1. Well to moderately well drained, moderately fine to fine textured deep reddish brown earths with some inclusions of coarse textured and shallow phases and of imperfectly drained soils of variable texture and depth.

2. Mostly well drained moderately fine to coarse textured shallow to deep reddish brown earth, including some gravelly and stony phases.

3. Well to imperfectly drained and poorly drained, moderately fine to coarse textured and of variable depth reddish brown earths and low humic gley soils.

4. Rock outcrops.

5. Upland soils consisting mainly of red yellow podzolic soils with soft laterite in deep subsoil occurring on foot slopes of hills belonging to the Intermediate zone.

c.2 Semi-detailed soil survey

As mentioned earlier, semi-detailed soil survey area of 5,300 ha was identified by excluding the proposed forest reserve, National Park from whole of System F area. Following is the survey description indicating the study results of System F area.

Field observations for the identified area of about 5,300 ha show that the soil distribution in the area surveyed is of a complex nature. Complex geology, colluviation from adjacent hills, deposition of local alluvium, deposition of levee alluvium along frequently changing Kalu Ganga river course, rapid change of climate from dry zone to intermediate zone and the presence of high mountain range on the south west boundary are some of the factors that bring about the complexity in soil distribution.

Well drained reddish brown earth covers the major part of the area, about 3,300 ha. In addition to Alutwewa, Padavkema, Handapangala and Etiliwewa Series which were discussed earlier, observed the presence of a well drained soil series that is characterized by the presence in the profile of coarse pisolitic lateritic gravel with or without saprolitic laterite. This pisolite gravel has an oily luster. As this soil does not appear to belong to already described soil series, it is provisionally named as Dasgiriya Series.

D.2.4 Laboratory Analysis of the Soil Samples

About 150 soil samples taken at 9 selected sites in system F and 31 selected sites in Systems I, MH and the NWDZ (NW-1) were analyzed at Irrigation Department Laboratory. Followings are the specifications for laboratory tests:

1. pH

Measurement of pH was made on a 1:2.5 soil:water suspension, equilibrated for 1 hour, and measured with a combination of electrode using KCL gel.

2. EC (Electrical Conductivity)

Measurement of EC was made on extracts from 1:5.0 soil:water mixtures, equilibrated for 24 hours and values of EC were quoted in mmho cm-at 25°C.

3 CEC (Cation Exchangeable Capacity)

1M ammonium acetate buffered at pH 7.0 was used for measurements of exchangeable cation. The results were indicated as me/100 g of soils (oven dry basis).

4. Exchangeable Cations

Exchangeable calcium, magnesium, potassium and sodium were measured by using 1M ammonium acetate extraction at pH 7.0.

5. Total Nitrogen

Micro Kjeldahl Method was applied for the measurement of the "Total Nitrogen" (the catalytic oxidation of organic and chemically combined N).

6. Soil Moisture

15 bar, 1/3 bar moisture and 0.05 bar moisture was determined by gravimetric and centrifugal method.

7. Available Phosphorus

Available phosphorus was determined by Olsen's method of bicarbonate extraction.

8. Particle Size Distribution

Particle size distribution was measured by pipette method, and the textures were indicated based on the USDA System.

The results of soil observation and laboratory analysis are summarized as follows:

(1) Soil Reaction (pH)

Range : from 4.5 to 7.5 in surface layers
Interpretation : preferred range for crop cultivation

(2) Electrical Conductivity (EC)

Range : from 0.04 to 0.96 (m.mohs/cm)
Interpretation : no salinity problem will be anticipated

(3) Organic Matter (O.M.%)

Range : from 0.5% to 1.8%
Interpretation : normally low in organic matter content

(4) Total Nitrogen (%)

Range : from 0.07% to 0.21%
Interpretation : normally suitable for crop cultivation

(5) Available Phosphorus (ppm)

Range : from 0 ppm to 12 ppm
Interpretation : normally low in available phosphorus content

(6) Cation Exchange Capacity (meq/100 g soil)

Range : from 6.0 to 42.1 meq/100 g soil
Interpretation : suitable for paddy and upland crops

(7) Exchangeable Sodium (ES)

Range : from 0.1 to 4.4 meq/10g soil
Interpretation : negligible for sodium effect

(8) Range : from 85% to more than 100%
Interpretation : highly saturated by exchangeable bases such as Ca, Mg and Na

C.2.5 Soil Classification

The soil classification systems applied to the previous soil studies and the reports are based on the Sri Lanka National Classification systems established in the report of "SOILS OF CEYLON AND FERTILIZER USE, 1967 (Dr. C.R. Panabokke)" and the SOIL TAXONOMY (USDA). Correlation of Sri Lanka Great soil group and the great group of SOIL TAXONOMY (USDA) is shown in Table D.2.4. National Soil Map, indicating study area, is shown in Fig. D.2-2.

According to the assessment of the existing soil data and information, either national classification system or soil taxonomy (USDA) are available for the preparation of semi-detailed soil maps in the Systems H, IH, I, MH and the NWDZ (NW-1). As for the Systems H, IH, MH, and I, soil classifications based on the National Classification System have been already made. Soil units of national classification system, called "soil series",

are defined in these area, however, the applied categories are not available in other Systems and the NWDZ (NW-1). Therefore, sub-group of soil taxonomy(USDA) and/or great group of national classification system are used as the classification unit in this soil study.

The soils of the entire study area are classified into eight (8) great groups, according to the above mentioned classification system. Following and Table D.2.5 are the summary of soil classification results (details are shown in Table D.2.6 together with the USBR land classification results, which are discussed latter). System wise Soil Maps are shown in DRAWINGS:

	Great Soil Group	Extent (ha)	Extent (%)
1.	Alluvial Soils	51,300	12.1
2.	Old Alluvial	500	0.1
3.	Solonetz	3,900	0.9
4.	Low Humic Gley Soils	89,900	21.2
5.	Reddish Brown Earth	(256,400)	(60.4)
	- well drained	214,000	50.4
	- imperfectly drained	42,400	10.0
6.	Red Yellow Podzolic Soils	100	0.02
7.	Grumusols	200	0.1
8.	Lithosols (Rock outcrop)	17,400	4.1
9.	Marsh/Tank	4,700	1.1
	Total	424,400	100.0

According to the results of soil classification mentioned above, soils of the survey area are composed of Alluvial soils (12%), Old Alluvial (0.1%), Solonetz (1%), Low Humic Gley Soils (21%), Reddish Brown Earth (60%), Red Yellow Podzolic soils and Lithosols (4%). Except for Solonetz and Lithosols, the soils of this area are generally suitable for agricultural development.

The major characteristics of the soil units are described below:

(1) Alluvial Soils

Alluvial soils are found in all the Systems and in the NWDZ (NW-1). These soils are formed from recent and/or semi-recent alluvial sediments, and are distributed in the valleys and flood plains of the streams and rivers. According to the soil taxonomy (USDA), Alluvial soils are sub-divided into following sub-groups:

Typic Tropaquepts (Inceptisols) are dark brown to dark yellowish brown colored soil with grey subsoil and mottles, and have texture of sandy clay loam to clay overlying sand to loamy sand. The soils are imperfectly to poorly drained, and the soil reaction is ranging from pH 5.0-7.0. This soil unit is mainly developed on the floodplain, and has high suitability for paddy cultivation. These soils are

representative of the alluvial plains (soils) and distributed in all the systems and in the NWDZ. The soils are suitable for lowland paddy.

Tropic Fluvaquents (Entisols) are characterized as grey (mottled) colored, poorly drained and sandy clay loam to clay textured soils. These soils are developed on the valley bottoms in the NWDZ. The soil reaction is ranging from pH 4.5-8.0 and are highly suitable for paddy cultivation. The soil fertility is moderate and has low infiltration rate.

Typic Ustifluvents (Entisols) are normally formed on the natural levees and river terrace along the Mi-oya in the NWDZ and along the Amban Ganga in System F. They are well drained, dark grayish brown, brown and dark yellowish brown colored, and fine sandy loam to loamy fine sand textured soils. Furthermore, the soils are permeable and moderately fertile. The soil reactions are ranging from pH 6.0-8.0. From the physiographic point of view the soils seem to be suitable for irrigation farming, however, crops to be selected for these areas are restricted to tree crops, upland crops and orchards.

Aquic Ustifluvents (Entisols) are developed on the flood plains and are widely distributed in System I. The effective soil depth is very deep and the soil texture is sandy clay loam to clay. Due to its poorly drained condition and low permeability, the soils are highly suitable for lowland rice cultivation. Soil pH is ranging from 6.0 to 7.5, however, some salinity problem soils are identified in delta areas of Systems I and M. Generally the soils are highly fertile.

(2) Old Alluvium

The soils of this great group are distributed on the ridges in the coastal plain, low-lying areas and sandy bottomland of the NWDZ.

Typically, this soil group has a light textured upper solum of 60-120 cm depth, overlying dense sandy clay loam. The texture of the upper horizon is coarse sand or loamy sand. Clay content often decreases with depth due to eluviation to the lower subsoil and lateral movement of water over the subsoil. The old alluvium soils are imperfectly drained. The vegetation of the soils consists of low forest and open bush. pH values vary between 5 and 6. Cation Exchange Capacities range from 2 to 9 m.e./100 g. The soils are generally only suitable for paddy cultivation due to its poor drainage condition. The soils are classified as Aquic Albaqualf or Typic psammaquent.

(3) Reddish Brown Earth (RBE)

This soil covers the greater part of entire survey area and is developed on the eroded peneplains. Due to their topographic condition, the soils are found on undulating plain or gently undulating plain. Generally, they are found on the upper part of these land form units and are characterized as well to moderately well drained, red to brown colored and medium textured soils. From the upper part toward the lower and/or bottom part of the landscape, the soil changed from well drained reddish

brown earth, through the imperfectly to poorly drained RBE, to the low humic gley soils. This soil sequence resulting by moisture and topographic condition is very common in the survey areas and is called as "catenary sequence". It is a typical landscape in dry zone of Sri Lanka.

According to the USDA soil taxonomy, following sub-groups are identified:

Udic Haplustalfs (Alfisols) are found in entire survey areas and are typical sub-groups of RBE. The topsoils of this group are reddish brown to brown colored and the subsoils are red to brown. They are well drained and the textures are sandy clay loam overlying sandy clay to sandy clay loam with clay skins. They have fairly gravelly sub-soils, and the gravel are mostly of quartz type. The soils are developed on upper part of the undulating plain, however, effective soil depth is moderately deep and the soils have moderately high fertility. The soil reaction ranges from pH 5.5 to pH 7.0 and infiltration rate of this soil group is moderate. Wide range of upland crops can be grown on these soils.

Udic Rhodustalfs (Ustalfs/Alfisols) are found in System 1 and have similar characteristics as udic haplustalfs mentioned before. They are formed on gently undulating plain with slopes less than 4%. In the System I, very gravelly sub-soils are found from 50-70 cm in depth, which are formed from weathered gneissic rocks. The soil reactions are slightly acid, ranging from pH 5.5 to pH 6.5. This soil group is well drained, however, its infiltration rate is generally low. The soils are suitable for upland crops and in places for paddy cultivation where the land form is relatively concave.

(4) Reddish Brown Earth/Imperfectly to Poorly Drained

The soils of this great group are generally found on the depression of the undulating plains, have catenary sequences with proper well drained Reddish Brown Earth, and are distributed in all the Systems and the NWDZ. These soils are scattered throughout the NWDZ, where the topography is very gently undulating. Due to their very gentle slopes, the soils are imperfectly to poorly drained and the effective soil depth is moderately deep. The parent materials of these soils are colluvial and alluvial origin, and the top soils of this group are conveyed from upper-lying eroded materials. The soils are characterized as dark grayish brown to yellow colored, sandy loam to sandy clay loam textured, underline by yellowish brown colored soils.

According to the Soil Taxonomy (USDA) classification, Aquic/Typic Haplustalfs, typical sub-group of this great group, are found in all the Systems and the NWDZ. The soils are imperfectly drained and developed on the bottom lands and lower concave slopes. The soil pH of this unit ranges from 6.0 to 7.0 in top soil and from 7.0 to 8.5 in sub-soil. The top soils are dark colored and sub soils are dark grey to dark grayish brown. The textures of this soil unit are sandy loam overlying sandy clay loam. The soils are moderately fertile.

(5) Low Humic Gley Soils (LHG)

The soils of this great group occur on gently undulating plains of all the Systems and the NWDZ. These soils are distributed in positions lying of RBE soils below the following catenary sequence. The land forms are commonly bottomland and/or valley bottoms, and the slopes are flat or almost flat (less than 0.5%). These soils are poorly drained and the top soils of their profiles are dark colors, with yellowish brown and strong brown and the sub-soils are also mottled yellow brown and strong brown. Generally the soils have acid reaction, but drier areas have high pH. Salinity problems are scarcely forecasted in LHG soils within the area. The soils of this group are classified as Tropaqualfs, Typic Tropaqualfs, Aeric Tropaquents, Tropic Fluvaquents, and Typic or Vertic Argiaquolls. The soils of this group are generally suited for paddy cultivation.

Tropaqualf shows evidence of clay accumulation in the sub-soil, and has aquic moisture regime and high base saturation. The soils of this group are best suited for paddy cultivation.

(6) Red Yellow Podzolic Soils

This soil is found in the south-eastern, eastern and north eastern part of the NWDZ and in the southern fringe of System F. They occur on a wide range of slopes and are often well drained. According to the Kelani-Aruvi Report (Ref. 9), topsoil colours are dark yellowish brown, strong brown or yellowish red and subsoils are yellowish red.

The texture is sandy clay loam with up to 35% clay, overlying a somewhat heavier textured alluvial subsoil with maximum 15% clay. Soils are fairly gravelly, upto 50%, but in places very little gravel occurs. The structure is weak to moderate blocky in the topsoil, as well as the subsoil. The consistence is friable and throughout the profile this soil is porous. The available water storage capacity is high, and the permeability is medium to high, with an infiltration rate of 1-4 cm/h and a medium hydraulic conductivity. These soils are acid with a pH of about 5. Their CEC ranges from 10 to 30 meq/100 g and the base saturation is 20 to 35%. Calcium, together with magnesium, are the dominant cations. Exchangeable potassium values are 0.02-0.1 me/100 g in the topsoil. N content is 0.03-0.15% and available P_2O_5 in the topsoil is less than 4 ppm. According to the Soil Taxonomy, the soils of this group are classified mainly as Typic Tropudult and Typic haplustalf and as Typic Haplustalf if the base saturation exceeds 35%. The soils of this group are suited for perennial tree crops.

(7) Grumusols

This soil group is formed within the western part of System I. The region has a flat topography, and in some areas the surface features an uneven relief - a gilgai micro-relief caused by the expanding nature of the clay. Typical of expanding clay soils, they have wide surface cracks which extend to more than 50 cm below the surface in

the dry state. Slickensides in the subsoil are also a common feature reflecting the expanding nature of the clay.

Colour is generally black to dark grey (2.5 Y 2/0-4/0), and the texture is heavy with 40-55% clay. In places the surface is very gravelly. These soils have montmorillonitic clays, and also have a well-developed subangular blocky structure. Their consistency is extremely hard when dry and very sticky and plastic in the wet state. At depth $CaCO_3$ concretions are of common occurrence and the clay overlies limestone at a depth of 100-120 cm.

Chemically the soils are favorable. Its pH ranges from 7 to 8. CEC is 40 to 50 meq/100g soil and the exchange complex is fully saturated. Ca is the dominant cation. The exchangeable Na content is below 10%. N levels are low, with less than 0.04% in the topsoil. Available P_2O_5 content being less than 3 ppm is low. The topsoils are non-saline, but at a depth of about 70 cm, EC levels of 10 mmhos/cm indicate salinity in places. The black clays belong taxonomically to the Typic and Entic pellusterts. The soils of this group are to be excluded from potential irrigable area.

(8) Solonetz

In the study area, the soils of this group occur in small extent in river terraces in association with old alluvial soils and in moderately wide valleys where they are associated with LHG soils in Systems D and I. The soils have a shallow sandy topsoil that overlying a strongly natric (sodic) subsoil which is much finer - textured. The sub-soil is generally very hard when dry and very sticky when wet. The exchangeable sodium percentage (ESP) can exceed 15% specially in top soil. The soils of this group are classified as Typic Natrustalf and/or saline Tropaquent. Generally, the soils are rated as unsuitable for agricultural development.

D.2.6 Description of Soil Characteristics for Each System and Zone

The major characteristics of the soils of each system and the NWDZ (NW-1) are summarized as follows:

(1) Soils of Systems H, IH and MH

The topography of System H and IH is complex, consisting of a series of hills and narrow valleys. The hills rise sharply from the valley floors presenting clear delineations between lands considered arable and lands of inferior quality. The valleys vary in width from about 100 meters to 2-3 km and generally have gentle slopes leading to well developed natural drainage streams.
In the System MH area, topography becomes less undulating, resulting in fewer tanks. Rock outcrops occur only in limited areas and will not be major problem.

The soils of these areas have developed from a complex of parent rocks and are residual in nature. The steeper slopes are eroded with a predominance of the coarser materials remaining on the surface. The valleys have residual soils overlain by a thin

mantle of locally eroded alluvium and are considered the most suitable for irrigation development. The soils are low in nitrogen fertility as are all tropical soils in which excessive leaching takes place during the rainy season.

(2) Soils of System I

The soils of system I, with its gentle slopes, are characterized by relatively high proportion of bottomlands with gleyed soils. The upland soils are medium textured and have a very gravelly lower subsoils. They overlie highly weathered granite rocks at a depth of about 1m. The soils of upper slopes are well drained, mostly reddish brown to red, and vary in texture and depth. Heavier textured clayey soils are mostly deep. Gravel is encountered at 50-70 cm depth and often at depths greater than 90 cm. Such deep soils are typical of System I. The steeper areas, with slopes of over 4%, are occupied by soils with gravel below 30-50 cm depth. Soils on lower slopes and in bottom lands are imperfectly to poorly drained, and are slightly heavier in texture with mottled gleyed subsoil. Accumulations of $CaCO_3$ occur in the sub-soil. The soils of flood plains are mostly medium textured alluvia with dark brown colours and mottling due to their imperfect drainage (Ref. 12).

(3) Soils of System M and extension area of System MH

The soils of these area are characteristically gravelly, with gravel encountered at 50-70 cm depth, and occur on slopes of less than 4%. In the south the gravel is encountered closer to the surface. Heavy textured alluvial delta soils, with imperfect drainage, cover a large area in the east. Rock outcrops are scattered over the entire area and occupy around 9% (Ref. 12).

(4) Soils of NWDZ

The physiographic units at the lowest elevations are alluvial plains which can be subdivided into the two sub-units described below:

- Alluvial soils which are largely immature soils formed on recent deposits; they are mostly heavily textured and stratified, but stratification in the alluvial plains occurs at greater depth than in the lagoons. Some soils show weakly developed signs of pedogenesis, and the topography is flat.

- The oxic soils formed on Red Earth formations, underlain at considerable depth by weathered limestone. These are low base status, deep, mostly red, medium textured soils. This area has a slightly higher elevation than the surrounding sand, and is less flat; generally slopes have gradients of less than 3%.

The second major physiographic unit is the gently undulating peneplain which constitutes the greater part of the study area in the NWDZ. The soils are residual and have been derived from rocks of the Vijayan and Khondalite Series. Most soils are dark red brown to dark brown, medium to heavy textured and gravelly, and many, but not all, show plinthite in different stages of hardening at depth.

The soils derived from the Khondalite Series have a relatively high content of quartz gravel, while those derived from the Vijayan Series have mixed gravel, with quartz and feldspar.

The peneplain soil pattern is a repeating catena of well drained reddish brown, dark brown to yellowish brown soils on convex upland slopes, dark brown to grey and mottled soils on concave and lower slopes and gleyed, poorly drained soils in the bottomland position. Except for the valley bottom soils, all members of the catena have clear horizon development, the most significant feature being clay illuviation. In the zone adjacent to the coastal plain the peneplain soils have a high content of ironstone gravel; this gravel is rounded in the north, and irregularly shaped in the south.

In the area north of the Mi Oya, soils show shallower depth to rock than in the rest of the peneplain. The undulating rock occurs at 50-150 cm but is not continuous. In the south-east part of the peneplain the soils have a sandy topsoil of 0-50 cm. The sand is of colluvial origin and consists of sand transported from higher ground, which had lost most of its clay through eluviation prior to being washed down the slope. Deeper sandy soils also occur, particularly around inselbergs and in areas with many rock outcrops.

D.3 LAND USE SURVEY

D.3.1 Methodology

The purpose of the survey was to provide land use maps for the entire study area and information giving the extent of the agricultural lands. The lands are sub-divided into paddy field, upland field, perennial crop field and sugarcane estate, and non-agricultural lands. The extent of agricultural lands provide the information for the delineation of newly developable area.

In order to prepare land use maps of one mile one inch scale indicating the present land use information mentioned above, the following source materials were used:

(1) topographic maps (1:63,360 scale)

(2) 781 sheets of black and white aerial photographs, scale 1:20,000 and/or 1:50,000, printed by Survey Department (these photos were taken in 1981-1983)

(3) existing land use maps, printed by Survey Department

The topographic maps, showing the paddy field or some other type of agricultural land use were used as the working basis for this survey. During the period of field survey from February 1988 to September 1988, collection of the existing information with respect to present land use, aerial photo interpretation and field checking were carried out for the entire land resources study area. For the up-dating of existing land use information, field visiting to all the Systems excepts for System M was carried out. Field data were collected by interviewing to A.I. and the farmer within the area concerned. These information were recorded onto one mile one inch Topo Maps, and used as the basic data for the preparation of present land use maps.

D.3.2 Present Land Use

Land use categories applied to the study are shown below:

1. Agricultural Land
   - 1.1 Paddy
     - irrigated (including major irrigation scheme and minor irrigation scheme)
     - rainfed (non-irrigated paddy field in INTERMEDIATE ZONE)
   - 1.2 Upland (shifting cultivation (chena), vegetables etc.)
   - 1.3 Perennial Crop Field (coconut, tea, rubber and other tree crops)
2. Forest (dense forest, forest plantation and natural forest)
3. Homestead (residential and homestead for domestic supply)
4. Shrub
5. Marsh/Lagoon
6. Tank
7. Urbanland (town, factory and ruins)
8. Barren land (rock out-crops and erosional remnant)

For the delineation of newly developable area within the present study area, agricultural land, homestead, marsh/lagoon, tank and urbanland should be excluded from the total arable land. Land Use survey results are summarized as follows (details are shown in Table D.3.1, and Present Land Use Maps are shown in DRAWINGS):

Land Use Category	Extent (ha)	Extent (%)
1. Agricultural Land	(203,700)	(48.0)
1.1 Paddy	(101,400)	(23.9)
- irrigated	98,700	23.3
- rainfed	2,700	0.6
1.2 Upland	98,900	23.3
1.3 Perennial	3,400	0.8
2. Homestead	26,700	6.3
3. Forest	124,100	29.2
4. Shrub	47,300	11.1
5. Marsh	1,100	0.3
6. Tanks	8,300	2.0
7. Urban Land	600	0.1
8. Barren Lands	12,600	3.0
Total	424,400	100.0

About 48% of the entire survey area are occupied by agricultural land, of which 49% is irrigated paddy field, 49% is upland field, 2% is perennial crop field and the rest is rainfed paddy. Non agricultural lands are about 52% of entire area, of which 81% is forest or shrub including National Park and forest reserve.

D.4 LAND CLASSIFICATION

D.4.1 Methodology

Land classification systems applied in the past soil study reports are the modified USBR and ID method based on the Sri Lanka National Soil Classification System. They are summarized in Table D.1.1.

Except for System F, preceding land classification survey results are utilizable for this study as much as possible.

In order to prepare the detailed reconnaissance leveled suitability maps, following procedures for mapping were adopted for the survey:

- preparation of the existing detailed reconnaissance soil maps,
- identification of the soil classification units and delineation of the boundaries onto one mile one inch scaled topographic maps,
- USBR basis assessment and evaluation of the soil profile description and laboratory analysis data,
- mapping of the land classification results onto one mile one inch topographic map, and
- measuring the extent (ha)

According to the existing soil data and preceding land classification results, the modified USBR system is the most suitable for the evaluation of land resources of the study area. Soil characteristics and land qualities such as soil texture, depth, permeability, drainage, slopes, gravel contents and topography are used in this classification. The rating does not take into account the present type of land use, cost of clearing, location, water supply or other factors which do not directly effect the productivity of the land. Followings are the classification criteria applied in the present study:

Class-1 Irrigable

Lands that are the most suitable for irrigation farming, being capable of producing sustained and relatively high yields of a wide range of climatically suited crops at reasonable production cost.

Class-2 Moderately Suitable for Irrigation

Lands that are moderately suitable for irrigation farming, however, adapted to a somewhat narrower range of crops, more expensive to prepare for irrigation or more costly to farm.

Class-3 Arable

Lands that are suitable for irrigation development but are approaching marginality for irrigation and are of distinctly restricted suitability because of more extreme deficiencies in the soil, topographic or drainage characteristics than described in class 2 lands.

Class-4 Limited arable or special uses

Lands are included in this class only after special economic and engineering studies have shown them to be arable. Present soil study will apply following three sub-classes, which are considering their excessive, specific deficiency or deficiencies susceptible of correction at high cost. They are:

- Class 4R : only suitable for wet land rice, due to their extremely poor drainage conditions
- Class 4P : only suitable for coconut palms
- Class 4S : sprinkler or lift irrigation required due to steep slopes or where land is above command

Class-6 Nonarable

Lands in this class include those considered nonarable under this master plan study because of failure to meet the minimum requirements for the other classes of land.

These classification criteria are shown in Table D.4.1, limitation on suitability of land due to soil, drainage, topography, etc. are indicated by using the following symbols, either individually and collectively:

- 'b' Rock or shallow depth; where rock outcrops cover 10-25% of the surface or when rock occurs at 60-100 cm depth, the soils have been downgraded by one class
- 'd' Impeded drainage; imperfectly drained soils have been downgraded to sub-class 2d on sloping land; poorly and imperfectly drained soils on flat low lying land have been rated sub-class 4 Rd
- 'f' Low fertility of Ultisols due to low base saturation; downgraded to sub-class 2f
- 'k' Gravel; soils with gravel content over 60% and gravel starting from 30-60 cm, are downgraded to sub-class 2k; when gravel occurs at less than 30 cm depth, soils are downgraded to sub-class 3k

- 'm' Undulating to mountainous terrain; downgraded to sub-class 4 Sm, mostly out of command

- 'q' High permeability of "oxic" soils; downgraded to sub-class 4Sq because of excessive percolation under normal irrigation practices

- 's' Salinity; highly saline and sodic soils have been downgraded to sub-class 6s

- 't' Uneven topography; areas with more than 25% of the area with over 4% slope have been downgraded to sub-class 4St; a large portion of the remainder of the area has slopes close to 4%

- 'v' Very sandy soils; sandy soils with less than 10% clay, and less than 50 cm deep, overlying a heavier textured subsoil, have been downgraded to sub-class 2v, deep sands have been downgraded to sub-class 3v

- 'w' Flooding hazard; poorly drained areas which are flooded sever; times annually for periods of up to several weeks have been downgraded to sub-class 4Rdw

D.4.2 Results of the Classification

The land classification for the entire survey area was made in accordance with the modified USBR specification, and the following land class groups were identified (details are shown in Table D.4.2, and Land Classification Maps are shown in DRAWING):

Class System	1, 2, 3*1		4R*2		4S, 4P, 6*3	
	(ha)	(%)	(ha)	(%)	(ha)	(%)
F	4,400	83.0	100	1.9	800	15.1
H	42,300	47.4	33,500	37.6	13,400	15.0
IH	1,800	25.4	4,100	57.7	1,200	16.9
MH	24,200	42.2	20,900	36.4	12,300	21.4
I	74,200	51.4	64,200	44.4	6,100	4.2
M	27,900	32.7	39,000	45.7	18,400	21.6
NWDZ (NW-1)	21,500	60.4	12,000	33.7	2,100	5.9
Total	196,300	46.2	173,800	41.0	54,300	12.8

Remarks : *1: suitable for upland crop and lowland paddy
*2: only suitable for lowland paddy
*3: unsuitable for gravity irrigated farming

D.4.3 Delineation of Arable Lands

In order to delineate the arable lands onto one mile one inch Topo Maps, land class 4P, 4S and 6 were excluded from gross study area for each System and Zone. Newly

developable land within the study area was first identified by excluding the existing agricultural land from the potential irrigable area. The results of land classification study show that more than 90% of System I and NWDZ (NW-1), 85% of Systems F and H, 83% of System IH and about 80% of Systems MH and M are suitable for irrigated farming. Considering the present land use condition, the potential newly irrigable lands are widely extending in Systems I and M and the NWDZ.

D.4.4 Land Classification for Newly Surveyed Area of System F

That part of the System F for which semi-detailed soil and land classification is reported, comes under the agroecological zone IL2. It receives and average rainfall of about 2,090 mm (average between Bakamuna 1,740 mm and Pallegama 2,450 mm). The corresponding figure for the DL1 region is about 1,350 mm. The rainfall exceeds potential evapotranspiration in October, November, December and January compared to only November and December in DL1 region.

The area is also blessed with runoff and seepage from the hill range that runs along its western boundary. The streams run through the area. Their lower stretches has moisture in stream beds for a very long time. Crystalline limestone which is a common rock in the area is a favourable medium for ground water as evidenced by the presence of perennial shallow wells at many points. Kalu Ganga which runs along its eastern boundary is perennial. Thus the area has adequate moisture for at-least one rainfed crop season per year and year round domestic water sources.

D.4.5 Land Suitability for Specific Crops

The Land Use Policy Planning Division of the Ministry of Lands and Land Development (MLLD) operates a land information system using a microcomputer (Ref. 17). Primary information about land is abstracted from existing maps of topography, climate, soil and land use. These data are then analyzed in terms of land suitability for a wide range of land use types. Land characteristics, applied to the land suitability map for specific crops, are dominant slope range, length of growing period days, mean annual temperature, 75% confidence MAR, soil depth, soil texture, soil drainage and soil reaction. By using these data, obtained from various organization concerned, MLLD prepared crop suitability map for specific food crops at a scale of 1:500,000. The specific crops consist of; 1) rice, 2) maize, 3) cassava, 4) soya bean, 5) oil palm, 6) coconut, 7) sugarcane, 8) cotton, 9) tea, 10) rubber, 11) black gram, 12) chillies, and 13) cashew. These maps are built up of grid cells each 5 km square. Among the specific food crops prepared by the system, suitability for black gram, chillies, maize, rice and cashew are presented in Figs. D.4-1 to D.4-6. Possibility for the introduction of these high valued cash crops is able to be investigated by observing these maps. According to the Data, NCRB area has high potentiality for introduce upland crops under irrigated condition, such as black gram, chillies and maize.

LIST OF REFERENCES

1. TROPICAL SOIL MANUAL, J.R. LONDON, 1984
2. SOIL TAXONOMY, USDA, 1975
3. SOIL SURVEY MANUAL, USDA, 1962
4. LAND CLASSIFICATION, BUREAU OF RECLAMATION MANUAL,USDI, 1953
5. HANDBOOK OF THE SOILS OF SRI LANKA, SOIL SCIENCE SOCIETY OF CEYLON, 1972
6. SYSTEM D DEVELOPMENT INTERIM REPORT, IRRIGATION DEPARTMENT, 1979
7. SOILS AND CROPPING POTENTIAL OF THE UNDEVELOPED AREA OF SYSTEM G, IRRIGATION DEPARTMENT, 1978
8. THE DETAILED RECONNAISSANCE SOIL SURVEY AND LAND USE RECOMMENDATIONS OF AREA 'H' KALA - OYA BASIN, 1968
9. A REPORT ON A SURVEY OF THE RESOURCES OF THE KELANI - ARUVI AREA, A CANADA-CEYLON COLOMBO PLAN PROJECT, 1962
10. A REPORT ON A SURVEY OF THE RESOURCES OF THE MAHAWELI GANGA BASIN, A CANADA-CEYLON COLOMBO PLAIN PROJECT, 1963
11. RECONNAISSANCE LAND CLASSIFICATION AND SOIL SURVEY REPORT, MAHAWELI GANGA BASIN DEVELOPMENT TRANS BASIN DIVERSION SCHEME, IRRIGATION DEPARTMENT AND THE U.S. AID MISSION, 1962
12. TRANSBASIN DIVERSION STUDY, ANNEX 1; SOILS AND LAND SUITABILITY, RECONNAISSANCE SOIL MAPS AND LAND SUITABILITY, RECONNAISSANCE SOIL MAPS, JOINT VENTURE MAHAWELI TRANSBASIN, DIVERSION, 1981
13. MAHAWELI GANGA DEVELOPMENT PROGRAM IMPLEMENTATION STRATEGY STUDY, ANNEX F, LAND RESOURCES AND AGRICULTURAL BENEFITS, NEDECO, 1979
14. MAHAWELI GANGA DEVELOPMENT PROJECT 1, STAGE II, VOLUME III - LAND CLASSIFICATION, SOGREAH, 1972
15. THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT, VOLUME-II ANNEX, JICA, 1988
16. PANABOKKE C.R. SOILS OF CEYLON AND FERTILIZER USE, 1967
17. ESTABLISHMENT OF A LAND USE POLICY PLANNING DIVISION, A LAND USE PLANNING HANDBOOK FOR SRI LANKA, MLLD, 1985

LIST OF MAPS REFERRED

1. DETAILED RECONNAISSANCE SOIL MAP OF RAJANGANE RESERVOIR SCHEME (TWO INCHES TO ONE MILE), ID
2. DETAILED RECONNAISSANCE SOIL MAP OF MAHA MANKADA WELA AREA (TWO INCHES TO ONE MILE), ID.
3. SOIL MAP OF NACHCHADUWA SCHEME, MAJOR IRRIGATION REHABILITATION PROJECT (16 CHAINS TO ONE INCH), ID.
4. SOIL MAP OF MAHAWELI DEVELOPMENT PROJECT SYSTEM D1, MEDIUM INTENSITY (ONE MILE TWO INCHES), ID
5. SOIL MAP OF HURULUWEWA SCHEME, MEDIUM INTENSITY (ONE INCH TO TWELVE CHAINS), ID
6. SOIL MAP OF SYSTEM A, RANDENIGALA PROJECT (ONE INCH TO ONE MILE), ID
7. PROVISIONAL SOIL MAP (SEMI-DETAILED) OF KANTALAI EXTENSION SCHEME (12 CHAINS TO ONE INCH), ID
8. SOIL MAP OF SYSTEM D2 (ONE INCH TO ONE MILE), ID
9. SOIL MAP OF SYSTEM G (ONE INCH TO ONE MILE), ID
10. SOIL MAP OF SYSTEM AD (ONE INCH TO ONE MILE), ID
11. LAND USE MAP (1:100,000), SURVEY DEPARTMENT

    - KANDY (NWDZ)
    - KURUNEGALA (NWDZ & H)
    - MATALE (NWDZ)
    - POLONNARUWA (D1, D2, G, F)
    - PUTTALAM (NWDZ)
    - BATICALOA (SEDZ)
    - AMPARAI (SEDZ)

12. SOIL MAP OF THE SUGAR CANE PLANTATION - KANTALAI, ID
13. SOIL MAP OF SRI LANKA, ID

TABLES

Table D.1.1 SUMMARY OF THE PAST SOIL STUDIES WITHIN THE STUDY AREA

System /Zone	Survey Area (ha)	Extent Ratio (%)	Past Studies Conducted by	Covering Area (ha)	Soil Classi-fication System	Soil Unit	Land Classi-fication System	Survey Intensity (ha/ point)
A/D	7,300	0.5	1.LUD/ID<4	7,300	National	series	ID method	400
			2.JICA	7,300	National	great group	ID method	2,400
			3.Randenigala Project	7,300	National, USDA	series	USBR	400
D1	74,200	5.1	1.LUD/ID<4	20,400	National	series	ID Method	400
			2.JICA	20,400	National	great group	ID Method	1,000
D2	26,000	1.8	1.LUD/ID<4	5,900	National	series	ID Method	400
			2.JICA	5,900	National	great group	ID Method	1,000
F	15,200 <3	1.0	-	0	-	-	-	-
G	11,700	0.8	1.LUD/ID<4	11,700	National	series	ID Method	400
			2.JICA	11,700	National	great group	ID Method	500
H	89,200	6.1	1.Mahaweli Project	89,200	National	series	USBR	280
			1.LUD/ID<4		National	series	ID Method	
IH	7,100	0.5	1.Mahaweli Project	7,100	National	series	USBR	280
			1.LUD/ID<4	6,300	National	series		400
M/H<1	7,000	0.5	1.LUD/ID*	7,000	National	series	-	400
I	144,500	9.9	1.Transbasin Diversion Project	144,500	National, USDA	great group sub-group	USBR	270
J	82,400	5.7	1.Transbasin Diversion Project	82,400	National, USDA	great group sub-group	USBR	270
K	31,100	2.1	1.Transbasin Diversion Project	31,100	National, USDA	great group sub-group	USBR	270
L	96,400	6.6	1.Transbasin Diversion Project	96,400	National, USDA	great group sub-group	USBR	270
M<2	160,100	11.0	1.Transbasin Diversion Project	160,100	National, USDA	great group sub-group	USBR	270
NWDZ	480,700	33.0	1.Transbasin Diversion Project	480,700	National, USDA	great group sub-group	USBR	270
SEDZ	225,300	15.4	1.Transbasin Diversion Project	225,300	National, USDA	great group sub-group	USBR	270
Total	1,458,200	100.0		1,369,100				

Remarks: <1; Huruluwewa irrigation scheme.
<2; Including extension area of System MH.
<3; Including national park area (whole area of System F).
<4; Land Use Division, Irrigation Department.

Table D.2.1 LAND FORM CLASSIFICATION

Land Form Category	F<1 (ha)	F<1 (%)	H (ha)	H (%)	IH (ha)	IH (%)	MH (ha)	MH (%)
1. Coastal Plain	0	0.0	0	0.0	0	0.0	0	0.0
2. Flood Plain	0	0.0	2,600	2.9	500	7.0	3,700	6.4
3. Bottom Land	0	0.0	33,500	37.6	4,100	57.7	17,900	31.2
4. Gently Undulating Plain	3,100	57.5	39,700	44.4	900	12.7	24,100	42.0
5. Undulating Plain	1,300	29.3	7,900	8.9	900	12.7	4,900	8.5
6. Hilly Undulating Plain	400	11.5	0	0.0	0	0.0	3,700	6.4
7. Rock Out-Crops	500	1.7	5,500	6.2	400	5.6	2,300	4.0
8. Tanks	0	0.0	0	0.0	300	4.3	800	0.7
Total	5,300	100.0	89,200	100.0	7,100	100.0 0	57,400	100.0

Land Form Category	I (ha)	I (%)	M (ha)	M (%)	NW-1 (NWDZ) (ha)	NW-1 (NWDZ) (%)	Total (ha)	Total (%)
1. Coastal Plain	0	0.0	1,400	1.6	0	0.0	1,400	0.3
2. Flood Plain	24,000	16.6	14,400	16.9	5,500	15.4	50,700	11.9
3. Bottom Land	41,000	28.4	26,900	31.5	6,500	18.3	129,900	30.6
4. Gently Undulating Plain	73,600	50.9	27,300	32.0	21,500	60.4	190,200	44.8
5. Undulating Plain	700	0.5	9,400	11.0	0	0.0	25,100	5.9
6. Hilly Undulating Plain	0	0.0	900	1.1	0	0.0	5,000	1.2
7. Rock Out-Crops	3,100	2.1	4,500	5.3	1,200	3.4	17,500	4.1
8. Tanks	2,100	1.5	500	0.6	900	2.5	4,600	1.2
Total	144,500	100.0	85,300	100.0	35,600	100.0	424,400	100.0

Remark: <1; Excluding national park.

Table D.2.2 SOIL PROFILE DESCRIPTION

(1) NWDZ (NW-1)-RBE

Profile No.	:	Mi Oya-5
Location	:	upper inginimitiya
Topography	:	hilly undulating
Slope	:	8%
Land Use	:	forest
Drainage	:	well
Parent material	:	
Brief Description	:	R.B.E.

Description

0 - 8 cm	A	dull reddish brown (5YR 4/4); loam; slightly wet; granular and sub angular brocky
8 - 26 cm	B	brown (7.5YR 4/4); clay loam; wet; plastic; clay cutans; sub angular brocky; coaked wood
26 - cm	BC	reddish brown (2.5YR 4/8); gravelly loam; wet; more than 70% of weathered granite gravel

(2) SYSTEM I - LHG

Profile No.	:	I-2
Location	:	Van oya (hanbara vanoya basin)
Topography	:	gently ungulating plain
Slope	:	0-2%
Land Use	:	rainfed paddy (maha)
Drainage	:	poorly
Parent Material	:	
Brief description	:	L.H.G.

Description

0 - 8 cm	Ap	dark brown (10YR 3/3); sandy clay loam; very plastic; slightly compact; thin roog
0 - 26 cm	Dt	grayish yellow brown (10YR 4/2); clay loam; excessively plastic and moderately sticky; compact; Ma and Fe mottling; granite gravel
26 - 61 cm	Bt2	dark grayish yellow (2.5Y 5/2); loam; plastic; compact; Hn and Fe mottling;
61 - cm	DC	dark grayish yellow (2.5Y 5/2); clay loam; excessively plastic and modarately sticky; slightly friable; Fe nd Mh mottling; 5% of granite gravel

(3) SYSTEM MH - LHG

Profile No.	:	MH-2
Location	:	Ruruluwewa
Topography	:	lowland
Slope	:	flat
Land Use	:	paddy
Drainage	:	poor
Parent Material	:	
Brief Description	:	L.H.G.

Description

0 - 9 cm	A	dull yellowish brown (10YR 4/3); sandy loam; moderately plastic and sticky; 1% of mottling; fine root; excessively wet;
9 - 45 cm	Bg	dark grayish (2.5Y 5/2); sandy clayey loam; very plastic and moderately sticky; massive; 1% of quartz gravel
45 - cm		grayish yellow brown (10YR 4/2); sandy clay; moderately plastic and very sticky; massive; iron motling; 1% of quartz gravel

(4) SYSTEM MH - RBE

Profile No.	:	MH-3
Location	:	Punchi Himindewa
Topogarphy	:	high land
Slope	:	4%
Land Use	:	home garden
Drainage	:	well
Parent Material	:	
Brief Description	:	R.B.E.

Desciption

0 - 28 cm	A	dark brown (7.5YR 3/3); sandy loam; massive; 1% of quartz gravel; dry
28 - 56 cm	B	dark reddish brown (5YR 3/3); silty loam/ very plastic; moderately wet; excessivery massive; 5% of quartz gravel
56 - cm	BC	dark reddish brown (5YR 3/6); gravel layer; excessively massive; more than 50% of granitic gravel

(5) SYSTEM F - RBE

Location	:	100 meters west of Kaluganga-Pallegama road 200 meters north of Vi Yaya Ela
Land Form	:	Side slope of small valley draining to Vi Yaya Ela in undulating topography
Slope	:	2%
Vegetation & Land Use	:	paddy irrigated from Hattota Amuna Ela. Cropped in Yala and Maha. Age of paddy 10-14 days. Surrounding areas have been heavily mined, irrigated on.
Parent material	:	Gueissic basic (inferred pro pisolites)
Drainage	:	Imperfectly drained. Transmission of water through porous gravel below 78 cm from Hattota Amuna Ela.
Surface stones and rockout crops	:	Absent at site but about 5-10% surface covered by rocks running as north-south discontinuous lines
Brief General Description of the Profile	:	Imperfectly drained moderately deep clay loam; resting on pisolitic, gravel, drainage impendence is perhaps due to canal seepage through the gravel layer.

Description

0 - 10 cm	Brown (10YR 4/4) sandy clay loam; weak medium to coarse subangular blocky; slightly sticky slightly plastic, friable moist; few fine mineral flakes (feldspar) clear smooth boundary to,
10 - 30 cm	Dark brown (10YR 3/3) clay loam, moderate medium to coarse subangular blocky, slightly sticky slightly plastic, very friable moist, few fine mineral flakes (feldspar) 0. quartz gravel <5% clear smooth boundary to,
30 - 78 cm	Olive brown (2.5Y 4/3), common coarse prominent sharp olive block soft iron manganese concretions, few olive mottles clay loam, moderate medium to coarse subangular blocky, slightly sticky slightly plastic, very friable moist, few fine fedspar Flakes Quartz gravel <5%, clear smooth boundary to,
78 - 156 cm	Yeliowish brown (10YR 5/6), gravel 80% mainly pisolitic granular, friable moist, some quartz gravel and few fine feldspar flakes.
	Water table at 156 cm.
Soil Series	Hambegamuwa

Table D.2.3 SPECIFICATION OF SOIL DRAINAGE CLASSIFICATION

Class	Depth of Gley	Depth of Mottling
Well drained	no gleying	and no mottling
Moderately-well drained	no gleying	and mottling at >75 cm
Imperfectly-drained	gley at >125 cm or gley at 75 - 125 cm	and mottling at <75 cm
Poorly drained	gley at 20-75 cm	-
Very poorly-drained	gley at 0-20 cm	-

Table D.2.4 SOIL TAXONOMY CORRELATION (1/2)

USDA Soil Taxonomy Sub Group	Sri Lanka Great Group (1961)
Arenic Albaqualf	Old Alluviam - poorly drained
Tropic Fluvaquent	Low Humic Gley Soil and Alluviam poorly drained
Aquic Haplustalf	Reddish Brown Earth (Non-Calcic Brown soil) - imperfectly drained
Arenic Haplustalf	Non-Calcic Brown Soil and Reddish Brown Earth - sandy topsoil; all imperfectly drained
Lithic Haplustalf	Shallow Non-Calcic Brown Soil and Reddish Brown Earth
Oxic Haplustalf	Latosol - moderately well to imperfectly drained
Typic Haplustalf	Reddish Brown Earth - moderately well to imperfectly drained
Udic Haplustalf	Reddish Brown Earth (and Non-Calcic Brown Soil) - well drained
Ultic Haplustalf	Latosol - moderately well to imperfectly drained
Typic Natrustalf	Saline/Sodic Soil - moderetaly well to imperfectly drained
Aquic Natrustalf	Saline/Sodic Soil - imperfectly to poorly drained
Rhodic Paleustalf	Red Yellow Latosol - well to excessively drained
Typic Pellustert	Grumosol
Entic Pellustert	Grumosol
Typic Psammaquent	Regosol - poorly drained
Typic Quartzipsamment	Regosol - excessively drained

Table D.2.4 SOIL TAXONOMY CORRELATION (2/2)

USDA Soil Taxonomy Sub Group	Sri Lanka Great Group (1961)
Udic Rhodustalf	Reddish Brown Earth - well draiend
Abruptic Tropaqualf	Old Alluvium - imperfectly to poorly drained
Aertic Tropaqualf	Low Humic Gley Soil
Typic Tropaqualf	Low Humic Gley Soil
Tropaquent	Low Humic Gley Soil, Regosol with a dense subsoil and some saline and sodic soils - poorly drained
Typic Tropaquept	Alluvium - imperfectly to poorly drained
Typic Tropudult	Red Yellow Pedzolic soil - well drained
Aquic Ustifluvent	Alluvium - imperfectly drained
Mollic Ustifluvent	Alluvium - well drained
Typic Ustifluvent	Alluvium - light textured-moderately well to well drained
Aquic Ustipsamment	Regosol - imperfectly to poorly drained
Typic Ustipsamment	Regosol, Non-Calcic Brown Soil-imperfectly drained
Aquic Ustorthent	Regosol, Non-Calcic Brown Soil-imperfectly drained
Typic Ustorthent	Regosol, Non-Calcic Brown Soil-excessively and well drained

Table D.2.5 SUMMARY OF THE SOIL CLASSIFICATION

	F		H		IH		MH	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
1. Alluvial Soils	(600)	(11.3)	(2,600)	(2.9)	(500)	(7.0)	(3,700)	(6.4)
- well drained	500	9.4	900	1.0	0	0.0	100	0.1
- imperfect/poddy drained	100	1.9	1,700	1.9	500	7.0	3,600	6.3
2. Old Alluvial	0	0.0	0	0.0	0	0.0	0	0.0
3. Solonetz	0	0.0	0	0.0	0	0.0	600	1.0
4. Low Humic Gley Soils (LHG)	0	0.0	33,500	37.6	4,100	57.7	7,800	13.6
5. Raddish Brown Earth (RBE)	(4,100)	(77.4)	(47,600)	(53.3)	(1,800)	(25.4)	(42,200)	173.6
- well drained	3,300	62.3	47,600	53.3	1,500	21.1	31,600	55.1
- imperfectly drained	800	15.1	0	0.0	300	4.3	10,600	18.5
6. Red Yellow Podozolic Soils	100	1.9	0	0.0	0	0.0	0	0.0
7. Grumusols	0	0.0	0	0.0	0	0.0	0	0.0
8. Lithosols	500	9.4	5,500	6.2	300	4.2	2,300	4.0
9. Others	0	0.0	0	0.0	400	5.7	800	1.4
Total	5,300	100.0	89,200	100.0	7,100	100.0	57,400	100.0

	I		M		NW-1 (NWDZ)		Total	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
1. Alluvial Soils	(24,000)	(16.6)	(14,400)	(16.9)	(5,500)	(15.4)	(51,300)	(12.1)
- well drained	600	0.4	0	0.0	0	0.0	2,100	0.5
- imperfect/poddy drained	23,400	16.2	14,400	16.9	5,500	15.4	49,200	11.6
2. Old Alluvial	0	0.0	0	0.0	500	1.4	500	0.1
3. Solonetz	200	0.1	3,100	3.6	0	0.0	3,900	0.9
4. Low Humic Gley Soils (LHG)	33,900	23.5	4,600	5.4	6,000	16.9	89,900	21.2
5. Raddish Brown Earth (RBE)	(81,000)	(56.0)	(58,200)	(68.3)	(21,500)	(60.4)	(256,400)	(60.4)
- well drained	74,300	51.4	37,600	44.1	18,100	50.8	214,000	50.4
- imperfectly drained	6,700	4.6	20,600	24.2	3,400	9.6	42,400	10.0
6. Red Yellow Podozolic Soils	0	0.0	0	0.0	0	0.0	100	0.02
7. Grumusols	200	0.1	0	0.0	0	0.0	200	0.1
8. Lithosols	3,100	2.1	4,500	5.0	1,200	3.0	17,400	4.1
9. Others	2,100	1.5	500	0.5	900	2.5	4,700	1.1
Total	144,500	100.0	85,300	100.0	35,600	100.0	424,400	100.0

Table D.2.6 (1/8) SOIL CLASSIFICATION OF SYSTEM F
(SEMI-DETAILED SURVEY AREA)

Land Form	Map Symbol	Classification 1.National 2.Series 3.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain									
2.Flood Plain									
3.Bottomland									
4.Gently Undulating Plain									
	f1	1.R.B.E. 2.Padaukewa 3.Typic Haplustalf	0-2	deep	1.sandy loam 2.sandy clay loam	1.reddish brown 2.reddish brown	well to moderate	1	1,500
	f2	1.R.B.E. 2.Alutweaw 3.Typic Haplustalf	0-3	deep	1.sandy loam to sandy clay loam 2.sandy clay loam	1.brown 2.reddish brown to brown	well to moderate	2k	500
	f3	1.R.B.E. 2.Dasgiriya 3.Typic Haplustalf	0-4	deep	1.sandy loam 2.sandy clay loam	1.brown 2.reddish brown	well to moderate	2k	100
	f4	1.R.B.E. 2.Dasgiriya 3.Typic Haplustalf	0-4	shallow	1.gravelly sandy loam 2.very gravelly sandy loam	1.brown 2.brown	well	3kt	200
	f5	1.R.B.E. 2.Hambegamuwa 3.Aquic Haplustalf	0-2	moderate to deep	1.sandyn loam to sansy clay loam 2.sandy loam,sandy clay loam to clay	1.greyish brown 2.greyish brown	imperfect	2d	700
	f6	1.R.B.E. 2.Huratgawa 3.Tropaqualf	0-2	moderate to deep	1.sandyn loam to sansy clay loam 2.sandy loam,sandy clay loam to clay sandy clay loam (very gravelly from <30cm)	1.greyish brown 2.greyish brown	imperfect	4Rd	100
5. Undulating Plain									
	f7	1.Alluvial Soil 2.Mahaweli 3.Typic Ustifluvent	0-2	deep	1.sandy clay loam 2.sandy clay loam	1.yellowish brown 2.yellowish brown	imperfect	2d	100
	f8	1.Alluvial Soil 2.Mahaweli 3.Typic Ustifluvent	0-4	deep	1.sandy loam to sandy clay loam 2.sandy clay loam	1.orange 2.orange	well	2v	500
	f9	1.R.B.E. 2.Dasgiriya 3.Typic Haplustalf	2-8	moderate	1.sandy loam 2.sandy clay loam	1.brown 2.brown to reddish brown	well	2k	100
	f10	1.R.B.E. 2.Alutweaw 3.Typic Haplustalf	2-6	moderate	1.sandy loam 2.sandy clay to gravelly sandy clay loam	1.brown 2.reddish brown	well	2k	500
	f11	1.R.B.E. 2.Padaukewa 3.Typic Haplustalf	1-4	deep	1.sandy loam 2.sandy clay loam	1.reddish brown 2.reddish brown	well	1	100
	f12	1.R.B.E. 2.Etiliwewa 3.Typic Haplustalf	4-6	shallow	1.sandy loam 2.sandy clay loam (very gravelly from <30cm)	1.brown 2.brown to reddish brown	well well poor	3kt	tr.
	f13	1.Alluvial Soil 2.Hambegamuwa 3.Aquic Haplustalf	0-4	shallow moderate	1.sandy loam 2.sandy clay loam sandy loam	1.brown 2.brown	imperfect	3kt	tr.
	f14	1.Alluvial Soil 2.Mahaweli 3.Typic Ustifluvent	0-8	deep	1.sandy loam sandy clay loam 2.sandy loam sandy clay loam	1.orange 2.orange	well	2v	tr.
6.Hilly Undulating Plain									
	f15	1.R.B.E. 2.Etiliwewa 3.Typic Haplustalf	2-8	shallow	1.gravelly sandy clay loam 2.very gravelly sandy clay loam	1.brown 2.brown to reddish brown	well	6kb	200
	f16	1.R.B.E. 2.Dasgiriya 3.Typic Haplustalf	2-4	moderate to depp	1.sandy loam to sandy clay loam 2.very gravelly sandy clay loam	1.brown 2.brown to reddish brown	well	6kb	100
	f17	1.R.Y.P. 2.Typic Tropudulf	2-8	moderate to depp	1.sandy clay loam 2.sandy clay loam	1.red 2.yellow	well	3kt	100
7.Low Terrace									
8.Colluvial Plain									
9.Rock Out-crop									
	f18	1.Lithosol	steep	shallow	1.25-50%surface covered with rock)	-	-	6	500
Total									5,300

Remarks: tr.; Less than 50 ha.

Table D.2.6 (2/8) SOIL CLASSIFICATION OF SYSTEM H

Land Form	Map Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain			-	-	-	-	-	-	-
2.Flood Plain									
	h1	1.Alluvial soils 2.Typic Ustifulvent	0-0.5	deep	1.loamy sand 2.sandy loam	1.dark grey to dark reddish brown 2.brown to dark brown	well drained	2k	900
	h2	1.Alluvial soils 2.Aquic Ustifuluvent	0-0.5	deep	1.clay loam 2.fine sandy loam to sandy clay loam	1.dark grey to greyish brown 2.grey with mottle	imperfectly to poorly drained	2d	1,700
3.Bottomland									
	h3	1.L.H.G. 2.Typic Tropaqualf	0-0.5	deep	1.sandy loam 2.sandy clay loam	1.dark grayish brown 2.mottled yellowish brown	imperfectly drained	4Rd	20,100
	h4	1.L.H.G. 2.Typic Tropaqualf	0-0.5	deep	1.sandy loam 2.sandy clay loam feldspar dominant	1.dark grayish brown 2.mottled yellowish brown	imperfectly drained	4Rd	13,400
4.Gently Undulating Plain									
	h5	1.R.B.E. 2.Udic Rhodustalf	0-2	deep	1.sandy clay loam 2.gravelly sandy clay loam (gravelly from >90)	1.dark reddish brown 2.dark red	well drained	1	20,300
	h6	1.R.B.E. 2.Udic Rhodustalf	0-2	deep	1.sandy clay loam 2.gravelly sandy clay loam (gravelly from <90) feldspar dominant	1.dark reddish brown 2.dark red	well drained	1	19,400
5.Undulating Plain									
	h7	1.R.B.E. 2.Udic Rhodustalf	0-2	shallow	1.sandy clay loam 2.gravelly sandy clay loam (less than 25% of surface covered by rock)	1.dark reddish brown 2.dark red	well drained	4St	7,900
6.Hilly Undulating Plain			-	-	-	-	-	-	-
7.Low Terrace									
8.Colluvial Fan									
9.Rock Out-crop									
	h8	1.Lithosols	steep	shallow	1.more than 25% of the surface covered by rock	-	-	6b	5,500
Total									89,200

Table D.2.6 (3/8) SOIL CLASSIFICATION OF SYSTEM IH

Land Form	Map Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain			-	-	-	-	-	-	-
2.Flood Plain									
	ih1	1.Alluvial soils 2.Typic Ustifulvent	1-2	deep	1.sandy loam to loamy sand 2.sandy clay loam	1.yellowish brown to dull yellowish brown 2.Mn mottle and gley	imperfectly drained	2d	500
3.Bottomland									
	ih2	1.L.H.G. 2.Typic Tropaqualf	0-0.5	deep	1.sandy clay 2.clay with soft carbonate layer	1.very dark grey with mottle 2.groy (gley)	very poorly drained	4Rd	900
	ih3	1.L.H.G. 2.Typic Tropaqualf	1-2	deep	1.sandy clay loam 2.clay	1.very dark grey 2.very dark brown mottle	poorly drained	4Rd	3,200
4.Gently Undulating Plain									
	ih4	1.R.B.E. 2.Aquic Haplustalf	2-3	moderate to deep	1.sandy loam 2.sandy clay loam	1.yellowish brown 2.mottle and gley	imperfectly drained	3d	300
	ih5	1.R.B.E. 2.Udic Haplustalf	3-4	moderate to deep	1.heavy sandy clay loam 2.gravelly sandy sandy clay loam (quartz gravel)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2k	600
5.Undulating Plain									
	ih6	1.R.B.E. 2.Udic Haplustalf	3-4	shallow	1.heavy sandy clay loam 2.gravelly sandy sandy clay loam (very gravelly from 30-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2kt	400
	ih7	1.R.B.E. 2.Udic Haplustalf	3-4	shallow	1.heavy sandy clay loam 2.gravelly sandy sandy clay loam (very gravelly from <30cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	4stk	500
6.Hilly Undulating Plain			-	-	-	-	-	-	-
7.Lowterrace									
8.Colluvial Fan									
9.Rock Out-crop									400
10.Tank									300
Total									7,100

Table D.2.6 (4/8) SOIL CLASSIFICATION OF SYSTEM MH (EXISTING IRRIGATED AREA)

Land Form	Map Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain									
2.Flood Plain									
	mh1	1.Alluvial Soils 2.Typic Ustifluvent	0-2	deep	1.sandy loam 2.sandy loam	1.dark brown to yellowish red 2.dark yellowish brown	well drained	2v	60
	mh2	1.Alluvial Soils 2.Typic Tropaquent	0-2	deep	1.sandy clay to clay 2.sandy clay to clay	1.dark greyish brown to grey 1.dark greyish brown to grey	imperfectly to poorly drained	4Rd	750
3.Bottomland									
	mh3	1.L.H.G. 2.Tropaquent	0-1	deep	1.sandy clay loam 2.sandy clay loam (carbonate concretion)	1.grey and mottled 2.grey and mottled	poorly drained	4Rd	2,070
4.Gently Undulating Plain									
	mh4	1.R.B.E. 2.Aquic Haplustalf	0-3	deep	1.sandy clay loam 2.sandy clay to sandy clay loam (very gravelly from >50cm)	1.dark brown to reddish brown 2.grey with mottle	imperfectly drained	2d	1,050
	mh5	1.R.B.E. 2.Udic Haplustalf	0-4	deep	1.sandy clay loam 2.sandy clay to sandy clay loam	1.reddish brown to brown 2.red to brown	well drained	1	580
	mh6	1.R.B.E. 2.Udic Haplustalf	0-4	moderate	1.sandy clay loam 2.sandy clay to sandy clay loam (very gravelly from 50-90cm)	1.reddish brown to brown 2.red to brown	well drained	2k	1,740
	mh7	1.R.B.E. 2.Udic Haplustalf	0-4	shallow	1.sandy clay loam 2.sandy clay to sandy clay loam (very gravelly from 15-50cm)	1.reddish brown to brown 2.red to brown	well drained	3kt	510
	mh8	1.R.B.E. 2.Udic Haplustalf	0-4	shallow	1.sandy clay loam 2.sandy clay to sandy clay loam (very gravelly from <15cm)	1.reddish brown to brown 2.red to brown	well drained	4skt	60
5.Undulating Plain									
	mh9	1.R.B.E. 2.Udic Haplustalf	0-4	moderate	1.sandy clay loam 2.sandy clay to sandy clay loam (2-10% of surface covered with rock)	1.reddish brown to brown 2.red to brown	well drained	2kt	10
	mh10	1.R.B.E. 2.Udic Haplustalf	0-4	moderate	1.sandy clay loam 2.sandy clay to sandy clay loam (10-25% of surface covered with rock)	1.reddish brown to brown 2.red to brown	well drained	4stk	10
6.Hilly Undulating Plain									
7.Low Terrace									
8.Colluvial Plain									
9.Rock Out-crop									
	mh11	1.Lithosol	steep	shallow	1.25-50%surface covered with rock)	-	-	6	140
Total									6,980

Table D.2.6 (5/8) SOIL CLASSIFICATION OF SYSTEM MH (EXTENSION AREA)

Land Form	Map Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain									
2.Flood Plain	m3	1.Alluvial soils 2.Aquic Ustifuluvent	0-0.5	deep	1.sandy clay loam 2.sandy clay loam	1.very dark to dark greyish brown with brown mottle 2.grey	poorly drained	4Rd	2,900
3.Bottomland	m4	1.L.H.G. 2.Typic Tropaqualf	0-0.5	deep	1.sandy loam 2.sandy clay loam	1.very dark reddish brown,with mottle 2.grey (gley)	poorly drained	4Rd	5,700
	m5	1.R.B.E. 2.Aquic Haplustalf	0-2	deep	1.sandy loam 2.sandy clay loam	1.dark 2.mottled with dark gray to dark reddish brown	imperfectly drained	4Rd	9,500
	m6	1.Solonetz 2.Typic Natrustalf	0-0.5	deep	1.clay loam 2.sandy clay loam	1.dark to very dark brown 2.very dark brown	imperfectly drained	6sd	600
4.Gently Undulating Plain	m7	1.R.B.E. 2.Udic Rhodustalf	0-2	deep	1.sandy clay loam 2.clay loam to clay (gravely from>90cm)	1.dark reddish brown 2.dark red	well drained	1	1,700
	m8	1.R.B.E. 2.Udic Haplustalf	0-4	deep	1.sandy clay loam 2.sandy clay to clay (very gravely from 50-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2k	14,100
	m9	1.R.B.E. 2.Udic Haplustalf	2-4	deep	1.sandy clay loam 2.sandy clay to clay (very gravely from 30-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2kt	2,300
	m10	1.R.B.E. 2.Udic Haplustalf	2-4	deep	1.sandy clay loam 2.sandy clay to clay	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	3kt	2,100
5.Undulating Plain	m11	1.R.B.E. 2.Udic Haplustalf	4-8	moderate	1.sandy clay loam 2.sandy clay to clay (very gravely from 30-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	4stk	4,800
6.Hilly Undulating Plain	m12	1.R.B.E. 2.Udic Haplustalf	4-8	shallow	1.sandy clay loam 2.sandy clay to clay (very gravely from<40cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	6t	3,700
7.Low Terrace									
8.Colluvial Fan									
9.Rock Out-crop	m13	1.Lithosols	steep	shallow	1.more than 25% of the surface covered by rock	-	-	6b	2,200
10.Tank								6sd	800
Total									50,400

Table D.2.6 (6/8) SOIL CLASSIFICATION OF SYSTEM I

Land Map Form	Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain			-	-	-	-	-	-	-
2.Flood Plain									
	i1	1.Alluvial soils 2.Typic Ustifulvent	0-0.5	deep	1.loamy sand to sandy loam 2.loamy sand	1.dark to dark greyish brown 2.brown to dark brown,with mottle	moderately well and imperfectly drained	2d	600
	i2	1.Alluvial soils 2.Aquic Ustifuluvent	0-0.5	deep	1.sandy clay loam 2.sandy clay loam	1.very dark to dark greyish brown with brown mottle 2.grey	poorly drained	4Rd	23,400
3.Bottomland									
	i3	1.L.H.G. 2.Typic Tropaqualf	0-0.5	deep	1.sandy loam 2.sandy clay loam	1.very dark reddish brown,with mottle 2.grey (gley)	poorly drained	4Rd	33,900
	i4	1.R.B.E. 2.Aquic Haplustalf	0-2	deep	1.sandy loam 2.sandy clay loam	1.dark 2.mottled with dark gray to dark reddish brown	imperfectly drained	4Rd	6,700
	i5	1.Grumsol 2.Typic Pellusterts	0-0.5	moderate	1.sandy clay loam 2.sandy clay	1.black to dark grey 2.black	moderately well	4Rd	200
	i6	1.Solonetz 2.Typic Natrustalf	0-0.5	deep	1.clay loam 2.sandy clay loam	1.dark to very dark brown 2.very dark brown	imperfectly drained	6sd	200
4.Gently Undulating Plain									
	i7	1.R.B.E. 2.Udic Rhodustalf	0-2	deep	1.sandy clay loam 2.clay loam to clay (gravely from>90cm)	1.dark reddish brown 2.dark red	well drained	1	1,400
	i8	1.R.B.E. 2.Udic Haplustalf	0-4	deep	1.sandy clay loam 2.sandy clay to clay (very gravely from 50-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2k	47,900
	i9	1.R.B.E. 2.Udic Haplustalf	2-4	deep	1.sandy clay loam 2.sandy clay to clay (very gravely from 30-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2kt	23,400
	i10	1.R.B.E. 2.Udic Haplustalf	2-4	deep	1.sandy clay loam 2.sandy clay to clay	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	3kt	900
5.Undulating Plain									
	i11	1.R.B.E. 2.Udic Haplustalf	4-8	moderate	1.sandy clay loam 2.sandy clay to clay (very gravely from 30-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	4stk	700
6.Hilly Undulating Plain			-	-	-	-	-	-	-
7.Low Terrace									
8.Colluvial Fan									
9.Rock Out-crop									
	i12	1.Lithosols	steep	shallow	1.more than 25% of the surface covered by rock	-	-	6b	3,100
10.Tank								6	2,100
Total									144,500

Table D.2.6 (7/8) SOIL CLASSIFICATION OF SYSTEM M

Land Form	Map Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain									
	m1	1.Solonetz 2.Typic Natrustalf	0-0.5	deep	1.clay loam 2.sandy clay loam	1.dark to very dark brown 2.very dark brown	imperfectly to poorly drained	6sd	1,400
2.Flood Plain									
	m2	1.Alluvial soils 2.Typic Ustifulvent	0-0.5	deep	1.loamy sand to sandy loam 2.loamy sand	1.dark to dark greyish brown 2.brown to dark brown,with mottle	moderately well and imperfectly drained	2d	600
	m3	1.Alluvial soils 2.Aquic Ustifuluvent	0-0.5	deep	1.sandy clay loam 2.sandy clay loam	1.very dark to dark greyish brown with brown mottle 2.grey	poorly drained	4Rd	13,800
3.Bottomland									
	m4	1.L.H.G. 2.Typic Tropaqualf	0-0.5	deep	1.sandy loam 2.sandy clay loam	1.very dark reddish brown,with mottle 2.grey (gley)	poorly drained	4Rd	4,600
	m5	1.R.B.E. 2.Aquic Haplustalf	0-2	deep	1.sandy loam 2.sandy clay loam	1.dark 2.mottled with dark gray to dark reddish brown	imperfectly drained	4Rd	20,600
	m6	1.Solonetz 2.Typic Natrustalf	0-0.5	deep	1.clay loam 2.sandy clay loam	1.dark to very dark brown 2.very dark brown	imperfectly drained	6sd	1,700
4.Gently Undulating Plain									
	m8	1.R.B.E. 2.Udic Haplustalf	0-4	deep	1.sandy clay loam 2.sandy clay to clay (very gravely from 50-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	2k	26,400
	m10	1.R.B.E. 2.Udic Haplustalf	2-4	deep	1.sandy clay loam 2.sandy clay to clay	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	3kt	900
5.Undulating Plain									
	m11	1.R.B.E. 2.Udic Haplustalf	4-8	moderate	1.sandy clay loam 2.sandy clay to clay (very gravely from 30-70cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	4stk	9,400
6.Hilly Undulating Plain									
	m12	1.R.B.E. 2.Udic Haplustalf	4-8	shallow	1.sandy clay loam 2.sandy clay to clay (very gravely from<40cm)	1.dark brown to dark reddish brown 2.dark red to reddish brown	well drained	6t	900
7.Low Terrace									
8.Colluvial Fan									
9.Rock Out-crop									
	m13	1.Lithosols	steep	shallow	1.more than 25% of the surface covered by rock	-	-	6b	4,500
10.Tank								6	500
Total									85,300

Table D.2.6 (8/8) SOIL CLASSIFICATION OF NWDZ (NW-1)

Land Form	Map Symbol	Classification 1.National 2.USDA	Range of Slope(%)	Effective Soil Depth	Texture 1.Surface 2.Sub-surface	Colour Plofile 1.Surface 2.Sub-surface	Drainage Condition	USBR Land Class	Extent (ha)
1.Coastal Plain									
2.Flood Plain									
	mi5	1.Alluvial Soils 2.Typic Tropaquent	0-2	deep	1.sandy clay loam 2.sandy clay to clay	1.dark greyish brown to grey with mottle 2.dark greyish brown to grey	imperfectly to poorly drained	4Rd	2,200
	mi6	1.Alluvial Soils 2.Typic Tropaquept	0-2	deep	1.sandy loam to sand 2.sandy clay loam to clay	1.dark brown (gret) 2.brown and grey mottle	poorly drained	4Rd	3,300
3.Bottomland									
	mi7	1.Old Alluvial 2.Abruptic Tropaqualf	0-1	moderate	1.coarse sand 2.gravely sandy clay loam to clay	1.pinkish grey 2.light brownish grey with mottle	imperfect /poor	4Rdv	500
	mi9	1.L.H.G. 2.Tropaquent	0-1	deep	1.sandy clay loam 2.clay	1.grey and mottled 2.grey and mottled	poorly drained	4Rd	5,400
	mi10	1.L.H.G. 2.Tropic Fluvaquent	0-2	deep	1.sandy to sandy loam 2.sandy clay loam	1.grey and mottled 2.grey and mottled	poorly drained	4Rd	600
	mi11	1.Old Alluvial 2.Typic Psammaquent	0-2	deep	1.sand to sandy loam 2.sand to sandy loam	1.pinkish grey to grey 2.pinkish grey to grey	poor	4Rdv	0
4.Gently Undulating Plain									
	mi14	1.R.B.E. 2.Udic Haplustalf	0-4	deep	1.sandy clay loam 2.sandy clay to sandy clay loam	1.reddish brown to brown 2.red to brown	well drained	1	15,700
	mi15	1.R.B.E. 2.Aquic Haplustalf	0-3	deep	1.sandy clay loam 2.sandy clay to sandy clay loam	1.dark brown to yellowish brown 2.grey with mottle	imperfectly drained	2d	3,400
	mi16	1.R.B.E. 2.Udic Haplustalf	0-4	shallow	1.sandy clay loam 2.sandy clay to	1.reddish brown to brown	well drained	2k	2,400
5.Undulating Plain			-	-	-	-	-	-	-
6.Hilly Undulating Plain					clay loam	2.yellowish red			
7.Low Terrace									
8.Colluvial Fan									
9.Rock Out-crop									
	mi27	1.Lithosol	steep	shallow	1.25-50%surface	-	-	6	2,100
Total									35,600

Table D.3.1 PRESENT LAND USE

Land Use Category	F (ha)	F (%)	H (ha)	H (%)	IH (ha)	IH (%)	MH (ha)	MH (%)
1.Agricultural Land	3,000	56.6	72,200	80.9	5,900	81.0	21,900	38.2
1.1 Paddy	1,200	22.6	58,300	65.3	5,900	81.0	8,300	14.5
-irrigated	600	11.3	58,100	65.1	5,900	81.0	7,500	13.1
-rainfed	600	11.3	200	0.2	0	0.0	800	1.4
1.2 Upland	1,800	34.0	13,700	15.4	0	0.0	11,300	19.7
1.3 Perennial Crop	0	0.0	200	0.2	0	0.0	2,300	4.0
2.Homestead	600	11.3	15,400	17.4	1,100	17.5	1,600	2.8
3.Forest	1,700	32.1	200	0.2	0	0.0	6,500	11.3
4.Shrub	0	0.0	400	0.4	100	1.5	22,600	39.4
5.Urban Area	0	0.0	100	0.1	0	0.0	300	0.5
6.Tank	0	0.0	700	0.8	0	0.0	300	0.5
7.Barren Land	0	0.0	200	0.2	0	0.0	4,200	7.3
8.Marsh	0	0.0	0	0.0	0	0.0	0	0.0
Total	5,300	100.0	89,200	100.0	7,100	100.0	57,400	100.0

Land Use Category	I (ha)	I (%)	M (ha)	M (%)	NW-1 (NWDZ) (ha)	NW-1 (NWDZ) (%)	Total (ha)	Total (%)
1.Agricultural Land	65,100	45.1	23,500	27.6	12,100	34.0	203,700	48.0
1.1 Paddy	20,800	14.4	3,200	3.8	3,700	10.4	101,400	23.9
-irrigated	20,200	14.0	3,200	3.8	3,200	9.0	98,700	23.3
-rainfed	600	0.4	0	0.0	500	1.4	2,700	0.6
1.2 Upland	44,000	30.5	19,800	23.2	8,300	23.3	98,900	23.3
1.3 Perennial Crop	300	0.2	500	0.6	100	0.3	3,400	0.8
2.Homestead	6,600	4.6	900	1.1	500	1.4	26,700	6.3
3.Forest	58,700	40.5	34,400	40.3	22,600	63.5	124,100	29.2
4.Shrub	6,800	4.7	17,000	19.9	400	1.1	47,300	11.1
5.Urban Area	100	0.1	100	0.1	0	0.0	600	0.1
6.Tank	6,800	4.7	500	0.6	0	0.0	8,300	2.0
7.Barren Land	400	0.3	7,800	9.1	0	0.0	12,600	3.0
8.Marsh	0	0.0	1,100	1.3	0	0.0	1,100	0.3
Total	144,500	100.0	85,300	100.0	35,600	100.0	424,400	100.0

Table D.4.1 SPECIFICATIONS FOR LAND CLASSIFICATION

Land Characteristics	Class 1 - Arable	Class 2 - Arable	Class 3 - Arable
		Soils	
Texture	Sand loam to friable clay loam	Loamy sand to very permeable clay	Loamy sand to permeable clay
Depth (measurements in cm): To sand, gravel or cobble	90 plus - good free working soil of fine sandy loam or finer; or 105 of sandy loam	60 plus - good free working soil of fine sandy loam of finer; or 75-90 of sandy loam to loamy sand	45 plus - good free working soil of fine sandy loam of finer; or 60 to 75 of coarser-textured soil
To shale, raw soil from shale or similar material (15 less in each to rock and similar material)	150 plus; or 135 with minimum of 15 of gravel overlying impervious material or sandy loam throughout	120 plus; or 105 with minimum of 15 of gravel overlying impervious material or loamy sand throughput	105 plus; or 90 with minimum of 15 of gravel overlying impervious material or loamy sand throughout
To penetrable lime zone	45 with 150 penetrable	35 with 120 penetrable	25 with 90 penetrable
Alkalinity	pH 9.0 or less, unless soil is calcareous, total salts are low and evidence of black alkali is absent	pH 9.0 or less, unless soil is calcareous, total salts are low and evidence of black alkali is absent	pH 9.0 or less, unless soil is calcareous, total salts are low and evidence of black alkali is absent
Salinity	Total salts not to exceed 0.2%. May be higher in open permeable soils and under good drainage conditions	Total salts not to exceed 0.5%. May be higher in open permeable soils and under good drainage conditions	Total salts not to exceed 0.5%. May be higher in open permeable soils and under drainage conditions
		Topography	
Slopes	Smooth slopes up to 4% in general gradient in reasonably large-size bodies sloping in the same plane	Smooth slopes up to 8% in general gradient in reasonably large-size bodies sloping in the same plane; or rougher slopes which are <4% in general gradient	Smooth slopes up to 12% in general gradient in reasonably large-size bodies sloping in the same plane; or rougher slopes which are <8% in general gradient
Surface	Even enough to require only small amount of levelling and no heavy grading	Moderate grading required but in amounts found feasible at reasonable cost in comparable irrigated area	Heavy and expensive grading required in spots but in amounts found feasible in comparable irrigated areas
Cover (loose rocks and vegetation)	Insufficient to modify productivity or cultural practices, or clearing cost small	Sufficient to reduce productivity and interfere with cultural practices. Clearing required but at moderate cost	Present in sufficient amounts to require expensive but feasible clearing
		Drainage	
Soil and topography	Soil and topographic conditions such that no specific farm drainage requirement is anticipated	Soil and topographic conditions such that some farm drainage will probably be required but with reclamation by artificial means appearing feasible at reasonable cost	Soil and topographic conditions such that significant farm drainage wil probably be required but with reclamation by artificial means appearing expensive but feasible

Class 4 - Limited arable

Include lands having excessive deficiencies and restricted utility but which special economic and engineering studies have shown to be irrigable

Class 5 - Non-arable

Includes lands which will require additional economic and engineering studies to determine their irrigability and lands classified as temporarily non-productive pending construction of corrective works and reclamation

Class 6 - Non-arable

Includes lands which do not meet the minimum requirements of the next higher class mapped in a particular survey and small areas or arable land lying within larger bodies of non-arable land

Table D.4.2 LAND CLASSIFICATION

Land Class	Sub-Class	F (ha)	F (%)	H (ha)	H (%)	IH (ha)	IH (%)	MH (ha)	MH (%)
1		1,600	30.2	39,700	44.4	0	0.0	2,300	3.4
2	d	800	15.1	1,700	1.9	500	7.0	1,100	0.0
	k	1,200	22.6	900	1.0	600	8.5	15,800	28.0
	kt	0	0.0	0	0.0	400	5.6	2,300	4.6
	v	500	9.4	0	0.0	0	0.0	100	0.0
3	d	0	0.0	0	0.0	300	4.2	0	0.0
	kt	300	5.7	0	0.0	0	0.0	2,600	4.2
4	Rd	100	1.9	33,500	37.6	4,100	57.7	20,900	35.8
	Rdv	0	0.0	0	0.0	0	0.0	0	0
	Stk	0	0.0	7,900	8.9	500	7.0	4,900	9.5
6	b	300	5.7	5,500	6.2	0	0.0	2,300	4.4
	s	0	0.0	0	0.0	0	0.0	0	0.0
	sd	0	0.0	0	0.0	700	10.0	1,400	2.8
	t	500	9.4	0	0.0	0	0.0	3,700	7.3
Total		5,300	100.0	89,200	100.0	7,100	100.0	57,400	100.0

Land Class	Sub-Class	I (ha)	I (%)	M (ha)	M (%)	NW-1 (NWDZ) (ha)	NW-1 (NWDZ) (%)	Total (ha)	Total (%)
1		1,400	1.0	0	0.0	15,700	44.1	60,700	14.3
2	d	600	0.4	600	0.7	3,400	9.6	8,700	2.0
	k	47,900	33.1	26,400	30.9	2,400	6.7	95,200	22.4
	kt	23,400	16.2	0	0.0	0	0.0	26,100	6.1
	v	0	0.0	0	0.0	0	0.0	600	0.1
3	d	0	0.0	0	0.0	0	0.0	300	0.1
	kt	900	0.6	900	1.1	0	0.0	4,700	1.1
4	Rd	64,200	44.4	39,000	45.7	11,500	32.3	173,300	41.0
	Rdv	0	0.0	0	0.0	500	1.4	500	0.1
	Stk	700	0.5	9,400	11.0	0	0.0	23,400	5.5
6	b	3,100	2.1	4,500	5.3	0	0.0	15,700	3.7
	s	2,100	1.5	0	0.0	0	0.0	2,100	0.5
	sd	200	0.1	3,600	4.2	900	2.5	6,800	1.6
	t	0	0.1	900	1.1	1,200	3.4	6,300	1.5
Total		144,500	100.0	85,300	100.0	35,600	100.0	424,400	100.0

FIGURES

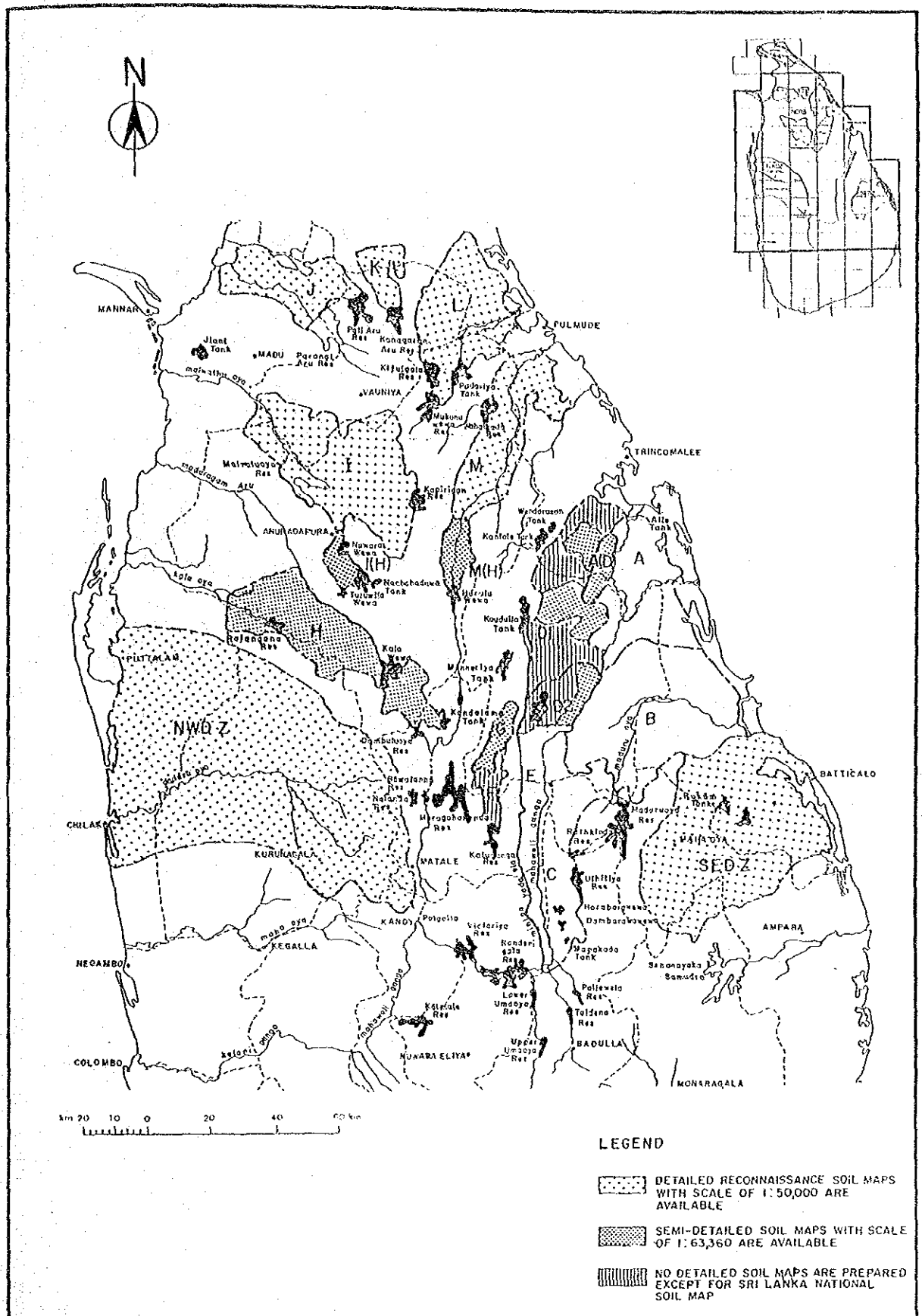

Fig. D.1-1 Available Soil Survey Information in the Study Area

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THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT

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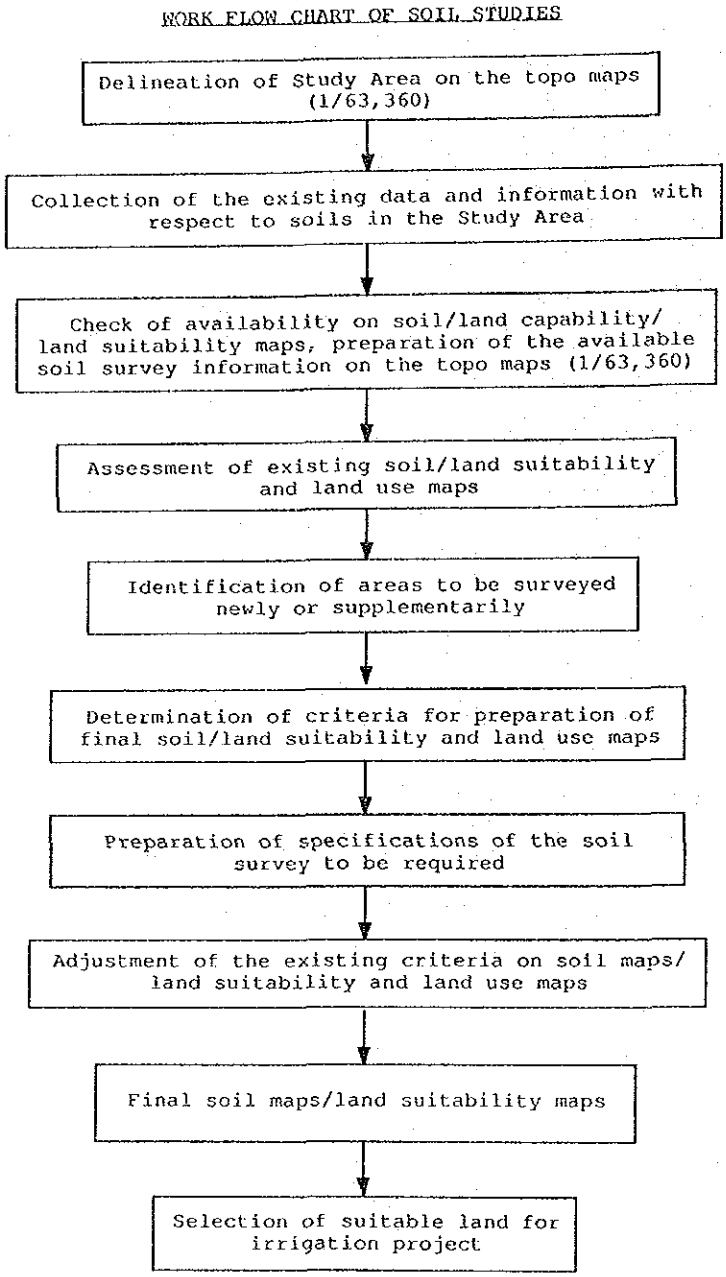

Fig. D.1-2 Work Flow Chart of Soil Studies

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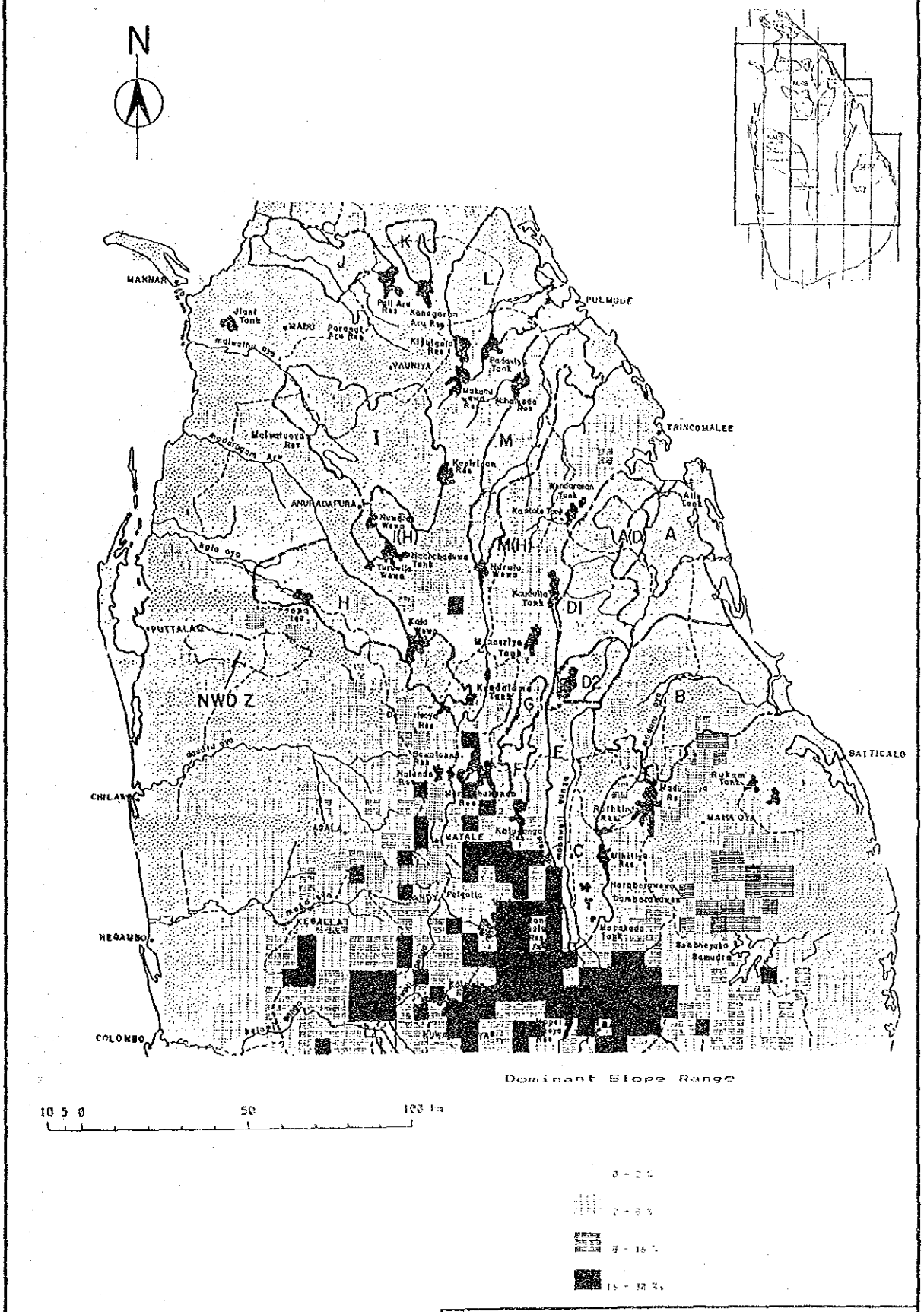

Fig. D.2-1 Slope Classification Map

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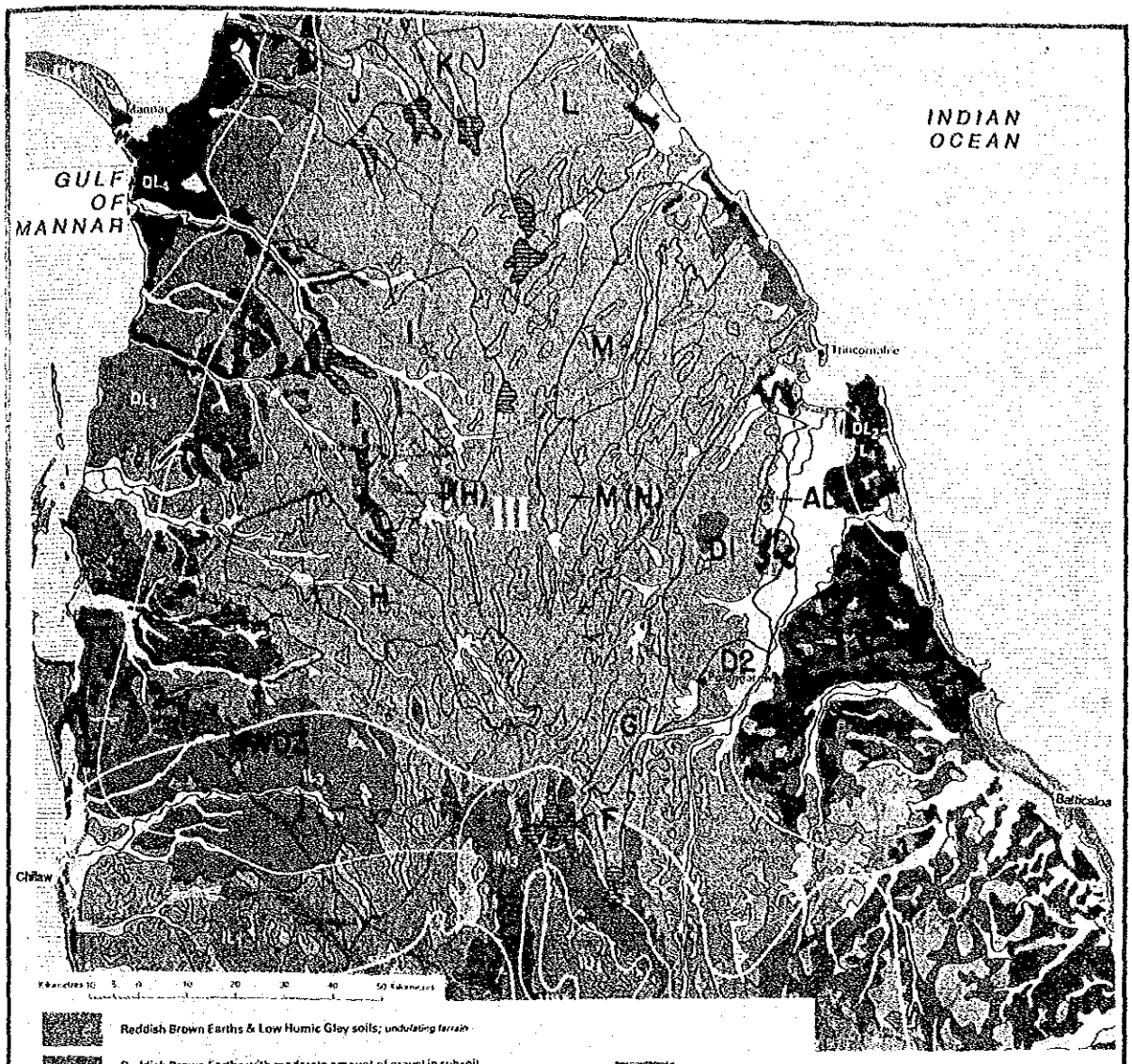

Fig. D.2-2 National Soil Classification Map

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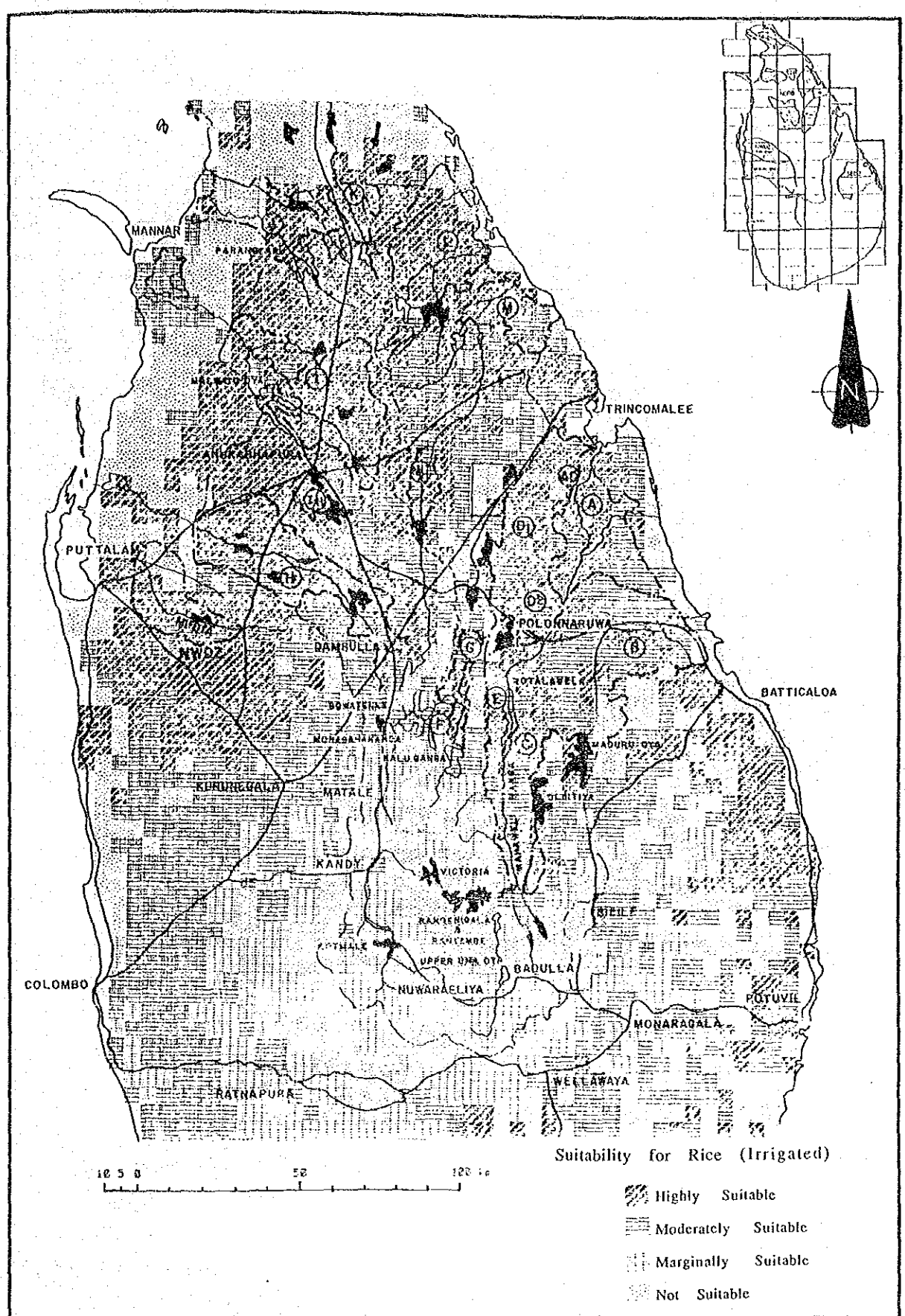

Fig. D.4-1 Crop Suitability Map (Irrigated Rice)

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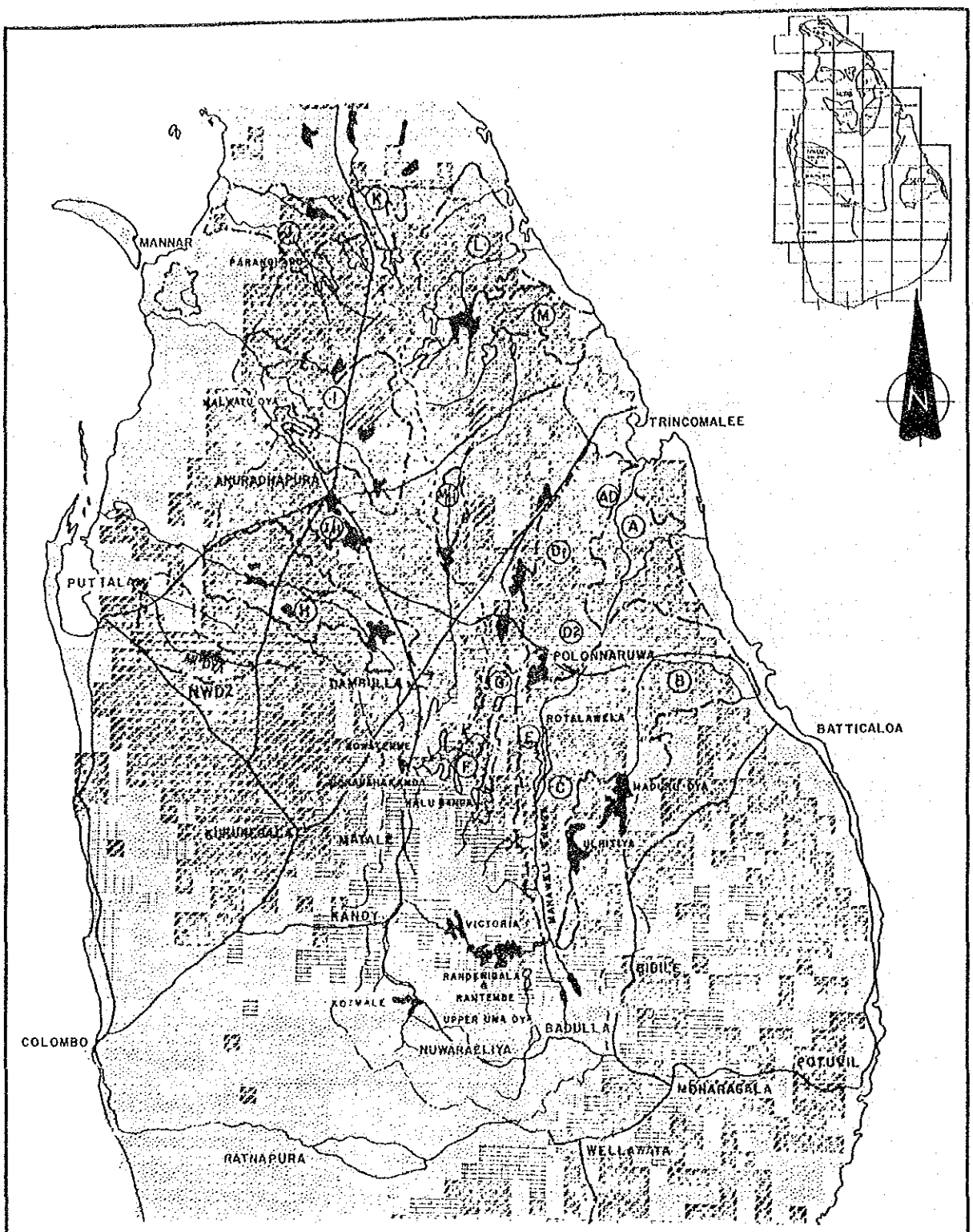

Suitability for Chillies (Irrigated)

- Highly Suitable
- Moderately Suitable
- Marginally Suitable
- Not Suitable

Fig. D.4-2 Crop Suitability Map (Irrigated Chillies)

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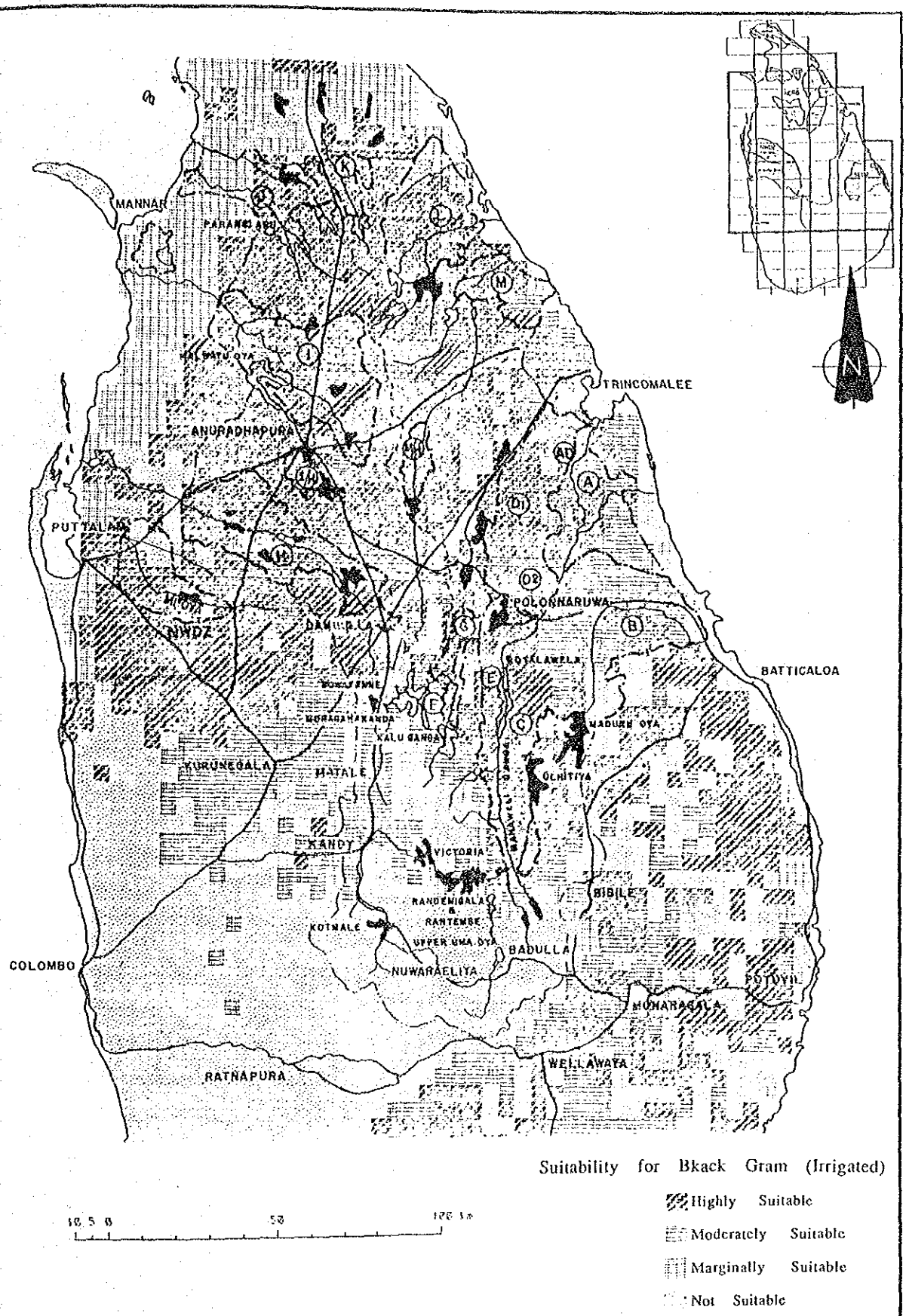

Fig. D.4-3 Crop Suitability Map (Irrigated Black Gram)

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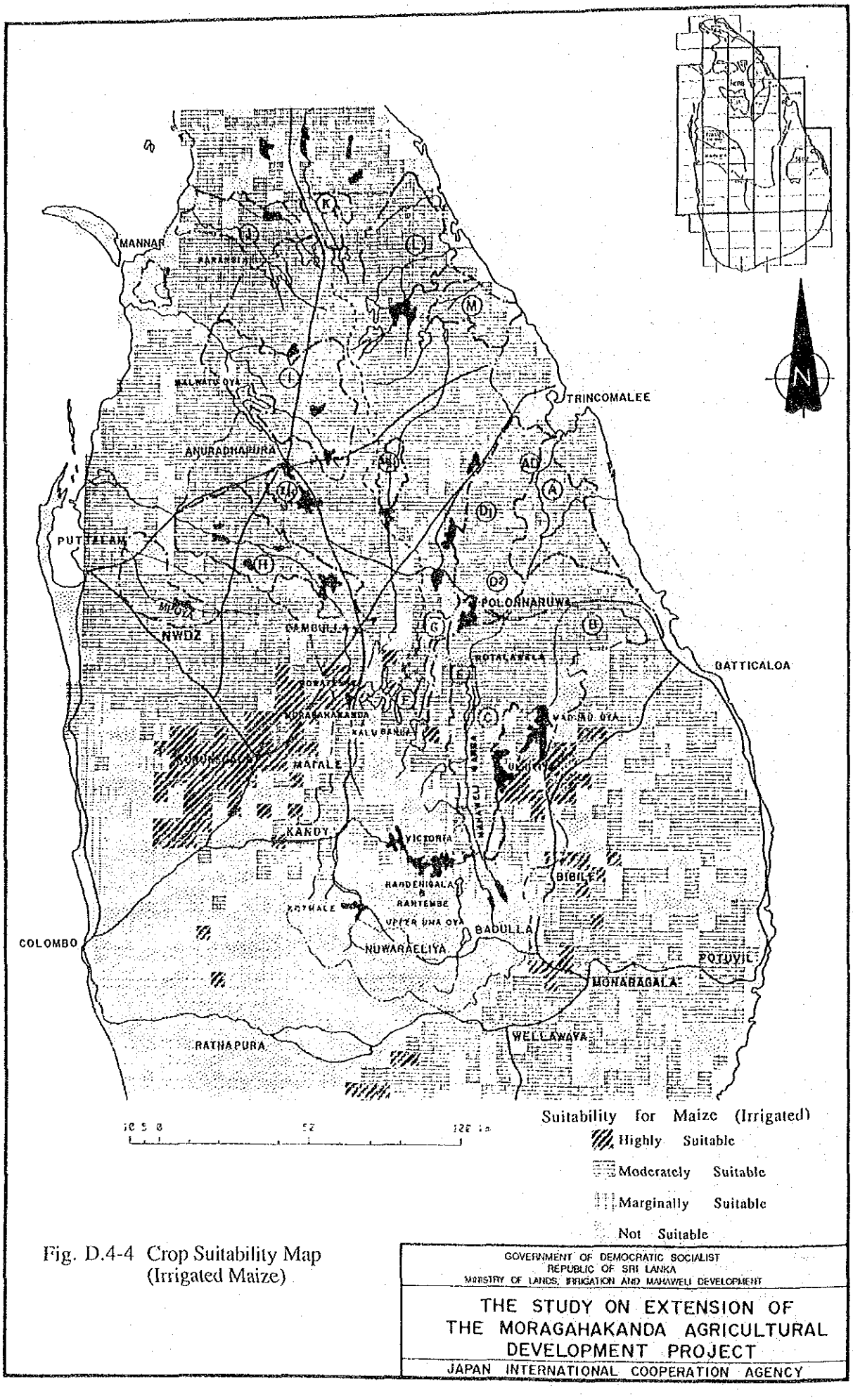

Fig. D.4-4 Crop Suitability Map (Irrigated Maize)

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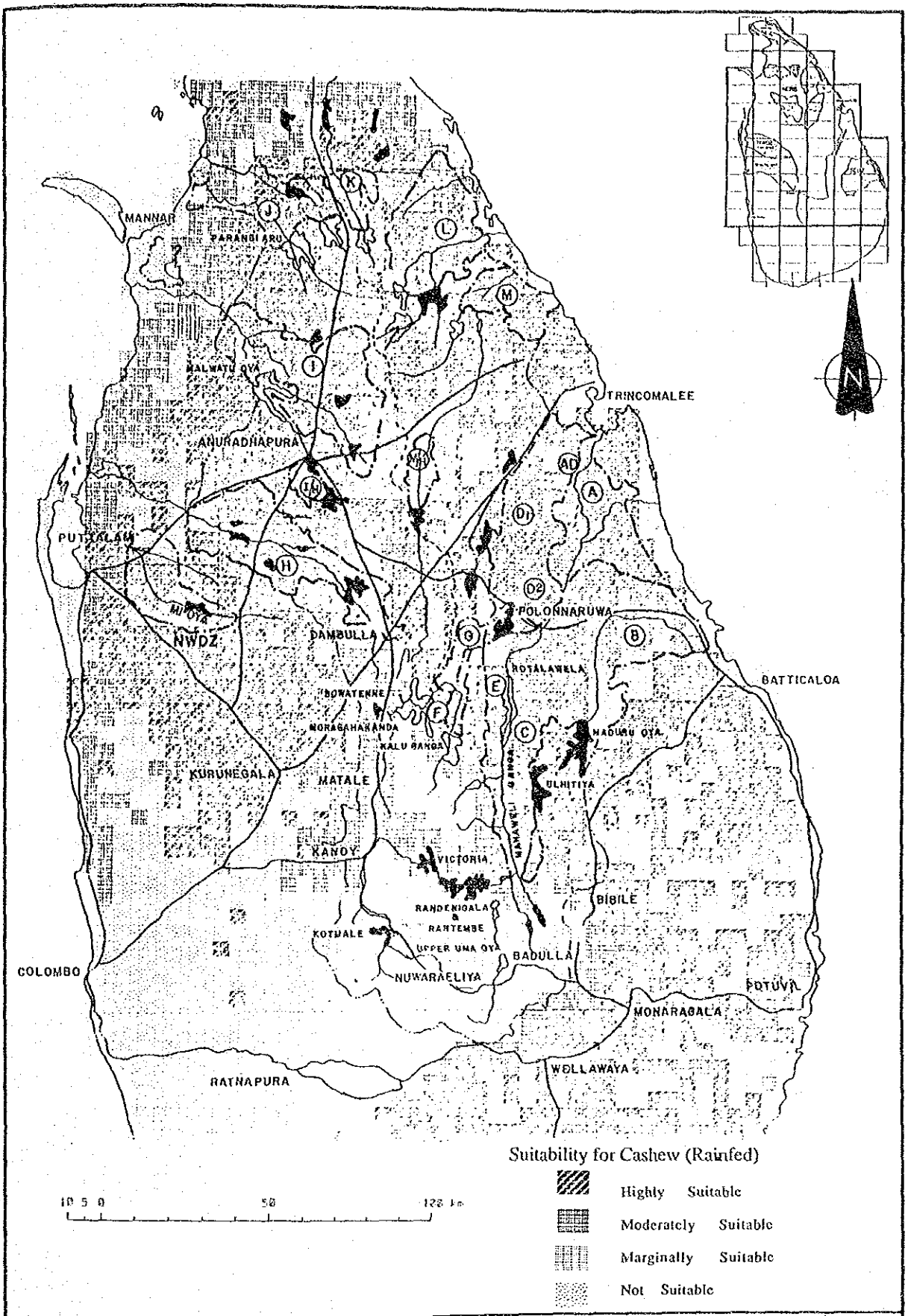

Fig. D.4-5 Crop Suitability Map (Rainfed Cashew)

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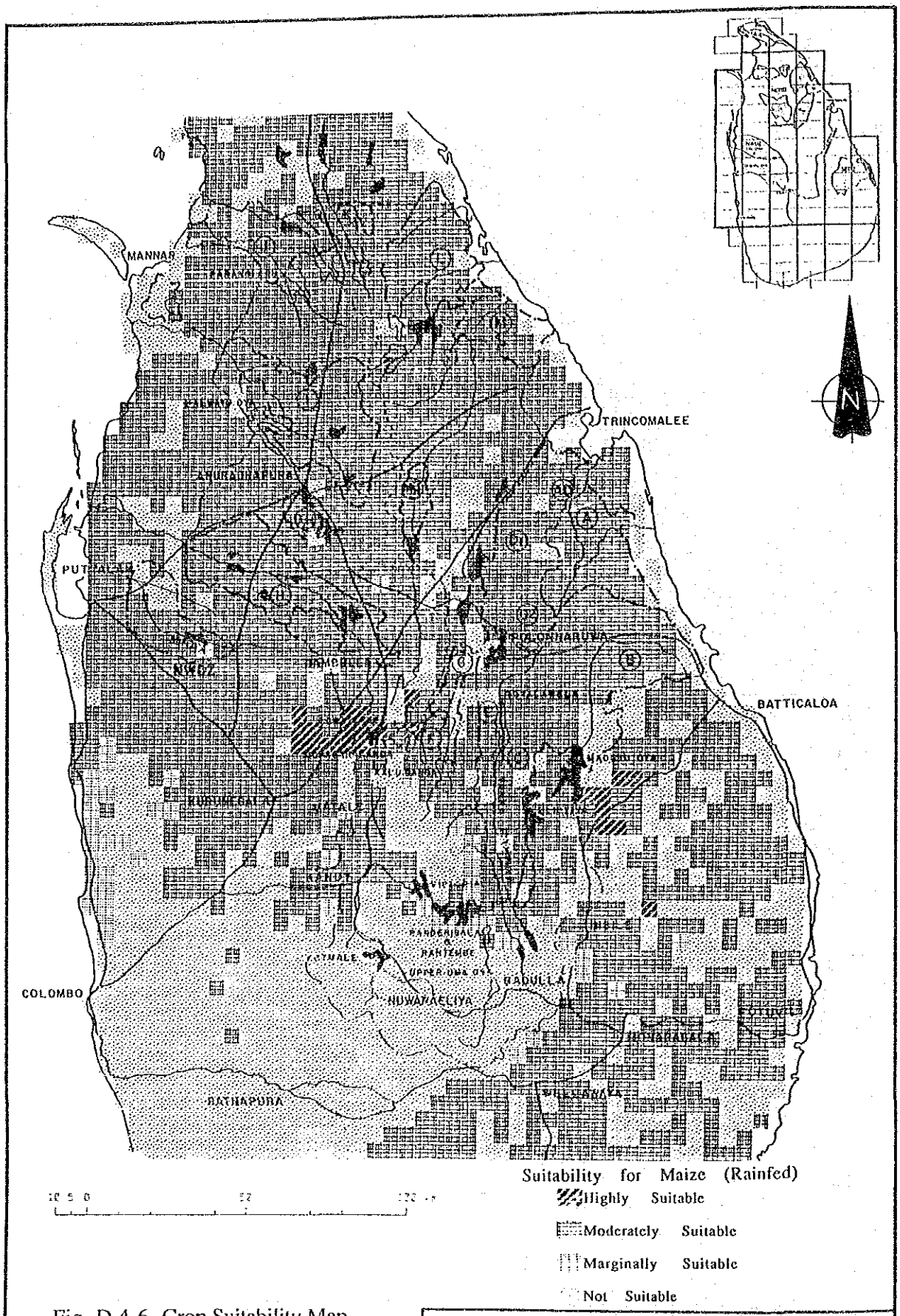

Fig. D.4-6 Crop Suitability Map (Rainfed Maize)

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