9 ton/ha from present 1.5 ton/ha. Sugar cane yield will increase to 85 ton/ha from the existing 39 ton/ha by increment of irrigation water and expansion of allotee's cane.

The summary of change in unit yields of crops are shown below: