DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

MINISTRY OF MAHAWELI DEVELOPMENT

THE STUDY ON EXTENSION OF THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT

UPDATING THE FEASIBILITY STUDY

VOLUME-III ANNEX

PHASE-I

MAY 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

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REPORT

ABBREVIATIONS

CB	Central Bank of Sri Lanka
CEB	Ceylon Electricity Board
CECB	Central Engineering Consultancy Bureau
CISIR	Central Institute for Scientific and Industrial Research
DA	Department of Agriculture
DCS	Department of Census and Statistics
FAO	Food and Agriculture Organization - United Nations
FD	Forest Department
GDP	Gross Domestic Product
GNP	Gross National Product
GOJ	Government of Japan
GOSL	Government of Sri Lanka
IBRD	International Bank for Reconstruction and Development (World Bank)
ID	Irrigation Department
IDB	Industrial Development Board
JICA	Japan International Cooperation Agency
MADR	Ministry of Agricultural, Development and Research
MASL	Mahaweli Authority of Sri Lanka
MEA	Mahaweli Economic Agency
MECA	Mahaweli Engineering and Construction Agency
MFP	Ministry of Finance and Planning
MLLD	Ministry of Lands and Land Development
MMD	Ministry of Mahaweli Development
MTI	Ministryof Trade and Industries
NCDZ	North Central Dry Zone
NCP	North Central Province
NCRB	North Central River Basin
NWDZ	North-Western Dry Zone
RVDB	River Valley Development Board
SEDZ	South-Eastern Dry Zone
SD	Survey Department
UNDP	United Nations Development Programme
WMP	Water Management Secretariat
GA	Government Agent Division

AGA	Assistant Government Agent Division
GS	Grama Sevaka Division
T&V	Training and Visit System
KVS	Kursi Vapthi Sevaka (GS level instructor)
CRCS	Comprehensive Rural Credit Scheme
MPCS	Multi-Purpose Co-operative Societies
ASC	Agrarian Service Centre
NCRCS	New Comprehensive Rural Credit Scheme
AI	Agricultural Instructor
PMB	Paddy Marketing Board
MRKFED	Co-operative Marketing Federation
FCD	Food Commissioner's Department
CWE	Co-operative Wholesale Establishment

REPORT

MGDP	Master Plan of Mahaweli Ganga Development Project (UNDP/FAO, 1968)
AMDP	Accelerated Mahaweli Development Programme (NEDECO, 1977)
ISS	Implementation Strategy Study (NEDECO, 1978)
HCP	Hydrological Crash Programme (NEDECO, 1981)
TDS	Transbasin Diversion Study (Electrowatt, 1981 & 1984)
MWRMP	Mahaweli Water Resources Management Project (ACRES, 1986)

ABBREVIATIONS OF MEASUREMENT

Length

mm = Millimeter
cm = Centimeter
m = Meter
km = Kilometer
ft = Foot
yd = Yard

Area

cm^2 = sq.cm = Square centimeter
m^2 = sq.m = Square meter
ha = Hectare
km^2 = sq.km = Square kilometer

Volume

cm^3 = cu.cm = Cubic centimeter
l = lit = liter
kl = Kiloliter
m^3 = cu.m = Cubic meter
gal. = Gallon
MCM = Million Cubic Meters

Weight

mg = Milligram
g = Gram
kg = Kilogram
ton = Metric ton
lb = Pound

Time

sec = s = Second
min = Minute
h = Hour
d = Day
y = Year

Electrical Measures

V = Volt
A = Ampere
Hz = Hertz (cycle)
W = Watt
kW = Killowatt
MW = Megawatt
GW = Gigawatt

Other Measures

% = Percent
PS = Horsepower
° = Degree
' = Minute
" = Second
°C = Degree centrigrade
10^3 = Thousand
10^6 = Million
10^9 = Billion (milliard)

Dirived Measures

m^3/s = m^3/sec = Cubic meter per second
cusec = Cubic feet per second
mgd = Million gallon per day
kWh = Kilowatt hour
MWh = Megawatt hour
GWh = Gigawatt hour
kWh/y = Kilowatt hour per year
kVA = Kilovolt ampere
BTU = British thermal unit

Money

Rs. = Sri Lanka Rupees
US$ = US dollar
Yen = Japanese Yen

CONVERSION FACTORS

	From Metric System			To Metric System		
Length	1 cm	=	0.394 inch	1 inch	=	2.54 cm
	1 m	=	3.28 ft = 1.094 yd	1 ft	=	30.48 cm
	1 km	=	0.621 mile	1 yd	=	91.44 cm
				1 mile	=	1.609 km
Area	1 cm^2	=	0.155 sq.in	1 sq.ft	=	0.0929 m^2
	1 m^2	=	10.76 sq.ft.	1 sq.yd	=	0.835 m^2
	1 ha	=	2.471 acres	1 acre	=	0.4047 ha
	1 km^2	=	0.386 sq.mile	1 sq.mile	=	2.59 km^2
Volume	1 cm^3	=	0.0610 cu.in	1 cu.ft	=	28.32 lit
	1 lit	=	0.220 gal. (imp.)	1 cu.yd	=	0.765 m^3
	1 kl	=	6.29 barrels	1 gal. (imp.)	=	4.55 lit
	1 m^3	=	35.3 cu.ft	1 gal. (US)	=	3.79 lit
	10^6 m^3	=	811 acre-ft	1 acre-ft	=	1,233.5 m^2
Energy	1 kWh	=	3,413 BTU	1 BTU	=	0.293 Wh
Temperature	°C	=	(°F-32) 5/9	°F	=	1.8°C + 32
Derived Measures						
	1 m^3/s	=	35.3 cusec	1 cusec	=	0.0283 m^3/s
	1 kg/cm^2	=	14.2 psi	1 psi	=	0.703 kg/cm^2
	1 ton/ha	=	891 lb/acre	1 lb/acre	=	1.12 kg/ha
	10^6 m^3	=	810.7 acre-ft	1 acre-ft	=	1,233.5 m^3
	1 m^3/s	=	19.0 mgd	1 mgd	=	0.0526 m^3/s

EXCHANGE RATE

US$1.0 = J. Yen 140.0 = Rs. 30.5

ANNEX - G

POWER GENERATION

ANNEX - G

POWER GENERATION

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ANNEX-G POWER GENERATION

G.1 POWER MARKET

G.1.1 Organization

The entire public power supply system in Sri Lanka is undertaken by the Ceylon Electricity Board (CEB) as the statutory Authority of the Government. The CEB is presently supplying electric power and energy to consumers both directly and indirectly through the Lanka Electricity Company (LECO). The LECO was established in 1983 to take over and improve the retail supply of power within municipalities, previously handled by 218 local authorities, who obtained bulk supplies from the CEB.

The organization structure of the CEB as of February 1988 is shown in Fig. G.1-1. The CEB is managed by General Manager under the supervision of 8 member Board of Directors. The CEB has the following six departments besides managertal organization; Commercial, Generation Group, Region A, Region B, Transmission and Generation Projects, and Transmission and Generation Planning. Each department is controlled by Additional General Manager or Deputy General Manager.

G.1.2 Existing Power Supply System

The Sri Lanka power supply system (CEB System) is predominantly dependent on hydropower. Thermal powerplants are used for backing up the hydro-shortfalls and to tide over interim periods between commissioning of hydropower plants. There are the following two existing hydropower complexes in Sri Lanka; Kehalgamu-Maskeli Complex and Mahaweli Complex. The hydropower plants in the Kehelgamu-Maskeli Complex are situated in the South West Monsoon region and gets the major portion of its water supply during the months from May through September. The hydropower plants in the Mahaweli Complex receives most of its water supply from the North-East (October to March) monsoon.

The total installed capacity of generating facilities owned by CEB has reached 1,116 MW in 1988, consisting of 916 MW of hydropower plants and 200 MW of thermal powerplants. Out of the said facilities, hydropower plants could generate 3,682 GWh under normal hydrological conditions, supplemented by a firm thermal availability of 1,265 GWh, according to the CEB's estimates. Under very dry conditions, hydro energy reduces to a firm level of 2,538 GWh, giving a firm energy output of 3,803 GWh with thermal energy. The list of the existing powerplants are given in Table G.1.1. The location of powerplants is shown in Fig. G.1-2.

The transmission network in Sri Lanka uses voltages of 220 kV, 132 kV and 66 kV. Voltages of 220 kV and 132 kV are employed for the trunk lines and voltage of 66 kV is applied for short distance only. The length of tranamission lines was 1,639 km as of the end of 1985, consisting of 133 km of 220 kV line, 1,167 km of 132 kV line and

339 km of 66 kV line, as shown in Table G.1.2. The transmission network is presented in Fig. G.1-2.

There were 31 grid substations as of the end of 1985, of which 2 are operated with a primary voltage of 220 kV, 21 with 132 kV. Primary distribution is made by 33 kV and 11 kV lines and their lengths as of 1985 are 7,909 km and 1,145 km respeceively.

Load dispatching in the Sri Lanka generation and transmission system is centralized at the CEB System Control Center located at Kolonnawa.

G.1.3 Present Power Demand

The power demand of the CEB system in 1986 is summarized as follows:

Sold energy (GWh)	2,231	
- Domestic and religions	369	(16.5%)
- Small and medium industries	480	(21.5%)
- Heavy industries	445	(20.0%)
- Commercial and hotels	381	(17.1%)
- Local authorities	543	(24.3%)
- Street lighting	13	(0.6%)
Energy losses (GWh)	420	
Energy generation (GWh)	2,652	
Peak Power demand (MW)	540	
Annual load factor (%)	56.1	

G.1.4 Power Tariff

The electric base tariff presently effective in the fiscal year 1987 is shown in Table G.1.3. The average tariff of CEB on the whole of Sri Lanka in 1986 was Rs. 1.50 per kWh.

G.1.5 Historical Trend of Power Market

The historical trend of peak power demand and energy sales and generation in the past 16 years are shown in Table G.1.4 and Fig. G.1-3.

The total energy consumption has increased at an average rate of 9% since 1965. However, the trend for the recent six years showed lower rate (8%) due to insufficient power generating capacity, or in other words, supply constraints in 1980 and 1981. In 1983, a decline in the volume of water sorted by the dams due to long-term drought, and increased unit cost of thermal generation due to increased oil prices resulted in a low growth rate for energy consumption.

The installed capacity and genrated energy by hydropower plants and thermal powerplants since 1975 is presented in Table G.1.5. The installed capacity and generated energy by hydropower development could not keep place with the rapid demand increase from 1978 and thermal generation has accordingly increased yearly from 1978. The power situation was, however, improved in 1984, with the completion of the Victoria hydropower station and the Sapugaskanda diesel powerplant.

Transfer of thermal power to hydropower also progressed and the generated energy by hydropower plants rapidly increased yearly from 1984. In 1984, due to the large share of generated output attributed to hydropower, fuel energy cost largely decreased. These facts show the importance of hydropower development in Sri Lanka which is a non-oil producing country and presently suffers from a trade balance deficit.

G.1.6 Demand Forecast

The commercial branch of the CEB is responsible for making forecasts of electricity demand as the basis for planning of the development of the generation and transmission systems. The CEB forecasts are updated annually, based on the latest available statistics, as well as past trends is electrical demand growth.

In August 1987, the CEB published "Long Range Generation Expansion Plan - 1987". According to this report, power demand growth is anticipated at a rate of 8.2% for 1988 to 1990, 10% for 1991 to 1995, 9.5% for 1996 to 2000 and 8.5% after 2001. The peak power demand and generation forecast are summarized as follows and shown in Table G.1.6.

Year	Peak Demand (MW)	Generation (GWh)	Load Factor (%)
1988	593	2,986	57.5
1990	682	3,495	58.5
1995	1,089	5,629	59.0
2000	1,714	8,861	59.0
2002	2,018	10,431	59.0

G.1.7 Potential Hydropower Project

Hydropower potential in Sri Lanka is laid to be equivalent to about 2,000 MW, of which 1,116 MW are already developed or committed. There are 11 existing stations with a total capacity of 916 MW as presented in Tables G.1.1 and 1.3 committed sites with a total capacity of 200 MW as given in Table G.1.7.

The six hydropower projects, having a total capacity of 690 MW, were proposed for future development as shown in Table G.1.7.

G.1.8 Generation Expansion Plan

The Long Range Generation Expansion Plan as mentioned in the preceeding Sub-section G.1.6 made the evaluation of different expansion configurations to select the economically optimal expansion plan. The generation expansin plan upto 2002 is shown in Table G.1.8 and the energy and power balances are presented in Tables G.1.9 to G.1.11. The conclusion and recommendation in the said Generation Expansion Plan are mentioned herein after :

Energy and power shortfalls will occur by 1994/1995 and 1997/1998. A generation mix of initial diesel units with subsequent coal base units provides an economically optimal expansion planning strategy. The firm recommendation, however, is the committment of 2 x 20 MW diesel units in 1993. The addition of further diesel units should be re-examined in a future study, after careful consideration of other options such as oil base units and combined cycle units operating on residual fuel. It is also confirmed that large coal units are suitable to meet the base load requirements of the system for 1998 onwards.

G.2 POWER BENEFIT

G.2.1 Valuation of Power and Energy

The conventional approach to economic analysis of a hydropower project is to define its benefit as the cost saved in construction and operation (fuel cost) of the cheapest alternative facility that could provide power supply of equivalent quality and quantity to the intended beneficiaries.

There are the cheapest alternative thermal facilities to meet system load sharing portions; gas turbine and diesel generator for peak load, oil-fired steam plant for middle load and coal-fired steam plant for base load. For this project, diesel generation, likewise considered as the most viable alternative to hydropower by the CEB, was selected as the cheapest alternative energy source, since the Moragahakanda powerplant is characterized by peak generation, 5.5 hours of firm operation. The necessary construction and operation costs for such facilities required to replace the project are adopted as the project benefit.

Accordingly, peak generation supply under the present project will be evaluated on the basis of alternative diesel. Namely, for power output (kW) and firm energy (kWh) which correspond to supply for peak load, a diesel station was considered as an alternative. While, for secondary energy, fuel costs of oil thermal stations which are to be introduced before the project are considered as alternative, since the secondary energy of hydropower will save fuel consumption at oil thermal stations, as mentioned above.

As for the secondary energy of the project, full amount is assumed effective for fuel cost save in oil thermal generation, as there will be abandant thermal generation which can effectively be replaced by generation under the project.

G.2.2 Estimation of kW and kWh Values

The kW and kWh benefits are the annual costs per kW and kWh of diesel power station, respectively, which is equivalent to the Moragahakanda power station, as stated in the preceding Sub- section G 2.1. The calculation of unit kW and kWh values is made as follows:

1) Alternative facility : Diesel generator or coal thermal
2) Capacity : 20 - 30 MW class
3) Unit construction cost : US$ 480/kW
4) Service life : 20 years
5) Adjustment factor :

(Unit: %)

	Diesel Coal	Thermal	Hydro
Transmission loss	1.0	3.0	4.0
Forced outage	5.0	3.0	0.5
Auxiliary power use	2.0	7.0	0.5
Overhaul	18.0	15.0	1.0

- Capacity (kW) adjustment factor =

$$\frac{(1 - 0.04) \times (1 - 0.005) \times (1 - 0.005) \times (1 - 0.01)}{(1 - 0.01) \times (1 - 0.05) \times (1 - 0.02) \times (1 - 0.18)} = 1.2450$$

- Energy (kWh) adjustment factor for diesel =

$$\frac{(1 - 0.04) \times (1 - 0.005)}{(1 - 0.01) \times (1 - 0.05)} = 1.0156$$

- Energy (kWh) adjustment for coal thermal =

$$\frac{(1 - 0.04) \times (1 - 0.005)}{(1 - 0.03) \times (1 - 0.03)} = 1.0152$$

6) Capacity value

Discount rate : 10%

Annual capitalized cost :

US$480/kWx(1+0.12*1)x1.245x0.1175 = US$78.64/kW

*1: Ratio of replacement cost

Annual O&M Cost :

US$480/kWx0.03 = US$14.40/kW

Total annual cost (kW value) :

US$(78.64+14.40)/kW = US$93.04/kW

7) Firm energy value

Fuel Cost L1	:	US$0.275/kg
Caloric value	:	10,800 kcal/kg
Plant efficiency	:	34.0%
Heat rate	:	2,529 kcal/kWh
Energy value	:	US$0.0644/kWh
O&M value	:	US$0.0020/kWh
Net energy value	:	US$0.0664/kWh
Adjusted energy Value	:	US$0.0664/kWh x 1.0156*1 = US$0.0674

Remarks: *1: Fuel cost in 1996 at 1987 constant price recommended by ADB

8) Secondary energy value

Fuel cost	:	US$0.048/kg
Caloric value	:	5,300 kcal/kWh
Plant efficiency	:	27.0%

Heat rate	:	3,185 kcal/kWh
Energy value	:	US$0.0288/kWh
O&M value	:	US$0.0006/kWh
Net energy value	:	US$0.0294/kWh
Adjusted energy Value	:	US$0.0294/kWh x 1.0152 = US$0.0298/kWh

G.2.3 Dependable Peak Power and Annual Energy Outputs

To estimate dependable peak power and annual energy outputs, the monthly reservoir operation was made according to the following rules:

- The first priority of the water release is given to the irrigation requirements in case the water level is above the operation water level. When the irrigation requirements are less than the required water to keep the firm power potential in case the reservoir water level is above the operation level, the required water is released. The first priority of the water release below the operation level is given to the power requirement. In case the water level reaches the low water level (L.W.L.), the available inflow is discharged without regulation until the inflow becomes bigger than the requirement.

- Firm power potential is the maximum potential which can be kept to be generated constantly and continuously without any obstruction against the successfulness of the irrigation requirements.

- The operation water level is set at the water level above which a shortage capacity of 606 mcm is secured under the high water level (H.W.L.). In other words, the water release is governed above the operation water level so as to satisfy the bigger requirements for the irrigation or the firm power generation. The water release below the operation water level is governed pricipally to keep the firm power generation.

In addition to the above operation rules, the following rules was applied to the irrigation dam in the optimization study of development sacle as mentioned in ANNEX-J:

- So far the water level is above the L.W.L., the water is released to meet the irrigation water requirements. When the water level reaches L.W.L., the available inflow is released without regulation until the requirements exceed the inflow.

The dependable peak power and annual energy outputs are obtained as described hereunder:

- By the simulation calculation of the monthly power output for 27 years from 1950 to 1976, 27 values of monthly output for each month have been obtained.

- The maximum power output for each month is obtained by the following equation. The maximum power output of the third order from the lowest value for each month is assumed as the effective peak power output of the due month.

The mean value of the effective peak power output of 12 months from January to December is defined as the depandable peak power output.

Pmax = g. Qmax. (Hg - h), Ut.Ug

where,
Pmax : Maximum power output (kW)
Qmax : Maximum plant discharge (m^3/s)
Hg : Gross head (m)
h : Head loss (m)
Ut : Turbine efficiency
Ug : Generation efficiency

- The mean power and energy outputs for each month are calculated by the following equations. The mean power output of the third order from the lowest value is assumed as the effective mean power output of the due month. The mean value of the effective mean power output of 12 months from January to December is defined as the firm power output. The firm energy output is obtained by multiplying the firm power output by annual operation hours at 8,760 hours. The average annual energy output is the mean value of annual energy output for 27 years from 1950 to 1976. The secondary energy output is the balance between the average annual energy output and firm energy output.

Pmean = g.Qmean. (Hg - h). Ut.Ug

where,
Pmean : Mean power output (kW)
Qmean : Mean plant discharge (m^3/s)

E = Pmean.T

where,
E : Monthly energy output
T : Monthly operation hours

The summary of the outputs analysis is as follows:

3rd Minimum Peak Power (MW)

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
18.6	17.4	16.0	16.0	15.2	14.2	14.9	15.7	14.9	16.0	16.0	18.2	16.1

3rd Minimum Energy (1,000MWh)

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
9.9	10.0	5.3	4.5	4.2	4.0	4.2	4.4	4.1	4.7	4.6	4.5	66.4

Mean Monthly Energy (1,000 MWh)

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
15.4	14.5	12.8	10.9	12.2	12.6	12.8	11.6	7.8	10.3	9.9	14.5	145.3

Average annual energy : 145.3 GWh
Firm energy : 66.4 GWh
Secondary energy : 78.9 GWh

TABLES

Table G.1.1 EXISTING GENERATION CAPACITY - 1988
(CEB POWER SYSTEM)

	Capacity (MW)		Mean Annual Energy (GWh)		
	Units (No.x Cap)	Total Installed	Firm	Secondary	Total
1. HYDROPOWER*					
Kehelgamu - Maskeli Complex					
Old Laxapana I	3 x 8.33	25	253	42	295
Old Laxapana II	2 x 12.5	25			
New LAxapana	2 x 50	100	439	80	519
Wimalasurendra	2 x 25	50	84	36	120
Samanala	2 x 37.5	75	384	75	459
Canyon I	1 x 30	30	144	35	179
Sub-total:		305	1,304	268	1,572
Mahaweli Complex					
Ukuwela	2 x 19	38	164	-	164
Bowatenne	1 x 40	40	49	15	64
Victoria	3 x 70	210	447	439	886
Kotmale	3 x 67	201	270	232	502
Randenigala	2 x 61	122	304	190	494
Sub-total:		611	1,234	876	2,110
Total Hydropower		916	2,538	1,144	3,682
2. THERMAL POWER					
Kelanitissa Gas turbine	6 x 20	120	725 /1	-	725
Sapugaskanda Diesel	4 x 20	80	540 /2	-	540
Total Thermal		200	1,265	0	1,265
Total System		1,116	3,803	1,144	4,947

/1 Plant factor = 0.69
/2 Plant factor = 0.77

* Inginiyagala Udawalawe and Nilambe plants are not inclued.

Table G.1.2 TRANSMISSION LINE LENGTH

(Unit: km)

	1977	1981	1982	1983	1984	1985	1986
220 kV	-	-	-	-	-	133	
132 kV	897	1,013	1,013	1,013	1,132	1,167	
66 kV	317	339	339	339	339	339	
Total	1,214	1,352	1,352	1,352	1,471	1,639	

Source: CEB Annual Report 1982, 1983, Power for Prosperity, Statistical Digest 1984.

Table G.1.3 C.E.B. TARIFF - EFFECTIVE FROM 1988-01-01

DOMESTIC	First 10 units @ Rs. 0.55 per unit + Fixed charge Rs. 5/ = per month 10 - 100 units @ Rs. 1.05 per unit 100 - 450 units @ Rs. 2.00 per unit Above 450 units @ Rs. 2.50 per unit Fuel adjustment charge when in operation is applicable on units in excess of 100 per month.
RELIGIOUS & CHARITABLE INSTITUTIONS	First 150 units @ Rs. 0.60 -per unit + Fixed charge Rs. 5/ = per month Above 150 units @ Rs. 2.00 per unit Fuel adjustment charge when in operatin is applicable on units in excess of 150 per month.
STREET LIGHTING	Rs. 1.80 per unit + Fuel adjustment charge

OTHER CATEGORIES	General Purpose	Indus-trial	Hotels	Industrial (Time of Day)	Hotels	Bulk Supply to Licensees
Supply at 400/230 V Contract demand less than 50 kVA						
Unit Charge (Rs./Unit)	2	1.75	1.95	-	-	
	+	+	+	-	-	
Fixed Charge (upto 10 kVA) (Rs.) per month	20	20	20	-	-	
	or	or	or			
Fixed Charge (above 10 kVA) (Rs.) per month)	100	100	100			
Supply at 400/230 V Contract demand 50 kVA and above						
Demand charge (Rx/kVA) per month	125	110	125	50	50	30
	+	+	+	+	+	+
Unit charge (Rs./Unit)	1.9	1.6	1.85	1.50 (Off Peak)	1.50 (Off Peak)	0.40 (BLOCK A)
				+	+	+
				2.45 (Peak 6 pm to 9 pm)	2.45 (Peak 6 pm to 9 pm)	0.80 (BLOCK B)
	+	+	+	+	+	+
Fixed charge (Rs.) per month	200	200	200	200	200	1.45 (BLOCK C)
HT Supply at 11 kV, 33 kV and 132 kV						
Demand charge (Rs./kVA) per month	115	95	115	45	45	25
	+	+	+	+	+	+
Unit charge (Rs./Unit)	1.8	1.5	1.75	1.45 (Off Peak)	1.45 (Off Peak)	0.35 (BLOCK A)
				+	+	+
				2.20 (Peak 6 pm to 9 pm)	2.20 (Peak 6 pm to 9 pm)	0.75 (BLOCK B) 1.35 (BLOCK C)
	+	+	+	+	+	
Fixed charges (Rs.) per month	200	200	200	200	20	

NOTE: The fuel adjustment charge will be expressed as a percentage and is applicable on the unit charges only. The fuel adjustment charge when in operation shall apply to all general purposes, industrial and hotel consumers.

BLOCK A: 120% of the sum of approved units used per month by religious premises and approved charitable institution consumers, plus 120% of the sm of units used per month by domestic consumer consuming upto 10 units per month, plus 120% of 10 units x (number of domestic consumers consuming above 10 units per month).

BLOCK B: 120% of the sum of units used in excess of 10 units per month by domestic consumers consuming in excess of 10 units and upto 100 units per month, plus 120% of 90 units x (number of domestic consumers consuming in excess of 100 units per month).

BLOCK C: All units in excess of the sum of units in BLOCK A and BLOCK B, plus fuel adjustment charge.

Prepared by CECB (based on Government GAzette (Extraordinary) No. 480/35 on 19-11-1987)

Table G.1.4 PEAK POWER DEMAND AND ENERGY CONSUMPTION, LOSSES AND GENERATION

Year	Energy (GWh)									Peak Power Demand (MW)	Load Factor (%)
	Domestic and Religious	Small & Medium Industries	Heavy Industries	Commercial and Hotels	Local Authori-ties	Street Lighting	Total Consump-tion	Losses	Total Genera-tion		
1961	40	86	-	56	76	-	258	50	308	-	-
1962	41	106	-	57	78	-	282	62	344	69	56.9
1963	42	127	-	57	83	-	309	63	372	74	57.4
1964	44	137	-	60	92	-	333	168	401	83	55.2
1965	46	148	-	65	101	-	360	68	428	89	54.9
1966	48	185	-	72	119	-	424	69	493	105	53.6
1967	57	195	36	75	132	-	489	92	591	122	54.4
1968	55	212	60	81	148	-	556	91	647	135	54.7
1969	59	229	73	82	161	-	604	106	710	147	55.1
1970	63	245	98	88	178	-	662	124	786	163	55.0
1971	65	209	165	93	181	11	722	127	849	173	56.0
1972	73	221	215	97	183	12	810	134	944	200	53.9
1973	82	273	194	108	198	12	866	114	980	199	56.2
1974	83	257	220	118	202	13	892	119	1011	215	53.7
1975	85	255	268	123	222	13	965	114	1079	219	56.2
1976	95	255	261	140	237	14	999	134	1133	240	53.9
1977	107	257	262	148	253	14	1041	176	1217	261	53.2
1978	119	292	300	159	276	15	1161	224	1385	291	54.3
1979	153	304	328	201	296	16	1298	228	1526	329	52.9
1980	191	306	320	223	336	17	1392	276	1668	369	51.6
1981	217	331	347	220	381	9	1503	369	1872	413	51.7
1982	258	365	374	235	418	9	1686	380	2066	431	54.7
1983	305	367	383	244	433	10	1792	322	2114	437	55.2
1984	309	404	387	308	458	11	1877	374	2250	487	52.7
1985	346	446	404	350	502	12	2060	404	2464	515	54.6
1986	369	480	445	381	543	13	2232				

Table G.1.5 INSTALLED CAPACITY AND GENERATED ENERGY BY HYDROPOWER PLANTS AND THERMAL POWER PLANTS

Year	Installed Capacity (MW)			Annual Generated Energy (GWh)				
	Hydro	Thermal	Total	Hydro (1)	Thermal	Total (2)	Increase Rate (%)	(1)/(2) (%)
1975	291	70	361	1,078.4	0.1	1,078.5	6.6	100.0
1976	329	70	399	1,108.6	24.2	1,132.8	5.0	97.9
1977	329	70	399	1,214.4	2.1	1,216.5	7.4	99.8
1978	329	70	399	1,338.5	42.7	1,381.2	13.5	96.9
1979	329	70	399	1,461.2	64.3	1,525.5	10.4	95.8
1980	329	90	419	1,479.4	188.8	1,668.2	9.4	88.7
1981	369	130	499	1,571.2	300.1	1,871.3	12.2	84.0
1982	369	190	559	1,608.1	457.6	2,065.7	10.4	77.8
1983	399	190	589	1,217.2	897.4	2,114.6	2.4	57.6
1984	609	200	809	2,090.7	170.0	2,260.7	7.0	92.4
1985	609	200	809	2,394.6	69.4	2,464.0	8.9	97.2
1986								
1987								

Table G.1.6 PEAK DEMAND AND GENERATION FORECASE (JULY 197)

Year	Peak Demand (MW)	Generation Forecast (GWh)	Load Factor (%)
1988	593	2,986	57.5
1989	630	3,230	58.5
1990	682	3,495	58.5
1991	744	3,845	59.0
1992	818	4,229	59.0
1993	900	4,652	59.0
1994	990	5,118	59.0
1995	1,089	5,629	59.0
1996	1,193	6,166	59.0
1997	1,306	6,750	59.0
1998	1,430	7,391	59.0
1999	1,566	8,094	59.0
2000	1,714	8,861	59.0
2001	1,860	9,614	59.0
2002	2,018	10,431	59.0

Source: "Long Range Generation Expansion Plant" CEB, August 1987

Table G.1.7 COMMITTED AND PROPOSED HYDROPOWER PROJECTS

	Capacity (MW)		Mean Annual Energy (GWh)		
	Unit (No. x Cap)	Total Installed	Firm	Secondary	Total
Committed					
Canyon Unit 2	1 x 30	30	-	-	34
Rantembe	2 x 25	50	174	72	246
Samanalawewa	2 x 60	120	420	42	462
Sub-total		200	594	114	742
Proposed					
Broadlands	2 x 20	40	53	92	145
Upper Uma Oya		80	144	80	224
Upper Kotmale		240	360	210	570
Kukule		180	384	8	392
Jasmin		100	180	88	268
Lower Uma Oya		50	96	57	153
Sub-total:		690	1,217	535	1,752
TOTAL		890	1,811	649	2,494

Source: "Long Range Generation Expansion Plan"
CEB, August 1987

Table G.1.8 GENERATION EXPANSION MASTER PLAN (1987)

Year	Power Plant to be Installed
1988	*Canyon Unit 2 (30 MW)
1989	---
1990	---
1991	*Rantambe (49 MW) + *KPS Rehab. (50 MW)
1992	*Samanalawewa (120 MW)
1993	Diesel 2 x 20 MW (Supugaskande)
1994	---
1995	Diesel 4 x 20 MW (Colombo)
1996	Diesel 4 x 20 MW (Colombo)
1997	Diesel 4 x 20 MW (Colombo)
1998	Coal 1 x 150 MW (Trinco)
1999	Coal 1 x 150 MW + 1 x 300 MW (Trinco)
2000	---
2001	Coal 1 x 300 MW (Trinco)
2002	Diesel 8 x 20 MW

* Committed Projects

Source: "Long Range Generation Expansion Plan"
CEB, August 1987

Table G.1.9 ENERGY BALANCE BASED ON FIRM CAPABILITY

YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Gen. Required	2,986	3,230	3,495	3,845	4,229	4,652	5,118	5,629	6,165	6,750	7,391	8,093	8,861	9,615	10,432
K-M Complex	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466	1,466
Ukuwela-Bowatenna	213	213	213	213	213	213	213	213	213	213	213	213	213	213	213
Mahaweli Complex	1,129	1,129	1,129	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303
Samanalawewa	-	-	-	-	409	409	409	409	409	409	409	409	409	409	409
Total Hydro	2,802	2,808	2,808	2,982	3,391	3,391	3,391	3,391	3,391	3,391	3,391	3,391	3,391	3,391	3,391
Thermal Required	178	422	687	863	838	1,261	1,727	2,238	2,774	3,359	4,000	4,702	5,470	6,224	7,041
Diesels (Sapu.)	178	422	540	540	540	810	810	810	810	810	810	308	500	276	211
KPS (Steam)	-	-	-	302	298	302	302	302	302	302	302	-	-	-	-
KPS (GT)	-	-	147	21	-	149	615	586	582	627	357	-	-	-	-
Diesels - Colombo	-	-	-	-	-	-	-	540	540	540	540	308	500	276	211
Diesels - Colombo & Galle	-	-	-	-	-	-	-	-	540	540	540	308	500	276	211
Diesels - Galle	-	-	-	-	-	-	-	-	-	540	540	308	500	278	211
Coal 1 (250 MW)	-	-	-	-	-	-	-	-	-	-	911	911	911	911	911
Coal 2 (150 MW)	-	-	-	-	-	-	-	-	-	-	-	911	911	911	911
Coal 3 (300 MW)	-	-	-	-	-	-	-	-	-	-	-	1,648	1,648	1,648	1,648
Coal 4 (300 MW)	-	-	-	-	-	-	-	-	-	-	-	-	-	1,648	1,648
Diesels (160 MW)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,079
Total Thermal Gen.	178	422	687	863	838	1,261	1,727	2,238	2,774	3,359	4,000	4,702	5,470	6,224	7,041
Total Generation	2,980	3,230	3,495	3,845	4,229	4,652	5,118	5,629	6,165	6,750	7,391	8,093	8,861	9,615	10,432
Deficit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

THERMAL FIRM BASED ON THE FOLLOWING PLANT FACTORS:
Coal (150 MW) = 0.73
Coal (300 MW) = 0.66
G.T. = 0.69
Diesels = 0.77
KPS (steam) = 0.69

RETIREMENTS:

KPS (GT) - End of 1998
KPS (Steam) - End of 2000

DERATED CAPACITIES FOR COAL P.S.:

TRINCO 150 MW unit - 142.5 MW
300 MW unit - 285.0 MW

Table G.1.10 POWER BALANCE

YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Installed Hydro Capacity (MW)	946	946	946	995	1,115	1,115	1,115	1,115	1,115	1,115	1,115	1,115	1,115	1,115	1,115
Installed Thermal Capacity (MW)	200	200	200	250	250	290	290	370	450	530	680	1,010	1,010	1,260	1,420
Total Capacity (MW)	1,146	1,146	1,146	1,245	1,365	1,405	1,405	1,485	1,565	1,645	1,795	2,125	2,125	2,375	2,535
Projected Demand (MW)	593	630	682	744	818	900	990	1,089	1,193	1,306	1,430	1,566	1,714	1,860	2,918
Reserve Margin (%)	93	82	68	67	67	56	42	36	31	26	26	36	24	28	26
Loss of Load Probability (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.390	0.001	0.048	0.362	0.433	

Table G.1.11 FUEL PRICE PROJECTIONS
(Recommended by ACB)
(Prices in US$ per BBL for oil
and US$ per MT for Coal)

Year	Crude Oil	Oil Sulfur Res. Oil	Coal
1987	16.00	13.67	35.50
1988	16.23	13.92	36.35
1989	16.46	14.18	37.21
1990	16.70	14.45	38.10
1991	17.45	15.32	39.56
1992	18.23	16.24	41.08
1993	19.05	17.22	42.66
1994	19.91	18.26	44.30
1995	20.80	19.37	46.00
1996	22.34	20.81	47.14
1997	23.98	22.34	48.31
1998	25.75	23.99	49.51
1999	27.65	24.76	50.74
2000	29.70	25.67	52.00
2001	31.89	29.71	53.29
2002	34.24	31.90	54.61
2003	36.77	34.26	55.96
2004	39.48	36.79	57.35
2005	42.39	39.51	58.77
2006	46.52	42.43	60.23
2007	48.88	45.50	61.73

FIGURES

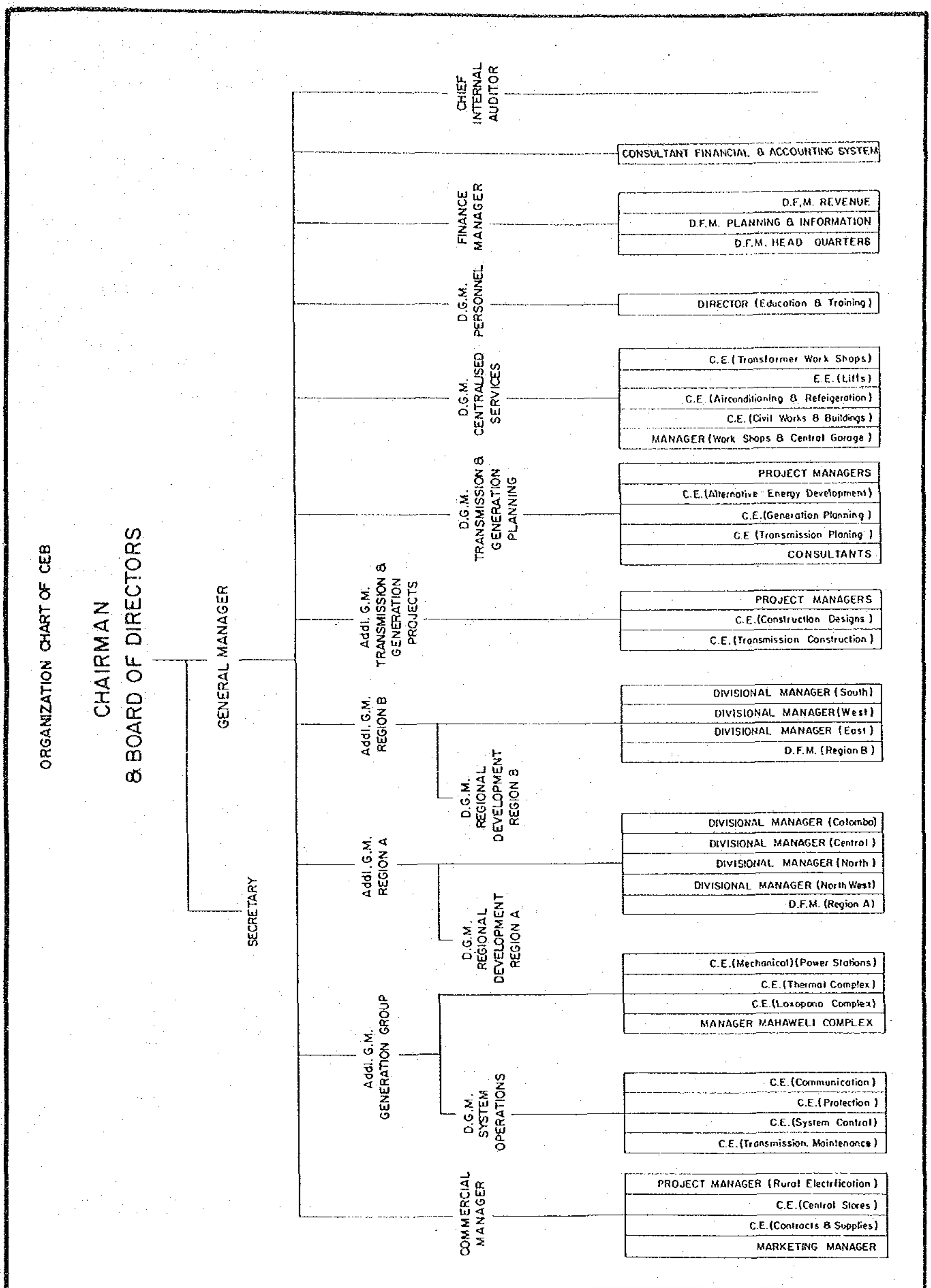

Fig. G.1-1 Organization Chart of CEB

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

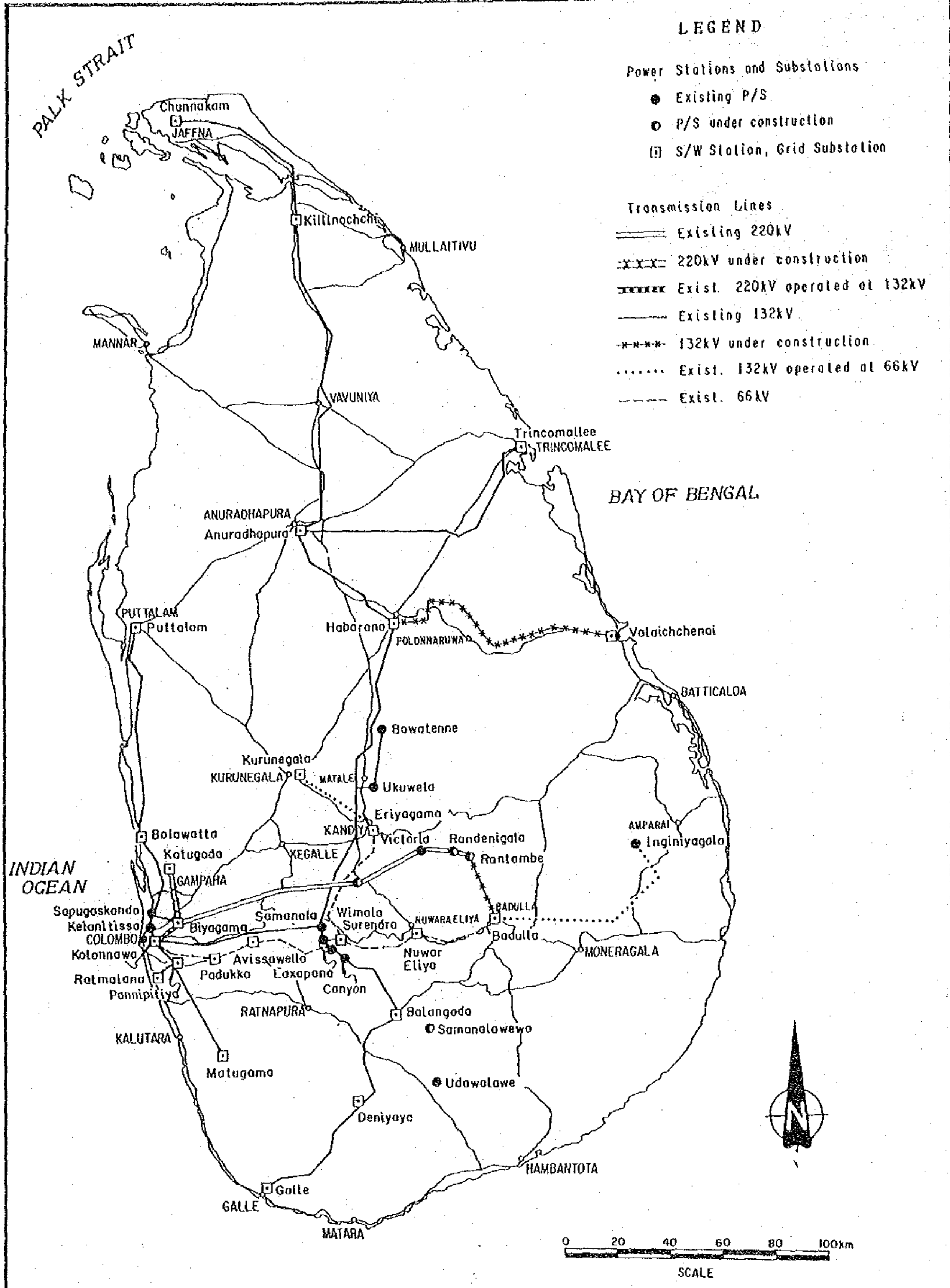

Fig. G.1-2 Electricity System of Sri Lanka

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

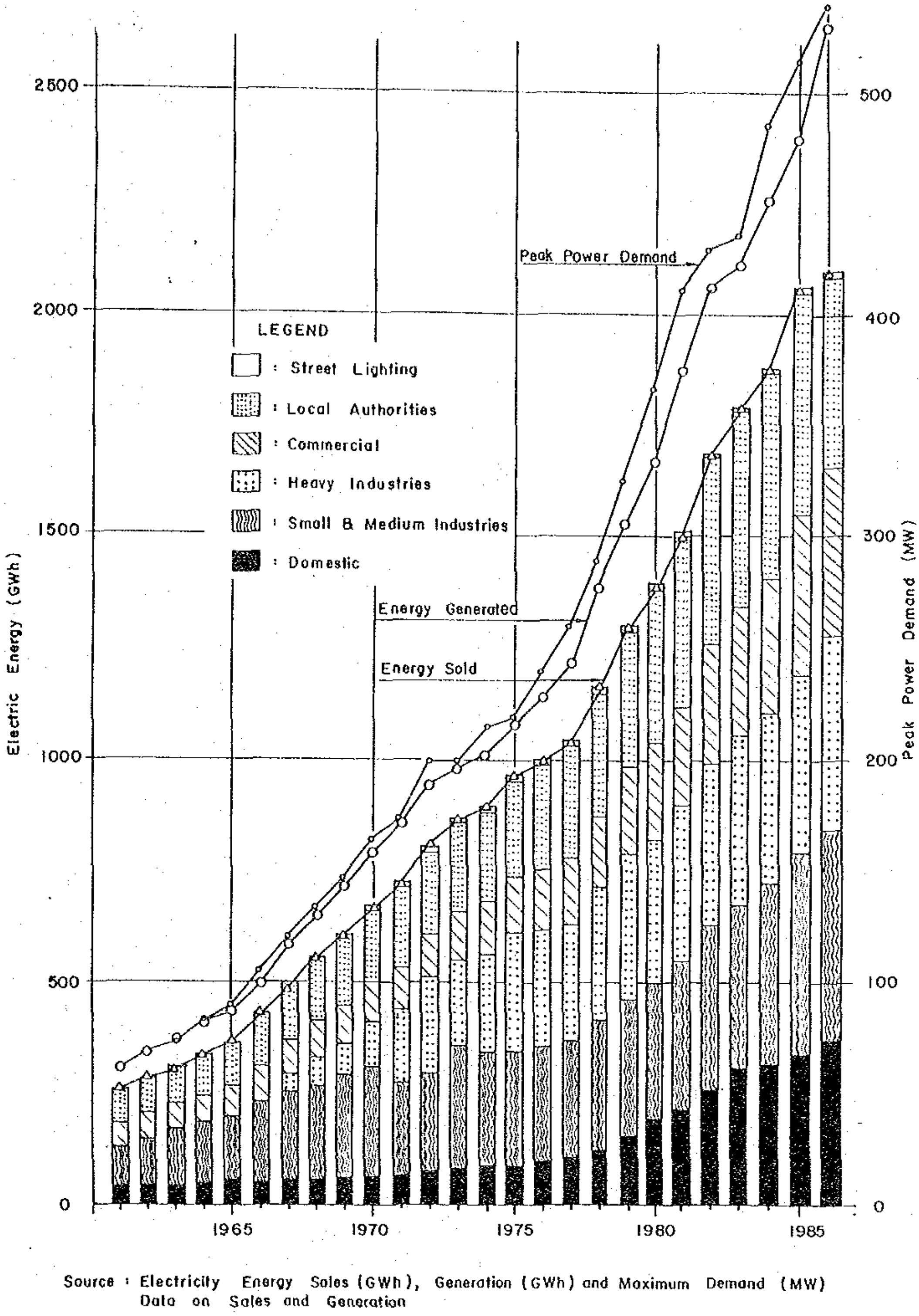

Fig. G.1-3 Historical Peak Demand and Energy Generated and Sold (1961-86)

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

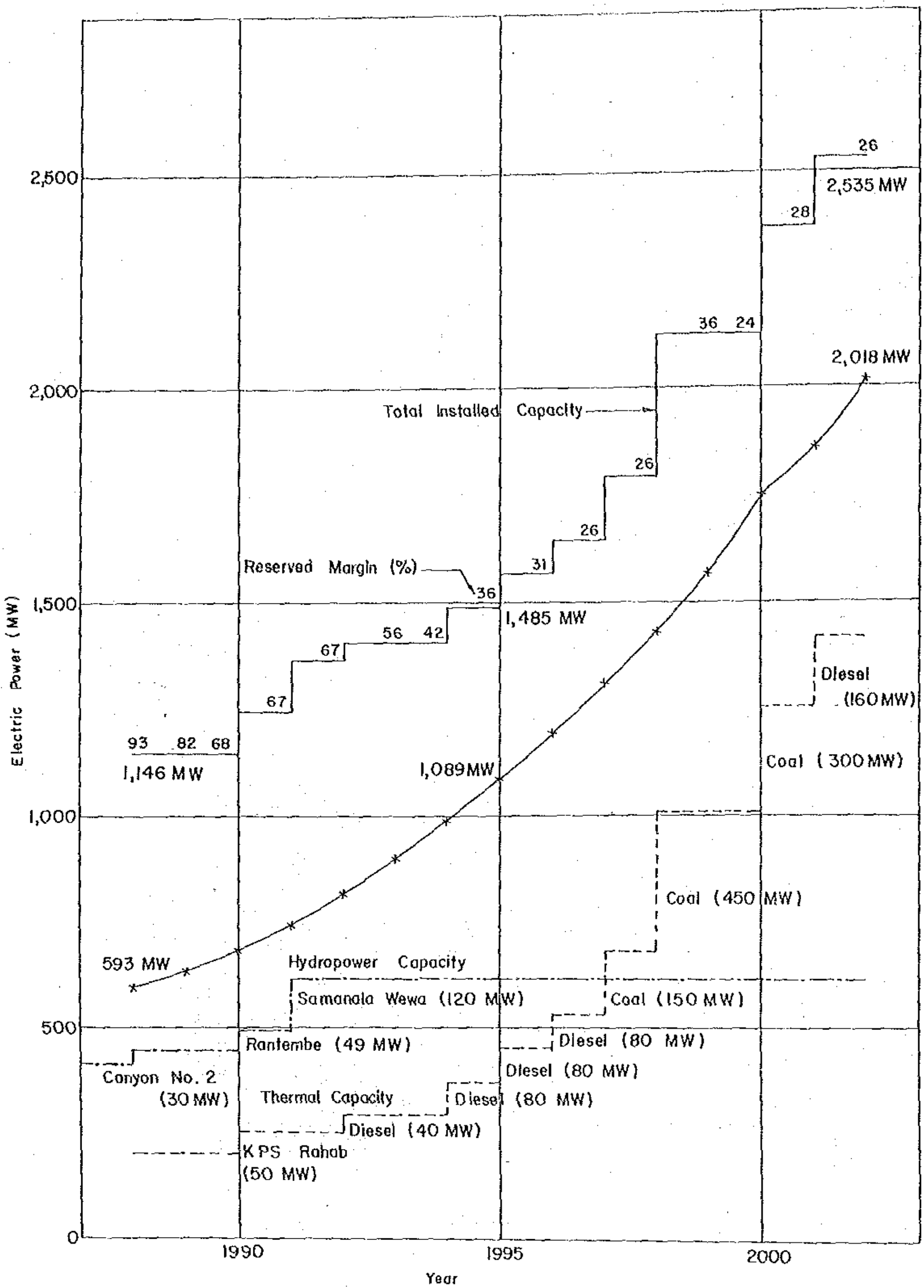

Fig. G 1-4 Projected Power Demand and Installed Capacity(1988-2002)

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

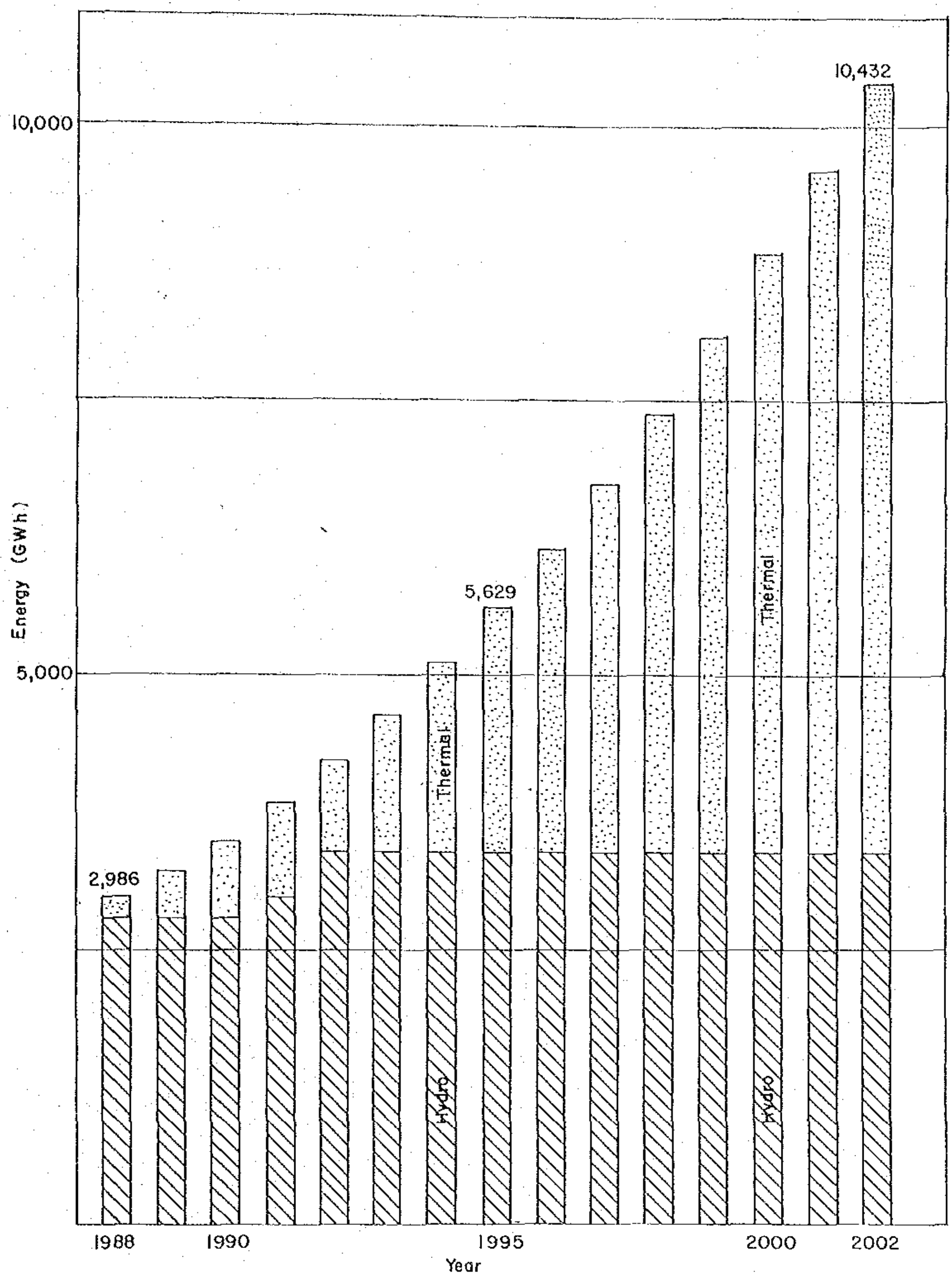

Fig. G.1-5 Projected Energy Balance (1988-2002)

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

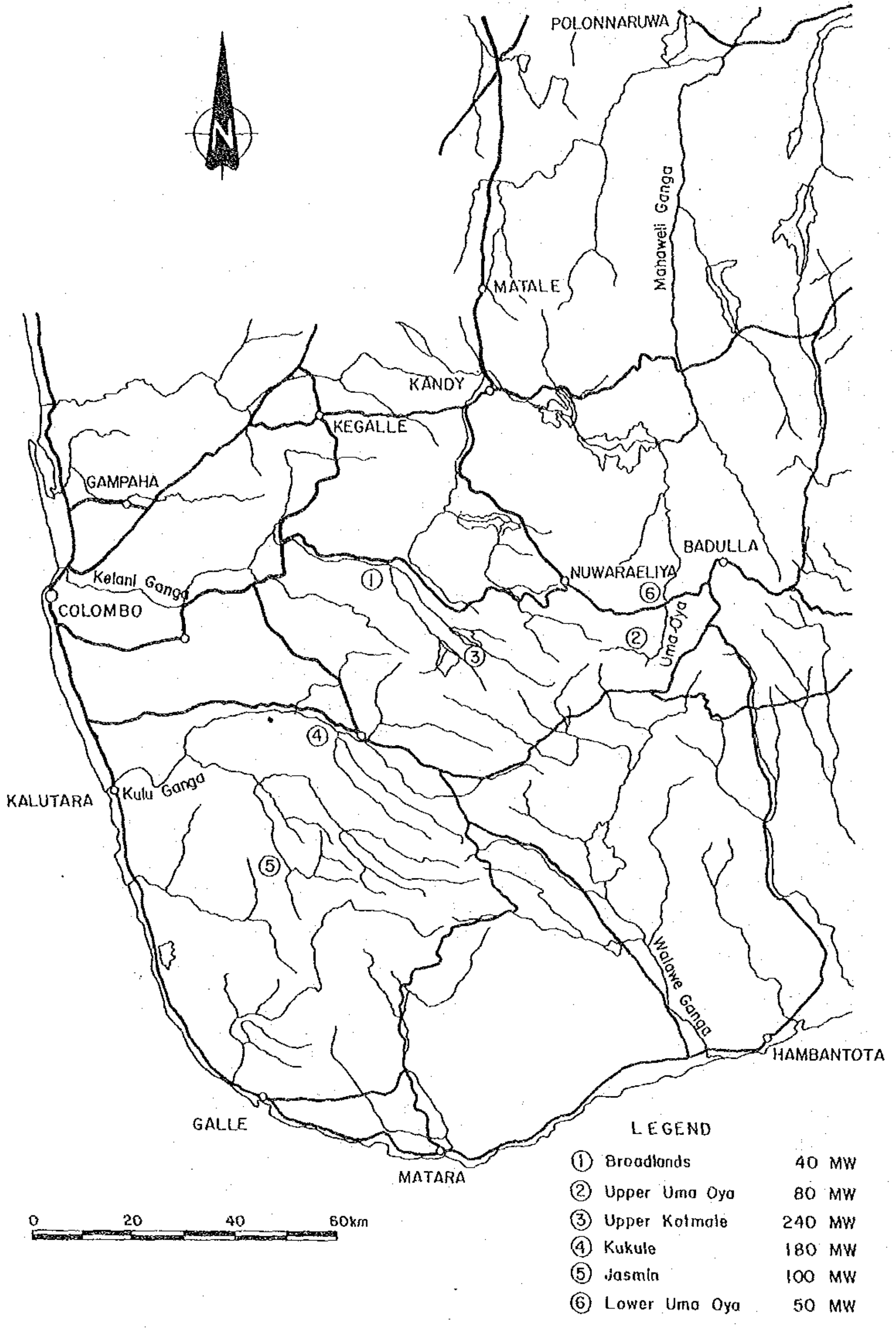

Fig. G.1-6 Potential Hydropower Projects

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 - H

WATER BALANCE

ANNEX - H

WATER BALANCE

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ANNEX-H WATER BALANCE

H.1 INTRODUCTION

This report was recompiled on the basis of the Feasibility Report prepared by JICA in 1979. Due to limitation of time and the scope of work for Phase-I, this report presents the conditions and results of the previous study. The water balance study in a whole Mahaweli Ganga including the project will be executed in Phase-II stage.

H.2 CONDITION OF WATER BALANCE

H.2.1 General

The available water resources to the Project consist of the natural runoff from its own basin of the Amban Ganga and diverted water from the Mahaweli Ganga through the Polgolla diversion tunnel completed in 1975. The Amban Ganga flow augmented by the Polgolla diversion is once impounded at the Bowatenna reservoir. Part of the regulated water is diverted from the Bowatenna reservoir to Kalawewa regions so-called systems H, IH and MH areas with an irrigation area of 48,600 ha, located in the other basins. Further diversion is made for the Nalanda reservoir about 10 km upstream of the Bowatenna reservoir to Dewahuwa area with an irrigation area of 1,220 ha in another basin. Available water to the Project is estimated as the balance of the above diversions and the natural runoff in the basin.

Diversion water at Polgolla from the Mahaweli ganga to the Amban Ganga is utilized for hydropower generation at the Ukuwela power station with an installed capacity of 38 MW. Bowatenna power station with a capacity of 40 MW is operated by using the water release to downstream of the Amban Ganga.

Downstream of the Bowatenna reservoir, there are two existing intake weirs at Elahera and Angamedilla. Intake water at the Elahera anicut is led to the existing fields in Systems G and D1 through Elahera-Minneriya canal which links four existing tanks, Minneriya, Giritale, Kaudulla and Kantalai. Water diverted at the Angamedilla anicut is impounded at the Parakrama Samudra and the regulated water is supplied to the existing fields in System D2.

In order to establish water resources development plan, water balance study by using long term hydrological data is essential, which was analyzed on monthly basis for 28 years from 1950 to 1977 as stated hereinafter in detail.

H.2.2 Water Requirement for Irrigation

There are two existing intake weirs at Elahera and Angamedilla on the Amban Ganga, downstream of the Reservoir. The former is located 1.6 km downstream of the Moragahakanda Dam and the latter is located 28 km downstream along the river course of the Amban Ganga. Required release from the proposed Moragahakanda Reservoir can be calculated as a balance of both diversion requirements at Elahera and Angamedilla, and river runoff from the remaining catchment area between the dam and the Amgamedila Anicut.

The diversion water requirement at the Elahera Anicut was estimated as a sum of irrigation requirements which would be taken directly from the Elahera-Minneriya Canal and through 4 existing tanks i.e. Giritale, Minneriya, Kaudulla and Kantalai, and those at Angamedilla were calculated as the irrigation requirement through Parakrama Samudra tank. The schematic illustration of the present irrigation system is given in the attached Fig. H.2-1.

Through the existing tanks; Minneriya, Giritale, Kaudulla and Kantalai, the irrigation water of Systems G and D1 is taken from Elahera and irrigation water diverted at Angamedilla is supplied to the existing field in System D2 through the Parakrama Samudura tank. Between the Elahera and Angamedilla intake weirs, the Kalu Ganga joints to the Amban Ganga and provides an important water resources to the System D2. The water flow system of the above is as shown in Fig. H.2-3.

Depending on the irrigation water requirements stated in the ANNEX-F, average monthly diversion requirement was projected at 1,821 MCM per annum for 62,200 ha including 13,900 ha of the extension area against 1,429 MCM per year for 48,300 ha of existing irrigation area depending on the water balance study carried out by the previous study in 1979 as summarized in Table H.2.1 and details in Tables H.2.2 to H.2.3.

The average annual water demand only for irrigation at the proposed Moragahakanda reservoir was estimated to be about 1,260 MCM (40 m^3/sec), varying from 720 MCM (23 m^3/sec) to 1,55 MCM (49 m^3/sec). The average monthly demand is 105 MCM (40 m^3/sec), varying from 77 MCM (30 m^3/sec) to 144 MCM (56 m^3/sec).

(1) Evaporation Losses

The evaporation from the water surface of tanks and reservoir was estimated on the basis of pan-evaporation records at Kalawewa as follows:

Unit: mm

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
92	98	123	115	128	136	142	146	148	113	94	90	1,425

(2) Canal Conveyance Losses

The existing canal layout of the Elahera-Minneriya and Angamedilla canals is as shown in Fig. H.2-2. All the canals are made of earth. Seepage loss from the bank of canal and evaporation loss from canal water surface will be the main canal conveyance losses.

The UNDP/FAO has provided a curve showing correlation between canal discharge and seepage loss rate to estimate possible rate of conveyance loss in unlined canals in the Mahaweli region. According to UNDP recommendations, the conveyance loss in unlined canals with capacity of more than 200 cusec was estimated at about 0.3% of canal discharges for each mile. Since no actual measurements of canal losses were available in the project area, the rate of loss of each canal in the project area was calculated by applying the above value.

Consequently the conveyance losses of respective canals were estimated according to the UNDP/FAO recommendation as follows:

Section	Canal Length (mls)	Rate of Loss (%)
Elahera-Diyabeduma	20	6.0
Diyabeduma-Giritale	5	1.5
Diyabeduma-Minneriya	5	1.5
Minneriya-Kaudulla	6	1.8
Minneriya-Kantalai	32	9.6
Angamedilla-Parakrama	3	0.9

H.2.3 Water Demand for Hydropower Generation

As discussed in ANNEX-G, power demand growth is projected at a rate of 8.2% for 1988 to 1990, about 9.5% for 1990 to 2000. After 1992, no development of hydropower plants is planned, but introduction of thermal powerplants are scheduled to install every year to meet the electric power and energy demand.

Water stored in the Moragahakanda reservoir will be used primarily for irrigation, and irrigation water is released to the existing tanks, almost throughout the year as discussed in ANNEX-F. Water release from the reservoir could be utilized to generate hydroelectric power with the head created by the dam construction. By utilizing created head, optimization study of the Moragahakanda reservoir with and without hydropower generation was conducted as described in ANNEX-J.

H.2.4 Water Resources of Amban Ganga

The available water resources to the Project consist of the natural runoff from its own basin of the Amban Ganga and diverted water from the Mahaweri Ganga through the Polgolla diversion tunnel. The Amban Ganga flow augmented by the Polgolla diversion is once impounded at the Bowatenna reservoir. Part of the regulated water is diverted from the Bowatenna reservoir to Kalawewa regions so-called Systems H, IH and MH areas. Further diversion is made from the Nalanda reservoir about 10 km upstream of the Bowatenna reservoir to Dewahuwa area in another basin. Available water to the Moragahakanda dam was estimated as the balance of the above diversions and the natural runoff in the basin. In addition to the above available water to the dam, runoff from the remaining catchment area excluding that of the proposed dam is used for the irrigation at Angamedilla.

Therefore, various hydrologic circumstances are entangled in estimating available water for the Moragahakanda Reservoir. For the assessment of the available water for the Reservoir, hydrologic components to be taken into considerations are summarized as follows:

i) Polgolla diversion flow
ii) Natural runoff of the Amban Ganga
iii) Diversion flow to other basins

(1) Polgolla Diversion

Depending on the river flow data at Gurudeniya situated about 16 km downstream of Polgolla, natural runoff at Polgolla was estimated by multiplying the recorded runoff at the Gurudeniya with a factor 0.961, which is a ratio of the catchment areas at Polgolla 1,292 km^2 and Gurudeniya 1,344 km^2. The average annual run off at Polgolla was calculated at 2,439 MCM by using runoff records from 1950 to 1977. It was observed that the annual variations were so large ranging from the minimum runoff of 1,332 MCM recorded in 1976 to the maximum of 3,356 MCM in 1957 as shown in Table H.2.4.

According to the said data, about 56% of annual runoff occured during six months from April to September, which are the dry season in the Amban Ganga basin.

Based on the diversion policy established by the UNDP/FAO, the Mahaweli runoff is diverted to such extent as the maximum of 56.6 m^3/sec (150 cusec) for the requirements in the downstream reaches. The monthly diverted discharge through the Polgolla tunnel was estimated by analyzing the daily discharge data, according to the diversion policy aforesaid. The results of the estimation are summarized in Table H.2.5. The average diversion for 28 years amounted to 1,283 MCM per annum, corresponding to 1.7 times the natural flow of the Amban Ganga. Accordingly, the Polgolla diversion flow was considered to be the most important water resources for the development in the downstream areas of the Amban Ganga.

Upstream of Polgolla, the Kotmale dam was constructed in 1986. Polgolla diversion with Kotmale was also analyzed and expected to be increased to 1,550 MCM annum in an average after functioning of the Kotmale dam, which was about 1.2 times the presently diverted discharge. The results of the analysis for 28 years are summarized as shown in Table H.2.6. However, in this study diversion water at Polgolla without Kotmale dam was used to formulate the main project features.

(2) The Amban Ganga

The catchment area at the proposed dam site on the Amban Ganga is 782 km^2. Daily average runoff data are observed only at Elahera station,with catchment area of 779 km^2 since October 1941.

The difference in catchment areas at the station and the dam site is negligible, therefore the Elahera data was utilized for that of the dam site without any correction. The recorded runoff at the gage station for 28 years from 1950 to 1977 are summarized in Table H.2.7. The average annual runoff is 776 MCM, corresponding to about 1.0 x 10^6 m^3 MCM per square kilometer or about 1,000 mm in depth. As the average annual rainfall in the basin is 2,363 mm, about 42% of the rainfall flows out as surface runoff. It is noteworthy that much supplement of the water is obtained from the Mahaweli Ganga, while the Amban Ganga basin during dry season.

The Kalu Ganga joins to the Amban Ganga between Elahera, and Angamedilla intake weirs. The water diverted at Angamedilla is fed to the Parakrama Samudra tank and is used for irrigation in System D2.

As no reliable data were available at Angamedilla, the estimated flow by NEDECO (ISS in 1978) was adopted in the water balance study. The estimated monthly flow of the Amban Ganga at Angamedilla is shown in Table H.2.8.

(3) Diversion Flow to Other Basins

In the Amban Ganga basin, there are two existing reservoirs, Nalanda and Bowatenna, from which the Amban Ganga runoff is diverted to Dewahuwa and Kalawewa region, respectively. The Nalanda water is supplied to the existing fields of 1,220 ha in Dewahuwa region. The annual diversion flow to Dewahuwa region was estimated at 26.6 MCM on an average and the monthly average diversion requirements are summarized in the Table H.2.9.

A part of the Bowatenna water is diverted to Systems H, I(H) and M(H) with an irrigation area of 48,600 ha in Kalawewa region through the irrigation tunnel with the maximum capacity of 28.3 m^3/s (1,000 cusec). The water demanded for Systems G, D1 and D2 is released to the Amban Ganga through the Bowatenna power station with an installed capacity of 40 MW.

Diversion requirements at Bowatenna are estimated by NEDECO taking the tank operation in the region into account (ISS, 1978). The monthly diversion requirements estimated by NEDECO are shown in Table H.2.10.

Diversion policy at Bowatenna reservoir is one of essential factors for the planning of the Moragahakanda Reservoir. In the diversion policy established in the past, the maximum diversion was limited to 28.3 m^3/s (1,000 cusec) and the priority was given to systems D and G, since they are located in the Amban Ganga basin.

However, the benefited areas in Systems H, I(H) and M(H) were increased by about 40% of the acreage taken in the water balance study by the UNDP/FAO so that shortage of water was expected to occur in these Systems, unless the diversion policy was modified. Consequently, the following diversion criteria were newly established for planning the Moragahakanda reservoir, referring to the records of diversion and estimated irrigation requirements for the said area:

- First priority was given to the diversion of the minimum flow required for operation of the Bowatenna power station. According to the daily load curve of power in Sri Lanka, three hours peak is remarkable. Therefore, the minimum required flow was decided to be 1.03 MCM a day for three hours daily.

- The remaining water should be diverted to Systems H, I(H) and M(H) so as to meet the irrigation requirements. However, the maximum allowable diversion during a certain period to 31.1 m^3/s (1,100 cusec).

According to the above criteria, the monthly available water at the Moragahakanda dam site before and after completion of Kotmale dam was calculated and the results are shown in Tables H.2.11 and H.2.12, respectively.

H.2.5 Inflows to Tanks

As described in the preceding Section, there are five tanks; Kaudulla, Minneriya, Kantalai, Giritale and Parakrama Samudra in the project area. The basic features of these tanks are shown in Table H.2.13.

Each existing tank has its own catchment area, but there were no reliable runoff records on these existing tanks. NEDECO has estimated natural run off to each existing tank taking rainfall, catchment area, topography and vegetation into account. In NEDECO data, however, the catchment areas of the Gal Oya 215 km^2 and Aluth Oya 73 km^2 were disregarded in the estimation of the Kantalai tank inflow as well as the area along the Elahera-Minneriya canal 145 km^2 for the estimate of the Minneriya tank inflow. For the estimate of natural inflow to these tanks, therefore, the runoff from these catchment areas were also counted, using ratio of catchment areas. The monthly inflows to tanks are shown in Tables H.2.14 to H.2.18.

H.3 WATER BALANCE

The Mahaweli Ganga receives rain from both the south-west and north-east monsoons, while the Amban Ganga gets rain mainly during the north-east monsoon period. As a result, their flow conditions are quite different. The Yala season from April to September is the dry season in the Amban Ganga basin. In this period, the Mahaweli river flow is diverted continuously through the Polgolla tunnel as stated in the preceding Section.

H.3.1 Condition of Simulation

Since the annual fluctuation of rainfall is fairly large and water flow system is complicate, it seems to be a proper manner to apply long term water balance study. In due consideration of availability in hydrological data concerned, the water balance study is carried out on monthly basis for a period of 28 years from 1950 to 1977.

The criteria for acceptable deficit of irrigation water and hydropower potential established in the previous Feasibility Study are decided as follows:

Irrigation : The total number of crop season of water shortage shouldn't exceed 20% of the total crop seasons for the study period, as practiced in irrigation projects of developing countries in Asia.

Firm Power Potential : The total number of months of power potential shortage should not exceed 2% of the total number of months for the study period.

The Amban Ganga flow augmented by the Polgolla diversion is once impounded at the Bowatenna reservoir. A part of regulated water is diverted to Kalawewa region so-called Systems H, IH and MH areas with an irrigated area of 48,600 ha through an irrigation tunnel with a maximum allowable capacity of 31.1 m^3/sec (1,100 cusec) during certain time.

In the previous Feasibility Study in 1979, the policy was modified to maximize the diversion water dully in consideration of shortage of irrigation water due to expansion of irrigation area more than that originally planned. The downstream release for power generation was limited to 1.03 MCM per day for 3 hrs peak generation aforesaid. Based on the modified policy, average annual diversion water was estimated to be 519 MCM, ranging 235 MCM in 1960 to 862 MCM in 1956 .

Further diversion was made from the Nalanda reservoir about 10 km upstream of the Bowatenna reservoir to Dewahuwa region with an existing irrigation area of 1,220 ha in another basin. The annual diversion flow is 26.6 MCM on an average as described in Section H.2.4.

H.3.2 Tank Operation

Total effective storage capacity of five existing tanks in the project area is 563 MCM. In order to use the given water resources to maximum extent, tank operation criteria was established taking into consideration following basic conditions:

- To maximize use of natural runoff from own catchment area of the tank and to minimize spill-out.

- To use tank water as much as possible when irrigation requirements are high and to store water in the tank when irrigation requirements are low.

- To supply water to the tank proportionately with available flow at the dam site to minimize the scale of the proposed reservoir.

- To limit the maximum flow to the tank according to the capacities of existing intakes and canals.

At first, reasonable tank operation criteria for respective tanks were established to minimize the storage capacity of the proposed reservoir by using the 1950-1977 records. The balance between natural inflows from catchment areas and irrigation requirements is calculated for each tank on the monthly basis for 28 years as shown in the Table H.3.1. Operation rule curves indicated that substantial water in the tanks should be released during the Yala season from May to August and stored during the Maha season from October to January as shown in the Fig. H.3-1.

As seen in the table, it is necessary to supply irrigation water annually about 80 MCM to 400 MCM to the respective tanks to meet irrigation requirements of the fields commanded by the tanks.

The annual water demands were distributed into 12 months and released to those tanks from the Moragahakanda reservoir through the existing intakes and canals. The distribution of water shall be done in such a way to minimize the proposed reservoir capacity. Then, the annual deficit was distributed to each month in proportion to the monthly average available water at the dam site and the monthly water budget of each tank was done as shown in Table H.3.2. In the table, negative number shows average monthly volume of water released from the tanks and positive number shows the water stored in the tanks. From the table, a rule curve of each tank was derived as shown in Fig. H.3-2, in which required storage for each month is shown in percentage of effective capacity of each tank. The curve indicated that the water in the tanks would be used for four months from May to August and stored during Maha season from October to January. Using this rule curve, the first trial of water balance calculation was carried out. The result, mainly due to the limited canal capacity, revealed that the following modifications were required to the tentative rule curves:

- From Minneriya tank, a large amount of water is sent at a time to the Kantalai and Kaudulla tanks. To assure this, the rule curve of the Minneriya tank is necessary to be kept at full level.

- In order to diminish shortage of water in the Parakrama samudra tank in September, the rule curve of Parakrama Samudra tank has to be modified for August. The modified curve is shown in Fig. H.3-2.

The final rule curves for respective tanks were decided based on the above modifications. The tank operation was carried out by using these final rule curves. Operation rule curves indicate that substantial water in the tanks would be released for four months from May to August in the Yala season and stored during the Maha season from October to January.

According to the final rule curves, the water level of each tank at the beginning of each month should be kept water surface elevation as indicated in the Table H.3.3.

H.3.3 Computer Program

As presented in Fig. H.3-3, the flow is regulated in two reservoirs and five tanks. The criteria and procedure used in the study area are summarized below:

(1) Operation Criteria of Existing Tanks

- Inflow to the Bowatenna reservoir is the sum of i) natural runoff of the Amban Ganga at Bowatenna less diversion requirements to Dewahuwa region from Nalanda reservoir and ii) Polgolla diversion flow.

- At the Bowatenna reservoir, the priority is given to the supply of the minimum required flow for power generation at Bowatenna (1.03 MCM per day).

- The inflow to Bowatenna after the supply of the minimum required flow for power generation is diverted as much as possible to Kalawewa region to meet the irrigation requirements within the maximum limit at 31.1 m^3/sec.

- At Elahera anicut, the diversion requirements have a priority over the downstream requirements.

- At Diyabeduma bifurcation, diversion requirements to Giritale tank have a priority.

- The operation of each tank shall follow as closely as possible the rule curve mentioned in Section H.3.2.

- Inflow to Kantalai tank is sent to Kaudulla tank in case kantalai tank is full.

(2) Operation Criteria of the Moragahakanda Reservoir

- Operation for irrigation purpose only

  In case reservoir water level is above the low water level, water will be released to meet the irrigation water requirements. In case reservoir water level becomes the low water level and the water requirements are more than the inflow, the inflow will be released without regulation.

- Operation for both irrigation and power generation purposes

  In case the reservoir is operated giving a priority to power generation, namely in case water is released aiming to get possible maximum firm power, it is clear from water balance studies that the proposed benefited area of 62,200 ha can not be fully irrigated even though the reservoir capacity is increased to the maximum possible extent. Therefore, the operation of reservoir has to be done in such manner to first meet the irrigation requirements and then to generate the maximum firm power.

In order to fulfil the above requirement, a water level is set up for the operation purpose between the high and low water levels of reservoir. This water level is called as "operation water level" in this report.

Adopting this operation water level, water is released following the criteria as mentioned below:

- In case the reservoir water level is above the operation water level, water will be released to meet irrigation requirements or to maintain a firm power potential, whichever is greater.

- In case reservoir water level will be below the operation water level, the water will be released in is such a manner that the firm power can be generated.

H.3.4 Calculation Procedure

All the analysis mentioned above were made all by the electronic computer with a comprehensive program enveloping all such inputs as diverted flow at Polgolla, available runoff on the Amban Ganga and its tributaries and from their own basins of the existing tanks, evaporation losses from the tanks and the reservoir, conveyance capacity and losses on every canal, storage capacity-water level relation at each tank and the reservoir, and irrigation requirements for the commanded area of each tank.

The calculation procedure of computer analysis is explained in Flow Chart as prepared in Fig. H.3-4.

H.3.5 Water Balance Calculation

The water balance calculation was carried out in the following cases in order to provide basic data for the optimization of the Moragahakanda reservoir capacity:

Case I Without reservoir

The study was carried out to know the condition of irrigation water supply to the existing field of 48,300 ha, without reservoir. The result was used as the basic data to evaluate without-project condition.

Case II Reservoir for irrigation purpose only

The study was executed to decide the minimum dam scale necessary to irrigate the proposed benefited area of 62,200 ha with the prescribed irrigation criteria. The result of study was useful to compute the allocation cost for irrigation.

Case III Combination of irrigation and hydropower

The study was done for various cases of dam height to know the firm power potential and annual energy product. The results was used for determining the optimum scale of the reservoir.

Case IV After Kotmale

In order to demonstrate the after-Kotmale conditions, a check calculation was carried out for the optimum scale of reservoir decided through the above case studies.

Case V Behavior of reservoir water level in impounding

In order to estimate the required time until the benefit envisaged under the project the behavior of the reservoir water level were examined in conditions.

H.4 SUMMARY OF THE STUDY

H.4.1 Summary of The Study

All the results of computer analysis shown in Tables H.4.1 to H.4.6 are summarized below:

(1) In the case I study, it was found that remarkable water deficit would occur in Yala cultivation season. As summarized in Table H.4.7, water deficit would occur in 23 years out of the total 28 years in the study period. The average amount of water deficit in Yala season would be 112 MCM, which correspond to 12.6% of the average irrigation water requirements. Thus, it could be concluded that without reservoir, the amount of available water could not be met even to the irrigation requirements of the existing fields of 48,300 ha.

Contrary to the above, water would be supplied almost sufficiently in Maha season, though some water deficits occur in such drought years as 1973 to 1975.

(2) In the case II study, water balance calculations were carried out with trial and error method under various scales of reservoir capacity in order to know the required scale of dam for irrigation. As a result, it was found that the proposed benefited area of 62,200 ha could be irrigated sufficiently by providing a dam with an effective storage of 606 MCM. In this case, no amendments are required on capacities of the existing canals and tanks. The features of the required dam are;

High water level	MSL 187 m
Low water level	MSL 150 m
Total capacity	628 MCM
Dead capacity	22 MCM
Effective capacity	606 MCM

By providing the above reservoir at Moragahakanda, occurrence of water deficit was limited to eight times in Yala season and three times in Maha season during the study period. As shown in Table H.4.8, an average amount of deficit would be 88 MCM in Yala season, which correspond to 7.9% of the average amount of irrigation requirements. In Maha season, water deficit would occur only in drought years of 1973 to 1975. An average deficit would be 10 MCM or 1.4% of the average irrigation requirements.

In the calculation, the low water level was assumed at MSL 150 m considering the expected sedimentation. However, it will be changed depending upon a type of intake structure or taking power generation into account. In such cases, the high water level is necessary to be changed in such manner to keep always the effective capacity of 606 MCM for irrigation.

(3) The Case III study was executed to know potentials of power generation under various heights of dam. In the upstream of the dam site, Bowatenna power station

has been constructed and, therefore, the highest water level of the Moragahakanda dam is limited to MSL 200 m, which is the tail water level of the station. Taking the above into consideration, the study was carried out for following three cases.

	H.W.L.	Total Reservoir Capacity
Case a	200 m	1,110 MCM
Case b	195 m	900 MCM
Case c	188 m	658 MCM

As the first step of the study on Case a and b, possible maximum firm power capacity was decided for each case by the trial and error method. After then, annual power output was calculated under various conditions of installed capacity of generator. For the Case c study, however, only annual power output was computed as no firm power would be expected. The result of study is summarized in Table H.4.9.

(4) In Case IV study, the following were made clear

Irrigation water deficit would be lessened to an extent as seen in Table H.4.10: times of the failure are reduced only by one to 7 from 8 in Yala seasons and equal in Maha, while the deficit in quantity is improved to 3.7% from 5.4% in Case II.

This fact would be seemingly understood that the reservoir capacity decided to meet the irrigation requirements without Kotmale Reservoir could not function to reduce occurrences of the irrigation water deficit, though excessive water became available.

(5) In Case V study: Behavior of Reservoir Water Level in Impounding

In order to estimate the required time until the benefit envisaged under the project, the behaviors of the Reservoir water level were examined in conditions that impounding of the Reservoir would commence in the beginning of October upon the completion of the Dam by releasing the water to meet the irrigation requirements downstream.

The analysis were made in two cases of feeding the existing farm land of 44,800 ha and the full beneficial area of the project of 62,200 ha. The reservoir operation in this case was made to release on satisfying the irrigation requirements until the water level would reach the L.W.L and after that to obey the operation rule established in the previous subsection.

The results of the analyses are presented in Tables H.4.11 and H.4.12 and summarized below:

- Impounding by feeding the existing land would take 3 to 73 months until the water level would reach the H.W.L and 1 to 25 months until it reaches the L.W.L. The average period is 5.5 months to reach the L.W.L and 19.3 months to the H.W.L. The average, when the worst case is excluded, is 17.3 months.

- Impounding by releasing the water for all the beneficial areas would take 28 months in an average until the water level attains to the H.W.L.

According to the results, it was recommended that the target of completion of reclamation of the new land should be delayed to a time 18 months or three cropping seasons after the completion of the dam, otherwise the benefit would not be raised as planned. As the power generation would be started when the water level reaches the L.W.L, the target of the completion was considered same as the dam.

H.4.2 Future Study

System D2 area will be affected to some extent by the pool created by Kandakadu barrage for System A on the Mahaweli Ganga. The exact location of Kandakadu barrage is uncertain at present. Moreover, new land available in System D2 is subject to annual flood. Upon the completion of the proposed Moragahakanda dam, series of 6 large reservoirs upstream of the Mahaweli Ganga and the Amban Ganga will reduce remarkably the peak flood discharge in this area. Such study is essential during the period of the further stage.

In southern parts of System D1, there will be a certain possibility to extend irrigation area to be commanded through the branch canal No. 1, but to decrease the area in northern parts of System D1 through the branch canal No. 2. These studies should be carried out during the period of the next stage.

TABLES

Table H.2.1 AVERAGE MONTHLY DIVERSION REQUIREMENT AT EACH TANK (1950 - 1977 RECORDS)

Unit: MCM

Scheme	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
A. Existing Area (48,300 ha)													
1. System G	12	11	18	19	27	23	18	26	25	16	8	7	210
2. Ciritale	8	11	5	1	9	15	15	12	1	3	4	5	89
3. Minneriya	26	33	16	4	28	46	46	38	4	10	12	14	277
4. Kaudulla	15	19	9	3	17	27	27	22	2	6	7	8	162
5. Kantalai	29	40	34	16	42	60	60	49	26	17	13	16	402
6. Parakrama Samudra	26	33	16	4	32	49	49	40	5	9	12	14	289
Total	116	147	98	47	155	220	215	187	63	61	56	64	1,429
B. All Project Area (Area 62,200 ha)													
1. System G	12	11	18	19	27	23	18	26	25	16	8	7	210
2. Ciritale	8	11	5	1	9	15	15	12	1	3	4	5	89
3. Minneriya	26	33	16	4	28	46	46	38	4	10	12	14	277
4. Kaudulla	40	51	25	9	43	71	66	57	8	13	18	22	423
5. Kantalai	36	49	39	19	50	72	70	58	27	20	17	20	477
6. Parakrama Samudra	32	40	19	6	38	59	55	47	9	10	13	17	345
Total	154	195	122	58	195	286	270	238	74	72	72	85	1,821

Table H.2.2 (1/3)   MONTHLY DIVERSION REQUIREMENT AT EACH TANK
(Existing Fields: 48,300 ha)

SYSTEM - G

- WATER REQUIREMENTS IN MILLION CUBIC METERS
- IRRIGATION AREA : 6000 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	15	11	15	27	28	23	19	27	27	22	14	12	240	20
1951	1	10	16	21	22	23	19	24	21	17	3	4	181	15
1952	4	9	22	16	24	23	19	27	20	20	12	4	200	17
1953	7	13	19	7	29	23	18	22	25	16	4	5	188	16
1954	6	11	8	16	29	23	19	24	27	14	14	4	191	16
1955	4	11	20	16	28	23	19	27	21	24	17	13	223	19
1956	14	15	18	23	29	23	19	27	27	23	3	4	225	19
1957	11	0	22	27	27	23	19	27	24	6	3	4	193	16
1958	15	12	10	23	25	23	19	27	27	23	15	7	226	19
1959	20	18	22	21	25	20	19	27	27	16	3	4	222	19
1960	8	0	22	7	29	23	17	27	27	21	3	13	197	16
1961	10	8	11	23	29	23	19	27	27	17	3	4	201	17
1962	4	17	22	12	25	23	19	26	27	15	12	9	211	18
1963	4	6	19	7	29	23	19	27	27	19	3	4	187	16
1964	7	12	21	17	26	23	11	27	26	9	16	12	207	17
1965	18	3	16	13	22	23	19	22	27	10	3	4	180	15
1966	4	18	15	22	29	23	19	27	25	7	7	11	207	17
1967	23	11	21	19	29	23	19	27	27	6	3	13	221	18
1968	16	18	9	25	29	23	19	27	27	13	6	12	224	19
1969	12	13	22	20	29	23	19	18	27	12	15	6	214	18
1970	4	0	17	21	29	23	19	27	25	19	7	6	197	16
1971	10	8	16	16	29	23	19	19	27	27	15	0	205	17
1972	23	18	20	17	24	23	19	27	22	6	3	8	210	18
1973	23	13	22	27	29	23	19	27	26	15	6	4	234	20
1974	23	13	22	17	29	23	19	26	20	24	21	4	241	20
1975	18	14	12	25	28	23	15	27	27	24	8	8	229	19
1976	16	18	22	22	29	23	19	27	27	17	6	6	230	19
1977	17	18	21	27	28	23	19	27	24	11	6	7	228	19
TOTAL	335	316	500	534	767	641	517	721	711	448	231	190	5911	495
MEAN	12	11	18	19	27	23	18	26	25	16	8	7	211	18

MINNERIYA TANK

- WATER REQUIREMENTS IN MILLION CUBIC METERS
- IRRIGATION AREA : 9300 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	30	33	8	12	24	46	50	34	7	17	18	25	304	25
1951	9	37	19	1	21	46	50	40	2	17	3	24	264	22
1952	9	37	20	4	27	46	49	41	0	11	21	24	291	26
1953	20	37	20	0	33	46	31	36	4	0	19	7	253	21
1954	17	39	7	0	33	46	44	40	9	9	21	7	272	23
1955	18	31	18	0	31	46	50	34	2	19	22	24	295	25
1956	27	37	20	8	33	42	50	40	9	4	10	16	296	25
1957	32	19	20	10	25	46	46	40	6	8	3	7	262	22
1958	20	31	12	9	29	46	50	28	6	14	17	21	283	24
1959	26	39	20	4	25	44	50	41	6	0	5	16	276	23
1960	16	9	17	0	15	46	37	40	0	9	3	30	222	19
1961	9	22	8	3	30	46	50	41	8	2	8	7	234	20
1962	24	35	14	5	31	46	50	35	0	13	16	21	290	24
1963	9	24	6	4	33	46	44	41	0	14	3	7	231	19
1964	29	30	11	11	25	46	46	41	6	9	25	28	307	26
1965	13	26	20	0	15	46	50	32	9	0	3	7	241	20
1966	26	39	9	2	33	46	50	38	0	0	3	21	267	22
1967	38	33	14	8	31	46	50	41	4	0	3	7	275	23
1968	28	39	10	9	33	46	50	35	0	8	16	23	295	25
1969	34	36	20	0	33	46	42	37	0	0	11	7	246	22
1970	30	22	17	0	28	45	50	32	6	20	10	10	270	23
1971	21	33	18	0	24	46	49	37	9	17	24	7	285	24
1972	35	39	20	3	23	46	50	41	0	0	3	12	272	23
1973	39	37	18	11	30	42	31	41	2	13	27	7	298	25
1974	19	37	20	5	20	46	50	41	3	23	25	7	316	26
1975	29	37	16	0	23	46	33	36	0	21	14	7	262	22
1976	43	39	20	0	33	46	49	38	8	17	7	7	307	26
1977	34	38	17	12	32	46	48	39	0	0	3	7	276	23
TOTAL	724	910	439	121	773	1277	1299	1060	106	267	343	391	7710	646
MEAN	26	33	16	4	28	46	46	38	4	10	12	14	275	23

Table H.2.2 (2/3) MONTHLY DIVERSION REQUIREMENT AT EACH TANK (Existing Fields: 48,300 ha)

KAUDULLA TANK

* WATER REQUIREMENTS IN MILLION CUBIC METERS
* IRRIGATION AREA : 5500 HA.
(EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	17	20	4	7	14	27	29	20	4	10	11	15	178	15
1951	5	19	11	1	13	27	29	24	1	10	2	14	156	13
1952	5	22	12	3	16	27	29	24	0	8	13	14	173	14
1953	12	22	12	0	20	27	18	22	3	0	11	4	151	13
1954	10	23	4	0	20	27	26	24	5	5	13	4	161	13
1955	10	18	10	0	18	27	29	20	1	11	13	14	171	14
1956	16	22	12	4	20	25	29	24	5	2	6	9	174	15
1957	19	11	12	6	15	27	27	23	4	5	2	4	155	13
1958	12	19	7	5	17	27	29	17	4	8	10	12	167	14
1959	15	23	12	2	15	26	29	24	4	0	3	9	167	14
1960	10	5	10	0	9	27	22	24	0	5	2	18	132	11
1961	5	13	5	2	18	27	29	24	5	2	5	4	139	12
1962	14	21	6	3	18	27	29	21	0	7	10	12	170	14
1963	5	14	5	2	20	27	26	24	0	7	2	4	134	11
1964	17	18	7	7	15	27	26	24	3	5	15	16	180	15
1965	20	15	12	0	9	27	28	19	5	0	2	4	141	12
1966	15	23	5	1	20	27	29	22	0	0	2	12	156	13
1967	23	20	8	5	19	27	29	24	2	0	2	4	163	14
1968	17	23	6	5	20	27	29	21	0	5	9	12	174	15
1969	20	21	12	0	20	27	25	22	0	0	6	4	157	13
1970	18	13	10	0	16	26	29	19	4	12	6	6	159	13
1971	13	20	11	0	14	27	29	22	5	10	14	4	169	14
1972	21	23	12	2	13	27	29	24	0	0	2	7	160	13
1973	23	22	10	6	18	25	19	24	1	7	16	4	175	15
1974	23	22	17	3	12	27	29	24	2	14	15	4	187	16
1975	17	22	10	0	14	27	19	22	0	12	9	4	156	13
1976	23	23	12	0	20	27	29	23	5	10	4	4	180	15
1977	20	23	10	7	19	27	28	23	0	0	2	4	163	14
TOTAL	425	540	259	71	462	750	757	628	63	155	207	226	4543	381
MEAN	15	19	9	3	17	27	27	22	2	6	7	8	162	14

GIRITALE TANK

* WATER REQUIREMENTS IN MILLION CUBIC METERS
* IRRIGATION AREA : 3000 HA.
(EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	10	11	2	4	8	15	16	11	2	5	6	8	98	8
1951	3	11	6	0	7	15	16	13	1	6	1	8	87	7
1952	3	12	6	1	9	15	16	13	0	4	7	8	94	8
1953	6	12	6	0	11	15	10	12	1	0	6	3	82	7
1954	6	13	2	0	11	15	14	13	3	3	7	3	90	8
1955	6	10	6	0	10	15	16	11	1	6	7	8	96	8
1956	9	12	6	2	11	14	16	13	3	1	3	5	95	8
1957	10	6	6	3	8	15	15	13	2	3	1	2	84	7
1958	7	10	4	3	10	15	16	9	2	5	5	7	93	8
1959	8	13	6	1	8	14	16	13	2	0	2	5	88	7
1960	5	3	6	0	5	15	12	13	0	3	1	10	73	6
1961	3	7	3	1	10	15	16	13	3	1	3	2	77	6
1962	8	11	5	2	10	15	16	11	0	4	5	7	94	8
1963	3	8	2	1	11	15	14	13	0	5	1	2	75	6
1964	9	10	4	4	8	15	14	13	2	3	8	9	99	8
1965	11	8	6	0	5	15	16	10	3	0	1	2	77	6
1966	8	13	3	1	11	15	16	12	0	0	1	7	87	7
1967	12	11	5	3	10	15	16	13	1	0	1	2	89	7
1968	9	13	3	3	11	15	16	11	0	3	5	7	96	8
1969	11	12	6	0	11	15	14	12	0	0	3	2	86	7
1970	10	7	6	0	9	15	16	11	2	6	3	3	88	7
1971	7	11	6	0	8	15	16	12	3	6	8	2	94	8
1972	11	13	6	1	7	15	16	13	0	0	1	4	87	7
1973	13	12	6	4	10	14	10	13	1	4	9	2	98	8
1974	13	12	6	2	7	15	16	13	1	7	8	2	102	9
1975	9	12	5	0	8	15	11	12	0	7	5	2	86	7
1976	12	13	6	0	11	15	16	13	3	6	2	2	99	8
1977	11	12	6	4	11	15	16	13	0	0	1	2	91	8
TOTAL	233	298	140	40	256	417	418	342	36	88	111	126	2505	207
MEAN	8	11	5	1	9	15	15	12	1	3	4	5	89	7

Table H.2.2 (3/3) MONTHLY DIVERSION REQUIREMENT AT EACH TANK
(Existing Fields: 48,300 ha)

KANTALAI TANK

* WATER REQUIREMENTS IN MILLION CUBIC METERS
  (PADDY + UPLAND + SUGAR)
* IRRIGATION AREA ; 14500 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	43	40	38	32	19	64	71	44	32	26	10	20	439	37
1951	7	35	35	6	40	64	61	63	15	34	4	24	388	32
1952	7	50	41	7	39	64	64	67	32	46	15	13	467	39
1953	16	45	26	0	52	62	36	63	39	20	24	15	398	33
1954	10	45	23	10	50	64	44	47	35	14	28	5	375	31
1955	8	28	39	0	22	64	69	8	13	28	39	26	344	29
1956	27	46	43	15	51	49	58	53	21	1	2	29	395	33
1957	33	30	43	33	40	63	58	66	26	0	2	5	397	33
1958	37	42	17	15	50	64	64	31	29	20	30	28	427	36
1959	24	52	42	16	50	33	71	38	38	13	5	14	394	33
1960	16	12	39	0	42	64	33	67	32	27	2	41	375	31
1961	7	32	26	25	45	63	69	67	22	0	7	5	363	30
1962	14	45	39	15	33	64	68	61	28	25	21	13	426	36
1963	7	23	24	6	36	64	61	63	24	22	7	5	337	28
1964	35	50	13	27	50	64	45	41	44	7	19	35	430	36
1965	43	15	40	1	29	63	71	12	36	1	2	5	318	27
1966	15	47	28	7	52	64	70	21	21	0	2	24	351	29
1967	51	33	36	19	48	64	71	43	33	0	7	5	405	34
1968	27	54	16	13	48	63	71	50	16	29	2	8	397	33
1969	33	31	43	11	49	64	51	28	38	0	13	5	366	31
1970	23	21	33	9	34	62	71	54	25	31	3	25	391	33
1971	23	53	38	26	44	64	58	44	18	31	23	5	427	36
1972	51	48	40	27	43	56	64	67	3	0	13	18	428	36
1973	52	50	42	33	42	22	56	60	16	0	41	5	419	35
1974	55	47	43	12	30	64	57	60	22	47	34	8	479	40
1975	46	51	35	31	36	64	52	48	36	36	15	31	481	40
1976	52	54	43	24	52	56	55	51	26	25	10	5	453	38
1977	48	30	30	27	44	64	67	60	2	0	5	14	391	33
TOTAL	808	1109	955	447	1168	1680	1688	1375	720	483	370	456	11259	967
MEAN	29	40	34	16	42	60	60	49	26	17	13	16	402	34

PARAKRAMA SAMUDRA TANK

* WATER REQUIREMENTS IN MILLION CUBIC METERS
* IRRIGATION AREA ; 10100 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	32	40	8	13	32	50	54	38	9	16	22	26	340	28
1951	9	35	17	2	36	50	51	42	0	21	3	17	283	24
1952	9	33	20	3	29	50	51	44	1	10	21	21	297	24
1953	23	37	17	0	36	48	40	43	0	2	15	8	269	22
1954	16	36	4	5	36	50	48	40	10	8	21	8	282	24
1955	20	35	21	3	34	50	54	33	0	11	29	29	319	27
1956	33	39	18	5	36	42	54	43	10	6	9	14	307	26
1957	34	15	22	9	26	50	48	44	9	10	3	8	278	23
1958	26	36	14	8	32	50	54	33	9	7	17	8	292	24
1959	16	43	22	6	36	50	54	44	9	0	6	18	304	25
1960	17	10	36	0	22	50	43	44	8	17	13	31	277	23
1961	9	20	14	4	24	50	54	44	9	13	5	8	254	21
1962	25	39	17	6	31	50	54	44	0	11	19	22	318	27
1963	9	20	14	0	35	50	52	44	0	9	3	8	244	20
1964	29	24	0	8	35	50	46	42	5	19	25	28	311	26
1965	35	10	22	0	23	50	54	33	10	4	3	8	250	21
1966	21	43	9	0	36	50	54	35	7	0	3	18	276	23
1967	39	33	19	7	36	50	54	44	9	2	3	8	304	25
1968	32	43	12	6	34	50	54	44	9	9	9	23	327	27
1969	34	41	21	0	36	50	47	38	9	1	28	8	313	26
1970	27	16	22	0	25	41	54	36	8	6	3	12	252	21
1971	29	35	9	0	35	50	42	19	10	8	22	8	266	22
1972	41	43	22	2	25	50	54	44	0	0	3	8	292	24
1973	42	34	20	12	30	46	23	42	0	9	3	8	269	22
1974	42	40	21	1	32	50	54	44	0	25	20	20	349	29
1975	31	28	4	0	27	50	21	37	10	7	11	8	234	20
1976	23	43	22	10	36	48	54	39	1	15	3	8	302	25
1977	30	40	10	0	26	50	40	38	0	2	3	8	247	21
TOTAL	733	911	437	110	885	1377	1362	1109	152	248	325	399	8046	670
MEAN	26	33	16	4	32	49	49	40	5	9	12	14	287	24

Table H.2.3 (1/3) MONTHLY DIVERSION REQUIREMENT AT EACH TANK
(Irrigation Area : 62,200 ha.)

SYSTEM - G

- WATER REQUIREMENTS IN MILLION CUBIC METERS
- IRRIGATION AREA : 6000 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	15	11	15	27	28	23	19	27	27	22	14	12	240	20
1951	1	10	16	21	22	23	19	24	21	17	3	4	181	15
1952	4	9	22	16	24	23	19	27	20	20	12	4	200	17
1953	7	13	19	7	29	23	18	22	25	16	4	5	188	16
1954	4	11	6	16	29	23	19	24	27	14	14	4	191	16
1955	4	11	20	16	28	23	19	27	21	24	17	13	223	19
1956	14	15	18	23	29	23	19	27	27	23	3	4	225	19
1957	11	0	22	27	27	23	19	27	24	6	3	4	193	16
1958	15	12	10	23	25	23	19	27	27	23	15	7	226	19
1959	20	18	22	21	25	20	19	27	27	16	3	4	222	19
1960	8	0	22	7	29	23	17	27	27	21	3	13	197	16
1961	10	8	11	23	29	23	19	27	27	17	3	4	201	17
1962	4	17	22	12	25	23	19	26	27	15	12	9	211	18
1963	4	6	19	7	29	23	19	27	27	19	3	4	187	16
1964	7	12	21	17	26	23	11	27	26	9	16	12	207	17
1965	18	3	16	13	22	23	19	22	27	10	3	4	180	15
1966	4	18	15	22	29	23	19	27	25	7	7	11	207	17
1967	23	11	21	19	29	23	19	27	27	6	3	13	221	18
1968	16	18	9	25	29	23	19	27	27	13	6	12	224	19
1969	12	13	22	20	29	23	19	18	27	12	15	4	214	18
1970	4	0	17	21	29	23	19	27	25	19	7	6	197	16
1971	10	8	16	16	29	23	19	19	27	22	15	0	204	17
1972	23	18	20	17	24	23	19	22	22	6	3	8	210	18
1973	23	13	22	27	29	23	19	27	26	15	6	4	234	20
1974	23	13	22	17	29	23	19	26	20	24	21	4	241	-20
1975	18	14	12	25	28	23	15	27	27	24	8	8	229	19
1976	16	16	22	22	29	23	19	27	27	17	6	6	230	19
1977	17	18	21	27	28	23	19	27	24	11	6	7	228	19
TOTAL	335	316	500	514	767	641	517	721	711	448	231	190	5911	495
MEAN	12	11	18	19	27	23	18	26	25	16	8	7	211	18

MINNERIYA TANK

- WATER REQUIREMENTS IN MILLION CUBIC METERS
- IRRIGATION AREA : 9300 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	30	33	8	15	22	46	47	32	8	16	18	25	300	25
1951	9	32	19	2	19	46	47	39	3	16	2	11	245	20
1952	9	37	20	6	26	46	46	41	0	12	21	23	287	24
1953	20	37	20	0	34	46	25	35	6	0	18	7	248	21
1954	17	39	7	0	34	46	40	39	12	8	21	7	270	23
1955	18	31	18	0	31	46	48	33	2	18	21	24	290	24
1956	27	37	20	10	34	40	48	40	12	3	10	16	297	25
1957	32	19	20	12	24	46	42	39	8	7	2	7	258	22
1958	20	31	17	11	29	46	42	26	8	13	16	21	280	23
1959	26	39	20	6	24	42	47	41	8	0	4	16	273	23
1960	16	9	17	0	12	46	32	40	0	8	2	30	212	18
1961	9	22	8	4	30	46	47	41	10	2	8	7	234	20
1962	24	35	14	7	31	46	48	33	0	12	16	21	287	24
1963	9	24	6	5	34	46	40	40	0	13	2	7	226	19
1964	29	30	11	14	24	46	38	40	7	8	25	28	300	25
1965	33	26	20	0	12	46	47	29	12	0	2	7	234	20
1966	26	39	9	3	34	46	47	37	0	0	2	21	264	22
1967	38	33	14	10	31	46	48	41	5	0	2	7	275	23
1968	28	39	10	11	34	46	48	33	0	7	15	21	292	24
1969	34	36	20	1	34	46	38	36	0	0	10	7	262	22
1970	30	22	17	0	27	43	48	30	8	19	10	10	264	22
1971	21	33	18	0	23	46	46	36	11	16	23	7	280	23
1972	35	39	20	4	21	46	48	41	0	0	2	12	268	22
1973	39	37	18	13	30	39	26	41	3	12	27	7	292	24
1974	39	37	20	7	18	46	48	41	4	22	25	7	314	26
1975	38	39	20	1	34	46	46	38	11	16	6	7	302	25
1976	29	37	17	0	21	46	27	35	0	20	14	7	253	21
1977	34	38	17	15	33	46	44	39	0	0	2	7	275	23
TOTAL	719	910	440	157	760	1268	1203	1036	138	248	326	377	7582	633
MEAN	26	33	16	6	27	45	43	37	5	9	12	13	271	23

Table H. 2.3 (2/3) MONTHLY DIVERSION REQUIREMENT AT EACH TANK
(Irrigation Area : 62,200 ha.)

KAUDULLA TANK

- WATER REQUIREMENTS IN MILLION CUBIC METERS
- IRRIGATION AREA : 14600 HA.
  (INCLUDING EXTENSION AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	46	57	12	15	35	72	74	50	13	25	28	39	461	38
1951	11	51	50	3	30	72	74	62	5	25	4	37	406	34
1952	12	57	31	15	37	70	58	67	3	14	30	36	430	36
1953	31	59	12	0	60	70	0	49	15	0	26	10	352	29
1954	27	60	11	0	54	72	86	61	19	12	32	11	445	37
1955	28	68	28	0	48	70	44	44	8	24	30	37	429	36
1956	42	59	31	15	54	72	75	62	18	5	15	25	473	39
1957	50	30	31	19	37	72	66	65	13	11	4	11	409	34
1958	17	49	19	12	44	72	74	60	13	20	25	33	438	37
1959	40	62	31	9	37	72	74	64	13	0	6	25	433	36
1960	23	18	26	3	28	72	59	64	6	11	6	40	356	30
1961	18	39	15	8	47	72	75	30	10	5	13	15	349	29
1962	37	55	22	10	48	72	73	52	1	18	25	33	446	37
1963	13	38	9	8	55	72	63	63	0	21	4	11	355	30
1964	45	47	12	22	37	72	60	63	11	13	38	43	468	39
1965	52	40	31	0	19	72	74	46	19	0	4	11	368	31
1966	40	62	13	5	54	72	74	60	0	0	4	32	416	35
1967	60	52	22	16	49	72	74	64	9	0	4	11	433	36
1968	44	62	14	17	53	72	73	52	0	11	23	32	457	38
1969	53	56	31	1	53	72	60	57	0	0	16	11	410	34
1970	48	34	27	0	42	67	75	47	13	29	15	16	413	34
1971	33	52	29	0	36	71	71	57	17	25	37	11	439	37
1972	56	62	31	7	33	72	74	64	0	0	4	19	420	35
1973	61	57	28	21	47	61	40	63	5	18	42	11	454	38
1974	61	57	31	10	28	72	74	66	7	34	39	11	488	41
1975	45	57	26	1	34	72	47	55	1	31	27	11	397	33
1976	60	62	31	1	53	72	71	59	16	25	10	11	471	39
1977	53	60	27	24	51	72	69	60	0	0	4	11	431	36
TOTAL	1121	1437	686	247	1201	1993	1850	1586	235	377	512	604	11867	988
MEAN	40	51	25	9	43	71	66	57	8	13	18	22	423	35

GIRITALE TANK

- WATER REQUIREMENTS IN MILLION CUBIC METERS
- IRRIGATION AREA : 3000 HA.
  (EXISTING AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	10	11	3	5	7	15	15	10	3	5	6	8	98	8
1951	3	11	6	1	6	15	15	13	1	5	1	8	85	7
1952	3	12	6	7	8	15	15	13	0	4	7	8	93	8
1953	6	12	7	0	11	15	8	11	2	0	6	2	80	7
1954	6	13	2	0	11	15	13	13	4	2	7	2	88	7
1955	6	10	6	0	10	15	16	11	1	6	7	8	96	8
1956	9	12	7	3	11	13	16	13	4	1	3	5	97	8
1957	10	6	7	4	8	15	14	13	3	2	1	2	85	7
1958	7	10	4	4	9	15	15	8	3	4	5	7	91	8
1959	8	13	7	2	8	14	15	13	3	0	2	5	90	8
1960	5	3	6	0	4	15	10	13	0	3	1	10	70	6
1961	3	7	3	1	10	15	15	13	3	1	3	2	76	6
1962	8	11	5	2	10	15	16	11	0	4	5	7	94	8
1963	3	8	2	2	11	15	13	13	0	4	1	2	74	6
1964	9	10	4	5	8	15	12	13	2	3	8	9	98	8
1965	11	8	7	0	4	15	15	10	4	0	1	2	77	6
1966	8	13	3	1	11	15	15	12	0	0	1	7	86	7
1967	12	11	5	3	10	15	16	13	2	0	1	2	90	8
1968	9	13	3	4	11	15	16	11	0	2	5	7	96	8
1969	11	12	7	0	11	15	12	12	0	0	3	2	85	7
1970	10	7	6	0	9	14	16	10	3	6	3	3	87	7
1971	7	11	6	0	8	15	15	12	4	5	8	2	93	8
1972	11	13	7	1	7	15	16	13	0	0	1	4	88	7
1973	13	12	6	4	10	13	8	13	1	4	9	2	95	8
1974	13	12	7	2	6	15	16	13	1	7	8	2	102	9
1975	9	12	5	0	7	15	9	11	0	6	4	2	80	7
1976	12	13	7	0	11	15	15	12	3	5	2	2	97	8
1977	11	12	6	5	11	15	14	13	0	0	1	2	90	8
TOTAL	233	298	150	51	248	414	391	336	47	79	110	124	2481	208
MEAN	8	11	5	2	9	15	14	12	2	3	4	4	89	7

Table H.2.3 (3/3) MONTHLY DIVERSION REQUIREMENT AT EACH TANK

(Irrigation Area : 62,200 ha.)

KANTALAI TANK

* WATER REQUIREMENTS IN MILLION CUBIC METERS
(PADDY + UPLAND + SUGAR)
* IRRIGATION AREA : 17000 HA.
(INCLUDING EXTENSION AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	53	50	43	39	23	77	83	51	35	29	13	24	520	43
1951	9	44	38	7	48	77	73	74	15	38	5	29	457	38
1952	9	61	49	8	47	77	74	79	34	52	19	40	549	46
1953	20	55	30	0	63	75	22	74	44	22	29	19	453	38
1954	13	56	27	12	61	77	69	55	38	16	34	7	465	39
1955	11	37	45	0	27	77	81	10	13	31	47	32	411	34
1956	36	57	49	18	62	59	67	62	21	1	3	35	470	39
1957	42	38	49	40	48	76	68	75	28	0	3	7	474	40
1958	46	52	20	18	61	77	74	35	31	22	36	35	507	42
1959	32	63	48	20	61	40	83	44	40	14	6	17	468	39
1960	22	17	45	0	51	77	37	79	35	29	3	49	444	37
1961	9	41	30	31	55	76	80	79	23	0	3	7	434	36
1962	19	56	45	18	39	77	79	72	30	28	25	16	504	42
1963	9	31	28	7	43	77	71	74	25	25	3	7	400	33
1964	44	61	15	32	61	77	51	48	49	8	38	42	526	44
1965	53	21	46	1	34	76	83	13	40	1	3	7	378	32
1966	20	57	32	9	63	77	82	23	21	0	3	30	417	35
1967	62	42	42	23	58	77	83	52	32	13	3	8	495	41
1968	36	65	19	16	58	77	83	58	16	33	3	10	474	40
1969	42	40	49	14	59	77	58	32	42	0	17	7	437	36
1970	30	29	38	10	41	75	83	63	26	34	3	30	462	39
1971	30	64	43	31	53	77	68	51	19	34	28	7	505	42
1972	62	59	46	33	49	67	74	79	3	0	17	22	511	43
1973	63	59	48	40	51	75	65	71	16	0	49	7	494	41
1974	66	57	49	34	35	77	46	71	23	53	40	10	561	47
1975	56	62	40	37	43	77	60	56	40	40	19	37	567	47
1976	63	65	49	28	63	63	55	60	28	28	13	7	527	44
1977	58	37	35	32	53	77	78	71	2	0	6	18	462	39
TOTAL	1015	1371	1097	538	1410	2023	1950	1611	769	551	471	566	13372	1116
MEAN	36	49	39	19	50	72	70	58	27	20	17	20	478	40

PARAKRAMA SAMUDRA TANK

* WATER REQUIREMENTS IN MILLION CUBIC METERS
* IRRIGATION AREA : 12300 HA.
(INCLUDING EXTENSION AREA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	39	49	10	17	39	61	63	45	16	18	26	31	414	35
1951	11	42	21	4	45	61	58	51	0	24	3	21	341	28
1952	11	40	24	5	34	61	58	54	3	11	25	26	352	29
1953	28	45	21	0	46	56	41	52	0	2	18	9	318	27
1954	20	44	5	8	46	61	52	47	16	8	25	9	341	28
1955	24	43	26	5	41	61	63	32	0	12	34	30	371	31
1956	40	48	23	9	46	50	62	49	15	6	10	17	375	31
1957	41	18	26	13	31	61	53	53	15	11	3	9	334	28
1958	32	44	17	12	39	61	63	33	14	7	20	9	351	29
1959	23	52	26	10	44	60	63	52	15	0	7	22	374	31
1960	22	12	20	0	24	61	45	53	12	20	15	37	321	27
1961	11	24	17	7	27	60	63	54	15	15	5	9	307	26
1962	30	47	21	10	37	61	63	53	1	12	22	26	383	32
1963	11	25	17	0	42	61	58	54	0	10	3	9	290	24
1964	36	29	0	12	42	61	50	50	7	22	29	34	372	31
1965	42	12	26	0	25	60	63	34	16	4	3	9	294	25
1966	26	52	11	0	45	61	63	39	10	0	3	22	332	28
1967	47	41	23	11	45	61	61	54	15	2	3	8	373	31
1968	39	52	15	10	46	61	63	54	13	9	10	27	399	33
1969	42	50	26	0	46	61	52	44	13	1	34	9	378	32
1970	31	20	26	0	28	49	63	42	13	6	3	14	297	25
1971	34	43	11	1	44	61	44	19	16	8	25	9	315	26
1972	50	52	26	4	29	61	62	54	0	0	3	9	350	29
1973	52	41	24	18	35	53	23	50	0	10	3	9	318	27
1974	52	48	26	3	39	61	63	54	0	29	24	25	424	35
1975	37	35	5	0	32	61	21	43	16	7	13	9	279	23
1976	27	52	26	15	46	56	62	45	3	17	3	9	361	30
1977	31	49	12	0	30	61	42	45	0	2	3	9	284	24
TOTAL	891	1109	531	174	1073	1666	1539	1309	244	273	375	466	9648	805
MEAN	32	40	19	6	38	59	55	47	9	10	13	17	345	29

Table H.2.4 MONTHLY RUNOFF AT POLGOLLA

* MONTHLY RUNOFF IN MILLION CUBIC METERS
* MAHAWELI GANGA AT POLGOLLA (CATCHMENT AREA : 1292 SQ.KM)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	66	57	75	49	154	136	246	232	508	227	133	64	1947	162
1951	204	101	71	117	69	928	299	24	222	328	441	132	2936	245
1952	200	83	53	149	773	468	234	259	108	564	168	88	3147	262
1953	61	44	47	88	44	83	325	184	774	219	152	115	1536	128
1954	103	64	90	168	218	197	206	374	213	458	181	328	2600	217
1955	187	124	107	161	411	702	325	183	214	228	228	128	2998	250
1956	72	58	73	64	113	627	213	240	228	372	428	183	2671	223
1957	115	95	64	77	117	444	508	202	144	175	388	1027	3356	280
1958	237	78	167	129	229	249	235	278	121	372	326	136	2557	213
1959	91	72	67	121	137	614	518	204	206	334	250	156	2770	231
1960	122	178	85	149	173	258	306	264	477	372	443	153	2980	248
1961	84	64	56	73	279	188	227	385	198	207	243	195	2199	183
1962	108	53	46	66	280	164	255	189	306	383	240	143	2253	188
1963	137	71	64	115	117	178	255	217	210	340	246	296	2246	187
1964	143	84	71	56	96	113	264	254	266	178	380	124	2029	169
1965	53	49	36	139	442	283	115	257	156	290	239	202	2261	188
1966	90	40	56	110	60	67	108	121	355	314	253	122	1696	141
1967	91	75	73	57	56	148	193	174	93	431	320	350	2061	172
1968	65	41	65	78	146	251	515	344	319	308	300	183	2635	220
1969	102	56	42	146	288	372	188	131	237	291	183	218	2254	188
1970	156	129	65	143	146	238	204	379	174	310	321	342	2607	217
1971	178	76	69	177	192	303	346	359	553	381	195	270	3099	258
1972	76	41	29	82	367	108	329	237	173	481	403	293	2619	218
1973	100	46	34	55	36	102	144	324	108	112	200	223	1484	124
1974	107	58	77	149	232	352	539	436	383	306	132	133	2904	242
1975	102	47	53	98	135	502	175	441	356	400	671	228	3208	267
1976	121	46	9	96	40	34	153	118	95	228	234	158	1332	111
1977	46	31	36	76	222	275	210	153	91	371	242	116	1869	156
TOTAL	3237	1961	1780	3008	5572	8384	7635	6963	6688	8980	7940	6106	68254	5688
MEAN	116	70	64	107	199	299	273	249	239	321	284	218	2438	203

Table H.2.5 DIVERTED FLOW THROUGH POLGOLLA TUNNEL (Before Kotmale)

* DIVERTED FLOW THROUGH POLGOLLA TUNNEL
IN MILLION CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	55	47	49	37	54	107	120	151	136	144	103	53	1056	88
1951	110	78	60	89	51	147	140	13	100	156	147	104	1195	100
1952	117	71	42	111	129	147	125	143	91	144	119	76	1313	109
1953	50	53	16	78	72	63	127	126	107	132	118	100	1040	87
1954	91	54	72	118	122	137	141	152	144	142	135	150	1463	122
1955	141	103	88	106	138	147	152	139	117	135	142	108	1514	126
1956	63	48	62	53	88	129	143	143	144	151	147	144	1315	110
1957	99	78	54	69	70	147	152	131	121	116	147	152	1336	111
1958	136	67	105	93	141	126	152	152	108	135	147	116	1480	123
1959	80	62	57	86	118	142	152	140	136	150	146	109	1376	115
1960	98	113	71	104	111	146	152	144	137	152	147	118	1513	126
1961	68	53	43	53	119	117	126	151	144	126	145	129	1274	106
1962	97	43	34	59	122	120	143	101	140	144	143	120	1266	106
1963	106	61	52	91	106	110	149	146	141	148	145	151	1406	117
1964	109	63	59	45	67	77	143	141	134	125	143	102	1208	101
1965	42	38	24	103	151	146	101	141	121	146	145	142	1300	108
1966	76	30	44	90	49	56	95	98	143	152	150	108	1091	91
1967	79	58	58	45	44	98	143	135	79	116	120	136	1111	93
1968	73	52	47	79	75	122	152	150	140	152	140	130	1312	109
1969	85	44	32	101	119	147	142	112	131	143	131	121	1308	109
1970	121	94	51	111	129	143	134	152	128	144	146	152	1505	125
1971	131	65	58	105	125	130	152	147	140	151	131	136	1471	123
1972	65	31	17	68	139	92	134	126	112	152	147	147	1230	103
1973	88	36	22	43	24	76	111	152	94	96	143	127	1012	84
1974	87	43	54	114	130	147	146	151	147	150	107	80	1354	113
1975	85	36	59	86	101	140	139	150	146	152	147	144	1363	114
1976	100	37	19	86	31	23	83	91	86	139	145	123	963	80
1977	36	21	25	64	147	144	140	100	79	145	134	108	1143	95
TOTAL	2488	1559	1374	2281	2799	3326	3787	3676	3446	3938	3860	3384	35918	2994
MEAN	89	56	49	81	100	119	135	131	123	141	138	121	1283	107

Table H.2.6 DIVERTED FLOW THROUGH POLGOLLA TUNNEL (After Kotmale)

* DIVERTED FLOW THROUGH POLGOLLA TUNNEL
IN MILLION CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	80	86	99	75	139	91	108	151	142	151	101	34	1260	105
1951	151	108	92	133	92	147	151	89	147	151	147	151	1564	130
1952	151	101	30	137	151	147	151	151	145	151	132	85	1582	132
1953	86	71	69	83	82	103	151	151	147	151	147	137	1376	115
1954	67	60	107	147	151	147	151	151	147	151	124	151	1554	130
1955	151	131	126	147	151	147	151	151	147	151	147	97	1697	141
1956	101	92	110	101	135	147	151	144	147	151	147	151	1572	131
1957	132	118	99	108	129	147	151	151	129	57	147	151	1519	127
1958	151	106	131	145	157	147	151	151	111	151	147	151	1719	143
1959	108	100	107	110	147	147	151	151	147	151	147	143	1624	135
1960	128	142	76	147	151	147	151	151	147	151	147	135	1693	141
1961	94	76	84	92	151	147	151	151	147	151	147	151	1542	129
1962	113	72	77	100	151	147	151	151	147	151	147	135	1542	129
1963	128	82	93	123	125	147	151	151	147	151	147	151	1596	133
1964	142	105	102	92	129	110	151	151	147	151	147	132	1579	132
1965	91	86	79	144	151	147	129	151	109	151	147	178	1561	130
1966	98	70	35	122	93	82	109	122	147	151	147	127	1356	113
1967	114	99	105	93	93	147	151	151	101	151	147	151	1505	125
1968	106	75	98	115	151	147	151	151	147	151	147	151	1588	132
1969	125	91	81	147	151	147	151	151	147	151	147	151	1620	135
1970	132	124	82	143	151	147	151	151	147	151	147	151	1677	140
1971	161	98	100	147	151	147	151	151	147	151	147	151	1702	142
1972	88	61	64	98	151	147	151	151	139	151	147	151	1490	125
1973	106	55	65	48	65	118	139	151	101	111	147	151	1304	109
1974	108	74	93	147	151	147	151	151	147	151	132	135	1597	133
1975	99	61	72	116	151	147	151	151	147	151	147	151	1542	129
1976	128	82	43	112	72	66	118	118	78	151	147	151	1273	106
1977	73	46	40	121	151	147	112	150	120	151	147	143	1424	119
TOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MEAN	114	82	90	119	133	137	145	146	137	146	144	139	[illegible]	[illegible]

Table H.2.7 MONTHLY RUNOFF AT ELAHERA

* AMBAN GANGA AT ELAHERA
* NATURAL RUNOFF IN MILLION CUBIC METERS
* CATCHMENT AREA : 779 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	144	40	87	26	28	24	25	22	40	36	38	52	562	47
1951	330	101	40	33	28	46	30	13	38	59	123	162	1025	85
1952	265	106	46	33	61	35	16	14	11	79	81	83	857	71
1953	61	16	12	57	9	3	14	9	5	62	60	103	446	37
1954	123	97	61	56	20	12	12	9	5	54	46	260	805	67
1955	214	119	48	62	60	37	17	11	30	26	30	40	694	58
1956	37	54	51	49	30	15	5	3	2	10	99	102	452	38
1957	79	90	36	9	22	32	17	7	6	66	119	398	879	73
1958	114	49	104	88	92	24	18	32	8	51	77	107	764	64
1959	89	28	9	27	37	26	43	31	19	57	92	155	613	51
1960	144	302	73	58	34	23	45	17	17	66	143	99	1001	83
1961	112	65	51	30	43	25	24	26	12	18	99	155	660	55
1962	163	92	32	52	65	23	21	23	26	91	90	147	825	69
1963	257	151	61	69	44	22	19	20	14	33	95	223	1008	84
1964	256	143	80	38	32	18	29	19	20	25	64	130	852	71
1965	79	112	38	71	79	31	17	32	15	52	105	185	816	68
1966	134	74	66	46	22	14	11	9	25	60	147	103	711	59
1967	120	118	56	40	31	24	20	18	10	58	189	246	930	78
1968	128	43	70	34	17	15	31	17	12	52	125	176	720	60
1969	134	94	36	60	31	22	13	29	24	93	63	179	778	65
1970	216	246	63	73	46	22	19	16	20	44	72	161	998	83
1971	210	85	50	68	69	42	26	50	68	60	61	311	1080	90
1972	97	49	18	27	80	19	24	14	12	88	108	227	763	64
1973	61	47	19	19	16	11	10	9	8	9	45	177	431	36
1974	61	19	20	33	21	18	26	33	44	27	21	94	417	35
1975	78	18	45	27	25	25	23	30	29	23	145	116	599	50
1976	165	54	42	30	21	1	15	17	22	64	170	192	793	66
1977	83	22	28	39	142	117	94	47	27	160	232	291	1262	105
TOTAL	3977	2454	1362	1284	1207	726	664	577	567	1505	2741	4674	21736	1812
MEAN	142	88	49	46	43	26	24	21	20	54	98	167	776	65

Table H.2.8 MONTHLY RUNOFF AT ANGAMEDILLA

* AMBAN GANGA AT ANGAMEDILLA
* NATURAL RUNOFF IN MILLION CUBIC METERS
* CATCHMENT AREA : 1458 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	271	73	165	49	53	68	48	41	74	50	53	74	999	83
1951	468	180	76	98	45	70	43	24	173	85	200	331	1793	149
1952	171	208	83	110	106	53	24	20	16	113	119	140	1383	115
1953	161	60	68	80	15	4	24	19	9	116	113	196	865	72
1954	326	181	116	108	38	24	24	18	9	81	74	473	1472	123
1955	414	218	101	114	95	56	25	16	41	49	59	74	1262	105
1956	89	86	80	71	45	26	9	4	5	20	191	196	822	69
1957	166	169	68	18	40	60	30	10	6	121	276	748	1642	137
1958	218	91	196	168	170	44	31	60	18	95	143	200	1434	120
1959	168	51	168	51	69	49	80	59	33	108	170	291	1297	108
1960	304	471	111	93	59	16	66	28	29	66	210	176	1599	133
1961	241	134	95	68	75	39	34	36	18	29	196	325	1290	108
1962	345	203	65	101	109	39	33	33	38	130	158	291	1545	129
1963	520	289	113	126	76	34	26	28	21	49	164	424	1870	156
1964	511	278	141	69	55	26	43	29	26	35	89	220	1522	127
1965	150	265	66	119	128	46	24	45	21	79	171	339	1453	121
1966	266	151	140	88	40	21	16	14	36	94	250	183	1299	108
1967	260	241	108	68	50	34	280	25	15	89	351	460	1981	165
1968	308	79	174	69	30	23	48	24	19	75	193	355	1347	112
1969	274	186	65	101	55	34	18	44	34	133	96	359	1399	117
1970	401	453	111	124	76	34	26	26	31	71	123	334	1810	151
1971	390	120	96	116	114	64	40	66	105	89	115	715	2026	169
1972	208	91	64	201	129	26	41	24	28	181	200	464	1657	138
1973	108	64	33	38	30	21	20	20	11	70	86	333	784	65
1974	113	33	18	63	39	31	49	63	80	51	39	176	775	65
1975	148	73	86	41	48	49	44	58	58	44	271	219	1139	95
1976	309	100	78	58	39	1	28	31	41	170	318	359	1482	124
1977	118	41	53	73	265	219	176	89	51	300	434	544	2363	197
TOTAL	7768	4537	2713	2479	2093	1211	1350	954	1044	2195	4812	9019	40310	3361
MEAN	277	162	97	89	75	43	48	34	37	69	172	322	1440	120

Table H.2.9 AVERAGE MONTHLY NATURAL RUNOFF AND DIVERSION WATER (1950 - 1977 RECORDS)

Unit: MCM

Month	Average Monthly Natural Runoff			Diversion Water				Inflow to Moragahakanda	
				Polgolla					
	Polgolla	Elahera	Angamedilla	Before Kotmale	After Kotmale	Nalanda	Bowatenna	Before Kotmale	After Kotmale
Jan.	116	142	272	89	114	3.3	23	207	229
Feb.	70	88	162	56	89	1.3	37	119	142
Mar.	64	49	97	49	90	0.7	41	76	101
Apr.	107	46	89	81	119	0.8	42	85	118
May	199	43	75	100	131	3.3	54	90	120
June	299	26	43	119	137	3.4	70	77	92
July	273	24	48	135	145	3.7	66	86	96
Aug.	249	21	34	131	146	3.1	57	93	106
Sep.	239	20	37	123	137	1.8	71	71	83
Oct.	321	54	89	141	146	2.5	15	172	182
Nov.	284	98	172	138	144	1.3	25	209	214
Dec.	218	167	332	121	139	1.0	18	268	287
Total	2,439	776	1,440	1,283	1,537	26.6	519	1,553	1,770

Table H.2.10 MONTHLY DIVERSION REQUIREMENT FOR SYSTEM-H

* SYSTEM - H , IH AND HH
* DIVERSION REQUIREMENTS IN MILLION CUBIC METERS
* IRRIGATION AREA : 48600 HA.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	1	61	42	83	83	83	82	74	76	60	76	50	771	64
1951	0	3	47	31	39	83	64	73	61	2	0	1	404	34
1952	3	14	53	35	81	83	70	75	75	16	80	76	661	55
1953	75	82	76	34	83	83	82	75	75	0	19	6	690	58
1954	0	28	15	2	73	83	27	49	77	8	77	0	439	37
1955	0	0	6	13	15	69	67	36	49	17	73	76	421	35
1956	80	82	78	83	83	83	83	77	77	69	24	43	862	72
1957	79	25	78	74	6	59	68	56	74	0	0	0	519	43
1958	0	45	13	59	26	67	83	30	76	13	53	67	532	44
1959	33	83	22	53	6	22	80	67	75	1	2	0	497	41
1960	0	0	4	8	59	72	0	12	71	3	0	6	235	20
1961	9	2	26	53	58	42	63	76	77	1	9	0	416	35
1962	0	0	12	4	2	20	83	66	75	0	5	0	267	22
1963	0	0	0	6	56	83	33	68	73	27	2	0	348	29
1964	0	3	10	72	80	83	40	74	76	2	42	39	521	43
1965	78	40	46	75	8	83	85	13	74	0	0	0	468	39
1966	0	22	14	5	83	82	69	42	44	0	0	0	361	30
1967	1	5	8	72	62	65	73	65	76	0	4	0	431	36
1968	1	29	26	55	80	78	83	61	75	0	10	0	498	42
1969	44	57	71	29	80	83	83	46	75	0	4	0	572	48
1970	0	0	0	21	51	83	71	63	75	4	3	0	371	31
1971	0	2	2	5	71	83	83	22	53	0	33	0	354	30
1972	4	83	78	70	6	59	83	74	75	0	8	0	540	45
1973	33	83	76	83	83	83	63	71	75	56	79	0	785	65
1974	13	73	69	12	76	83	83	78	74	83	83	74	801	67
1975	81	83	75	83	75	83	62	76	76	58	12	47	811	68
1976	77	83	75	34	82	83	79	46	45	6	6	6	622	52
1977	30	50	58	60	6	7	7	34	76	1	1	1	331	28
TOTAL	642	1038	1153	1164	1513	1966	1847	1599	1982	427	705	492	14528	1213
MEAN	23	37	41	42	54	70	66	57	71	15	25	18	519	43

Table H.2.11 MONTHLY INFLOW TO MORAGAJALAMDA (Before Kotmale)

* MORAGAHAKANDA RESERVOIR (Before Kotmale)
* INFLOW IN MILLION CUBIC METERS
* CATCHMENT AREA : 782 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	194	44	22	41	43	44	57	95	97	117	63	53	920	77
1951	434	174	51	109	43	106	94	22	52	159	270	263	1779	148
1952	375	161	49	111	102	95	66	78	35	192	118	79	1666	122
1953	55	43	44	51	36	12	53	54	34	191	157	195	945	79
1954	260	121	115	170	70	82	121	108	69	185	102	408	1792	149
1955	351	220	128	151	179	111	97	110	95	141	97	70	1750	146
1956	44	49	51	49	44	57	60	65	66	89	220	201	995	83
1957	95	141	46	35	41	92	94	78	48	179	264	548	1661	138
1958	246	69	194	120	205	79	82	150	37	170	169	154	1675	140
1959	134	40	36	41	76	142	110	100	77	203	234	262	1455	121
1960	238	613	138	152	102	93	192	145	80	192	288	209	2242	187
1961	167	114	66	42	85	96	82	97	76	140	233	282	1480	123
1962	256	113	52	105	181	119	76	54	88	232	226	265	1787	149
1963	359	210	111	152	90	43	130	94	79	151	236	372	2029	169
1964	359	201	127	45	44	38	84	82	75	145	163	191	1554	130
1965	62	85	46	92	218	98	39	156	57	195	248	325	1620	135
1966	206	80	94	129	41	37	36	61	121	209	295	209	1518	127
1967	192	149	104	46	44	40	75	84	35	146	303	380	1618	135
1968	196	64	89	56	39	50	95	102	74	201	253	304	1523	127
1969	171	72	46	80	66	82	62	91	77	233	188	298	1478	123
1970	333	138	112	161	120	78	77	101	70	181	213	311	2095	175
1971	337	126	104	166	119	85	90	121	152	208	157	445	2160	180
1972	154	47	33	41	132	38	70	62	46	237	245	372	1477	123
1973	112	47	39	38	36	33	36	88	34	36	106	302	907	76
1974	131	36	40	62	64	78	82	102	114	91	43	98	941	78
1975	78	43	49	40	62	78	74	100	96	114	278	211	1203	100
1976	186	49	48	42	40	20	38	58	60	194	307	307	1347	112
1977	65	37	43	48	202	226	222	109	41	288	363	396	2036	170
TOTAL	5790	3333	2128	2378	2509	2150	2399	2615	1985	4812	5839	7510	43453	3622
MEAN	207	119	76	85	90	77	86	93	71	172	209	268	1552	129

Table H.2.12 MONTHLY INFLOW TO MORAGAJALAMDA (After Kotmale)

* MORAGAHAKANDA RESERVOIR (After Kotmale)
* INFLOW IN MILLION CUBIC METERS
* CATCHMENT AREA : 782 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	219	61	142	41	80	40	45	95	108	124	61	52	1068	89
1951	459	204	83	153	82	106	112	37	109	205	270	310	2130	178
1952	409	191	71	153	129	95	92	86	78	233	133	90	1736	145
1953	66	43	44	58	36	32	77	81	74	210	186	232	1139	95
1954	236	127	151	199	94	72	131	107	72	194	91	409	1883	157
1955	361	248	166	194	192	111	96	122	125	157	102	59	1933	161
1956	49	62	81	65	78	75	68	66	69	89	220	208	1130	94
1957	128	181	55	41	141	116	95	98	56	120	264	547	1842	154
1958	261	108	240	172	219	100	81	149	40	186	169	189	1914	160
1959	162	43	37	102	169	147	109	111	88	204	235	296	1703	142
1960	268	442	163	193	122	94	191	152	90	191	288	226	2422	202
1961	193	117	107	67	132	126	107	97	79	165	235	304	1749	146
1962	272	162	95	148	210	146	84	104	95	239	230	280	2063	172
1963	381	231	152	184	109	82	132	99	85	154	238	372	2219	185
1964	392	263	170	36	77	61	135	92	88	171	167	221	1873	156
1965	88	154	51	188	218	93	38	166	45	200	250	361	1872	156
1966	226	170	135	161	41	37	36	85	125	205	292	228	1694	141
1967	227	210	151	59	58	104	93	100	35	203	330	395	1967	164
1968	227	87	140	92	84	80	94	103	81	200	260	325	1773	148
1969	211	126	46	175	98	72	76	110	93	241	204	328	1790	149
1970	344	368	143	193	142	82	94	100	89	188	214	310	2267	189
1971	387	159	146	208	145	102	89	175	159	208	173	460	2391	199
1972	175	47	39	41	175	103	87	87	73	236	265	376	1684	140
1973	130	47	39	38	38	42	61	85	34	59	111	326	1010	84
1974	152	36	40	133	92	78	89	102	114	92	73	153	1176	98
1975	92	43	49	51	89	23	88	101	97	113	278	218	1307	109
1976	212	47	48	37	40	32	67	85	52	206	309	335	1492	124
1977	102	37	43	67	245	233	194	159	68	107	376	431	2320	193
TOTAL	6409	3968	2827	3311	3373	2576	2679	2956	2321	5083	6062	8041	49542	4132
MEAN	229	142	101	118	120	92	96	106	83	182	216	287	1769	148

Table H.2.13 BASIC FEATURE OF EXISTING TANKS

		KAUDULLA	MINNERIYA	KANTALAI /1	GIRITALE	P. SAMUDRA
Catchment Area	square km	83	385 /2	588 /3	24	73
Capacity	million cu-m	128.3	136.9	160.6	25.3	135.1
Dead Storage	million cu-m	4.9	0	0	0	18.5
Active Storage	million cu-m	123.4	136.9	160.6	25.3	116.6
Area at F.S.L.	square km	25.9	25.5	28.7	3.2	25.7
H.W.L.	m	73.2	93.7	59.3	92.2	59.1
L.W.L.	m	64.0	82.1(89.9) /4	42.8	79.0	51.8
Existing Irrigable Area	ha	4,330	5,420	8,420	2,500	7,940
Dam Length	km	9.2	2.8	3.7	0.5	14.7
Top elevation	m	76.8	97.1	63.4	97.2	61.0
Top width	m	-	7.6	13.7	9.1	3.7

/1: Including Vendarasam Kulam Tank
/2: Including catchment area along Elabera Minneriya Yoda Ela, 145 km^2
/3: Including catachment area of Gal Oya 215 km^2 and Aluth Oya 73 km^2
/4: Sill elevation of gates to Kantalai and Kaudulla Tank

Table H.2.14 MONTHLY RUNOFF AT MINNERIYA

* MINNERIYA TANK
* NATURAL INFLOW IN MILLION CUBIC METERS
* CATCHMENT AREA : 386 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	8	6	10	2	8	0	0	6	3	6	13	10	72	6
1951	34	6	2	8	10	0	0	2	5	5	29	11	112	9
1952	24	3	2	6	5	0	2	0	8	8	10	11	79	7
1953	14	3	2	16	0	0	14	5	5	18	11	27	115	10
1954	16	2	10	11	0	0	5	2	0	11	10	24	91	8
1955	16	8	3	11	1	0	0	5	8	5	10	11	78	7
1956	10	3	2	5	0	5	0	2	0	14	18	16	75	6
1957	6	16	0	3	6	0	5	2	3	11	35	80	167	14
1958	14	6	6	3	5	0	0	10	3	8	13	13	81	7
1959	10	0	0	6	6	3	0	0	3	18	21	16	83	7
1960	16	26	5	11	13	0	10	2	8	11	29	6	137	11
1961	22	13	10	8	3	0	0	0	2	14	18	30	125	10
1962	5	5	5	6	3	0	0	5	8	8	13	13	71	6
1963	27	11	11	8	2	0	5	2	8	8	35	30	147	12
1964	8	8	8	2	6	0	6	2	3	11	6	8	68	6
1965	5	11	2	11	13	0	0	8	0	24	24	32	132	11
1966	10	2	10	8	0	0	0	3	10	32	24	13	112	9
1967	2	5	5	5	3	0	0	0	3	21	29	34	109	9
1968	8	0	8	3	0	0	0	5	8	11	13	13	69	6
1969	5	1	0	10	2	0	6	3	10	19	16	51	125	10
1970	8	11	3	11	5	1	0	6	3	3	18	19	92	8
1971	11	1	1	13	6	0	2	3	2	5	8	38	98	8
1972	5	0	2	8	8	0	0	0	22	19	22	18	104	9
1973	0	1	3	1	1	5	13	0	3	8	5	29	77	6
1974	0	1	0	6	10	0	0	0	5	0	6	26	56	5
1975	8	3	1	10	8	0	13	5	8	3	14	11	86	7
1976	2	2	0	10	2	0	2	3	2	5	19	29	76	6
1977	5	2	1	0	2	0	3	3	13	21	22	22	96	8
TOTAL	306	168	116	208	132	16	86	84	158	327	491	641	2733	228
MEAN	11	6	4	7	5	1	3	3	6	12	18	23	98	8

Table H.2.15 MONTHLY RUNOFF AT KAUDULLA

* KAUDULLA TANK
* NATURAL INFLOW IN MILLION CUBIC METERS
* CATCHMENT AREA : 81 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	2	1	2	0	2	0	0	1	1	1	3	2	15	1
1951	7	1	0	2	2	0	0	0	1	1	6	2	22	2
1952	5	1	0	1	1	0	0	0	2	2	2	2	16	1
1953	3	1	0	3	0	0	3	1	1	4	3	6	25	2
1954	4	0	2	2	0	0	1	0	0	2	2	5	18	2
1955	3	2	1	2	1	0	0	1	1	1	2	2	16	1
1956	2	1	0	1	0	1	0	0	0	3	4	3	15	1
1957	1	3	0	1	1	0	1	0	1	3	8	17	36	3
1958	3	1	1	1	1	0	0	2	1	2	3	3	18	2
1959	2	0	0	1	1	1	0	0	1	4	5	3	18	2
1960	3	5	1	5	3	0	2	0	2	2	6	1	28	2
1961	6	3	2	2	1	0	0	0	0	3	4	7	28	2
1962	1	1	1	1	1	0	0	1	2	2	3	3	16	1
1963	6	3	2	2	0	0	1	0	2	2	8	7	33	3
1964	2	2	2	0	1	0	1	0	1	2	2	2	15	1
1965	1	2	0	3	3	0	0	2	0	5	5	7	28	2
1966	2	0	2	2	0	0	0	1	2	7	5	3	24	2
1967	0	1	1	1	1	0	0	0	1	4	6	8	23	2
1968	2	0	2	1	0	0	0	1	2	2	3	3	16	1
1969	1	1	0	2	0	0	1	1	2	4	4	11	27	2
1970	2	3	1	2	1	1	0	2	1	1	4	4	22	2
1971	3	1	1	3	2	0	0	1	0	1	2	8	22	2
1972	1	0	0	2	2	0	0	0	5	4	5	4	23	2
1973	0	1	1	1	1	1	3	0	1	2	1	6	18	2
1974	0	1	0	1	2	0	0	0	1	0	2	6	13	1
1975	2	1	1	2	2	0	3	1	2	1	3	2	20	2
1976	0	0	0	2	0	0	0	1	0	1	4	6	14	1
1977	1	0	1	0	0	0	1	1	3	5	5	5	22	2
TOTAL	65	16	26	44	29	4	17	17	36	71	110	138	591	49
MEAN	2	1	1	2	1	0	1	1	1	3	4	5	21	2

Table H.2.16 MONTHLY RUNOFF AT KANTALAI

* KANTALAI TANK
* NATURAL INFLOW IN MILLION CUBIC METERS
* CATCHMENT AREA : 487 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	12	10	15	2	12	0	0	10	5	10	22	17	115	10
1951	58	10	5	13	15	0	0	2	10	10	51	20	194	16
1952	42	5	2	12	10	0	2	0	15	15	17	20	140	12
1953	25	5	2	27	0	0	25	7	7	32	20	49	199	17
1954	27	5	17	20	0	0	10	2	0	20	17	44	162	14
1955	22	12	5	25	5	0	0	10	10	7	17	17	130	11
1956	17	5	2	7	0	7	0	2	0	25	29	27	121	10
1957	12	27	0	5	12	0	7	5	5	20	61	137	291	24
1958	25	12	12	7	7	0	0	17	5	12	22	22	141	12
1959	17	0	0	12	12	5	0	2	5	29	37	27	146	12
1960	27	44	7	22	22	0	17	2	15	20	49	10	235	20
1961	42	22	17	12	7	0	0	0	2	27	32	51	212	18
1962	7	7	10	10	5	0	0	10	12	15	22	22	120	10
1963	47	20	20	12	2	0	10	2	15	12	61	51	252	21
1964	15	15	12	2	12	0	10	2	5	17	12	15	117	10
1965	10	20	2	22	22	0	0	12	0	42	42	56	228	19
1966	17	2	17	15	0	0	0	5	17	54	42	22	191	16
1967	2	10	10	7	5	0	0	0	7	34	49	59	183	15
1968	15	0	15	7	2	0	0	10	15	20	25	22	131	11
1969	10	7	0	17	2	0	10	7	17	34	29	88	221	18
1970	12	22	5	20	10	5	0	12	5	7	29	34	161	13
1971	22	10	5	22	12	2	5	5	2	10	15	66	176	15
1972	7	0	2	12	15	0	0	0	37	32	39	32	176	15
1973	0	5	5	5	5	7	22	2	10	15	10	49	135	11
1974	0	5	0	10	17	0	0	0	10	0	12	44	98	8
1975	15	5	7	17	15	0	22	7	12	5	25	20	150	13
1976	2	2	0	17	2	0	5	5	2	10	32	51	128	11
1977	10	5	5	2	2	0	5	5	22	37	39	39	171	14
TOTAL	525	292	199	358	230	26	150	143	267	571	857	1111	4729	396
MEAN	19	10	7	13	8	1	5	5	10	20	31	40	169	14

Table H.2.17 MONTHLY RUNOFF AT GIRITALE

* GIRITALE TANK
* NATURAL INFLOW IN MILLION CUBIC METERS
* CATCHMENT AREA : 26 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	1	0	1	0	1	0	0	0	0	0	1	1	5	0
1951	2	0	0	1	1	0	0	0	0	0	2	1	7	1
1952	2	0	0	0	0	0	0	0	1	1	1	1	6	1
1953	1	0	0	1	0	0	1	0	0	1	1	2	7	1
1954	1	0	1	1	0	0	0	0	0	1	1	2	7	1
1955	1	1	0	1	0	0	0	0	0	0	1	1	5	0
1956	1	0	0	0	0	0	0	0	0	1	1	1	4	0
1957	0	1	0	0	0	0	0	0	0	1	2	5	9	1
1958	1	0	0	0	0	0	0	1	0	1	1	1	5	0
1959	1	0	0	0	0	0	0	0	0	1	1	1	6	0
1960	1	2	0	1	1	0	1	0	1	1	2	0	10	1
1961	2	1	1	1	0	0	0	0	0	1	1	2	9	1
1962	0	0	0	0	0	0	0	0	1	1	1	1	4	0
1963	2	1	1	1	0	0	0	0	1	1	2	2	11	1
1964	1	1	1	0	0	0	0	0	0	1	0	1	5	0
1965	0	1	0	1	1	0	0	1	0	2	2	2	10	1
1966	1	0	1	1	0	0	0	0	1	2	2	1	9	1
1967	0	0	0	0	0	0	0	0	0	1	2	2	5	0
1968	1	0	1	0	0	0	0	0	1	1	1	1	6	1
1969	0	0	0	1	0	0	0	0	1	1	1	3	7	1
1970	1	1	0	1	0	0	0	0	0	0	1	1	5	0
1971	1	0	0	1	0	0	0	0	0	0	1	2	5	0
1972	0	0	0	1	1	0	0	0	1	1	1	1	6	1
1973	0	0	0	0	0	0	1	0	0	1	0	2	4	0
1974	0	0	0	0	1	0	0	0	0	0	0	2	3	0
1975	1	0	0	1	1	0	1	0	1	0	1	1	7	1
1976	0	0	0	1	0	0	0	0	0	0	1	2	4	0
1977	0	0	0	0	0	0	0	0	1	1	1	1	4	[illegible]
TOTAL	22	9	7	15	7	0	4	2	10	22	37	43	175	14
MEAN	1	0	0	1	0	0	0	0	0	1	1	2	5	1

Table H.2.18 MONTHLY RUNOFF AT PARAKRAMA SAMUDRA

* PARAKRAMA SAMUDRA TANK
* NATURAL RUNOFF IN MILLION CUBIC METERS
* CATCHMENT AREA : 73 SQ.KM.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	2	1	2	0	1	0	0	1	0	2	2	2	13	1
1951	7	2	1	2	0	0	1	1	2	1	5	4	26	2
1952	7	2	1	2	1	0	1	0	1	3	3	3	24	2
1953	3	1	1	3	0	1	2	1	2	4	3	6	27	2
1954	4	1	1	2	0	0	1	1	0	3	3	8	26	2
1955	4	1	0	2	1	0	0	2	2	2	1	2	17	1
1956	2	1	1	1	0	2	0	1	0	3	4	4	19	2
1957	2	4	0	1	2	0	1	0	0	2	9	17	38	3
1958	3	1	1	1	1	0	0	2	0	3	3	6	21	2
1959	4	0	0	1	0	0	0	0	0	5	5	4	19	2
1960	4	6	1	4	2	0	2	0	1	1	4	2	27	2
1961	6	4	1	2	2	0	0	0	0	2	5	7	29	2
1962	3	1	1	1	1	0	0	0	2	2	3	3	17	1
1963	7	4	1	3	1	0	1	0	2	3	7	6	35	3
1964	2	3	4	1	0	0	1	1	1	1	2	2	18	2
1965	1	6	0	3	2	0	0	2	0	3	8	8	33	3
1966	3	0	2	4	0	0	0	2	1	6	1	4	22	2
1967	1	5	2	1	0	0	0	0	0	4	7	7	27	2
1968	2	0	2	1	0	0	0	0	0	3	4	3	15	1
1969	2	1	4	4	0	0	1	1	1	4	2	10	30	3
1970	3	4	0	3	2	1	0	1	1	1	7	5	30	3
1971	2	1	2	2	0	0	2	4	0	3	3	11	30	3
1972	6	0	0	2	2	0	0	0	6	9	8	1	34	3
1973	0	2	3	3	1	1	5	1	5	3	5	18	45	4
1974	0	1	0	2	1	0	0	0	2	0	3	3	12	1
1975	2	2	3	3	2	0	1	1	0	3	4	5	26	2
1976	3	0	0	1	0	1	0	1	1	2	8	10	27	2
1977	2	1	2	3	2	0	2	1	2	4	9	8	36	3
TOTAL	87	55	36	55	24	6	21	24	32	84	128	169	721	61
MEAN	3	2	1	2	1	0	1	1	1	3	5	6	26	2

Table H.3.1 MONTHLY AVERAGE WATER BALANCE OF EACH TANK

Unit: million cu-m

Name of Tank	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN.
1. KANTALAI	-17.50	-38.54	-32.07	-6.43	-42.14	-71.32	-64.29	-52.43	-17.93	0.71	13.79	19.46	-308.68
2. KAUDULLA	-37.71	-50.04	-23.64	-7.25	-41.86	-71.04	-63.32	-55.96	-7.11	-10.93	-14.36	-16.64	-399.86
3. HINNERIYA	-14.75	-26.50	-11.57	1.82	-22.43	-44.71	-39.89	-34.00	0.71	2.82	5.89	9.43	-173.18
4. GIRITALE	-7.54	-10.32	-5.11	-1.29	-8.61	-14.79	-13.82	-11.93	-1.32	-2.04	-2.79	-2.89	- 82.43
5. PARAKRAMA S.	-28.71	-37.64	-17.68	-4.25	-37.46	-59.21	-54.21	-45.89	-7.57	-6.75	-8.82	-10.61	-316.82

Table H.3.2 MONTHLY WATER BUDGET OF EACH TANK

Unit: million cu-m

Name of Tank	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1. KANTALAI	24.03	-14.36	-16.84	10.60	-24.43	-56.23	-47.42	-34.17	-3.94	34.47	55.15	73.14
2. KAUDULLA	16.09	-18.72	-3.92	14.81	-18.91	-51.49	-41.47	-32.31	11.01	32.80	39.23	52.88
3. HINNERIYA	48.67	-46.02	-23.79	36.79	-55.81	-143.97	-119.33	-90.23	15.64	89.03	123.48	165.56
4. GIRITALE	3.56	-3.87	-1.04	3.26	-3.88	-10.76	-9.32	-7.05	2.41	6.98	8.26	11.44
5. PARAKRAMA S.	33.88	-1.91	5.70	16.39	-22.44	-51.06	-42.29	-39.57	0.61	9.90	26.38	64.43

Table H.3.3 REQUIRED WATER LEVEL OF TANKS

Unit: m

Name of Tank	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
KANTALAI	58.1	59.3	58.5	57.9	58.3	58.5	54.8	52.0	48.1	46.9	51.7	55.0
KAUDULLA	72.7	73.2	72.6	72.5	73.0	72.4	70.4	68.4	65.9	66.9	69.0	70.8
MINNERIYA	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7
GIRITALE	91.6	92.2	91.5	91.4	91.9	91.2	88.8	86.0	82.7	84.1	86.8	89.1
P. SAMUDRA	57.4	58.5	58.5	58.6	59.1	58.4	57.4	55.9	52.0	52.2	52.9	54.7

Table H.4.1 SUMMARY OF CASE I STUDY

Condition of study

(1) H.W.L. El. 140 m

(2) L.W.L. El. 140 m

(3) Firm Power 0 kW

(4) Installed capacity 0 kW

(5) Without reservoir

* MORAGAHAKANDA DAM
* MONTHLY RELEASE IN MILLION CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	193,70	44,07	71,93	40,98	42,77	43,40	57,30	94,90	97,20	116,50	62,70	52,60	918,25	76,52
1951	435,70	173,70	51,30	109,20	42,77	105,60	94,23	21,90	52,20	158,50	269,70	262,60	1777,40	148,12
1952	374,70	160,70	49,43	111,07	106,70	94,60	66,30	77,90	35,43	192,27	117,70	78,60	1465,40	122,12
1953	54,98	42,59	44,25	50,60	35,74	32,47	53,30	53,90	34,20	190,50	156,70	194,60	943,83	78,65
1954	259,70	120,70	116,30	170,70	69,70	61,60	121,30	107,90	69,20	184,50	101,70	407,60	1790,40	149,20
1955	350,70	219,70	128,30	151,20	173,70	110,60	97,30	109,90	95,20	140,50	96,70	69,60	1748,40	145,70
1956	44,25	49,25	51,28	49,49	43,51	56,60	60,30	64,90	66,20	88,50	219,70	200,60	994,58	82,88
1957	94,70	140,70	45,73	34,69	40,55	91,60	93,53	77,90	68,20	178,50	263,70	547,60	1657,40	138,12
1958	245,70	68,70	194,30	120,20	204,70	78,60	82,30	149,90	37,20	169,50	168,70	151,60	1673,40	139,45
1959	133,70	39,63	35,74	41,35	76,18	141,60	110,30	99,90	77,20	202,50	233,70	261,60	1453,40	121,12
1960	237,70	412,70	138,30	152,20	101,70	92,60	192,30	144,90	80,20	191,50	287,70	208,60	2240,40	186,70
1961	166,70	113,70	66,30	42,48	85,44	95,60	82,30	96,90	76,20	139,50	232,70	281,60	1479,40	123,28
1962	255,70	132,70	52,30	105,20	180,70	118,60	76,30	53,90	88,20	231,50	225,70	264,60	1785,40	148,78
1963	358,70	209,70	111,30	152,20	89,70	44,60	130,30	93,90	79,20	150,50	235,70	371,60	2027,40	168,95
1964	358,70	200,70	127,30	45,42	44,25	38,07	84,30	81,90	75,20	144,50	162,70	190,60	1553,60	129,47
1965	61,64	84,76	46,47	97,03	217,70	91,60	38,70	155,90	57,20	194,50	247,70	324,60	1617,80	134,82
1966	205,70	79,70	94,50	129,20	40,55	34,54	36,48	60,90	121,20	208,50	294,70	208,60	1516,37	126,36
1967	191,70	165,70	104,30	46,16	43,88	40,74	75,30	83,90	35,06	145,64	302,70	379,60	1617,19	134,77
1968	193,70	63,70	89,30	58,70	38,70	49,60	95,30	101,90	74,20	200,50	252,70	303,60	1521,40	126,78
1969	170,70	78,70	45,73	79,77	65,70	81,60	67,30	90,90	77,20	232,50	187,70	297,60	1475,40	122,95
1970	332,70	337,70	112,30	131,20	119,70	77,60	77,30	100,90	70,20	180,50	212,70	310,60	2093,40	174,45
1971	336,70	175,70	104,30	168,20	118,70	84,60	90,30	170,90	152,20	207,50	156,70	444,60	2158,40	179,87
1972	153,70	47,40	33,50	41,35	131,70	38,39	70,30	61,90	46,20	236,50	244,70	371,60	1477,05	123,09
1973	111,70	45,46	39,30	38,19	35,70	35,43	36,11	85,90	34,32	35,74	108,34	301,60	907,20	75,60
1974	130,70	34,10	39,81	62,70	83,70	77,60	82,30	101,90	114,20	90,50	42,70	97,60	939,51	78,29
1975	77,70	43,33	49,06	39,50	41,66	77,60	74,30	99,90	96,20	113,50	277,70	210,60	1201,05	100,09
1976	183,70	49,25	47,95	42,64	40,18	19,60	37,96	57,90	60,20	193,50	306,70	306,60	1346,00	112,17
1977	64,70	37,41	42,77	45,79	201,70	225,83	222,30	108,90	41,35	256,35	362,70	395,60	2035,40	169,62
TOTAL	5782,37	3328,57	2137,93	2351,96	2502,66	2142,54	2405,61	2637,70	1990,97	4804,99	5831,24	7498,80	43414,83	3617,90
MEAN	206,51	118,88	76,18	85,97	89,38	76,52	85,91	93,29	71,11	171,61	208,26	267,81	1550,53	129,21

Table H.4.2 (1/2)   SUMMARY OF CASE II STUDY

Condition of study

(1) H.W.L. El. 187 m

(2) L.W.L. El. 150 m

(3) Firm power 0 kW

(4) Installed capacity 0 kW

(5) Irrigation purpose only
Before Kotmale

* MORAGAHAKANDA DAM
* MONTHLY RELEASE IN MILLION CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	141,09	135,57	92,43	142,52	74,55	149,56	178,32	150,38	110,54	149,56	72,49	52,23	1452,24	121,02
1951	[illegible]	123,25	141,49	71,74	92,74	149,58	182,73	147,42	51,58	146,51	86,85	132,17	1432,86	119,40
1952	37,12	122,91	144,30	74,45	106,21	144,71	181,95	155,46	116,03	140,34	138,03	136,91	1508,94	125,75
1953	133,24	123,52	43,75	57,13	35,21	31,91	52,71	53,29	33,58	134,78	179,72	129,22	955,05	79,59
1954	103,18	124,66	59,21	21,42	140,67	141,58	175,55	151,16	153,91	123,46	149,82	102,14	1488,16	124,01
1955	54,37	96,59	81,92	13,30	100,59	102,57	174,60	114,46	41,26	139,42	145,01	192,09	1270,49	105,87
1956	154,14	152,74	147,72	107,34	42,98	54,04	59,21	84,29	65,58	88,03	123,07	132,33	1195,69	99,64
1957	141,82	153,74	147,39	75,34	43,72	91,04	92,94	77,29	47,58	110,07	36,47	0.	988,70	82,39
1958	87,49	125,12	37,29	44,09	112,55	130,41	180,37	95,96	86,00	133,03	139,37	137,58	1311,21	109,27
1959	164,34	152,53	153,21	142,49	155,45	135,94	144,82	141,60	76,58	105,07	42,43	129,35	1538,85	128,24
1960	84,10	0.	49,34	3,97	43,68	106,91	92,98	113,82	43,65	70,09	0.	103,22	720,30	60,03
1961	5,32	60,12	9,47	31,52	132,55	145,31	129,37	151,46	157,54	59,56	64,04	56,51	1067,17	88,93
1962	84,20	133,19	112,52	47,54	125,37	144,65	136,17	150,45	79,51	122,43	135,35	137,11	1478,37	123,20
1963	13,73	47,47	14,55	4,77	123,95	159,93	126,40	153,46	77,43	134,54	2,94	30,26	956,83	79,74
1964	114,10	119,03	37,32	77,27	125,74	165,54	133,97	149,17	109,36	99,39	169,93	143,68	1454,47	121,21
1965	155,49	119,77	142,59	123,50	32,14	144,95	125,28	179,14	82,37	25,01	13,67	36,53	1182,35	98,53
1966	75,57	137,59	50,14	64,50	155,44	148,54	193,42	131,14	55,15	7,21	4,52	129,89	1211,19	100,93
1967	144,50	121,76	142,45	137,51	144,34	143,54	150,59	150,62	110,26	67,51	2,43	42,45	1399,09	116,59
1968	112,50	139,50	84,47	93,42	171,47	155,58	185,71	154,66	98,37	101,98	99,05	138,76	1556,45	129,70
1969	143,44	127,42	159,37	101,24	164,67	151,58	181,47	107,94	54,02	17,97	98,61	1,63	1303,64	108,64
1970	111,45	25,18	62,59	17,34	85,55	113,94	184,23	150,74	92,94	149,06	102,06	127,75	1224,67	107,06
1971	99,33	123,23	124,24	40,49	52,12	129,22	163,38	133,54	90,54	148,10	143,15	70,61	1348,47	112,37
1972	145,84	114,32	148,54	134,47	105,45	149,54	184,29	151,46	51,32	48,65	16,73	108,85	1380,77	115,06
1973	148,04	153,24	144,20	143,17	157,36	115,32	35,52	85,29	33,73	35,27	105,94	123,71	1321,39	110,12
1974	148,34	159,44	72,52	81,72	81,17	77,34	81,71	101,29	113,58	90,03	42,31	97,23	1108,00	92,33
1975	75,02	42,03	43,55	39,03	41,13	77,94	73,71	99,29	95,58	113,03	126,71	132,71	965,73	80,48
1976	141,90	133,78	149,03	113,73	37,45	19,34	37,37	57,29	59,58	146,21	120,92	124,96	1148,34	95,70
1977	147,92	152,44	147,73	144,47	143,18	139,79	144,09	148,48	116,78	9,62	12,48	0.	1306,90	108,91
TOTAL	3684,54	3179,02	2812,23	2144,79	2892,72	3497,02	4144,49	3494,74	2301,83	2746,04	2324,07	2750,31	35276,29	2939,69
MEAN	132,59	113,54	100,44	77,31	103,31	124,89	148,03	124,81	82,21	98,07	83,00	98,23	1259,87	104,99

Table H.4.2 (2/2)   SUMMARY OF CASE II STUDY

* MORAGAHAKANDA DAM
* MONTHLY SPILL-OUT IN CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	49.63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	49.63	4.14
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	45.97	34.61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	80.60	6.72
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	99.63	121.03	42.50	134.17	73.96	3.62	0.	0.	0.	0.	0.	0.	473.71	39.48
1956	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	210.33	210.33	17.53
1958	155.33	0.	92.79	67.48	[illegible]	0.	0.	0.	0.	0.	0.	0.	405.50	33.79
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	172.34	64.13	144.51	54.97	0.	81.06	26.55	31.72	117.76	244.62	102.64	1282.02	106.86
1961	153.60	50.51	52.55	7.12	0.	0.	0.	0.	0.	0.	0.	104.19	372.67	31.06
1962	185.52	0.	0.	0.	19.91	0.	0.	0.	0.	0.	0.	78.97	265.30	22.11
1963	134.29	157.05	97.74	141.51	0.	0.	0.	0.	0.	0.	0.	300.15	1030.45	85.87
1964	241.87	73.63	85.50	0.	0.	0.	0.	0.	0.	0.	0.	0.	404.50	33.69
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	77.50	77.50	6.46
1966	127.85	0.	0.	33.50	0.	0.	0.	0.	0.	0.	33.28	75.79	270.12	22.51
1967	44.21	42.29	0.	0.	0.	0.	0.	0.	0.	0.	0.	102.05	188.54	15.71
1968	73.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	73.22	6.10
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.34	9.34	0.78
1970	217.47	111.55	45.72	139.51	27.22	0.	0.	0.	0.	0.	0.	85.12	826.79	68.90
1971	234.39	0.	0.	97.45	32.44	0.	0.	0.	0.	19.40	10.47	371.07	765.42	63.78
1972	4.93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	64.35	69.18	5.77
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	114.35	392.68	507.03	42.25
TOTAL	1953.77	1168.59	472.26	767.15	302.30	3.62	81.06	26.35	31.72	137.34	442.72	1974.00	7361.65	613.47
MEAN	69.95	41.74	16.89	27.40	10.79	0.13	2.90	0.94	1.13	4.91	15.81	70.50	262.92	21.91

* MORAGAHAKANDA DAM
* MONTHLY RESERVOIR WATER LEVEL IN METERS
(AT THE END OF THE MONTH)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	187.00	183.79	182.96	179.26	177.68	172.44	164.51	159.08	157.25	152.24	150.00	150.00	2016.19	168.02
1951	176.76	178.83	176.78	176.33	173.80	171.24	165.39	150.00	150.00	152.51	169.87	176.55	2016.06	168.00
1952	187.00	187.00	185.63	184.70	184.58	182.75	178.35	174.85	170.25	172.67	171.46	167.75	2145.00	178.75
1953	141.42	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	158.13	161.02	166.38	1846.96	153.91
1954	175.41	175.06	177.78	183.12	179.35	175.23	172.15	169.53	163.22	167.68	164.13	180.43	2083.39	173.62
1955	187.00	187.00	187.00	187.00	187.00	187.00	183.89	183.45	185.14	185.06	183.32	178.84	2221.70	185.14
1956	173.64	167.39	159.08	150.00	150.00	150.00	150.00	150.00	150.00	150.00	162.77	167.82	1880.65	156.72
1957	164.33	166.70	156.91	150.00	150.00	150.00	150.00	150.00	150.00	157.72	174.33	187.00	1906.98	158.92
1958	187.00	184.98	187.00	187.00	187.00	185.09	181.62	183.32	181.59	182.72	183.63	184.09	2215.04	184.59
1959	183.58	179.55	174.33	168.31	162.57	162.95	157.07	150.00	150.00	162.79	175.02	180.48	2006.63	167.22
1960	185.74	187.00	187.00	187.00	187.00	186.43	187.00	187.00	187.00	187.00	187.00	187.00	2242.17	186.85
1961	187.00	187.00	187.00	187.00	185.09	183.27	179.42	176.93	172.85	176.64	182.99	187.00	2192.18	182.68
1962	187.00	186.94	184.77	185.93	187.00	185.98	182.10	178.16	178.58	182.48	185.46	187.00	2211.60	184.30
1963	187.00	187.00	187.00	187.00	185.70	181.85	179.51	176.81	176.75	177.32	185.70	187.00	2198.44	183.20
1964	187.00	187.00	187.00	185.29	182.79	177.91	175.42	171.68	169.58	172.03	171.54	174.03	2141.77	178.48
1965	168.65	166.80	157.67	153.23	170.21	166.51	150.00	154.97	150.00	168.20	179.92	187.00	1972.72	164.39
1966	187.00	185.10	185.45	187.00	182.83	177.60	169.19	162.27	167.30	177.96	187.00	187.00	2155.47	179.62
1967	187.00	187.00	185.59	182.37	177.69	171.50	166.60	160.94	150.00	161.04	178.87	187.00	2095.59	174.63
1968	187.00	184.32	184.22	182.45	177.76	172.00	166.19	161.67	159.10	167.36	175.95	182.32	2100.74	175.06
1969	183.24	181.48	177.29	176.23	171.22	165.95	154.16	150.37	154.74	172.32	176.66	187.00	2050.64	170.89
1970	187.00	187.00	187.00	187.00	187.00	185.62	181.85	180.03	178.90	180.11	183.78	187.00	2212.28	184.36
1971	187.00	186.98	186.17	187.00	187.00	185.34	182.70	183.83	185.77	187.00	187.00	187.00	2232.78	186.06
1972	187.00	183.96	179.92	175.72	174.78	170.99	162.78	155.22	150.00	169.43	180.35	187.00	2075.20	172.93
1973	185.67	181.95	176.86	170.56	161.56	150.00	150.00	150.00	150.00	150.00	150.00	168.77	1945.18	162.10
1974	167.46	155.91	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	1823.37	151.95
1975	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	166.96	171.73	1838.69	153.22
1976	173.91	165.96	161.01	150.00	150.00	150.00	150.00	150.00	150.00	157.58	171.98	180.29	1913.73	159.48
1977	176.69	170.72	163.22	150.40	159.20	166.55	171.37	168.81	163.15	178.84	187.00	187.00	2042.95	170.25
TOTAL	5044.26	4985.21	4910.62	4850.91	4830.70	4763.95	4661.26	4585.18	4551.13	4700.82	4883.65	5010.47	57784.09	4815.34
MEAN	180.15	178.04	175.38	173.24	172.53	170.14	166.47	163.76	162.54	168.10	174.42	178.95	2063.72	171.98

Table H.4.3 (1/4) SUMMARY OF CASE III STUDY

Condition of study

(1) H.W.L. El. 195 m

(2) L.W.L. El. 170 m

(3) Firm power 6,000 kW

(4) Installed capacity 25,000 kW

(5) Combination of irrigation and hydropower
Before Kotmale

Table H.4.3 (2/4) SUMMARY OF CASE III STUDY

* MORAGAHAKANDA POWER STATION
* MONTHLY MEAN POWER OUTPUT IN MW

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	25.00	25.00	15.21	23.29	11.59	22.17	23.36	18.01	13.10	16.43	6.83	6.00	206.01	17.17
1951	13.55	20.38	20.82	12.05	13.15	21.03	23.47	14.35	6.00	15.91	13.30	18.12	192.15	16.01
1952	8.80	25.00	24.47	11.12	17.75	24.61	25.00	22.78	16.50	19.81	19.46	18.07	235.38	19.61
1953	16.47	13.91	6.00	6.00	6.00	6.00	5.01	4.91	3.13	11.44	14.81	15.08	108.78	9.06
1954	14.43	19.22	7.03	6.00	25.00	23.47	23.16	19.05	18.65	12.70	18.23	13.66	200.38	16.70
1955	13.96	25.00	21.39	25.00	25.00	18.55	25.00	19.51	7.08	23.45	24.83	25.00	253.15	21.10
1956	22.77	22.80	18.02	11.12	6.00	6.00	6.00	6.00	6.02	9.37	14.64	16.66	145.20	12.10
1957	17.98	14.87	18.04	7.79	6.00	7.85	9.85	8.15	6.00	14.38	6.00	25.00	141.92	11.83
1958	25.00	23.64	22.08	20.71	25.00	23.05	25.00	15.51	14.07	21.38	23.49	22.67	261.56	21.80
1959	24.10	25.00	22.21	19.96	18.78	16.87	19.21	15.70	8.34	14.20	6.00	18.74	207.11	17.26
1960	12.90	25.00	23.12	25.00	16.75	18.45	25.00	24.11	13.31	25.00	25.00	25.00	259.05	21.59
1961	25.00	21.07	10.65	8.80	23.62	24.93	25.00	22.79	23.24	8.67	10.22	25.00	226.79	18.90
1962	25.00	25.00	19.13	11.79	24.38	25.00	25.00	23.46	12.91	19.12	23.06	25.00	258.86	21.57
1963	25.00	25.00	18.45	25.00	21.27	25.00	25.00	23.10	11.76	19.84	6.00	25.00	250.41	20.87
1964	25.00	25.00	21.22	11.71	21.45	25.00	20.41	20.86	15.15	13.34	25.88	19.80	244.83	20.40
1965	21.00	15.74	17.18	14.75	6.00	18.51	17.16	14.80	8.26	6.00	6.00	9.16	154.57	12.88
1966	25.00	25.00	13.54	13.72	25.00	25.00	25.00	19.07	7.10	6.00	6.00	25.00	215.43	17.95
1967	25.00	25.00	24.35	16.18	25.00	24.68	20.33	19.08	15.81	6.00	6.00	18.70	228.13	19.01
1968	25.00	25.00	14.75	15.87	25.00	24.50	24.47	19.00	11.94	12.42	13.93	21.13	233.00	19.42
1969	22.72	22.71	22.81	15.36	22.33	21.58	21.00	9.55	8.28	6.00	10.79	6.00	189.13	15.76
1970	25.00	25.00	18.67	25.00	19.87	20.34	25.00	23.75	14.75	22.89	16.83	25.00	262.08	21.84
1971	25.00	23.63	21.38	24.13	19.70	22.99	25.00	21.85	15.68	25.00	25.00	25.00	274.32	22.86
1972	25.00	25.00	23.78	21.13	15.24	21.82	23.63	17.07	6.00	6.00	6.00	21.71	212.38	17.70
1973	25.00	25.00	25.00	23.29	20.06	12.78	6.00	6.41	6.00	6.00	6.11	14.84	176.50	14.71
1974	19.29	21.38	7.48	6.73	6.65	8.41	8.63	10.76	12.48	9.59	6.00	8.88	126.26	10.52
1975	6.15	6.00	6.00	6.00	6.00	6.00	6.00	7.38	10.46	12.08	15.52	17.59	107.17	8.93
1976	19.86	20.15	18.63	13.13	6.00	6.00	5.19	5.29	5.69	11.75	15.04	17.71	144.23	12.02
1977	21.70	22.92	18.12	10.90	18.12	17.62	18.93	19.80	15.13	6.00	13.25	25.00	205.49	17.12
TOTAL	581.55	618.21	499.51	435.53	474.68	518.94	531.82	450.11	312.77	380.57	382.24	534.31	5720.25	476.69
MEAN	20.77	22.08	17.84	15.55	16.95	18.53	18.99	16.08	11.17	13.59	13.65	19.08	204.29	17.02

* MORAGAHAKANDA POWER STATION
* MONTHLY ENERGY OUTPUT IN 1000MWH

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	18.60	16.80	11.33	16.77	8.62	15.97	17.38	13.40	9.43	12.22	4.92	4.46	149.90	12.49
1951	10.08	13.70	15.49	8.68	9.78	15.16	17.46	10.68	4.32	11.84	9.58	13.48	140.23	11.69
1952	6.55	16.80	18.20	9.44	13.21	17.72	18.60	16.95	11.88	14.74	14.01	13.44	171.55	14.30
1953	12.25	9.35	4.46	4.32	4.46	4.32	3.73	3.65	2.25	8.51	10.66	11.22	79.19	6.60
1954	10.73	12.91	5.23	4.32	18.60	16.90	17.23	14.17	13.43	9.45	13.13	10.01	146.11	12.18
1955	9.71	16.80	15.92	18.00	18.60	13.57	18.60	14.52	5.10	17.43	17.88	18.60	184.73	15.39
1956	16.94	15.18	13.41	8.01	4.46	4.32	4.46	4.46	4.33	6.97	10.54	12.40	105.50	8.79
1957	13.38	9.99	13.43	5.61	4.46	5.65	7.33	6.06	4.32	10.70	4.32	18.60	103.85	8.65
1958	18.60	15.89	16.43	14.91	18.60	16.60	18.60	11.54	10.09	15.90	16.91	16.87	190.95	15.91
1959	17.93	16.80	16.52	14.37	13.97	12.15	14.29	10.19	6.00	10.56	4.32	13.95	151.06	12.59
1960	9.60	16.80	17.20	18.00	12.46	13.57	18.60	17.94	9.59	18.60	18.00	18.60	188.96	15.75
1961	18.60	14.16	7.93	6.89	17.57	17.95	18.60	16.96	16.74	6.31	7.36	18.60	165.65	13.80
1962	18.60	16.80	14.24	8.49	18.14	18.00	18.60	17.44	9.30	14.23	16.60	18.60	189.05	15.75
1963	18.60	16.80	13.72	18.00	15.82	18.00	18.60	17.18	8.47	14.76	4.32	18.60	182.88	15.24
1964	18.60	16.80	15.79	9.87	15.96	18.00	15.19	15.52	10.91	9.93	17.19	14.73	178.49	14.87
1965	15.62	10.58	12.78	10.62	4.46	13.33	12.77	11.01	5.95	4.46	4.32	6.82	112.73	9.39
1966	18.60	16.80	10.07	9.88	18.60	18.00	18.60	14.19	5.11	4.46	4.32	18.60	157.23	13.10
1967	18.60	16.80	18.12	13.09	18.60	17.77	15.12	14.20	11.38	4.46	4.32	13.91	166.38	13.86
1968	18.60	16.80	10.97	11.43	18.60	17.64	18.20	14.14	8.60	9.24	10.03	15.72	169.96	14.16
1969	16.90	15.76	16.97	11.06	16.61	15.53	15.63	7.11	5.96	4.46	7.77	4.46	137.74	11.48
1970	18.60	16.80	13.85	18.00	14.78	14.65	18.60	17.67	10.62	17.03	12.13	18.60	191.34	15.94
1971	18.60	15.88	15.91	17.37	14.65	16.56	18.60	16.25	11.27	18.60	18.00	18.60	200.29	16.69
1972	18.60	16.80	17.69	15.21	11.34	15.71	17.58	12.70	4.32	4.46	4.32	16.15	154.89	12.91
1973	18.60	16.80	18.60	16.77	14.93	9.20	4.46	4.77	4.32	4.46	4.40	11.04	128.36	10.70
1974	14.35	14.37	5.57	4.84	4.95	6.06	6.42	8.00	8.98	7.13	4.32	6.60	91.59	7.63
1975	6.06	4.03	4.46	4.32	4.46	4.32	4.46	5.49	7.53	8.99	11.17	13.08	78.39	6.53
1976	14.62	13.54	13.86	9.45	4.46	4.32	3.86	3.94	4.10	8.74	10.83	13.18	104.90	8.74
1977	16.14	15.40	13.45	7.55	11.99	12.69	14.08	14.73	10.89	4.46	9.54	18.60	149.87	12.49
TOTAL	432.67	415.44	371.64	313.58	353.16	373.44	395.67	334.88	225.19	283.15	275.21	397.53	4171.77	347.65
MEAN	15.45	14.84	13.27	11.20	12.51	13.34	14.13	11.96	8.04	10.11	9.83	14.20	148.99	12.42

Table H.4.3 (3/4) SUMMARY OF CASE III STUDY

* MORAGAHAKANDA DAM
* MONTHLY RELEASE IN MILLION CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	144.32	135.67	92.85	142.52	76.55	149.56	178.82	150.38	110.54	147.90	80.87	53.47	1445.46	120.45
1951	106.40	123.20	141.69	81.46	92.84	149.56	182.76	123.88	53.67	146.51	107.43	132.17	1441.56	120.13
1952	55.50	130.35	144.80	76.45	106.71	144.71	181.95	155.46	116.03	146.34	138.05	136.91	1532.75	127.73
1953	133.24	110.77	55.87	55.02	58.36	59.13	52.40	51.44	31.69	112.13	129.72	129.22	978.96	81.58
1954	111.65	126.46	50.23	38.72	166.47	161.56	175.55	151.16	153.91	109.26	149.82	102.14	1497.12	124.76
1955	80.99	130.35	123.49	139.66	144.32	105.28	135.51	118.46	41.26	139.42	145.01	192.09	1545.85	128.82
1956	136.14	132.24	147.72	96.05	55.90	54.84	56.67	56.38	54.02	86.31	123.07	132.53	1171.89	97.66
1957	141.82	106.74	149.39	67.84	56.04	70.97	90.77	75.09	53.84	130.07	45.76	159.83	1148.14	95.68
1958	144.32	125.12	129.38	115.70	144.32	130.61	180.37	95.96	84.00	133.03	139.32	137.58	1559.72	129.98
1959	148.36	137.50	131.01	142.89	150.45	135.86	164.82	123.82	74.32	124.72	44.70	127.08	1538.51	128.21
1960	80.00	132.33	133.49	139.46	96.69	105.76	144.97	139.19	74.37	144.32	139.66	144.32	1474.77	122.90
1961	144.32	109.87	61.49	37.97	135.31	145.31	185.37	151.48	137.54	59.56	64.04	148.94	1407.17	117.26
1962	144.32	131.18	112.37	67.56	141.91	144.45	186.17	130.45	82.69	122.43	135.35	146.29	1565.15	130.43
1963	144.32	130.35	106.49	139.66	123.95	159.93	186.60	153.46	77.43	134.54	36.91	147.20	1540.84	128.40
1964	144.32	130.35	122.49	77.27	128.94	165.56	138.97	149.12	109.36	99.39	169.93	143.68	1579.38	131.62
1965	155.49	110.77	142.89	128.50	59.24	140.94	147.59	134.46	72.66	50.79	41.91	56.81	1233.05	102.75
1966	144.32	112.58	80.18	77.55	165.46	166.56	196.82	151.18	55.15	43.77	36.86	145.90	1396.29	116.36
1967	144.32	130.35	142.05	105.40	164.46	163.56	150.50	150.62	132.39	52.20	42.86	115.76	1494.47	124.54
1968	144.32	139.50	88.67	93.42	171.47	165.56	145.71	154.46	98.37	101.98	99.05	138.76	1581.26	131.77
1969	140.66	127.49	149.39	101.98	160.47	161.56	150.18	88.00	73.27	49.89	75.87	38.53	1348.19	112.35
1970	146.39	130.35	107.49	139.66	114.69	114.84	184.23	150.74	92.94	149.06	102.06	148.03	1580.69	131.72
1971	144.32	123.23	124.26	135.64	113.69	130.07	163.88	133.54	90.54	145.80	139.66	144.32	1588.96	132.41
1972	144.32	134.08	149.34	136.47	104.45	149.46	184.70	148.68	53.93	59.46	40.95	133.30	1429.53	119.13
1973	148.04	153.26	166.90	160.07	158.36	108.60	56.25	60.17	34.44	58.58	56.62	123.71	1305.00	108.75
1974	145.04	159.36	67.31	59.98	61.23	74.98	79.54	99.09	111.25	88.30	54.03	82.64	1085.97	90.50
1975	75.05	50.26	56.53	56.01	59.80	58.04	58.47	69.52	93.29	111.28	126.71	132.71	947.66	78.97
1976	141.80	133.78	149.03	111.81	56.05	56.97	53.49	55.44	57.69	115.15	120.92	124.94	1177.08	98.09
1977	147.92	152.46	147.73	94.00	143.18	139.79	144.09	148.88	116.28	44.61	79.89	144.32	1503.15	125.26
TOTAL	3703.21	3605.57	3293.77	2818.93	3204.83	3514.37	4080.17	3390.47	2377.38	2897.80	2646.98	3565.19	39098.58	3258.22
MEAN	132.26	128.77	117.63	100.68	114.46	125.51	145.72	121.09	84.91	103.49	94.54	127.33	1396.38	116.36

* MORAGAHAKANDA DAM
* MONTHLY SPILL OUT IN MILLION CUBIC METERS

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	45.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	45.79	3.82
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	26.52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	26.52	2.21
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	85.52	0.	7.04	29.38	0.	0.	0.	0.	0.	0.	0.	121.94	10.16
1956	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	28.94	28.94	2.41
1958	97.79	0.	0.	0.	55.38	0.	0.	0.	0.	0.	0.	0.	153.16	12.76
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	215.52	0.	8.04	0.	0.	23.31	0.	0.	42.77	144.32	60.76	494.73	41.23
1961	18.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.49	21.27	1.77
1962	107.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	59.67	167.41	13.95
1963	210.79	75.52	0.	8.04	0.	0.	0.	0.	0.	0.	0.	140.85	435.19	36.27
1964	210.79	66.52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	277.30	23.11
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	57.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.94	72.73	6.06
1967	43.60	34.52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	78.12	6.51
1968	47.79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	47.79	3.98
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	119.78	203.52	0.	17.04	0.	0.	0.	0.	0.	0.	0.	56.59	396.43	33.04
1971	188.79	0.	0.	0.	0.	0.	0.	0.	0.	13.45	9.83	296.76	508.83	42.40
1972	4.22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.22	0.35
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	247.76	247.76	20.65
TOTAL	1153.17	707.63	0.	40.17	84.76	0.	23.31	0.	0.	56.21	154.16	908.72	3128.13	260.68
MEAN	41.18	25.27	0.	1.43	3.03	0.	0.83	0.	0.	2.01	5.51	32.45	111.72	9.31

Table H.4.3 (4/4) SUMMARY OF CASE III STUDY

* MORAGAHAKANDA DAM
* MONTHLY RESERVOIR WATER LEVEL IN METERS
(AT THE END OF THE MONTH)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MEAN
1950	195,00	192,40	191,71	188,34	187,24	183,50	179,05	176,53	175,82	174,20	174,20	173,95	2192,14	182,68
1951	186,66	188,02	186,82	185,68	183,85	182,23	178,86	174,20	173,96	174,49	181,15	185,49	2179,32	181,61
1952	195,00	195,00	192,27	191,10	192,98	191,48	187,74	186,95	182,07	183,52	182,74	180,68	2261,51	188,46
1953	177,38	174,20	173,43	173,07	171,69	170,08	170,00	170,00	170,00	174,20	175,45	178,57	2077,67	173,14
1954	183,47	183,17	185,29	189,63	186,19	182,66	180,69	178,87	175,09	178,21	176,05	187,17	2186,48	182,21
1955	195,00	195,00	195,00	195,00	195,00	195,00	192,44	192,04	193,38	193,30	191,88	188,08	2321,15	193,43
1956	186,17	180,55	176,47	174,20	173,38	173,33	173,38	173,69	174,20	174,20	178,44	181,00	2117,06	176,42
1957	179,12	180,37	175,90	174,20	173,21	174,20	174,20	174,20	173,73	175,99	186,14	195,00	2134,27	177,86
1958	195,00	193,36	195,00	195,00	195,00	193,44	190,62	191,95	190,52	191,41	192,11	192,46	2315,86	192,99
1959	192,02	188,56	186,51	180,96	177,49	178,00	175,53	174,20	174,20	177,61	184,44	188,91	2176,83	181,40
1960	193,33	195,00	195,00	195,00	195,00	194,50	195,00	195,00	195,00	195,00	195,00	195,00	2337,82	194,82
1961	195,00	195,00	195,00	195,00	193,42	191,93	188,63	186,61	183,69	186,29	191,53	195,00	2297,10	191,43
1962	195,00	194,94	193,17	194,08	195,00	194,15	191,01	187,80	187,82	191,12	193,49	195,00	2312,58	192,71
1963	195,00	195,00	195,00	195,00	193,93	190,65	188,72	186,54	186,45	186,85	192,80	195,00	2300,93	191,74
1964	195,00	195,00	195,00	194,01	191,57	187,40	185,45	183,02	181,72	183,15	182,81	184,32	2258,51	188,21
1965	181,01	180,07	175,82	174,20	181,14	179,12	174,20	175,15	174,20	180,35	187,24	195,00	2157,57	179,80
1966	195,00	193,45	193,71	195,00	191,44	187,24	181,65	178,06	180,59	186,07	193,78	195,00	2271,02	189,25
1967	195,00	195,00	193,86	192,11	188,18	184,04	181,35	178,49	174,20	174,28	187,37	195,00	2263,27	188,94
1968	195,00	192,83	192,72	191,59	187,32	183,24	180,04	177,65	176,47	180,48	185,59	190,87	2233,75	186,15
1969	191,59	190,16	186,53	185,85	182,31	179,34	174,20	174,20	174,23	181,68	185,33	193,27	2198,55	181,21
1970	195,00	195,00	195,00	195,00	195,00	193,84	190,78	189,10	188,16	189,09	192,20	195,00	2313,57	192,76
1971	195,00	194,96	194,29	195,00	195,00	193,62	191,46	192,34	193,87	195,00	195,00	195,00	2330,53	194,21
1972	195,00	192,53	189,10	185,74	186,53	182,61	178,23	174,20	173,62	181,42	188,24	195,00	2222,21	185,18
1973	193,91	190,90	186,65	182,40	177,64	174,20	172,94	174,20	172,96	171,56	174,20	181,52	2153,07	179,42
1974	180,83	175,67	174,20	174,20	174,20	174,20	174,20	174,20	174,20	174,20	173,48	174,20	2097,79	174,82
1975	174,20	173,72	173,17	172,14	171,01	171,96	172,68	174,20	174,20	174,20	180,61	183,17	2095,27	174,61
1976	184,48	181,52	177,45	174,20	173,19	170,99	170,00	170,00	170,00	174,20	181,78	187,86	2115,69	176,31
1977	184,93	180,93	176,34	174,20	176,77	180,26	182,79	181,30	178,27	186,73	195,00	195,00	2192,72	182,73
TOTAL	5316,92	5282,40	5236,48	5213,90	5185,32	5137,33	5075,87	5042,92	5022,57	5092,79	5196,12	5291,10	62093,88	5174,49
MEAN	189,89	188,66	187,02	186,21	185,19	183,48	181,28	180,10	179,38	181,89	185,58	188,97	2217,64	184,80