

JAPAN INTERNATIONAL COOPERATION AGENCY

**MINISTRY OF HOUSING & PLANTATION INFRASTRUCTURE
SRI LANKA LAND RECLAMATION & DEVELOPMENT CORPORATION**

**THE STUDY
ON
STORM WATER DRAINAGE PLAN
FOR THE COLOMBO METROPOLITAN REGION
IN
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**

**FINAL REPORT
VOLUME III : SUPPORTING REPORT (1)
(MASTER PLAN)**

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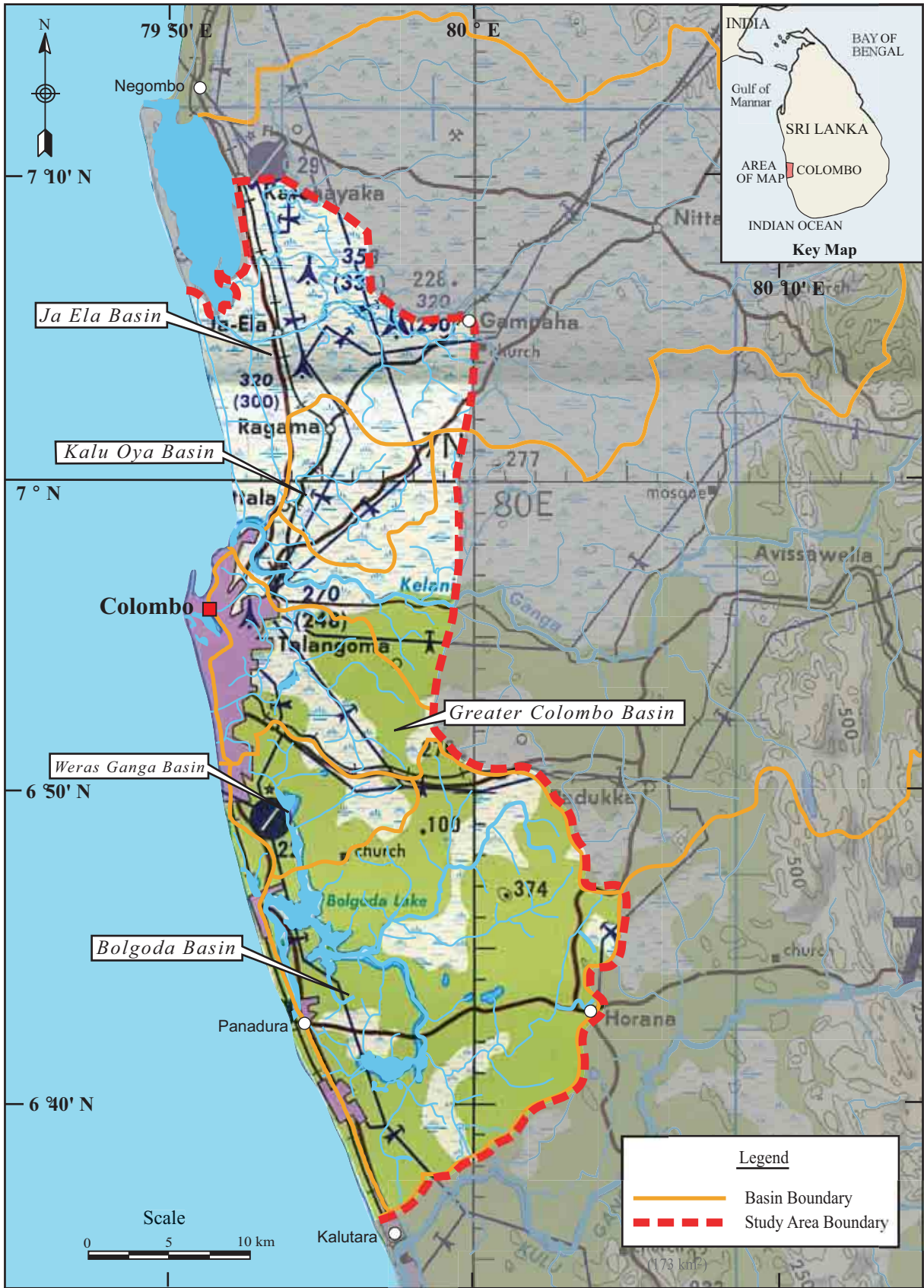
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*The Study on Storm Water Drainage Plan
for the Colombo Metropolitan Region
in the Democratic Socialist Republic of Sri Lanka*
JAPAN INTERNATIONAL COOPERATION AGENCY

Location Map

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SUPPORTING REPORT (1)

ANNEX 1 : SOCIO-ECONOMY AND ECONOMIC EVALUATION

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ANNEX 1 : SOCIO-ECONOMY AND ECONOMIC EVALUATION

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CHAPTER 1 PRESENT CONDITION OF THE STUDY AREA

1.1 General Characteristics of the Study Area

The study area, which belongs to the Western Province or the Colombo Metropolitan Region (CMR), is the most urbanized area in Sri Lanka and is considered the center of economy, politics, and social activities. Urban areas have been growing in the study area, particularly the suburbs of Colombo Municipality. Because of rapid urban development, low land area, which functions as a retention area, has been decreasing, and flood damage is expected to increase. Balanced urban growth is a major issue of CMR. The Urban Development Authority (UDA) prepared the Colombo Metropolitan Regional Structure Plan (CMRSP) to promote balanced urban development by proposing a zoning plan and an infrastructure plan.

1.2 Administrative Division

The four basins that are covered in the study area consist of the west part of Colombo District, the southwest part of Gampaha District, and the northwest part of Kalutara District. Since the basin boundaries and the administrative boundaries do not always match, the area coverage of the District Secretariat (DS) Divisions within and outside the study area need to be estimated separately. The study area is estimated to cover 89.0% of the Colombo district, 48.8% of the Gampaha district, and 41.9% of the Kalutara district for a total of 64.2% of CMR. The DS Divisions within the study area are listed in Table 1.2.1 and shown in Figure 1.2.1.

The related local governments, which include municipal councils, urban councils and Pradeshiya Sabha (MC, UC and PS respectively), and DS Divisions are listed in Table 1.2.2.

1.3 Population

Total population of the study area in 2001 was estimated to be 3,438,000 which accounts for 64.4% of the total population of the Western Province (CMR) or 18.1% of total population of Sri Lanka (19 million), and makes it one of the highly populated areas in Sri Lanka. Of the three districts in the study area, Colombo District has the largest population with 57.7% of population share, followed by Gampaha District with 29.3% and Kalutara District with 12.9% as shown below.

Estimated Population in the Study Area

(Unit: 1,000 persons)

Item	Colombo	Gampaha	Kalutara	Study Area
Population (2001)	1,985	1,008	445	3,438
Population (1994)	1,933	803	392	3,128
Population (1981)	1,526	656	341	2,523
Population density (2001) persons/ha	51	27	14	32
Area (ha)	39,019	37,278	31,530	107,827

Source: Department of Census and Statistics, Colombo Metropolitan Regional Plan (UDA)

Note: Since the area and population are based on the administrative boundary, the total area mentioned here may not always match with the basin area.

1.3.1 Population Density

Population density in the study area is high with 32 persons/ha compared with 3 for the national average. Population is highly concentrated in DS Divisions of Colombo and Thimbrigasyaya with population density (persons/ha) of 248 and 114, respectively. DS Division Katana in Gampaha District also has a high population with population density of 99 persons/ha.

1.3.2 Population Growth Trend

The annual average population growth rate in the study area is estimated to be 1.7% between the period of 1981 and 1994. There are several areas in the study area with high population growth rates. One population growth trend can be seen in the outskirts of Colombo municipality including DS Divisions of Kesbewa, Kolonnawa, Moratuwa, Nugegoda (Sri Jayawardenapura Kotte) which show high growth rates of 2.3%, 3.0%, 2.9%, and 1.8%, respectively which are higher than the average population growth rate of the study area. The second highest growth trend can be seen in the north of Colombo towards the DS Division Katana of Gampaha district, the area around the Bandaranaike International Airport, where the population growth rate is 3.6%. The third population growth trend can be seen in some urban areas of Kalutara district, that is, DS Divisions Bandaragama (4.1%) and Dodangoda (1.8%).

1.4 Economic Conditions

1.4.1 National Economy

(1) National Trend (Trend and Policy)

Gross Domestic Product (GDP) of Sri Lanka in 2000 was Rs. 857,035 million and had been expanding throughout the 1990's with an annual average growth rate of 5.3%. The agriculture sector accounts for 20.5% of GDP in which tea, coconut, rubber, and paddy are the main agricultural products. Sri Lanka is the largest tea exporting country

in the world with an export volume of 288 million kg in 2000 or Rs. 12,226 million. The share in the manufacturing sector is 17.4% or Rs. 149,115 million, the textile, chemical (fertilizer, rubber, pharmaceuticals) and agro-processing (tea and coconut), are main manufacturing activities. Export oriented industries, apparel and textile industries are contributing to the economic growth of industrial sector. Wholesale and retail trade sectors are the highest contributor to GDP by producing 22.1% of GDP (Rs. 189,366 million) and play important roles in the external trade (Table 1.4.1).

The trade balance of Sri Lanka has been showing a deficit, which increased by 38.7% (Rupee term) in 2000. This resulted from a higher increase in import value (31.4%) compared with an export increase of (29.2%).

Trend of Trade Balance

(Unit: million Rs. (%increase))

Item	1996-97	1997-98	1998-99	1999-2000
Export	274,193 (20.9)	310,398 (13.2)	325,170 (4.8)	420,114 (29.2)
Import	346,026 (14.9)	380,139 (9.9)	421,888 (11.0)	554,291 (31.4)
Trade Balance	-71,833 (-3.3)	-69,741 (-2.9)	-96,718 (38.7)	-134,117 (38.7)

Source: Annual Report 2000, Central Bank of Sri Lanka

The growth in imports is largely attributed to higher costs of petroleum products, high demand for intermediary imports from manufacturers, and high expenditure on defense related imports. The external trade of Sri Lanka relies on textile and agricultural products. Major export items are textiles and garments that account for 54.0% of export value (Rs. 226,930 million) followed by tea with 12.6% (Rs. 53,133 million). Major import items are also related to textiles (intermediate goods for textiles and clothing), which accounts for 20.1% of import volume (Table 1.4.2).

The newest economic trend shows that the expansion throughout 1990s and 2000 has been slowing towards the end year 2000. The economic growth for the year 2001 was lower than expected due to droughts that affected the agricultural production, and a high price for oil that is utilized for power generation. It is expected that the economic growth rate in 2001 will be zero or even negative.

(2) Labor Force

Labor force is defined as persons aged 10 years and over who are able and willing to work. Agriculture has the largest share with 37.3% of employment in 2000 although the share has declined from 46.8% in 1990. Personal services (public officers) have the second largest share of employment with 18.8% followed by the manufacturing sector with 15.2%. Labor force participation rate has been steady for around 50% over 10 years, and unemployment rate has declined from 15.9% in 1990 to 7.0% in 2000. Increase in employment can be seen in the service sector including insurance & real

estate, trade & hotels, and the construction sector, while the employment in the mining and utility sectors declined. Employment in the agriculture sector has been steady over the 10 years (Table 1.4.3, Table 1.4.4).

1.4.2 Regional Economy (GRDP)

(1) Regional Economic Activities

Because of the limited information, regional economy is measured for the Western Province or CMR. CMR plays a major role in economic activities in Sri Lanka by producing 43.3% of GDP or Rs. 179,720 million in 1995. Concentration of manufacturing activities is particularly high by contributing 72.4% of GDP for the manufacturing sector (Table 1.4.5). Assuming that the GRDP share of CMR remains the same, GRDP for CMR in 2000 is estimated to be Rs. 378,890 million.

Unlike the employment condition in Sri Lanka, CMR has more employment in the manufacturing, wholesale, and personal service sectors. For the manufacturing (415,239 employees), transport (111,095 employees), and financial sectors (54,352 employees), more than 50% of the employment in Sri Lanka in 1994 was in CMR (Table 1.4.6).

Regional trend of employment in the study area shows high employment in the finance sector (34,438 employees) and wholesale (136,881 employees) in Colombo District, high industrial (196,498 employees) in Gampaha District, and a high concentration of employees in agriculture for Gampaha District (74,120 employees) and Kalutara District (68,042 employees).

(2) Agriculture

Since the study area is predominantly an urban area, agricultural activities are limited to contributing 8.0% of GDP. Rubber and coconut are major agricultural products in the CMR. Rubber, which is produced mainly in Kalutara District (41,375 ha) and Colombo District (10,141 ha), is the largest of the agricultural products in the CMR by producing Rs. 1,089 million or 35.0% of rubber production in Sri Lanka. Coconut plantations are second largest by producing Rs. 980 million or 17.0% of the coconut production in Sri Lanka, which can be seen in Gampaha District (56,751 ha) and Kalutara District (12,754 ha). Tea plantations can also be seen in a limited area of Kalutara District.

(3) Industry

CMR plays an important role in the industrial activities by producing 72.4% for manufacturing portion of GDP and 61.1% of electricity and gas production in Sri Lanka. Paper & paper products including printing & publishing, chemicals including

rubber & plastics and metal products are highly concentrated manufacturing sectors with the regional share of 96.9%, 92.1 and 91.4%, respectively.

Colombo District and Gampaha District have a high concentration of industrial activities in Sri Lanka. According to the Annual Survey of Industries 2000, in Colombo District and Gampaha District together, approximately 28.1% of industrial establishments are operating and producing more than 73.2% (Rs. 237,242 million) of total industrial production in Sri Lanka. Large scale industries (25 employees or more) dominate the manufacturing activities in CMR by producing 98.4% of production in the manufacturing sector.

In recent years, the concentration of industry in Colombo district has been shifting to Gampaha district where the share of industrial establishments, employment, and output of Gampaha district has been increasing in the last several years. It results from the location of industrial zones located in Gampaha district including the Export Processing Zones in Katunayaka and Biyagama and the industrial estates in Ekala.

1.5 Household Income in the Study Area

The household income in the study area is the highest in Sri Lanka. Average monthly household income in the three districts of Colombo, Gampaha, and Kalutara of the study area is Rs. 9,230 , which is higher than the national average of Rs. 6,476 as shown in Table 1.5.1. The average monthly household income is highest in Colombo District with Rs.11,107. In the study area, the income from social welfare programs (food stamps, Janasaviya and Samurdhi) is low, particularly for Colombo District (Rs. 40 per household per month) compared with the national average (Rs. 156 per household per month). Income from salaries & wages accounts for 48.9% of income sources, income from non agricultural activities 18.1%, income from agriculture 3.1%, and Janasaviya & Samurdhi 1.1%.

Since the income is high in the study area, household expenditure is also high as shown in Table 1.5.2. The average monthly household expenditure is Rs. 10,833 in Colombo district, while the national average is Rs. 6,305. In the study area, expenditure on non-food items is large. The national average shows that the expenditure on non-food items is 43.7% of total expenditure, while Colombo district shows 57.2% is spent on non-food items, which is attributed to high housing cost. Also more money is allocated to cultural activities & entertainment, transport, communication and education. Colombo district provides a variety of urban amenities and social services compared with other areas of Sri Lanka.

1.6 Public Finance

1.6.1 Trend of Public Finance

Fiscal operation of the Central Government of Sri Lanka for the year 2000 shows revenue of Rs. 211,282 million and expenditure of Rs. 335,823 million that resulted in a fiscal deficit of Rs. 124,541 million. In the past decade, the fiscal revenue did not cover the current expenditure. Fiscal deficit in 2000 is approximately 10% of GDP, and cumulative government debt in 2000 reached 97% of GDP and continues to increase (Table 1.6.1).

The government fiscal condition has been worsening in past years. The growth rate of expenditure is higher than that of the revenue. Weakening of financial conditions in 2000 was mostly resulted from an increase in defense cost, salary of public officers and increase in world oil price for power generation.

This fiscal condition is expected to continue for several years because of the amortization of short-term loans, which increases the expenditure and slows economic growth, which decreases revenue. The fiscal condition is expected to improve after 2004 when the economy regains and the payment of the short-term loans is expected to be completed.

1.6.2 Fiscal Structure

(1) Revenue

The revenue is composed of tax revenue and non-tax revenue, with 88.5% (Rs. 182,392 million) of the revenue from tax. Non-tax revenue is characterized as revenue from property incomes (from public corporations) and fees & charges. In spite of a slight increase in the revenue from the previous year (8 % growth), the revenue in 2000 recorded the lowest percentage of GDP (16.8%) in the last decade. Decline in import duty collection and the lower revenue collection from key public enterprises largely resulted in the decline of percentage of GDP.

(2) Expenditure

Current expenditure accounts for 70% to 80% of total expenditure and capital expenditure is limited to approximately 20% of total expenditure. In 2000, for the current expenditure, expenditure on goods and services (mostly salaries and wages) has the largest share with 38.9% of total expenditure followed by interest payments with 21.2%, and subsidies to households (pensions and social welfare) and other sectors with 12.5% (Table 1.6.2).

A large portion of the capital expenditure is spent on economic services, which includes infrastructure necessary for economic activities. Main areas for public

investment include transport, communication, energy and water supply. Most financial sources are transferred to public corporations or public institutions for implementation of the projects. SLLRDC is one of the implementing agencies responsible for drainage work.

Because of the Government's policy on balancing the budget, growth rate of the current expenditure is limited, while growth rate of the capital expenditure is still high.

1.6.3 Financing of Debt

Fiscal debts of the Government of Sri Lanka over the past years have accumulated to Rs.1,218,700 million and are almost reaching the GDP level, of which 55.5% (Rs. 676,666 million) is financed domestically and the rest (44.5%) is financed by foreign sources. The share of domestic debt in the overall debt has been increasing over the past years (Table 1.6.3).

For the domestic debt, Treasury Bonds, Treasury Bills and Rupee Loans (loans from banks and non banks) were key instrument used in mobilizing resources from the domestic market. However, in line with the strategy of market orientation of government debt, Treasury Bonds play a major role in raising resources from the domestic market.

Foreign debts can be classified by their type and currency. The foreign debts by type can be classified as project loans and non-project loans. The share of Japanese yen in the foreign debts (project loans plus non project loans) is 31.9% or Rs. 172,932 million. The project loans dominate the foreign debt with 88.2% of the foreign loan, and 32.2% of project loans or Rs. 154,076 million is in Japanese yen. The amount of non-project loans in Japanese yen is Rs. 18,856 million.

Because of a large amount of outstanding debt, interest payment on debt financing pressures the Central Government's financial conditions.

1.6.4 Government Policy on Fiscal Operations Reform

The Government of Sri Lanka has been trying to reduce the deficit with the target budget deficit of 7.6% of GDP in 2000 with gradual budgetary consolidation through a progressive reduction in the deficit in the subsequent years; 6 % of GDP in 2001 and 5 % of GDP in 2002. The lower deficit was expected to come from fiscal adjustment measures aimed at improving the revenue of the tax system, containing current expenditure and efficient cash management practice.

Expenditure rationalization measures to be undertaken in 2000 include a compulsory 5 percent savings from current expenditure by all spending units of the government, public corporations, banks, and statutory agencies. These measures are expected to

generate a surplus in the current account amounting to 2.5% of GDP in 2001 and 4.0 % of GDP in 2002. Meanwhile, public investment is expected to increase to 8.8% of GDP by 2002 to sustain the country's long term development.

However, there is a substantial deviation from this expected fiscal consolidation path due to unforeseen expenditure on defense activities, higher outlays on salaries and welfare payments and increased interest costs.

1.6.5 Policy on Allocation of Budget Expenditure

Budget allocation is determined based on necessity, urgency, and impact to the economy. Revenue involves four steps 1) calculation of inflexible items, 2) estimation of foreign funded projects, 3) estimation of O&M costs of existing facilities and 4) estimation of domestically funded projects. Inflexible items such as the items that have to be paid including salary, pension, and loan repayment have top priority among the expenditure items.

Projects funded by foreign donors have priority among the capital expenditures. The Government of Sri Lanka will provide necessary resources such as tax exemption, manpower, and local portion of the projects to support the foreign funded projects. The foreign funded projects are preferred because the cost of borrowing is low and the projects focus on infrastructure development, which matches with the interest of the Government of Sri Lanka. Economic infrastructure such as roads, ports, airports, power, and other urban infrastructure are considered as important infrastructure to be developed. CMR is expected to maintain its role as a center of economic activities in the future, but land is limited and flood sometimes interrupts the economic activities. Drainage improvement, together with other economic infrastructure, is important in CMR for healthy urban development.

The next priority is given to the O&M cost of existing facilities. The lowest priority is given to the projects to be funded solely by domestic resources. The 2002 budget policy was limited to provide funds for current and capital expenditure for on-going programs, and no new programs or projects were created.

1.6.6 Financing of Storm Water Drainage Projects

The drainage projects for major canals are implemented as a national project and the implementing agency is Sri Lanka Land Reclamation and Development Corporation (SLLRDC). Project costs are transferred from the Central Government to SLLRDC as "capital transfers to public corporations", which includes construction costs and O&M costs.

SLLRDC, which is one of the largest receivers of capital transfer payments among the public corporations, received Rs. 2,142 million in 2000 which is 0.6% of government expenditure or 3.2% of capital expenditure (17.8% share of capital expenditure among the public corporations). Of Rs. 2,142 million received, Rs. 35 million is allocated for maintenance of the canals and Rs. 2,107 million is allocated for construction.

The O&M of drainage facilities constructed by SLLRDC is the responsibility of SLLRDC. The costs necessary to maintain the canals are financed by the Central Government. The SLLRDC estimates the O&M costs every year and proposes to the Central Government, but the costs approved is usually less than the amount SLLRDC proposed, so that the funding available for O&M of existing drainage facilities is not enough. In 2001, SLLRDC requested Rs.140 million for maintenance of the canals, but only Rs.75 million was approved. In 2002, Rs. 59 million will be granted against Rs.159 million requested.

CHAPTER 2 SOCIO-ECONOMIC FRAMEWORK

2.1 General

Despite the steady economic growth in 1990s, the Sri Lankan economy faced negative growth in 2001 due mainly to high oil price and drought. The prospect of the economy, however, shows some positive signs. The economic growth rate in 2002 is expected to be positive, the prospect of peace with LTTE is also positive, and tourists are coming back to Sri Lanka. CMR continues to be a driving force of economic growth.

For the present study, the CMR Structural Plan (CMRSP) is closely related to the setting of future socio-economic conditions such as population, economy, land use, properties, etc. in the future. Basic policy of the CMRSP is to ease the urbanization pressure in the Core Area defined as the existing urban area of Colombo Municipality and surrounding area to Growth Centers outside the Core Area. For setting the macro frame, development policy in the CMRSP and other indicators are used.

2.2 Population Framework

Since CMR is a center of economic and social activities, urbanization in the study area is expected to continue and the population is expected to grow. The population framework of the urban area in the CMR is proposed in the CMRSP. The population growth rate is estimated to be 2.4%, which is higher than the CMR average of 1.4%. This rate is even higher than the rate for the study area for the period of 1981-1994 when it was 1.7%. The population of the CMR is expected to reach 6.5 million in 2010 or 1.2 times of the 2001 population of 5.3 million. The percentage of the population living in urban areas is the highest in Colombo District with 94% followed by 64% for Gampaha District and 47% for Kalutara District. Table 2.2.1 shows the estimated population of core areas and urban centers in the CMR for 2005 and 2010.

The estimate for the population in the study area in 2010 is from the CMRSP and the area coverage of the study area in the CMR mentioned in the section 1.2 Administrative Division. The population of the study area in 2010 is estimated to be 4.18 million composed of 2.43 million for Colombo District, 1.23 million for Gampaha District, 0.52 million for Kalutara District. Colombo District will be predominantly urban area, whereas in Kalutara District, half of the population will live in rural areas.

Estimated Population of CMR and Study Area in 2010

District	Projected Population (CMR) (million)	Urban Population (CMR) (million)	Urban Population (%)	Rural Population (CMR) (million)	Rural Population (%)	Study Area Population (million)
Colombo	2.73	2.57	94	0.16	6	2.43
Gampaha	2.53	1.62	64	0.91	36	1.23
Kalutara	1.24	0.58	47	0.66	53	0.52
Total	6.50	4.77	74	1.73	26	4.18

Source: CMRSP, 1997, Urban Development Authority

2.3 Economic Framework

2.3.1 Economic Framework of Sri Lanka

Since there is no National Development Plan in Sri Lanka, “Vision 2010 Sri Lanka”(2001) was prepared by the Ministry of Finance and Planning under the previous government, to illustrate the future vision of Sri Lanka. According to “Vision 2010 Sri Lanka”, Sri Lanka’s GDP growth rate is targeted between 7% and 8% during the decade up to 2010. The leading growth sectors will be manufacturing and services-related activities such as information technology, electronics, communications, transshipment and financial and business services. The emphasis of a macro perspective will be on increasing value addition, together with the efficient utilization and processing of domestic resources. The following table shows macro economic indicators set in the Vision 2010.

Macro Economic Indicators, 2000-2010

Item	2000	2003	2006	2008	2010
GDP Growth Rate (%)	6.0	6.3	7.4	7.6	8.2
Unemployment Rate (%)	7.4	6.3	5.1	3.8	3.0
Inflation (%)	6.2	5.9	3.9	3.5	3.5
Per Capita Income (US\$)	897	1,100	1,380	1,945	2,490

Sources: Vision 2010 Sri Lanka, National Planning Department, Ministry of Finance and Planning

Considering the economic growth rate during the 1990s was 5%, and the economy was slowing in 2001, the targets shown in the Vision 2010 may be rather optimistic even though the economy is recovering. The end of quotas for the garment industry in 2004 will affect the Sri Lanka economy. The garment industry is expected to shrink due to high competition from India, China, Bangladesh, North and Central Africa. Since garments and textiles contribute 54% of export value, the effect on the economy of Sri Lanka cannot be avoided. For the economy of Sri Lanka to grow on a sustainable basis, private sector investment needs to be encouraged to meet the economy’s resource requirements while developing the appropriate market environment to promote efficiency.

2.3.2 Economic Framework of the Study Area

(1) Expected Economic Trends of the Study Area

The study area is expected to continue to play an important role in economic activities in Sri Lanka as a manufacturing and financial center. Financial and other service activities will be seen mainly in the Colombo district, and more industrial activities will be seen in the Gampaha District because of the relocation policy addressed in CMRSP which directs factories in the existing urban area to move to new urban areas planned for outside the Core Area. Kalutara District will still remain rural, so agricultural activities will be a major economic activity and industrial and service activities will be limited.

(2) Economic Framework

The economic framework of the study area has been analyzed based on the characteristics of the economic activities of the study area and national trends. The basic conditions and the economic framework are summarized below.

- 1) CMR GRDP is applied to estimate the status of the economic framework of the study area based on the assumption that most economic activities are seen in the study area.
- 2) GRDP growth rate for the study area tends to be higher than the rate for GDP.
- 3) The growth rate of the agriculture sector is low and will continue to be low due to a projected decrease in agricultural land.
- 4) The growth rate for the industry and service sectors is high.
- 5) GRDP growth rate of the study area is estimated to be 7.2% up to 2005 and 7.9% up to 2010.
- 6) Because of the slow growth rate of the agriculture sector, the share of agriculture in GRDP is expected to decrease from 3.7% in 1995 to 1.8% in 2010.
- 7) The share of the industry sector in GRDP, on the other hand, is expected to increase from 36.8% in 1995 to 49.7% in 2010, while the share of the service sector is expected to decrease from 59.5% in 1995 to 48.5% in 2010.

Economic Framework of the Study Area

Sector	Growth Rate (2001-05) (%)	Growth Rate (2006-10) (%)	GRDP (Rs. million)	Sector Share (%)
Agriculture	1.6	1.6	10,765	1.8
Industry	9.9	10.9	305,497	49.7
Service	6.3	7.0	298,621	48.5
CMR GRDP	-	-	614,883	100.0

Note: Estimated by JICA Study Team

- 8) An investigation of the economic framework by districts in the study area shows that the Colombo District has a high percentage of the service sector, Gampaha District has high percentage of the industry sector, and Kalutara District has high percentage of the agricultural sector.

Economic Framework of the Study Area by Districts

(Unit: Upper Rs. million, (Lower %))

District	Agriculture	Industry	Service	District GRDP
Colombo	1,601 (14.9)	109,262 (35.8)	152,691 (51.4)	263,553
Gampaha	3,945 (36.6)	150,376 (49.2)	95,851 (32.1)	250,173
Kalutara	5,219 (48.5)	45,859 (15.0)	50,080 (16.8)	101,158
Sector GRDP	10,765 (100.0)	305,497 (100.0)	298,621 (100.0)	614,883

Note: Estimated by JICA Study Team

2.4 Future Property Values

Property value in the study area is considered to be highest in Sri Lanka due to the high population density and the high concentration of economic activity. Property value is measured by the land, household and office space value.

2.4.1 Land Value

Land value has a wide range depending on the area and land use. Land value for the commercial area is higher than the value for the residential area. The value in the Colombo District is highest among the three districts. The average land value is summarized in the table below.

Average Land Value by Land Use in 2001

(Unit: Rs./m²)

District	Residential Area		Commercial Area	
	High	Low	High	Low
Colombo	12,915	1,047	33,853	11,096
Gampaha	5,093	338	7,721	2,823
Kalutara	2,103	155	7,792	3,571

Source: State Valuation Department

In the past 10 years, the rate of increase has varied between high in the early 1990s and low in the late 1990s. The average increase rate for the period of 1990 to 1995 was 5% and that for the period of 1996 to 2001 was 4%. Since high inflation is not expected until 2010, the value in 2010 is estimated based on the past trend. The table below shows the expected land values in 2010.

Average Land Value by Land Use in 2010

(Unit: Rs./m²)

District	Residential Area		Commercial Area	
	High	Low	High	Low
Colombo	19,192	1,556	50,309	16,491
Gampaha	7,568	503	11,475	4,195
Kalutara	3,125	230	11,580	5,307

Note: Estimated by JICA Study Team

2.4.2 Residential and Commercial Values

The residential and commercial values are derived from construction cost and the size of the building. The values in 2010 are estimated based on economic growth for which 7.2% is applied. The method of estimating property value is discussed in Section 7.1 Economic Evaluation.

(1) Residential Value

The residential value for houses and household property is estimated for three house types. The future value is derived by applying a 7.1% growth rate to the present value.

Estimated Value of Houses in 2001

Group	Floor Area (m ²)*1	Average Unit Value (Rs/m ²)*2	Average Value of Houses	Residual Value (Rs./unit)	Household Property value (Rs.)*2
Group 1	36	1,722	61,992	30,996	9,300
Group 2	92	10,764	990,288	495,144	148,543
Group 3	185	10,764	1,991,340	999,976	299,993

Note: *1: Estimated based on Census of Population and Housing and information from ICTAD

*2: Estimated based on information from ICTAD

Building/Land Ratio: 0.66 estimated based on information from Construction Economic Department, University of Moratuwa

Depreciation Ratio: 0.50 estimated based on Census of population and housing and information from ICTAD

Group 1 Temporary: temporary house made of wood or mud in the main

Group 2 Permanent (medium): permanent house made of cement (average quality and medium floor area)

Group 3 Permanent (large): permanent house made of cement (better material and large floor area)

Household Property in 2010

Group	Average Value of Houses (Rs.)	Household Property Value (Rs.)
Group 1	57,951	17,387
Group 2	925,731	277,719
Group 3	1,869,574	560,873

Note: Estimated by JICA Study Team

(2) Commercial Property Value

The value of commercial property is estimated for shops, offices and factories, which is estimated from the information provided by ICTAD and an insurance company. Future value is derived by using the same method as for household value.

Value for Shops and Offices

(Unit: Rs.)

Item	2001	2010
Building	1,421,775	2,658,177
Facility*1	853,065	853,065

Note: *1: 50% of value of building

2.5 Socio-Economic Frame for Master Plan

A storm water drainage master plan will be proposed by the Study based on socio-economic conditions projected at some future date, which will also be the basis of evaluating projects to be proposed by the Study. The CMRSP provides the projected socio-economic conditions that will be realized with the proposed development projects to be implemented. Therefore, the study will follow the socio-economic conditions projected by CMRSP in principle.

The CMRSP was prepared in 1996 targeting its realization by the year 2010. At the present time in 2002, it appears that this target year would be too near to complete the numbers of the proposed development projects such as the detail planning and implementation of urban development for one Core Area and six Growth Centers.

As for the storm water drainage master plan to be processed, it will include various projects to attain a certain flood safety level for the four subject basins. One proposed project would require several years for implementation and also a large investment. Therefore, the year 2010 would also be too near to realize the entire storm water drainage master plan to be proposed in the Study.

The Study will therefore consider the following alternative scenarios to identify a realistic implementation:

- 1) Basic Scenario: Realization of the future socio-economic conditions projected based on CMRSP by 2010
- 2) Alternative Scenarios: Delay in realization of the future socio-economic conditions till 2015 or 2020

CHAPTER 3 ECONOMIC EVALUATION FOR MASTER PLAN

3.1 Methodology

The economic viability of the projects is evaluated based on the estimated project cost and flood control benefit. The economic cost is obtained by deducting the transfer payment from the financial cost. The economic benefit is defined as the impact of flood control measures, which is composed of the flood damage reduction impact and the efficient land utilization permitted by the flood free condition. The economic evaluation is conducted by calculating the Economic Internal Rate of Return (EIRR) and cost benefit analysis (B/C and B-C) on the basis of the economic cost and the estimated flood control benefit.

3.2 Economic Cost

For the economic evaluation, the project cost of the proposed storm water drainage plan, which is estimated in financial cost, is converted to the economic cost. In order to derive the economic cost from the financial cost, transfer payments such as taxes and price escalation are deducted. In addition to subtracting the transfer payments, a conversion factor of 0.9 is applied to the local portion of cost to adjust the price.

3.3 Economic Benefit

Storm water drainage is considered as basic infrastructure for urban development and important for the economic development of CMR, which will not only reduce the flood damage and increase flood free area, but also promote economic activities by reducing the effect of flood such as poor living conditions, inconvenience to people's lives, unhygienic environment, and slow economic activities. Storm water drainage is particularly important in CMR because of on the going urbanization and reduction of low land area such as paddy and marsh. Project benefits are analyzed both qualitatively and quantitatively.

3.3.1 Types of Project Benefits

Two types of project benefits are estimated for economic evaluation of the Master Plan: 1) flood damage reduction benefit and 2) land enhancement benefit.

- 1) Flood damage reduction benefit is characterized as flood damage reduced by implementation of the storm water drainage plan, which includes damage to property, damage to infrastructure and disturbance to economic activities.

- 2) Land enhancement benefit is characterized as the value added and efficient utilization of the land generated from the flood free environment. The CMR plays an important role in the economy of Sri Lanka, and land shortage is one of the major constraints to development. Converting the flood prone area into a flood free area will accelerate utilization of the land. The land enhancement benefit is measured in terms of the increase of the land value.

3.3.2 Flood Damage Reduction Benefit

The flood damage reduction benefit expected from the storm water drainage project is estimated by the following procedure.

- 1) Estimation of unit value of assets
- 2) Estimation of damage by inundation depth
- 3) Estimation of probable flood damage
- 4) Conversion to annual average flood damage

(1) Estimation of Unit Value of Assets

The expected flood damage is estimated by analyzing values of the assets by land use in the flood prone area. The values of the assets for the residential area are measured by the value of houses and household properties. The values for the commercial area are measured by the value of shops, offices (public buildings) and factories, and the values for the paddy area are measured by the productivity of paddy.

The method of estimating the values of assets is summarized below.

- 1) The values of assets such as houses, shops, and factories are estimated based mainly on the survey conducted for the Greater Colombo Flood Control and Environment Improvement Project, Institute of Construction, Training and Development, Valuation Department, and Insurance Company. In order to find the appropriate value of the assets for the study area, additional data were collected from publications and related agencies, and a further field survey was conducted.
- 2) Unit value of the asset is estimated based by category of land use in 2010 such as Urban 1, Urban 2, Rural, Paddy and Marsh/Water. Marsh/Water area is excluded from the estimation of flood damage.
- 3) The future land use is further divided into residential area, commercial area and open space to estimate the property values. This division is based on the land use in 2010 and urban development strategy proposed for urban area, semi-urban area and rural area. The table below shows the estimated land use distribution in 2010. The flood damage is estimated based on this land use distribution.

Land Use Distribution in 2010

(Unit: %)

Area	Ja Ela	Kalu Oya	Greater Colombo	Bolgoda
Urban 1				
Residential area	36.0	36.0	49.3	31.5
Commercial area	24.0	24.0	18.8	28.5
Open area	40.0	40.0	31.9	40.0
Urban 2				
Residential area	29.2	29.2	49.3	25.5
Commercial area	19.4	19.4	18.8	23.1
Open area	51.4	51.4	31.9	51.4
Rural				
Residential area	15.8	15.8	11.8	15.8
Commercial area	10.5	10.5	14.5	10.5
Open area	73.7	73.7	73.7	73.7

Note: Estimated by JICA Study Team

- 4) The value of paddy is estimated separately based on the productivity and price of rice. The productivity of 3,856 kg/ha and the rice price of Rs.27/kg were applied for estimation of the value of paddy.

a) Residential area

The value of the residential area is estimated for the house and household property divided into three groups of housing types:

- Group 1: Temporary: temporary house made of wood or mud in the main
- Group 2: Permanent (medium): permanent house made of concrete (average quality and medium floor area)
- Group 3: Permanent (large): permanent house made of concrete (better material and large floor area)

The following table shows the basic conditions applied to estimate the value of a house.

Estimation of Value of House

Group	Floor Area (m ²)*1	Average Unit Value (Rs/m ²)*2	Average Value of Houses	Building Land Ratio*3	Depreciation Ratio*4	Residual Value (Rs./unit)
Group 1	36	1,722	61,992	0.66	0.5	30,996
Group 2	92	10,764	990,288	0.66	0.5	495,144
Group 3	185	10,764	1,991,340	0.66	0.5	999,976

Note: *1, *4: Census of Population and Housing and information from ICTAD

*2: Information from ICTAD

*3: Information from Construction Economic Department, University of Moratuwa

The household property value is also estimated for three groups. The household property value is estimated by a ratio to the average value of the house.

Estimation of Household Property Value

Group	Average Value of House (Rs.)	Ratio of Household Property Value (%)*1	Estimated Household Property Value (Rs.)
Group 1	30,996	30	9,300
Group 2	495,144	30	148,543
Group 3	999,976	30	299,993

Note *1: Information from an insurance company

The proportion of each type of house is estimated from the Census of Population and Housing as shown in the table below.

Share of Types of Houses

(Unit: %)

Group	Ja Ela	Kalu Oya	Greater Colombo	Bolgoda
Group 1	8.0	8.0	7.0	9.0
Group 2	36.0	36.0	24.0	35.0
Group 3	56.0	56.0	69.0	56.0

Note: Estimated by JICA Study Team

b) Commercial area

The values of the commercial area are estimated for shops, offices and factories based on the information provided by the ICTAD and an insurance company operating in Sri Lanka.

Values of Shop and Office

(Unit: Rs.)

Category	Unit Value of Shop	Unit Value of Office (Public building)
Building	1,421,775	1,421,775
Facility*1	853,065	853,065
Merchandise	2,000,000	-

Note: *1: 60% of value of building

The value of factories is estimated from “Annual Survey of Industry” in which the values of buildings and machinery are presented. The unit value of the building is estimated at Rs. 3.9 million and value of the machinery at Rs. 7.5 million.

The shares of shops, offices and factories in the commercial area are estimated from the future land use plan. The table below shows the proportion of shops, offices, and factories in the commercial area.

Proportion of Shops, Offices and Factories in the Commercial Area

(Unit: %)

Category	Ja Ela	Kalu Oya	Greater Colombo	Bolgoda
Shops	25.0	25.0	34.0	25.0
Offices (Public buildings)	25.0	25.0	50.0	50.0
Factories	50.0	50.0	16.0	25.0

Note: Estimated by JICA Study Team

(2) Estimation of Flood Damage by Inundation Depth

The relationship between inundation depth and damage rate prepared by the Ministry of Construction, Japan is utilized for estimation of the flood damage by inundation depth. The flood damage per hectare of inundation area for the respective land uses (Urban 1, Urban 2, Rural and Paddy) is calculated from the value of assets per hectare and the flood damage rate (Table 3.3.1).

The inundation area and depth by land use of Urban 1, Urban 2, Rural and Paddy are given by hydrological analysis (Table 3.3.2).

(3) Estimation of Probable Flood Damage

The probable flood damage, which includes direct damage (damage to property), interruption to business operations and damage to infrastructure, is calculated under the various magnitudes of flood events. The inundation area and the flood probabilities of 2, 5, 10, 25 and 50 year floods are set for calculating the probable flood damages (Table 3.3.3).

Damage due to interruption to business operations and infrastructure is estimated based on the ratio set by the Ministry of Construction, Japan. The interruption to business operations is estimated at 6% of the property value, and the damage to infrastructure (roads, bridges) is estimated at 28% of the property value (Table 3.3.4). The following table shows the estimated probable damages for the four basins.

Probable Flood Damage

(Unit: million Rs.)

Flood Return Period	Ja Ela	Kalu Oya	Greater Colombo	Bolgoda
2 years	224	527	684	176
5 years	906	697	1,286	410
10 years	1,634	833	1,816	552
25 years	2,686	1,074	2,831	773
50 years	3,536	1,277	3,949	951

Note: Estimated by JICA Study Team

(4) Conversion of Probable Flood Damage to Annual Average Flood Damage

Based on the probable flood damage, the annual average flood damage is calculated by applying average occurrence probability to the corresponding probable flood damage.

The table below shows the annual average flood damage for the four basins. The estimated annual average flood damage is considered as a base for the flood reduction benefits (Table 3.3.5). The flood damage reduction benefit is derived from the annual average flood damage and the effect of the flood control measures measured by the reduced area of inundation.

Annual Average Flood Damage

(Unit: million Rs.)

Flood Return Period	Ja Ela	Kalu Oya	Greater Colombo	Bolgoda
2 years	56	132	171	44
5 years	225	315	466	132
10 years	352	392	622	180
25 years	482	449	761	220
50 years	544	473	829	237

Note: Estimated by JICA Study Team

3.4 Land Enhancement Benefit

(1) Basic Assumption

The land enhancement benefit is estimated as the increase of land value by the flood free condition resulting from the storm water drainage project. The flood free condition is expected to contribute to the utilization of the flood prone areas, and demand for the land will become high.

The conditions for estimating the land enhancement benefit are set as follows.

- 1) The land enhancement benefit is produced by utilization of the areas presently not utilized for any economically productive activities.
- 2) The rent value is applied to measure the land enhancement benefits assuming that the rent represents the economic activities of the land based on the fact that the value of the land is usually determined by the productivity or projected profit of the land.
- 3) The rent value of the land is divided into residential value and commercial value. The rent value is taken from past valuation record collected from the State Valuation Department.
- 4) Areas designated as marsh and water in the future land use are left untouched, that is, no utilization of those areas is expected.

(2) Methodology

Based on the basic assumptions mentioned above, the land enhancement benefit is estimated as follows.

1) Area to be utilized

The area to be utilized with the flood free condition is estimated by applying the future land use proposed in the CMRSP to the open area.

The table below shows the percentage of the open area expected to be developed as a residential area or commercial area under the flood free condition.

Percentage of Potential Area to be Developed in Open Area

Basin	Land Use	Estimated Land Utilization with Flood Free Condition	
		Residential Area (%)	Commercial Area (%)
Ja Ela	Urban 1	14.4	9.6
	Urban 2	15.0	10.0
	Rural	11.6	7.8
Kalu Oya	Urban 1	14.4	9.6
	Urban 2	15.0	10.0
	Rural	11.6	7.8
Greater Colombo	Urban 1	15.6	6.1
	Urban 2	15.6	6.1
	Rural	8.7	10.7
Bolgoda	Urban 1	12.6	11.4
	Urban 2	13.1	11.9
	Rural	11.6	7.8

Note: Estimated by JICA Study Team

2) Estimation of economic value of land

The economic value of the land is measured by the rent prices for residential use or commercial use by basin. The rent prices are shown in the table below.

Rent Price by Land Use

(Unit: Rs./m²/year)

District	Residential Use		Commercial Use	
	High Case	Low Case	High Case	Low case
Ja Ela	553	72	781	239
Kalu Oya	738	90	882	288
Greater Colombo	781	107	1,127	288
Bolgoda	421	70	650	146

Source: State Valuation Department

(3) Land Enhancement Benefit

Based on the estimated area to be utilized under the flood free condition and its rent price, the land enhancement benefit is calculated for each proposed measure by basin.

3.5 Intangible Benefit

In addition to the quantitative benefits discussed and estimated in the previous sections, it should be noted that the proposed storm water drainage project would produce a lot

of intangible benefits that cannot be measured quantitatively. The following intangible benefits can be expected through the implementation of the storm water drainage projects.

(1) Promotion of Economic Development

The storm water drainage project creates flood free land and the flood free land can be utilized for industry, commercial and residential purposes. Consequently, the economic development of the region is promoted.

(2) Improvement of People's Living Conditions

A lot of people are living in the project area. Some of them including low-income or poor people are subject to relocation for project implementation. If the project pays attention to the living conditions of the people affected, the project will contribute much to the improvement of the people's living conditions and the reduction of poverty.

(3) Alleviation of Inconvenience to People's Life

The flooding usually affects the people's life and causes inconvenience. As the storm water drainage project aims at reducing flooding in space and time. The people's lives will become much more convenient due to the project.

(4) Hygienic Improvement of the Environment

The flooding causes health hazards such as breeding of mosquitoes, contaminating the water and the spread of intestinal diseases, which are identified as one of the major causes of death among children and elderly. The storm water drainage project will improve the hygienic environment in urban areas and improve the people's health. It eventually contributes to savings in health care cost.

(5) Elimination of the Menace of Flooding

The people living in the lowlands are exposed to the menace of flooding. The storm water drainage project will eliminate the menace of flooding by reducing flooding or protecting the people from flood.

(6) Improvement of the Water Environment

The storm water drainage project is to be implemented primarily aiming at improving the storm water drainage system, but it will also contribute to improvement of the water environment by clearing of river banks, cleaning of channels, provision of recreational facilities, improvement of landscape, etc.

3.6 Economic Evaluation for the Proposed Storm Water Drainage Project

3.6.1 Basic Conditions

On the basis of the estimated construction cost, operation and maintenance cost (O&M cost) and estimated economic benefits, the Economic Internal Rate of Return (EIRR), B-C and B/C are calculated based on the following assumptions.

- 1) Project life of 40 years
- 2) Discount rate of 10%
- 3) Project cost is disbursed over five years as follows:
 - Year 1: 10% (detailed design)
 - Year 2: 10% (procurement)
 - Year 3: 30% (construction)
 - Year 4: 30% (construction)
 - Year 5: 20% (construction)
- 4) Annual O&M cost is assumed to be 1% of the direct cost and additional 1.5% for projects with pumping stations. The O&M cost is assumed to be disbursed for the entire project lifetime from the year following completion of the project works.
- 5) Benefit is produced over the entire project life from the year following completion of the project works.
- 6) The benefit is expected to increase by 5% per annum based on the economic growth and change in life style.

3.6.2 Economic Evaluation for Proposed Projects

The flood control benefit for the project is composed of the flood damage reduction benefit and the land enhancement benefit. This is calculated based on the annual average flood damage and the impact of the projects measured by the difference between the inundation area with and without the project. The impact of the projects is calculated by the size of reduction of the expected inundation area with the project.

3.6.3 Results of the Evaluations

The results of the evaluations for the proposed projects for each basin are expressed in B-C (Rs. million), B/C and EIRR (%). Economic feasibility line of the project is considered to be positive for B-C, one or above for B/C and 10% or higher for EIRR, which is based on the discount rate of 10%. Cost benefit stream for the four basins is shown in Table 3.6.1 to 3.6.4.

Economic Evaluation for the Proposed Storm Water Drainage Plans

Basin	B-C (million Rs.)	B/C	EIRR (%)
Ja Ela Basin Storm Water Drainage Plan	741	1.34	12.9
Kalu Oya Basin Storm Water Drainage Plan	1,359	1.94	17.4
Greater Colombo Basin Storm Water Drainage Plan	3,154	2.23	19.5
Bolgoda Basin Storm Water Drainage Plan	3,767	2.22	19.2

3.6.4 Sensitivity Analysis

A sensitivity analysis was conducted to analyze the effect of delaying the macro socio-economic frame target originally set for 2010, which will decrease the project benefit for a certain period because of less development of the basin. The sensitivity analysis is conducted for following two cases.

Case 1: Macro frame is completed and full benefit is expected in 2015

Case 2: Macro frame is completed and full benefit is expected in 2020

The table below shows the result of the sensitivity analysis. The result of the sensitivity analysis shows the impact of delaying the macro frame target is about 2% in EIRR for case 1 and 4% for the case 2. There is almost no difference among the basins.

Results of the Sensitivity Analysis

Basin	Case	B-C (million Rs.)	B/C	EIRR (%)
Ja Ela Basin Storm Water Drainage Plan	Base	741	1.34	12.9
	Case 1	277	1.13	11.1
	Case 2	40	1.02	10.2
Kalu Oya Basin Storm Water Drainage Plan	Base	1,359	1.94	17.4
	Case 1	903	1.63	14.6
	Case 2	239	1.13	11.0
Greater Colombo Basin Storm Water Drainage Plan	Base	3,154	2.23	19.5
	Case 1	2,101	1.77	15.6
	Case 2	1,647	1.61	14.4
Bolgoda Basin Storm Water Drainage Plan	Base	3,767	2.22	19.2
	Case 1	2,633	1.86	16.0
	Case 2	2,042	1.67	14.7

Tables

Table 1.2.1 DS Division and Population in the Study Area

District	DS Division	Area (ha)	Population (2001)	Study Area Coverage (%)	Estimated Population in the SA	Estimated Area in the SA (ha)	Population Share	Population Share (SA)	Population Density (per./ha)	Population Density of SA (per./ha)
1 Colombo		67,524	2,231,655	89.0%	1,985,381	39,019	41.7%	57.7%	33	51
	1) Colombo	1,550	383,878	100	383,878	1,550	7.2%	11.2%	248	248
	2) Dehiwara-Mount Lavinia	2,320	209,783	100	209,783	2,320	3.9%	6.1%	90	90
	3) Hanwella	22,800	93,662	0	0	0	1.7%	0.0%	4	
	4) Homagama	14,050	184,552	75	138,414	10,538	3.4%	4.0%	13	13
	5) Kaduwela	8,770	209,241	75	156,931	6,578	3.9%	4.6%	24	24
	6) Kesbawa	5,500	208,674	100	208,674	5,500	3.9%	6.1%	38	38
	7) Kolonnawa	2,730	160,442	100	160,442	2,730	3.0%	4.7%	59	59
	8) Maharagama	3,020	180,829	100	180,829	3,020	3.4%	5.3%	60	60
	9) Moratuwa	2,350	176,838	100	176,838	2,350	3.3%	5.1%	75	75
	10) Sri Jayawardenapura Kotte	2,210	115,605	100	115,605	2,210	2.2%	3.4%	52	52
	11) Padukka *		54,164	0	0	0	1.0%	0.0%		
	12) Thimbirigasyaya	2,224	253,987	100	253,987	2,224	4.7%	7.4%	114	114
2 Gampaha		139,870	2,064,651	48.8%	1,008,143	37,278	38.5%	29.3%	15	27
	1) Attanagalla	15,390	153,734	0	0	0	2.9%	0.0%	10	
	2) Biyagama	6,190	161,236	100	161,236	6,190	3.0%	4.7%	26	26
	3) Divulapitiya	19,840	127,876	0	0	0	2.4%	0.0%	6	
	4) Dompe	17,590	130,195	0	0	0	2.4%	0.0%	7	
	5) Gampaha	9,450	170,289	75	127,717	7,088	3.2%	3.7%	18	18
	6) Ja Ela	7,920	185,403	100	185,403	7,920	3.5%	5.4%	23	23
	7) Katana	2,260	223,050	50	111,525	1,130	4.2%	3.2%	99	99
	8) Kelaniya	2,220	134,169	100	134,169	2,220	2.5%	3.9%	60	60
	9) Mahara	9,580	176,816	50	88,408	4,790	3.3%	2.6%	18	18
	10) Minuwangoda	13,280	152,164	25	38,041	3,320	2.8%	1.1%	11	11
	11) Mirigama	18,740	143,744	0	0	0	2.7%	0.0%	8	
	12) Negombo	12,790	144,331	0	0	0	2.7%	0.0%	11	
	13) Wattala	4,620	161,644	100	161,644	4,620	3.0%	4.7%	35	35
3 Kalutara		160,765	1,060,137	41.9%	444,685	31,530	19.8%	12.9%	7	14
	1) Agalawatta	9,223	33,876	0	0	0	0.6%	0.0%	4	
	2) Bandaragama	5,522	86,418	75	64,814	4,142	1.6%	1.9%	16	16
	3) Beruwala	7,300	144,812	0	0	0	2.7%	0.0%	20	
	4) Bulathsinhala	20,764	59,231	0	0	0	1.1%	0.0%	3	
	5) Dodangoda	10,700	54,091	25	13,523	2,675	1.0%	0.4%	5	5
	6) Horana	10,717	90,485	50	45,243	5,359	1.7%	1.3%	8	8
	7) Ingiriya	9,204	45,347	0	0	0	0.8%	0.0%	5	
	8) Kalutara	7,790	141,725	75	106,294	5,843	2.6%	3.1%	18	18
	9) Madurawela	6,274	29,600	25	7,400	1,569	0.6%	0.2%	5	5
	10) Mathugama	13,410	71,910	0	0	0	1.3%	0.0%	5	
	11) Millaniya	7,227	44,271	100	44,271	7,227	0.8%	1.3%	6	6
	12) Palindanuwara	26,907	44,875	0	0	0	0.8%	0.0%	2	
	13) Panadura	4,717	163,141	100	163,141	4,717	3.0%	4.7%	35	35
	14) Walallavita	21,010	50,355	0	0	0	0.9%	0.0%	2	
Total		368,159	5,356,443	64.2%	3,438,208	107,827	100.0%	100.0%	15	32

Source: Local Government, Western Province

Note: For analysis of socio economic conditions of the Study Area, DS Divisions in the Study Area are estimated. Since the basin boundary and administrative boundary do not always match, the share of the DS Divisions that are in the Study area is taken by estimate. For simplicity, the area covered is estimated by three scales, 25%, 50%, and 75% of DS Division.

Due to regular administrative changes, the area for DS Divisions has not been updated.

* Paduka is a part of Hanwella and Homagama, and the area for Paduka has not been identified.

SA: Study Area

Table 1.2.2 Local Authorities in the Study Area and Population

District	MC, UC, PS	DS Division	Area (km ²)	Population (1999)
1 Colombo			670.78	2,195,084
1)	MC: Colombo*	Colombo	37.21	642,000
2)	MC: Dehiwela Mt Lavinia*	Dehiwela-Mount Lvinia	21.17	234,582
3)	MC: Sri Jayawardenepura Kotte*	Nugegoda	17.04	134,114
4)	MC: Moratuwa*	Moratuwa	23.34	177,100
5)	UC: Kolonnawa*	Kolonnawa	10.06	61,000
6)	UC: Seethawakapura	Hanwella	19.40	32,299
7)	PS: Homagama*	Homagama	140.08	183,782
8)	PS: Kaduwela*	Kaduwela	87.69	192,614
9)	PS: Kesbewa*	Kesbewa	55.00	197,433
10)	PS: Kotikawatte/Mulleriyawa*	Kolonnawa	29.63	113,296
11)	PS: Maharagama*	Maharagama	21.86	111,091
12)	PS: Seethawaka	Hanwella	208.30	115,773
2 Gampaha			1,420.02	2,087,991
1)	MC: Negombo/Kochikade	Negombo	30.08	171,004
2)	UC: Gampaha*	Gampaha	2.59	57,429
3)	UC: Ja-Ela*	Ja Ela	9.07	30,910
4)	UC: Seeduwa-Katunayake	Negombo	10.36	49,895
5)	UC: Minuwangoda	Minuwangoda	4.40	9,071
6)	UC: Peliyagoda*	Kelaniya	1.94	33,187
7)	UC: Wattala-Mobole*	Wattala	9.84	26,000
8)	PS: Attangagalla	Attanagalle	151.08	138,229
9)	PS: Biyagama*	Biyagama	64.00	142,623
10)	PS: Divulapitiya	Divulapitiya	193.67	130,341
11)	PS: Dompe	Weke	178.50	130,195
12)	PS: Gampaha*	Gampaha	134.11	112,860
13)	PS: Ja-Ela*	Ja Ela	63.08	153,606
14)	PS: Katana*	Katana	65.00	149,734
15)	PS: Kelaniya*	Kelaniya	21.90	143,851
16)	PS: Mahara*	Mahara	98.80	178,589
17)	PS: Minuwangoda*	Minuwangoda	135.00	139,978
18)	PS: Mirigama	Mirigama	186.60	130,712
19)	PS: Wattala*	Wattala/Negombo	60.00	159,777
3 Kalutara			1,535.30	1,022,736
1)	UC: Beruwala	Beruwala	5.18	32,300
2)	UC: Horana*	Horana	4.53	18,080
3)	UC: Kalutara	Kalutara	12.94	40,000
4)	UC: Panadura*	Panadura	5.80	40,501
5)	PS: Agalawatta	Agalawatte	361.00	92,050
6)	PS: Bandaragama*	Bandaragama	93.20	105,055
7)	PS: Beruwala	Beruwala	65.78	111,198
8)	PS: Bulathsinhala	Bulathsinhala/Madurawela	278.40	94,880
9)	PS: Dodangoda*	Dodangoda	115.03	61,010
10)	PS: Horana*	Horana	90.62	81,377
11)	PS: Kalutara*	Kalutara	98.50	88,920
12)	PS: Mathugama	Mathugama	134.10	72,872
13)	PS: Panadura*	Panadura	59.62	129,547
14)	PS: Walallavita	Walallavita	210.60	54,946

Source: Local Government, Western Province

Note: MC: Municipal Council, UC: Urban Council,
 PS: Pradeshiya Sabhas (former Town Councils and Village Councils considered as rural area)
 * Study Area
 Population of Colombo is in 2001

Table 1.4.1 Gross Domestic Product at Constant at 1996 Price(Unit: x 10³ Rs.)

	Item	1996	1997	1998	1999	2000
1	Agriculture, Forestry and Fishery	156,108	160,753	164,804	172,238	175,317
1)	Agriculture	122,594	126,107	128,337	133,952	136,212
	Tea	10,332	11,069	11,195	11,341	12,226
	Rubber	4,011	3,795	3,452	3,487	3,149
	Coconut	12,838	13,258	12,829	13,996	15,116
	Paddy	19,892	22,122	26,165	27,892	27,808
	Others	75,521	75,863	74,696	77,236	77,913
2)	Forestry	14,751	14,942	15,122	15,319	15,564
3)	Fishery	18,763	19,704	21,345	22,967	23,541
2	Mining and Quarrying	13,927	14,460	13,677	14,238	14,921
3	Manufacturing	112,724	122,929	130,702	136,498	149,115
	Agro processing	16,203	16,771	16,575	17,205	17,928
	Factory industry	87,771	96,795	104,151	108,838	120,157
	Small industry	8,750	9,363	9,976	10,455	11,030
4	Construction	48,234	50,842	54,461	57,075	59,815
5	Electricity, Gas, Water and Sanitary Services	9,171	9,918	10,921	11,958	12,496
6	Transport, Storage, Communication	73,784	80,268	86,442	93,444	100,706
7	Wholesale and Retail Trade	155,316	165,132	172,486	174,160	189,366
	Imports	64,629	70,833	76,609	75,536	85,280
	Exports	16,365	18,323	18,346	19,465	23,027
	Domestic	74,322	75,976	77,531	79,159	81,059
8	Banking, Insurance, and Real Estate	49,675	54,767	58,247	60,926	64,810
9	Ownership of Dwellings	14,232	14,416	14,592	14,767	15,018
10	Public Administration and Defense	35,215	37,055	38,170	39,773	41,443
11	Services	27,548	29,223	30,294	33,263	34,028
12	GDP	695,934	739,763	774,796	808,340	857,035
13	Net Factor Income from Abroad	-11,258	-8,816	-9,888	-14,000	-16,750
14	GNP	684,676	730,947	764,908	794,340	840,285

Source: Annual Report 2000, Central Government of Sri Lanka

Source: Annual Report 2000, Central Government of Sri Lanka

Table 1.4.2 Trade Balance

Item	Year	Amount (million Rs.)					Share (%)				
		1996	1997	1998	1999	2000	1996	1997	1998	1999	2000
Export		226,801	274,193	310,398	325,170	420,114	100	100	100	100	100
1 Agricultural exports		53,206	62,667	70,225	66,750	76,270	23.5	22.9	22.6	20.5	18.2
1) Tea		34,067	42,533	50,280	43,728	53,133	15.0	15.5	16.2	13.4	12.6
2) Rubber		5,753	4,640	2,808	2,305	2,179	2.5	1.7	0.9	0.7	0.5
3) Coconut		6,091	6,939	6,110	9,119	9,174	2.7	2.5	2.0	2.8	2.2
4) Minor agricultural products		7,295	8,555	11,027	11,598	11,784	3.2	3.1	3.6	3.6	2.8
2 Industrial exports		166,543	203,114	233,508	250,517	325,932	73.4	74.1	75.2	77.0	77.6
1) Food, beverages and tobacco		5,272	5,354	7,586	6,093	11,573	2.3	2.0	2.4	1.9	2.8
2) Textiles and garments		105,341	134,455	159,303	171,068	226,930	46.4	49.0	51.3	52.6	54.0
3) Petroleum products		5,740	5,743	4,662	5,210	7,414	2.5	2.1	1.5	1.6	1.8
4) Rubber products		9,357	10,513	11,528	11,350	14,924	4.1	3.8	3.7	3.5	3.6
5) Ceramic products		2,677	3,246	3,478	3,442	3,558	1.2	1.2	1.1	1.1	0.8
6) Leather, travel goods and footwear		7,690	10,812	13,855	14,140	13,391	3.4	3.9	4.5	4.3	3.2
7) Machinery and equipment		8,572	12,076	11,811	14,155	18,594	3.8	4.4	3.8	4.4	4.4
8) Diamond and jewellery		10,643	8,384	8,491	12,064	14,546	4.7	3.1	2.7	3.7	3.5
9) Other industrial exports		11,251	12,531	12,794	12,995	15,002	5.0	4.6	4.1	4.0	3.6
3 Mineral exports		5,292	5,271	3,863	4,540	7,352	2.3	1.9	1.2	1.4	1.8
1) Gems		4,771	4,899	3,577	4,326	7,091	2.1	1.8	1.2	1.3	1.7
2) Other mineral exports		521	372	286	214	261	0.2	0.1	0.1	0.1	0.1
4 Unclassified		1,760	3,141	2,802	3,363	10,560	0.8	1.1	0.9	1.0	2.5
Import		301,076	346,026	380,139	421,888	554,291	100.0	100.0	100.0	100.0	100.0
1 Consumer goods		68,372	72,062	80,956	87,505	105,403	22.7	20.8	21.3	20.7	19.0
1) Rice		5,118	4,331	2,621	3,290	288	1.7	1.3	0.7	0.8	0.1
2) Sugar		8,026	10,788	8,384	7,448	10,777	2.7	3.1	2.2	1.8	1.9
3) Wheat		11,267	8,128	8,133	7,792	9,625	3.7	2.3	2.1	1.8	1.7
4) Other food and drink		19,966	22,749	27,405	28,032	31,894	6.6	6.6	7.2	6.6	5.8
5) Other consumer goods		23,995	26,066	34,413	40,943	52,819	8.0	7.5	9.1	9.7	9.5
2 Intermediate goods		153,117	182,754	192,494	215,658	287,196	50.9	52.8	50.6	51.1	51.8
1) Petroleum		26,525	31,828	22,275	35,344	68,381	8.8	9.2	5.9	8.4	12.3
2) Fertilizer		4,189	3,916	3,989	4,690	6,059	1.4	1.1	1.0	1.1	1.1
3) Chemicals		7,402	8,024	9,241	9,590	11,152	2.5	2.3	2.4	2.3	2.0
4) Textiles and clothing		64,601	81,816	90,099	93,105	111,386	21.5	23.6	23.7	22.1	20.1
5) Other intermediate goods		50,400	57,170	66,890	72,929	90,218	16.7	16.5	17.6	17.3	16.3
3 Investment goods		66,647	78,232	95,322	110,599	130,890	22.1	22.6	25.1	26.2	23.6
1) Machinery and equipment		35,987	43,853	50,592	47,736	59,538	12.0	12.7	13.3	11.3	10.7
2) Transport equipment		9,885	12,276	17,098	37,191	39,489	3.3	3.5	4.5	8.8	7.1
3) Building materials		14,540	16,030	19,590	18,296	23,087	4.8	4.6	5.2	4.3	4.2
4) Other investment goods		6,235	6,073	8,042	7,376	8,776	2.1	1.8	2.1	1.7	1.6
4 Unclassified imports		12,940	12,978	11,367	8,126	30,802	4.3	3.8	3.0	1.9	5.6
Net Export		-74,275	-71,833	-69,741	-96,718	-134,177					

Source: Annual Report 2000, Central Bank of Sri Lanka

Table 1.4.3 Employment by Sector in Sri Lanka

(Unit: Person)

Year	Total	Major Industrial Groups									
		Agriculture	Mining & Quarrying	Manufacturing	Electricity Gas & Water	Construction	Trade & Hotels	Transport Storage & Communication	Insurance & Real Estate	Personal Services	Not Defined
1990	5,047,354	2,360,951	79,763	669,282	31,999	196,990	485,196	206,470	63,744	792,773	160,185
1991	5,015,519	2,130,241	55,677	751,035	20,744	236,696	538,695	205,492	93,190	742,131	241,620
1992	4,962,104	2,088,953	79,560	650,229	17,492	237,694	559,258	216,286	73,501	839,003	200,130
1993	5,201,473	2,159,053	80,544	684,349	32,763	226,792	576,628	212,056	82,235	911,827	235,228
1994	5,281,272	2,084,730	43,316	756,219	30,307	216,440	644,749	245,981	96,742	953,706	209,085
1995	5,357,110	1,966,794	89,250	788,582	24,944	285,494	652,770	252,205	81,265	929,207	286,607
1996	5,537,402	2,072,197	86,824	806,704	27,539	297,122	663,575	270,668	109,662	1,009,624	193,355
1997	5,607,881	2,031,907	91,788	920,422	30,954	311,792	695,725	267,968	94,418	969,281	193,627
1998	6,049,238	2,378,410	81,941	901,577	38,245	303,951	701,669	296,025	114,616	1,036,332	196,399
1999											
1	6,159,049	2,536,335	68,795	843,385	31,749	279,140	577,825	333,243	87,863	1,110,688	290,051
2	5,943,003	2,078,324	102,597	868,479	28,753	302,050	760,767	274,486	92,953	1,151,800	282,780
3	6,092,056	2,057,838	67,985	939,757	32,977	369,711	798,790	296,316	97,304	1,139,481	291,914
4	6,136,658	2,146,512	64,647	955,553	32,618	339,090	808,285	339,605	119,987	1,092,216	238,176
2000											
1	6,307,795	2,290,026	77,845	1,013,216	25,091	320,665	767,788	278,141	122,697	1,153,742	258,584
2	6,549,667	2,444,682	49,031	995,782	30,792	327,960	843,439	304,973	121,549	1,231,977	199,482

Source: Quarterly Report of the Labor Force Survey for Second Quarter 2000, Department of Census and Statistic

Sector Share

(Unit: Person)

Year	Total	Major Industrial Groups									
		Agriculture	Mining & Quarrying	Manufacturing	Electricity Gas & Water	Construction	Trade & Hotels	Transport Storage & Communication	Insurance & Real Estate	Personal Services	Not Defined
1990	100.0	46.8	1.6	13.3	0.6	3.9	9.6	4.1	1.3	15.7	3.2
1991	100.0	42.5	1.1	15.0	0.4	4.7	10.7	4.1	1.9	14.8	4.8
1992	100.0	42.1	1.6	13.1	0.4	4.8	11.3	4.4	1.5	16.9	4.0
1993	100.0	41.5	1.5	13.2	0.6	4.4	11.1	4.1	1.6	17.5	4.5
1994	100.0	39.5	0.8	14.3	0.6	4.1	12.2	4.7	1.8	18.1	4.0
1995	100.0	36.7	1.7	14.7	0.5	5.3	12.2	4.7	1.5	17.3	5.4
1996	100.0	37.4	1.6	14.6	0.5	5.4	12.0	4.9	2.0	18.2	3.5
1997	100.0	36.2	1.6	16.4	0.6	5.6	12.4	4.8	1.7	17.3	3.5
1998	100.0	39.3	1.4	14.9	0.6	5.0	11.6	4.9	1.9	17.1	3.2
1999											
1	100.0	41.2	1.1	13.7	0.5	4.5	9.4	5.4	1.4	18.0	4.7
2	100.0	35.0	1.7	14.6	0.5	5.1	12.8	4.6	1.6	19.4	4.8
3	100.0	33.8	1.1	15.4	0.5	6.1	13.1	4.9	1.6	18.7	4.8
4	100.0	35.0	1.1	15.6	0.5	5.5	13.2	5.5	2.0	17.8	3.9
2000											
1	100.0	36.3	1.2	16.1	0.4	5.1	12.2	4.4	1.9	18.3	4.1
2	100.0	37.3	0.7	15.2	0.5	5.0	12.9	4.7	1.9	18.8	3.0

Increase Rate

(Unit: Person)

Year	Total	Major Industrial Groups									
		Agriculture	Mining & Quarrying	Manufacturing	Electricity Gas & Water	Construction	Trade & Hotels	Transport Storage & Communication	Insurance & Real Estate	Personal Services	Not Defined
1990											
1991	-0.6	-9.8	-30.2	12.2	-35.2	20.2	11.0	-0.5	46.2	-6.4	50.8
1992	-1.1	-1.9	42.9	-13.4	-15.7	0.4	3.8	5.3	-21.1	13.1	-17.2
1993	4.8	3.4	1.2	5.2	87.3	-4.6	3.1	-2.0	11.9	8.7	17.5
1994	1.5	-3.4	-46.2	10.5	-7.5	-4.6	11.8	16.0	17.6	4.6	-11.1
1995	1.4	-5.7	106.0	4.3	-17.7	31.9	1.2	2.5	-16.0	-2.6	37.1
1996	3.4	5.4	-2.7	2.3	10.4	4.1	1.7	7.3	34.9	8.7	-32.5
1997	1.3	-1.9	5.7	14.1	12.4	4.9	4.8	-1.0	-13.9	-4.0	0.1
1998	7.9	17.1	-10.7	-2.0	23.6	-2.5	0.9	10.5	21.4	6.9	1.4
1999											
1	1.8	6.6	-16.0	-6.5	-17.0	-8.2	-17.6	12.6	-23.3	7.2	47.7
2	-3.5	-18.1	49.1	3.0	-9.4	8.2	31.7	-17.6	5.8	3.7	-2.5
3	2.5	-1.0	-33.7	8.2	14.7	22.4	5.0	8.0	4.7	-1.1	3.2
4	0.7	4.3	-4.9	1.7	-1.1	-8.3	1.2	14.6	23.3	-4.1	-18.4
2000											
1	2.8	6.7	20.4	6.0	-23.1	-5.4	-5.0	-18.1	2.3	5.6	8.6
2	3.8	6.8	-37.0	-1.7	22.7	2.3	9.9	9.6	-0.9	6.8	-22.9

Increase from 1990 to 2000 (%)	29.8	3.55	-38.5	48.8	-3.8	66.5	73.8	47.7	90.7	55.4	24.5
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Table 1.4.4 Employment Status for the Past 10 years in Sri Lanka

(Unit: Person)

Year	Population (age of 10 years & over)	Total Labor Force	Labor Force Participation Rate (%)	Labor Force				Not in Labor Force (Number)
				Employed		Unemployed		
				Number	Rate (%)	Number	Rate (%)	
1990	11,573,941	6,001,148	51.9	5,047,354	84.1	953,794	15.9	5,572,793
1991	11,795,793	5,877,198	49.8	5,015,517	85.3	861,680	14.7	5,918,596
1992	12,058,463	5,808,062	48.2	4,962,105	85.4	845,957	14.6	6,250,400
1993	12,278,055	6,032,383	49.1	5,201,474	86.2	830,910	13.8	6,245,675
1994	12,492,850	6,078,863	48.7	5,281,272	86.9	797,591	13.1	6,413,985
1995	12,736,185	6,106,138	47.9	5,357,117	87.7	749,021	12.3	6,630,048
1996	12,831,240	6,241,889	48.6	5,537,285	88.7	704,604	11.3	6,589,365
1997	12,870,791	6,266,160	48.7	5,607,881	89.5	658,279	10.5	6,604,630
1998	12,881,790	6,660,520	51.7	6,049,238	90.8	611,285	9.2	6,221,274
1999								
1	12,896,010	6,739,142	52.3	6,159,059	91.4	580,082	8.6	6,156,873
2	13,127,990	6,494,826	49.5	5,942,997	91.5	551,829	8.5	6,633,173
3	13,201,920	6,704,814	50.8	6,092,075	90.9	612,740	9.1	6,497,108
4	13,455,900	6,757,724	50.2	6,136,693	90.8	621,031	9.2	6,698,177
2000								
1	13,498,390	6,853,891	50.8	6,307,770	92.0	546,121	8.0	6,644,501
2	13,542,790	7,042,014	52.0	6,549,153	93.0	492,861	7.0	6,500,782

Source: Quarterly Report of the Labor Force Survey for Second Quarter 2000, Department of Census and Statistics

Increase rate

(Unit: %)

Year	Population (age of 10 years & over)	Total Labor Force	Labor Force Participation Rate (%)	Labor Force				Not in Labor Force (Number)
				Employed		Unemployed		
				Number	Rate (%)	Number	Rate (%)	
1991	1.9	-2.1	-4.0	-0.6	1.4	-9.7	-7.5	6.2
1992	2.2	-1.2	-3.2	-1.1	0.1	-1.8	-0.7	5.6
1993	1.8	3.9	1.9	4.8	0.9	-1.8	-5.5	-0.1
1994	1.7	0.8	-0.8	1.5	0.8	-4.0	-5.1	2.7
1995	1.9	0.4	-1.6	1.4	0.9	-6.1	-6.1	3.4
1996	0.7	2.2	1.5	3.4	1.1	-5.9	-8.1	-0.6
1997	0.3	0.4	0.2	1.3	0.9	-6.6	-7.1	0.2
1998	0.1	6.3	6.2	7.9	1.5	-7.1	-12.4	-5.8
1999								
1	0.1	1.2	1.2	1.8	0.7	-5.1	-6.5	-1.0
2	1.8	-3.6	-5.4	-3.5	0.1	-4.9	-1.2	7.7
3	0.6	3.2	2.6	2.5	-0.7	11.0	7.1	-2.1
4	1.9	0.8	-1.2	0.7	-0.1	1.4	1.1	3.1
2000								
1	0.3	1.4	1.2	2.8	1.3	-12.1	-13.0	-0.8
2	0.3	2.7	2.4	3.8	1.1	-9.8	-12.5	-2.2

Table 1.4.5 Gross Regional Domestic Product of Western Province at 1990

Item		GRDP for Western Province (million Rs.)						Western Province Share in the National GDP					
		1990	1991	1992	1993	1994	1995	1990	1991	1992	1993	1994	1995
1	Agriculture	6,189	6,199	6,109	6,202	6,393	6,638	8.5	8.4	8.4	8.0	8.0	8.0
1.1	Tea	278	197	147	190	199	202	2.8	1.9	1.9	1.9	1.9	1.9
1.2	Rubber	569	535	548	528	545	544	34.3	35.1	35.2	34.5	35.3	35.0
1.3	Coconuts	1,111	853	894	839	1,018	1,089	18.9	16.6	16.6	16.5	16.7	17.0
1.4	Paddy	1,204	945	891	973	929	980	8.3	6.6	6.6	6.5	6.0	6.0
1.5	Tabacco	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
1.6	Betal and Arecanuts	67	61	80	81	80	77	8.3	6.3	7.2	8.2	7.9	7.6
1.7	Other Food Crops	1,519	1,213	956	927	905	939	6.9	5.4	4.3	3.9	3.8	3.8
1.8	Minor Exported Crop	233	416	394	381	373	391	8.3	12.3	12.2	11.3	11.0	11.6
1.9	Plantation Development	238	375	472	523	539	544	12.7	17.9	17.9	17.9	17.9	17.9
1.10	Firewood and Forestry	74	87	66	56	61	57	2.5	2.9	2.1	1.7	2.0	1.9
1.11	Livestock	441	434	408	409	423	423	13.1	13.0	13.0	12.8	13.1	13.0
1.12	Fisheries	264	1,035	1,136	1,218	1,221	1,281	4.5	16.2	17.0	17.0	16.8	16.8
1.13	Micellaniou	193	47	116	77	101	110	17.9	4.9	6.3	5.6	6.2	6.0
2	Mining	740	551	535	615	725	778	16.2	16.2	16.8	16.9	17.5	17.8
3	Manufacture	39,119	42,856	46,707	51,140	55,484	60,043	71.2	72.4	72.4	72.4	72.4	72.4
3.1	Manufacture of Food, Beverages, and Tabacco	19,098	20,922	22,802	24,966	27,087	29,313	63.1	64.5	64.5	64.5	64.5	64.5
3.2	Textile Wearing Apparel and Leather	10,949	11,995	13,073	14,313	15,529	16,805	81.7	82.3	82.2	82.2	82.2	82.2
3.3	Manufacturing of Wood and Wood Products Including Furniture	602	660	719	787	854	924	76.8	79.9	79.9	79.9	79.9	79.9
3.4	Manufacture of Paper and Paper Products Printing and Publishing	258	283	308	337	366	396	96.4	96.9	96.9	96.9	96.9	96.9
3.5	Manufacture of Chemical and Petroleum, Coal, Rubber, and Plastic Product	3,145	3,445	3,755	4,111	4,461	4,827	92.1	92.1	92.1	92.1	92.1	92.1
3.6	Manufacture of Non Metallic Mineral Products Except Products of Petroleum and Coal	363	398	433	475	515	557	24.9	26.3	26.2	26.2	26.2	26.2
3.7	Basic Metal Industries	258	283	308	338	366	396	89.5	91.4	91.4	91.4	91.4	91.4
3.8	Manufacture of Fabricated Metal Products Machinery, and Equipment	3,474	3,806	4,148	4,541	4,927	5,332	86.2	86.6	86.6	86.6	86.6	86.6
3.9	Other Manufacturing Industries	972	1,065	1,161	1,271	1,379	1,492	93.2	94.4	94.4	94.4	94.4	94.4
4	Electricity and Gas	3,464	3,811	4,007	4,492	4,848	5,259	61.5	63.3	63.3	63.0	62.1	61.1
4.1	Electricity and Gas	3,359	3,700	3,894	4,374	4,728	5,138	61.6	63.5	63.5	63.1	62.2	61.2
4.2	Water Distribution	105	112	113	118	120	121	58.1	58.1	58.1	58.1	58.1	58.1
5	Trade	32,866	32,375	35,871	38,539	41,669	44,017	53.2	49.7	50.1	50.4	51.3	51.7
5.1	Trade	32,343	31,878	35,227	37,931	41,033	43,308	53.2	49.7	50.1	50.4	51.3	51.7
5.2	Hotels and Restaurants	523	497	644	608	636	709	52.9	47.7	50.0	49.7	50.0	52.4
6	Transport and Communication	13,783	14,376	15,209	15,810	16,389	17,910	46.5	46.1	46.2	45.7	45.4	47.6
6.1	Air Transport	343	365	369	370	565	635	96.6	97.7	97.4	97.3	97.0	97.3
6.2	Water Transport	1,985	2,139	2,238	2,402	2,111	2,403	83.8	85.8	85.0	85.8	86.0	86.2
6.3	Road Transport	9,642	9,874	10,525	10,796	11,270	12,460	44.6	43.4	43.6	43.1	43.2	45.4
6.4	Rail Transport	1,384	1,554	1,622	1,735	1,825	1,712	32.9	35.1	35.2	35.1	34.4	34.7
6.5	Telecommunication	302	315	323	331	409	471	63.7	63.2	63.2	63.1	62.9	62.5
6.6	Postal Service	127	127	132	177	209	229	21.5	20.4	20.5	20.5	20.7	21.0
7	Construction	7,796	7,917	8,325	9,064	9,762	10,867	36.1	36.1	35.7	35.7	35.9	36.9
7.1	Residential	3,601	3,657	3,735	4,167	4,637	5,112	48.2	48.2	48.7	47.9	47.8	47.4
7.2	Non residential	1,526	1,550	1,788	1,878	1,929	2,037	33.5	33.5	33.5	33.5	33.1	33.7
7.3	Others	2,669	2,710	2,802	3,019	3,196	3,718	27.9	27.9	27.2	27.3	27.4	29.4
8	Bank, Insurance, Real Estate, Business	8,539	7,961	8,384	9,259	10,194	11,136	49.5	43.7	43.7	44.2	44.9	44.9
8.1	Banking Institution and Business	5,823	4,921	5,066	5,521	6,316	6,692	58.8	47.0	47.0	47.8	49.0	48.9
8.2	Real Estate	228	241	322	366	391	446	60.0	60.0	60.0	60.2	62.0	64.3
8.3	Private Dwelling	2,488	2,800	2,996	3,372	3,487	3,998	35.7	38.0	38.1	38.3	38.0	38.4
9	Government Services	8,521	9,059	9,146	9,457	9,787	10,292	35.3	35.3	35.3	35.3	35.4	35.5
9.1	Public Administration and Defense	6,696	7,119	7,133	7,400	7,642	8,068	36.7	36.7	36.7	36.7	36.7	36.7
9.2	Health and Hospital Services	215	228	231	234	240	245	38.3	38.3	38.1	38.2	38.2	37.9
9.3	Education Services	1,610	1,712	1,782	1,823	1,904	1,979	30.3	30.3	30.5	30.5	30.8	31.0
10	Private Services	3,269	3,576	4,118	3,813	4,138	4,266	40.5	41.9	44.9	40.3	42.6	42.7
11	Import Duty	7,258	8,141	7,994	8,071	8,313	8,515	41.4	41.1	42.1	42.1	42.7	43.3
	Gross Regional Domestic Product	131,544	136,823	146,405	156,462	167,701	179,720	41.4	41.1	42.1	42.1	42.7	43.3

Source: Macro Division, National Planning Department, Ministry of Finance and Planning

Table 1.4.6 Sectoral Classification of Employed Labor Force

1) Employed Labor Force

(Unit: Person)

Sector	Colombo	Gampaha	Kalutara	CMR	Sri Lanka
Agriculture, Forestry	29,192	74,120	68,042	171,354	2,036,035
Mining	3,925	2,312	2,312	8,549	62,674
Manufacturing	164,925	196,498	53,816	415,239	769,900
Electricity & Gas	5,686	3,830	1,815	11,331	22,861
Construction	45,411	38,580	22,217	106,208	235,711
Wholesale	136,881	81,230	41,130	259,241	565,873
Transport	52,579	41,598	16,918	111,095	217,157
Insurance & Banking Services	34,438	15,444	4,470	54,352	85,583
Community Services	187,051	114,457	64,848	366,356	817,367
Others	18,704	7,927	10,645	37,276	195,725
Total	678,792	575,996	286,213	1,541,001	5,008,886

Source: Labor Force Survey, 1994, Department of Census and Statistics

2) Sector Share

(Unit: %)

Sector	Colombo	Gampaha	Kalutara	CMR	Sri Lanka
Agriculture, Forestry	4.3	12.9	23.8	11.1	40.6
Mining	0.6	0.4	0.8	0.6	1.3
Manufacturing	24.3	34.1	18.8	26.9	15.4
Electricity & Gas	0.8	0.7	0.6	0.7	0.5
Construction	6.7	6.7	7.8	6.9	4.7
Wholesale	20.2	14.1	14.4	16.8	11.3
Transport	7.7	7.2	5.9	7.2	4.3
Insurance & Banking Services	5.1	2.7	1.6	3.5	1.7
Community Services	27.6	19.9	22.7	23.8	16.3
Others	2.8	1.4	3.7	2.4	3.9
Total	100.0	100.0	100.0	100.0	100.0

3) District Share in Sri Lanka

(Unit: %)

Sector	Colombo	Gampaha	Kalutara	CMR	Sri Lanka
Agriculture, Forestry	1.4	3.6	3.3	8.4	100.0
Mining	6.3	3.7	3.7	13.6	100.0
Manufacturing	21.4	25.5	7.0	53.9	100.0
Electricity & Gas	24.9	16.8	7.9	49.6	100.0
Construction	19.3	16.4	9.4	45.1	100.0
Wholesale	24.2	14.4	7.3	45.8	100.0
Transport	24.2	19.2	7.8	51.2	100.0
Insurance & Banking Services	40.2	18.0	5.2	63.5	100.0
Community Services	22.9	14.0	7.9	44.8	100.0
Others	9.6	4.1	5.4	19.0	100.0
Total	13.6	11.5	5.7	30.8	100.0

4) District Share in CMR

(Unit: %)

Sector	Colombo	Gampaha	Kalutara	CMR
Agriculture, Forestry	17.0	43.3	39.7	100.0
Mining	45.9	27.0	27.0	100.0
Manufacturing	39.7	47.3	13.0	100.0
Electricity & Gas	50.2	33.8	16.0	100.0
Construction	42.8	36.3	20.9	100.0
Wholesale	52.8	31.3	15.9	100.0
Transport	47.3	37.4	15.2	100.0
Insurance & Banking Services	63.4	28.4	8.2	100.0
Community Services	51.1	31.2	17.7	100.0
Others	50.2	21.3	28.6	100.0
Total	44.0	37.4	18.6	100.0

Table 1.5.1 Average Monthly Household Income by Source of Income, Province and District

1) Source Income (Unit: Rs.)

Administrative Division	Total Income	Total Monetary Income	Salaries & Wages	Non Agricultural Activities	Agricultural Activities	Food Stamps, Janasavia, Samurdi*	Others	Non Monetary Income
Colombo	11,107	8,915	5,538	2,024	183	40	1,130	2,192
Gampaha	8,539	7,044	3,995	1,680	363	148	858	1,495
Kalutara	6,785	5,469	3,380	942	326	151	670	1316
Western Province	9,230	7,505	4,510	1,674	283	105	933	1,725
Sri Lanka	6,476	5,264	2,988	1,001	525	156	594	1,212

2) Share of Income Source (Unit: %)

Colombo	100.0	80.3	49.9	18.2	1.6	0.4	10.2	19.7
Gampaha	100.0	82.5	46.8	19.7	4.3	1.7	10.0	17.5
Kalutara	100.0	80.6	49.8	13.9	4.8	2.2	9.9	19.4
Western Province	100.0	81.3	48.9	18.1	3.1	1.1	10.1	18.7
Sri Lanka	100.0	81.3	46.1	15.5	8.1	2.4	9.2	18.7

3) Weight

Colombo	1.72	1.69	1.85	2.02	0.35	0.26	1.90	1.81
Gampaha	1.32	1.34	1.34	1.68	0.69	0.95	1.44	1.23
Kalutara	1.05	1.04	1.13	0.94	0.62	0.97	1.13	1.09
Western Province	1.43	1.43	1.51	1.67	0.54	0.67	1.57	1.42
Sri Lanka	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Statistical Abstract 2000, Department of Census and Statistics

Note: *Janasavia, Samurdi : Social welfare programs

Table 1.5.2 Average Monthly Household Expenditure

1) Expenditure Items

(Unit: Rs.)

Administrative Division	Total Expenditure	Food	Non food items	Housing	Fuel & Light	Clothing	Personal Care & Health Expense	Transport & Communication	Consumer Durable	Non Durable Household Goods	Education	Cultural Activities & Entertainment	Others
Colombo	10,833	4,632	6,201	2,236	491	531	597	937	233	141	275	168	592
Gampaha	8,151	4,174	3,977	1,382	379	323	420	547	194	99	168	79	386
Kalutara	6,546	3,764	2,782	699	275	256	373	382	169	82	155	95	296
Western Province	8,883	4,277	4,606	1,591	404	394	446	673	205	113	209	119	452
Sri Lanka	6,305	3,552	2,753	825	294	282	309	382	121	87	128	69	256

2) Share of Expenditure Items

(Unit: %)

Colombo	100.0	42.8	57.2	20.6	4.5	4.9	5.5	8.6	2.2	1.3	2.5	1.6	5.5
Gampaha	100.0	51.2	48.8	17.0	4.6	4.0	5.2	6.7	2.4	1.2	2.1	1.0	4.7
Kalutara	100.0	57.5	42.5	10.7	4.2	3.9	5.7	5.8	2.6	1.3	2.4	1.5	4.5
Western Province	100.0	48.1	51.9	17.9	4.5	4.4	5.0	7.6	2.3	1.3	2.4	1.3	5.1
Sri Lanka	100.0	56.3	43.7	13.1	4.7	4.5	4.9	6.1	1.9	1.4	2.0	1.1	4.1

3) Weight

Colombo	1.72	1.30	2.25	2.71	1.67	1.88	1.93	2.45	1.93	1.62	2.15	2.43	2.31
Gampaha	1.29	1.18	1.44	1.68	1.29	1.15	1.36	1.43	1.60	1.14	1.31	1.14	1.51
Kalutara	1.04	1.06	1.01	0.85	0.94	0.91	1.21	1.00	1.40	0.94	1.21	1.38	1.16
Western Province	1.41	1.20	1.67	1.93	1.37	1.40	1.44	1.76	1.69	1.30	1.63	1.72	1.77
Sri Lanka	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Statistical Abstract 2000, Department of Census and Statistics

Table 1.6.1 Summary of Government Fiscal Operations

(Unit: million Rs.)

Item	1996	1997	1998	1999	2000 (Approved Estimates)	2000 (Provisional)	2001 (Approved Estimates)
Total Revenue	146,279	165,036	175,032	195,905	233,974	211,282	264,479
Tax Revenue	130,202	142,512	147,368	166,028	201,766	182,392	234,113
Non Tax Revenue	16,077	22,524	27,664	29,877	32,208	28,890	30,366
Expenditure and lending minus repayments	221,119	235,739	267,926	278,708	337,034	335,238	408,309
Current expenditure	175,147	184,478	199,649	207,271	225,750	254,280	290,264
General public services	53,915	58,926	66,158	63,220	70,762	82,645	79,115
Civil administration	10,207	13,956	15,196	14,513	20,234	13,418	18,030
Defense	38,117	37,062	42,496	40,071	38,442	56,915	48,161
Public order and safety	5,591	7,908	8,466	8,636	12,086	12,312	12,924
Social services	59,293	59,742	63,595	66,319	73,614	77,160	94,718
Economic services	8,807	7,148	10,547	10,075	11,113	12,103	12,828
Others	53,132	58,662	59,349	67,657	70,261	82,372	103,603
(of which interest)	48,923	55,246	54,897	62,123	69,048	71,200	90,611
Capital expenditure and lending	45,972	51,261	68,277	71,437	111,284	80,958	118,045
General public services	3,161	3,442	6,243	6,345	8,234	7,157	7,057
Civil administration	1,935	3,442	6,243	6,345	7,614	5,610	5,224
Defense	1,226				620	1,547	1,833
Social services	10,323	11,552	15,528	17,493	20,210	16,471	21,659
Economic services	31,409	32,479	44,677	45,234	79,723	54,650	83,410
Others	1,079	3,788	1,829	2,365	3,117	2,680	5,919
Current account surplus/deficit	-28,868	-19,442	-24,617	-11,366	8,224	-42,998	-25,785
Primary account surplus/deficit	-23,457	-14,815	-38,250	-21,132	-26,809	-53,341	-32,447
Overall deficit	-74,840	-70,703	-92,894	-82,803	-103,060	-123,956	-143,830
Financing	72,381	70,062	93,148	83,254	95,857	124,540	123,058
Foreign financing	17,899	17,287	17,397	8,245	22,166	5,640	28,963
Net borrowing	10,160	9,958	10,197	1,484	14,166	495	21,463
Grants	7,739	7,329	7,200	6,761	8,000	5,145	7,500
Domestic financing	54,482	52,775	75,751	75,009	73,691	118,900	94,095
Market borrowing	49,754	30,276	71,362	74,875	43,691	118,499	69,095
Non bank	26,301	41,816	53,338	49,722	43,691	61,935	68,515
Bank	13,090	-2,171	18,954	25,995	0	53,389	580
Monetary authority	9,873	-13,991	5,609	20,807		44,840	
Commercial bank	3,217	11,820	13,345	5,188		8,549	580
Other borrowing	10,363	-9,369	-930	-842		3,175	
Privatization proceeds	4,728	22,499	4,389	134	30,000	401	25,000
Percentage in GDP (%)							
Total Revenue	19.0	18.5	17.2	17.7	18.7	16.8	18.3
Expenditure and lending minus repayments	28.5	26.4	26.3	25.2	26.3	26.7	26.9
Current expenditure	22.8	20.8	19.6	18.7	18.1	20.3	19.5
Capital expenditure and lending	5.7	5.7	6.7	6.5	8.2	6.5	7.4
Current account surplus/deficit	3.8	2.2	2.4	1.0	0.6	3.4	1.2
Primary account surplus/deficit	3.1	1.7	3.8	1.9	2.1	4.2	2.2
Overall deficit	9.4	7.9	9.2	7.5	7.6	9.9	8.5
Financing	9.4	7.9	9.2	7.5	7.6	9.9	8.5
Foreign financing	2.3	1.9	1.7	0.7	1.8	0.4	2.0
Domestic financing	6.5	3.4	7.0	6.8	3.5	9.4	4.8
Privatization proceeds	0.6	2.5	0.4		2.4		1.7

Source: Annual Report 2000, Central Bank of Sri Lanka

Table 1.6.2 Economic Classification of Expenditure and Lending minus Repayment

(Unit: million Rs.)

Item	1996	1997	1998	1999	2000 (Estimates)	2000 (Provisional)	2001 (Estimates)
Current Expenditure	175,148	184,748	199,649	207,270	226,750	254,279	281,384
Expenditure on goods and services	80,003	83,831	97,768	98,222	107,103	130,765	141,698
Salaries and wages	38,332	44,677	53,880	58,532	62,948	68,544	79,619
Other goods and services	41,671	39,154	43,888	39,690	44,155	62,221	62,079
Interest payments	48,923	55,245	54,898	62,123	69,048	71,200	90,611
Foreign	6,739	6,692	7,300	8,752	9,812	9,015	12,923
Domestic	42,184	48,553	47,598	53,371	59,236	62,185	77,688
Current transfer and subsidies	46,222	45,672	46,983	46,925	49,599	52,314	57,954
To public corporations	8,232	2,693	2,967	3,277	2,721	3,370	3,057
To public institutions	2,284	2,657	4,320	4,834	6,222	5,705	7,038
To other levels of government	1,592	1,941	1,977	1,629	1,625	1,424	777
To households and other sectors	34,114	38,381	37,719	37,185	39,031	41,815	47,082
Food stamps, food subsidies etc.	591			334	455	435	518
Janasaviya Samurdhi	8,591	8,718	8,652	8,020	8,000	9,661	10,300
Pensions	15,465	17,916	19,477	19,056	21,228	21,602	24,764
Fertilizer subsidy	1,500	1,895	2,152	1,390	1,500	1,733	2,000
Others	7,967	9,852	7,438	8,385	7,848	8,384	9,500
Provision for under expenditure/contingency					1,000		-8,879
Capital expenditure	37,637	43,983	54,161	60,340	89,566	67,769	95,658
Acquisition of real assets	20,938	25,468	32,246	32,933	43,512	32,934	45,507
Capital transfers	16,699	18,515	21,915	27,407	46,054	34,835	50,151
To public corporations	6,017	5,880	6,801	9,075	13,150	12,048	10,582
(of Sri Lanka Land Reclamation and Development Corporation (SLLRDC))	2,414	1,746	1,552	1,112	2,195	2,142	1,562
To public institutions	9,601	11,041	13,285	15,968	22,310	14,522	28,141
To other levels of government	1,042	1,511	1,764	2,297	10,477	8,218	11,323
Others	39	83	65	67	117	47	105
Provision for under expenditure/savings						9,023	-11,716
Lending minus repayment	5,873	6,366	14,371	11,548	22,537	13,775	22,211
Advance accounts	630	1,226	2,784	1,585	1,500	2,638	1,500
On lending	8,335	7,278	14,117	11,096	21,718	13,187	22,387
Restructuring cost	90	2,193	3,688	4,556	5,219	4,159	6,000
Loan repayments	-3,182	-4,331	-6,218	-5,689	-5,900	-6,209	-7,676
Total expenditure and net lending	218,658	235,097	268,181	279,158	338,853	335,823	399,253

Percentage of GDP

(Unit: %)

Item	1996	1997	1998	1999	2000 (Estimates)	2000 (Provisional)	2001 (Estimates)
Current Expenditure	22.8	20.8	19.6	18.7	18.1	20.3	19.5
Expenditure on goods and services	10.4	9.4	9.6	8.9	8.5	10.4	9.8
Salaries and wages	5.0	5.0	5.3	5.3	5.0	5.5	5.5
Other goods and services	5.4	4.4	4.3	3.6	3.5	5.0	4.3
Interest payments	6.4	6.2	5.4	5.6	5.5	5.7	6.3
Foreign	0.9	0.8	0.7	0.8	0.8	0.7	0.9
Domestic	5.5	5.5	4.7	4.8	4.7	5.0	5.4
Current transfer and subsidies	6.0	5.1	4.6	4.2	3.9	4.2	4.0
To public corporations	1.1	0.3	0.3	0.3	0.2	0.3	0.2
To public institutions	0.3	0.3	0.4	0.4	0.5	0.5	0.5
To other levels of government	0.2	0.2	0.2	0.1	0.1	0.1	0.1
To households and other sectors	4.4	4.3	3.7	3.4	3.1	3.3	3.3
Food stamps, food subsidies etc.	0.1						
Janasaviya Samurdhi	1.1	1.0	0.8	0.7	0.6	0.8	0.7
Pensions	2.0	2.0	1.9	1.7	1.7	1.7	1.7
Fertilizer subsidy	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Others	1.0	1.1	0.7	0.8	0.6	0.7	0.7
Provision for under expenditure/contingency					-0.1		-0.6
Capital expenditure	4.9	4.9	5.3	5.5	6.4	5.4	5.8
Acquisition of real assets	2.7	2.9	3.2	3.0	3.5	2.6	3.2
Capital transfers	2.2	2.1	2.2	2.5	3.7	2.8	3.5
To public corporations	0.8	0.7	0.7	0.8	1.0	1.0	0.7
To public institutions	1.3	1.2	1.3	1.4	1.8	1.2	1.9
To other levels of government	0.1	0.2	0.2	0.2	0.8	0.7	0.8
Others							
Provision for under expenditure/savings					-0.7		-0.8
Lending minus repayment	0.8	0.7	1.4	1.0	1.8	1.1	1.5
Advance accounts	0.1	0.1	0.3	0.1	0.1	0.2	0.1
On lending	1.1	0.8	1.4	1.0	1.7	1.1	1.6
Restructuring cost		0.2	0.4	0.4	0.4	0.3	0.4
Loan repayments	-0.4	-0.5	-0.6	-0.5	-0.5	-0.5	-0.5
Total expenditure and net lending	28.5	26.4	26.3	25.2	26.3	26.7	26.9

Source: Annual Report 2000, Central Bank of Sri Lanka taken from Ministry of Finance and Planning

Table 1.6.3 Outstanding Central Government Debt

(Unit: million Rs.)

Item	1996	1997	1998	1999	2000 (Provisional)
Total Domestic Debt	356,703	387,740	463,426	543,465	676,660
Short term	149,798	137,494	163,253	175,886	208,017
Medium and long term	206,905	250,246	300,173	367,579	468,643
By debt instrument	356,703	386,740	463,426	543,465	676,660
Rupee securities	205,975	238,475	250,570	262,056	263,888
Treasury bills	124,996	114,996	119,996	124,996	134,996
Treasury bonds		10,000	48,915	104,867	204,124
Others	25,732	23,269	43,945	51,546	73,652
By institutions	356,703	387,740	463,426	543,465	676,660
Banks	101,764	100,536	113,054	139,671	199,030
Central Bank	34,303	19,770	27,179	48,867	97,778
Commercial banks	67,461	80,766	85,875	90,804	101,252
Sinking fund	100	100	100	100	100
Non bank sector	254,839	287,104	350,272	403,694	477,530
National Saving Bank	47,794	62,498	67,260	79,555	87,263
Employees' Provident Fund	113,236	134,867	157,711	181,581	211,742
Others	93,809	89,739	125,301	142,558	178,525
Total Foreign Debt	359,685	376,331	461,273	507,866	542,040
Project Loans	302,960	320,867	400,284	444,423	477,845
Non project loans	56,725	55,464	60,989	63,443	64,195
By type	359,685	376,331	59,575	507,866	542,040
Concessional loans	350,319	362,435	44,633	497,672	535,129
Non Concessional loans	9,366	13,896	14,942	10,194	6,911
By currency	359,685	376,331	461,273	507,866	542,040
SDR	130,818	142,733	179,124	195,799	214,471
US dollars	74,918	83,111	89,877	91,282	98,130
Japanese yen	99,868	98,738	132,371	164,800	172,932
Deutsche mark	27,313	25,746	29,747	27,375	28,484
Others	26,768	26,003	30,154	28,610	28,023
External suppliers' credit	923	499	575	530	167
Total Outstanding Govt. Debt	716,388	764,071	924,699	1,051,331	1,218,700
Total outstanding govt. debt net of sinking fund	716,288	763,971	924,599	1,051,231	1,218,600
Debt/GDP (%)					
Domestic debt	46.4	43.6	45.5	49.1	53.9
Foreign debt	46.8	42.3	45.3	45.9	43.2
Total debt	93.2	85.9	90.8	95.0	97.1

Source: Annual Report 2000, Central Bank of Sri Lanka

Table 2.2.1 Estimated Urban Population of the CMR Based on Assumed Growth Rate (1996-2010)

Urban Centers	Area (ha)	Population (1996) (person)			Growth Rate (%)	Projected Population (person)		
		Core Area	Growth Area	Other Urban Areas		2000	2005	2010
Colombo (15)								
Avissawella	2,237			75,300	3.38	86,008	101,560	119,924
Hanwella	330			1,100	1.88	1,185	1,301	1,428
Colombo	4,020	638,700			1.38	674,693	722,549	773,800
Homagama	1,000		175,000		3.02	197,117	228,735	265,424
Padukka								
Battaramulla-Talangama	3,195	122,546			2.68	136,221	155,479	177,460
Kaduwela								
Piliyandala	3,817	97,225			2.68	108,074	123,353	140,793
Kolonnawa	2,440	65,000			1.68	69,479	75,515	82,075
Kotikawatta		60,400			1.68	64,562	70,171	76,267
Mulleriyawa		44,000			1.68	47,032	51,118	55,558
Moratuwa	1,990			190,400	2.38	209,184	235,290	264,654
Dehiwara Mt Lavinia	2,107			225,000	1.88	242,403	266,062	292,030
Kotte	5,990	125,000			2.68	138,948	158,593	181,014
Maharagama		75,000			2.68	83,369	95,156	108,608
Gampaha (22)								
Veyangoda/Nittambuwa								
Biyagama	1,000		200,000		3.02	225,277	261,411	303,341
Divulapitiya	522			6,025	1.68	6,440	7,000	7,608
Kotadeniyawa	200			2,330	1.68	2,491	2,707	2,942
Gampaha	9,500		150,000		4.30	177,512	219,104	270,440
Ja-Ela	7,920			50,000	1.88	53,867	59,125	64,896
Ekala	305			4,290	1.88	4,622	5,073	5,568
Kandana				44,500	1.68	47,567	51,699	56,190
Regama				47,000	1.68	50,239	54,603	59,347
Seeduwa-Katunayake								
Peliyagoda	2,220			29,700	1.48	31,498	33,899	36,482
Dalugama				57,000	1.88	61,409	67,402	73,981
Kelaniya				43,000	1.88	46,326	50,847	55,810
Kadawatha								
Minuwangoda	990			13,930	1.88	15,007	16,472	18,080
Mirigama								
Negombo	10,500		275,000		4.18	323,944	397,550	487,881
Kochikade								
Wattala-Mobole	4,620			35,300	1.38	37,289	39,934	42,767
Hendala				55,500	1.38	58,628	62,786	67,240
Welisara				37,500	1.38	39,613	42,423	45,432
Pugoda	401			6,027	1.38	6,367	6,818	7,302
Kirindiwela	575			8,046	1.88	8,668	9,514	10,443
Kalutara (13)								
Agalawatta	138			3,040	1.54	3,232	3,488	3,765
Bandaragama								
Beruwala	4,107			75,000	1.38	79,226	84,846	90,864
Aluthgama				24,000	1.38	25,352	27,151	29,077
Dharga Town				30,000	1.38	31,691	33,938	36,346
Bulathsinhala	250			2,990	1.68	3,196	3,474	3,775
Horana	7,500		75,000		3.45	85,898	101,774	120,584
Ingiriya	190			2,290	1.88	2,467	2,708	2,972
Kalutara	2,520			84,202	1.38	88,947	95,256	102,013
Matugama	652			17,138	1.88	18,464	20,266	22,244
Panadura	2,100			55,000	1.38	58,099	62,220	66,634
Keselwatte				60,000	1.38	63,381	67,877	72,691
Wadduwa				26,200	1.38	27,676	29,640	31,742
Total		1,227,871	875,000	1,311,808		3,742,669	4,205,886	4,737,491

Source: CMR Structural Plan

Table 3.3.1 Flood Damage per Hectare

1 Ja Ela Basin

(Unit: Rs./ha)

Area	Item	Unit Value (ha)	Inundation Depth (m)									
			Shallower than 0.2		0.2 to 0.5		0.5 to 1.0		1.0 to 2.0		Deeper than 2.0	
			Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage
Urban Area 1	House	12,001,751	0.03	360,053	0.053	636,093	0.072	864,126	0.109	1,308,191	0.152	1,824,266
	Household goods	3,600,525	0	0	0.086	309,645	0.191	687,700	0.331	1,191,774	0.499	1,796,662
	Commercial (building)	6,918,398	0	0	0.180	1,245,312	0.314	2,172,377	0.419	2,898,809	0.539	3,729,016
	Commercial (facility)	7,902,723	0	0	0.180	1,422,490	0.314	2,481,455	0.419	3,311,241	0.539	4,259,567
	Commercial (merchandise)	4,320,000	0	0	0.127	548,640	0.276	1,192,320	0.379	1,637,280	0.479	2,069,280
	Total in Urban Area 1	34,743,396		360,053		4,162,180		7,397,978		10,347,294		13,678,792
Urban Area 2	House	9,721,418	0.03	291,643	0.053	515,235	0.072	699,942	0.109	1,059,635	0.152	1,477,656
	Household goods	2,916,425	0	0	0.086	250,813	0.191	557,037	0.331	965,337	0.499	1,455,296
	Commercial (building)	5,603,902	0	0	0.180	1,008,702	0.314	1,759,625	0.419	2,348,035	0.539	3,020,503
	Commercial (facility)	6,401,205	0	0	0.180	1,152,217	0.314	2,009,978	0.419	2,682,105	0.539	3,450,250
	Commercial (merchandise)	3,499,200	0	0	0.127	444,398	0.276	965,779	0.379	1,326,197	0.479	1,676,117
	Total in Urban Area 2	28,142,151		291,643		3,371,365		5,992,362		8,381,308		11,079,821
Rural Area	House	5,260,767	0.03	157,823	0.053	278,821	0.072	378,775	0.109	573,424	0.152	799,637
	Household goods	1,578,230	0	0	0.086	135,728	0.191	301,442	0.331	522,394	0.499	787,537
	Commercial (building)	3,032,564	0	0	0.180	545,862	0.314	952,225	0.419	1,270,644	0.539	1,634,552
	Commercial (facility)	3,464,027	0	0	0.180	623,525	0.314	1,087,704	0.419	1,451,427	0.539	1,867,110
	Commercial (merchandise)	1,893,600	0	0	0.127	240,487	0.276	522,634	0.379	717,674	0.479	907,034
	Total in Rural Area	15,229,188		157,823		1,824,422		3,242,780		4,535,564		5,995,870

2 Kalu Oya Basin

(Unit: Rs./ha)

Area	Item	Unit Value (ha)	Inundation Depth (m)									
			Shallower than 0.2		0.2 to 0.5		0.5 to 1.0		1.0 to 2.0		Deeper than 2.0	
			Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage
Urban Area 1	House	12,001,751	0.03	360,053	0.053	636,093	0.072	864,126	0.109	1,308,191	0.152	1,824,266
	Household goods	3,600,525	0	0	0.086	309,645	0.191	687,700	0.331	1,191,774	0.499	1,796,662
	Commercial (building)	6,918,398	0	0	0.180	1,245,312	0.314	2,172,377	0.419	2,898,809	0.539	3,729,016
	Commercial (facility)	7,902,723	0	0	0.180	1,422,490	0.314	2,481,455	0.419	3,311,241	0.539	4,259,567
	Commercial (merchandise)	2,880,000	0	0	0.127	365,760	0.276	794,880	0.379	1,091,520	0.479	1,379,520
	Total in Urban Area 1	33,303,396		360,053		3,979,300		7,000,538		9,801,534		12,989,032
Urban Area 2	House	9,721,418	0.03	291,643	0.053	515,235	0.072	699,942	0.109	1,059,635	0.152	1,477,656
	Household goods	2,916,425	0	0	0.086	250,813	0.191	557,037	0.331	965,337	0.499	1,455,296
	Commercial (building)	5,603,902	0	0	0.180	1,008,702	0.314	1,759,625	0.419	2,348,035	0.539	3,020,503
	Commercial (facility)	6,401,205	0	0	0.180	1,152,217	0.314	2,009,978	0.419	2,682,105	0.539	3,450,250
	Commercial (merchandise)	2,332,800	0	0	0.127	296,266	0.276	643,853	0.379	884,131	0.479	1,117,411
	Total in Urban Area 2	26,975,751		291,643		3,223,233		5,670,436		7,939,243		10,521,116
Rural Area	House	5,260,767	0.03	157,823	0.053	278,821	0.072	378,775	0.109	573,424	0.152	799,637
	Household goods	1,578,230	0	0	0.086	135,728	0.191	301,442	0.331	522,394	0.499	787,537
	Commercial (building)	3,032,564	0	0	0.180	545,862	0.314	952,225	0.419	1,270,644	0.539	1,634,552
	Commercial (facility)	3,464,027	0	0	0.180	623,525	0.314	1,087,704	0.419	1,451,427	0.539	1,867,110
	Commercial (merchandise)	1,262,400	0	0	0.127	160,325	0.276	348,422	0.379	478,450	0.479	604,690
	Total in Rural Area	14,597,988		157,823		1,744,260		3,068,569		4,296,339		5,693,526

3 Greater Colombo Basin

(Unit: Rs./ha)

Area	Item	Unit Value (ha)	Inundation Depth (m)									
			Shallower than 0.2		0.2 to 0.5		0.5 to 1.0		1.0 to 2.0		Deeper than 2.0	
			Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage
Urban Area 1	House	16,917,260	0.03	507,518	0.053	896,615	0.072	1,218,043	0.109	1,843,981	0.152	2,571,424
	Household goods	5,075,178	0	0	0.086	436,465	0.191	969,359	0.331	1,679,884	0.499	2,532,514
	Commercial (building)	5,818,970	0	0	0.180	1,047,415	0.314	1,827,156	0.419	2,438,148	0.539	3,136,425
	Commercial (facility)	4,471,509	0	0	0.180	804,872	0.314	1,404,054	0.419	1,873,562	0.539	2,410,143
	Commercial (merchandise)	3,009,600	0	0	0.127	382,219	0.276	830,650	0.379	1,140,638	0.479	1,441,598
	Total in Urban Area 1	35,292,517		507,518		3,567,585		6,249,262		8,976,214		12,092,104
Urban Area 2	House	16,917,260	0.03	507,518	0.053	896,615	0.072	1,218,043	0.109	1,843,981	0.152	2,571,424
	Household goods	5,075,178	0	0	0.086	436,465	0.191	969,359	0.331	1,679,884	0.499	2,532,514
	Commercial (building)	5,818,970	0	0	0.180	1,047,415	0.314	1,827,156	0.419	2,438,148	0.539	3,136,425
	Commercial (facility)	4,471,509	0	0	0.180	804,872	0.314	1,404,054	0.419	1,873,562	0.539	2,410,143
	Commercial (merchandise)	3,009,600	0	0	0.127	382,219	0.276	830,650	0.379	1,140,638	0.479	1,441,598
	Total in Urban Area 2	35,292,517		507,518		3,567,585		6,249,262		8,976,214		12,092,104
Rural Area	House	4,049,162	0.03	121,475	0.053	214,606	0.072	291,540	0.109	441,359	0.152	615,473
	Household goods	1,214,749	0	0	0.086	104,468	0.191	232,017	0.331	402,082	0.499	606,160
	Commercial (building)	4,476,368	0	0	0.180	805,746	0.314	1,405,580	0.419	1,875,598	0.539	2,412,763
	Commercial (facility)	3,439,805	0	0	0.180	619,165	0.314	1,080,099	0.419	1,441,278	0.539	1,854,055
	Commercial (merchandise)	2,315,200	0	0	0.127	294,030	0.276	638,995	0.379	877,461	0.479	1,108,981
	Total in Rural Area	15,495,284		121,475		2,038,016		3,648,230		5,037,778		6,597,430

4 Bolgoda Basin

(Unit: Rs./ha)

Area	Item	Unit Value (ha)	Inundation Depth (m)									
			Shallower than 0.2		0.2 to 0.5		0.5 to 1.0		1.0 to 2.0		Deeper than 2.0	
			Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage	Damage Rate	Damage
Urban Area 1	House	10,365,089	0.03	310,953	0.053	549,350	0.072	746,286	0.109	1,129,795	0.152	1,575,494
	Household goods	3,109,527	0	0	0.086	267,419	0.191	593,920	0.331	1,029,253	0.499	1,551,654
	Commercial (building)	9,123,918	0	0	0.180	1,642,305	0.314	2,864,910	0.419	3,822,921	0.539	4,917,792
	Commercial (facility)	8,444,434	0	0	0.180	1,519,998	0.314	2,651,552	0.419	3,538,218	0.539	4,551,550
	Commercial (merchandise)	2,850,000	0	0	0.127	361,950	0.276	786,600	0.379	1,080,150	0.479	1,365,150
	Total in Urban Area 1	33,892,967		310,953		4,341,022		7,643,268		10,600,337		13,961,639
Urban Area 2	House	8,390,786	0.03	251,724	0.053	444,712	0.072	604,137	0.109	914,596	0.152	1,275,400
	Household goods	2,517,236	0	0	0.086	216,482	0.191	480,792	0.331	833,205	0.499	1,256,101
	Commercial (building)	7,395,175	0	0	0.180	1,331,132	0.314	2,322,085	0.419	3,098,578	0.539	3,986,000
	Commercial (facility)	6,844,436	0	0	0.180	1,231,998	0.314	2,149,153	0.419	2,867,819	0.539	3,689,151
	Commercial (merchandise)	2,310,000	0	0	0.127	293,370	0.276	637,560	0.379	875,490	0.479	1,106,490
	Total in Urban Area 2	27,457,633		251,724		3,517,694		6,193,727		8,589,688		11,313,141
Rural Area	House	5,192,416	0.03	155,772	0.053	275,198	0.072	373,854	0.109	565,973	0.152	789,247
	Household goods	1,557,725	0	0	0.086	133,964	0.191	297,525	0.331	515,607	0.499	777,305
	Commercial (building)	3,367,846	0	0	0.180	606,212	0.314	1,057,504	0.419	1,411,128	0.539	1,815,269
	Commercial (facility)	3,117,033	0	0	0.180	561,066	0.314	978,748	0.419	1,306,037	0.539	1,680,081
	Commercial (merchandise)	1,052,000	0	0	0.127	133,604	0.276	290,352	0.379	398,708	0.479	503,908
	Total in Rural Area	14,287,020		155,772		1,710,045		2,997,983		4,197,453		5,565,810

Table 3.3.2 Inundation Area by Inundation Depth for Different Probable Flood (Future Land Use)

1 Ja Ela Basin				2 Kalu Oya Basin				3 Greater Colombo Basin				4 Bolgoda Basin						
Area	Return Period	Item	Area (ha)	Area	Return Period	Item	Area (ha)	Area	Return Period	Item	Area (ha)	Area	Return Period	Item	Area (ha)			
Urban Area 1	2	Shallower than 0.2	0.0	Urban Area 1	2	Shallower than 0.2	1.2	Urban Area 1	2	Shallower than 0.2	0.1	Urban Area 1	2	Shallower than 0.2	0.4			
		0.2 to 0.5	0.0			0.2 to 0.5	15.7			0.2 to 0.5	6.0			0.2 to 0.5	1.1			
		0.5 to 1.0	0.0			0.5 to 1.0	3.4			0.5 to 1.0	13.1			0.5 to 1.0	1.1			
		1.0 to 2.0	0.0			1.0 to 2.0	2.5			1.0 to 2.0	0.0			1.0 to 2.0	0.0			
		Deeper than 2.0	0.0			Deeper than 2.0	0.5			Deeper than 2.0	0.0			Deeper than 2.0	0.0			
	5	Shallower than 0.2	0.0		5	Shallower than 0.2	1.4		5	Shallower than 0.2	2.4		5	Shallower than 0.2	0.9	5	Shallower than 0.2	0.9
		0.2 to 0.5	0.0			0.2 to 0.5	17.5			0.2 to 0.5	13.3			0.2 to 0.5	2.6			
		0.5 to 1.0	0.0			0.5 to 1.0	7.1			0.5 to 1.0	24.5			0.5 to 1.0	3.5			
		1.0 to 2.0	0.0			1.0 to 2.0	5.2			1.0 to 2.0	0.0			1.0 to 2.0	0.0			
		Deeper than 2.0	0.0			Deeper than 2.0	0.6			Deeper than 2.0	0.6			Deeper than 2.0	0.0			
	10	Shallower than 0.2	0.0		10	Shallower than 0.2	1.8		10	Shallower than 0.2	5.3		10	Shallower than 0.2	1.0	10	Shallower than 0.2	1.0
		0.2 to 0.5	0.0			0.2 to 0.5	17.5			0.2 to 0.5	18.3			0.2 to 0.5	3.0			
		0.5 to 1.0	0.0			0.5 to 1.0	10.5			0.5 to 1.0	30.0			0.5 to 1.0	5.0			
		1.0 to 2.0	0.0			1.0 to 2.0	7.8			1.0 to 2.0	2.8			1.0 to 2.0	0.5			
		Deeper than 2.0	0.0			Deeper than 2.0	0.8			Deeper than 2.0	1.3			Deeper than 2.0	0.0			
	25	Shallower than 0.2	0.0		25	Shallower than 0.2	2.4		25	Shallower than 0.2	10.9		25	Shallower than 0.2	0.8	25	Shallower than 0.2	0.8
		0.2 to 0.5	0.1			0.2 to 0.5	15.8			0.2 to 0.5	25.6			0.2 to 0.5	2.7			
		0.5 to 1.0	0.3			0.5 to 1.0	16.5			0.5 to 1.0	35.2			0.5 to 1.0	6.8			
		1.0 to 2.0	0.0			1.0 to 2.0	12.1			1.0 to 2.0	22.4			1.0 to 2.0	4.9			
		Deeper than 2.0	0.0			Deeper than 2.0	0.9			Deeper than 2.0	2.6			Deeper than 2.0	0.5			
50	Shallower than 0.2	0.0	50	Shallower than 0.2	3.0	50	Shallower than 0.2	17.5	50	Shallower than 0.2	0.5	50	Shallower than 0.2	0.5				
	0.2 to 0.5	0.3		0.2 to 0.5	13.3		0.2 to 0.5	32.5		0.2 to 0.5	2.0							
	0.5 to 1.0	0.5		0.5 to 1.0	22.0		0.5 to 1.0	37.5		0.5 to 1.0	8.0							
	1.0 to 2.0	0.0		1.0 to 2.0	16.0		1.0 to 2.0	47.8		1.0 to 2.0	9.8							
	Deeper than 2.0	0.0		Deeper than 2.0	1.0		Deeper than 2.0	4.3		Deeper than 2.0	1.0							
Urban Area 2	2	Shallower than 0.2	0.0	Urban Area 2	2	Shallower than 0.2	0.0	Urban Area 2	2	Shallower than 0.2	4.8	Urban Area 2	2	Shallower than 0.2	0.1			
		0.2 to 0.5	0.0			0.2 to 0.5	3.0			0.2 to 0.5	2.1			0.2 to 0.5	1.9			
		0.5 to 1.0	0.0			0.5 to 1.0	6.3			0.5 to 1.0	21.4			0.5 to 1.0	0.0			
		1.0 to 2.0	0.2			1.0 to 2.0	3.6			1.0 to 2.0	0.0			1.0 to 2.0	0.0			
		Deeper than 2.0	0.0			Deeper than 2.0	1.1			Deeper than 2.0	0.0			Deeper than 2.0	0.0			
	5	Shallower than 0.2	0.0		5	Shallower than 0.2	0.0		5	Shallower than 0.2	5.2		5	Shallower than 0.2	0.4	5	Shallower than 0.2	0.4
		0.2 to 0.5	0.0			0.2 to 0.5	3.4			0.2 to 0.5	5.0			0.2 to 0.5	4.6			
		0.5 to 1.0	0.0			0.5 to 1.0	6.3			0.5 to 1.0	34.2			0.5 to 1.0	0.2			
		1.0 to 2.0	0.5			1.0 to 2.0	5.1			1.0 to 2.0	0.0			1.0 to 2.0	0.0			
		Deeper than 2.0	0.0			Deeper than 2.0	2.0			Deeper than 2.0	0.0			Deeper than 2.0	0.0			
	10	Shallower than 0.2	0.0		10	Shallower than 0.2	0.5		10	Shallower than 0.2	5.3		10	Shallower than 0.2	0.8	10	Shallower than 0.2	0.8
		0.2 to 0.5	0.0			0.2 to 0.5	3.8			0.2 to 0.5	7.3			0.2 to 0.5	5.3			
		0.5 to 1.0	0.0			0.5 to 1.0	6.0			0.5 to 1.0	36.3			0.5 to 1.0	1.5			
		1.0 to 2.0	0.5			1.0 to 2.0	6.5			1.0 to 2.0	4.8			1.0 to 2.0	0.0			
		Deeper than 2.0	0.0			Deeper than 2.0	2.8			Deeper than 2.0	0.0			Deeper than 2.0	0.0			
	25	Shallower than 0.2	0.1		25	Shallower than 0.2	1.5		25	Shallower than 0.2	5.1		25	Shallower than 0.2	1.3	25	Shallower than 0.2	1.3
		0.2 to 0.5	0.0			0.2 to 0.5	4.2			0.2 to 0.5	10.8			0.2 to 0.5	4.8			
		0.5 to 1.0	0.0			0.5 to 1.0	5.3			0.5 to 1.0	31.0			0.5 to 1.0	4.2			
		1.0 to 2.0	0.4			1.0 to 2.0	9.1			1.0 to 2.0	22.7			1.0 to 2.0	0.5			
		Deeper than 2.0	0.4			Deeper than 2.0	4.0			Deeper than 2.0	0.0			Deeper than 2.0	0.0			
50	Shallower than 0.2	0.3	50	Shallower than 0.2	2.5	50	Shallower than 0.2	4.8	50	Shallower than 0.2	1.8	50	Shallower than 0.2	1.8				
	0.2 to 0.5	0.0		0.2 to 0.5	4.5		0.2 to 0.5	14.3		0.2 to 0.5	3.5							
	0.5 to 1.0	0.0		0.5 to 1.0	4.5		0.5 to 1.0	18.5		0.5 to 1.0	7.0							
	1.0 to 2.0	0.3		1.0 to 2.0	11.5		1.0 to 2.0	45.5		1.0 to 2.0	1.0							
	Deeper than 2.0	0.8		Deeper than 2.0	5.0		Deeper than 2.0	0.0		Deeper than 2.0	0.0							
Rural Area	2	Shallower than 0.2	5.3	Rural Area	2	Shallower than 0.2	3.5	Rural Area	2	Shallower than 0.2	18.0	Rural Area	2	Shallower than 0.2	13.5			
		0.2 to 0.5	15.1			0.2 to 0.5	17.1			0.2 to 0.5	27.5			0.2 to 0.5	32.5			
		0.5 to 1.0	5.7			0.5 to 1.0	17.7			0.5 to 1.0	56.1			0.5 to 1.0	12.6			
		1.0 to 2.0	20.4			1.0 to 2.0	23.8			1.0 to 2.0	0.0			1.0 to 2.0	2.7			
		Deeper than 2.0	4.2			Deeper than 2.0	0.0			Deeper than 2.0	0.0			Deeper than 2.0	0.2			
	5	Shallower than 0.2	9.0		5	Shallower than 0.2	4.5		5	Shallower than 0.2	22.3		5	Shallower than 0.2	10.3	5	Shallower than 0.2	10.3
		0.2 to 0.5	33.0			0.2 to 0.5	18.8			0.2 to 0.5	46.4			0.2 to 0.5	59.4			
		0.5 to 1.0	14.2			0.5 to 1.0	21.2			0.5 to 1.0	93.0			0.5 to 1.0	38.2			
		1.0 to 2.0	75.4			1.0 to 2.0	30.6			1.0 to 2.0	15.3			1.0 to 2.0	4.9			
		Deeper than 2.0	36.8			Deeper than 2.0	0.0			Deeper than 2.0	0.3			Deeper than 2.0	1.3			
	10	Shallower than 0.2	14.8		10	Shallower than 0.2	5.3		10	Shallower than 0.2	25.3		10	Shallower than 0.2	8.0	10	Shallower than 0.2	8.0
		0.2 to 0.5	50.3			0.2 to 0.5	19.3			0.2 to 0.5	58.0			0.2 to 0.5	61.0			
		0.5 to 1.0	49.7			0.5 to 1.0	24.5			0.5 to 1.0	107.8			0.5 to 1.0	55.5			
		1.0 to 2.0	114.0			1.0 to 2.0	34.8			1.0 to 2.0	42.5			1.0 to 2.0	8.5			
		Deeper than 2.0	72.7			Deeper than 2.0	0.5			Deeper than 2.0	1.8			Deeper than 2.0	2.5			
	25	Shallower than 0.2	23.9		25	Shallower than 0.2	6.6		25	Shallower than 0.2	29.6		25	Shallower than 0.2	4.9	25	Shallower than 0.2	4.9
		0.2 to 0.5	74.2			0.2 to 0.5	19.1			0.2 to 0.5	73.3			0.2 to 0.5	45.8			
		0.5 to 1.0	114.7			0.5 to 1.0	30.4			0.5 to 1.0	116.5			0.5 to 1.0	77.7			
		1.0 to 2.0	158.8			1.0 to 2.0	39.7			1.0 to 2.0	101.6			1.0 to 2.0	15.4			
		Deeper than 2.0	125.1			Deeper than 2.0	5.5			Deeper than 2.0	5.0			Deeper than 2.0	4.4			
50	Shallower than 0.2	31.8	50	Shallower than 0.2	7.8	50	Shallower than 0.2	33.8	50	Shallower than 0.2	2.5	50	Shallower than 0.2	2.5				
	0.2 to 0.5	93.0		0.2 to 0.5	18.3		0.2 to 0.5	86.0		0.2 to 0.5	22.3							
	0.5 to 1.0	173.0		0.5 to 1.0	35.8		0.5 to 1.0	112.8		0.5 to 1.0	94.8							
	1.0 to 2.0	190.3		1.0 to 2.0	42.8		1.0 to 2.0	174.0		1.0 to 2.0	22.3							
	Deeper than 2.0	167.5		Deeper than 2.0	10.5		Deeper than 2.0	9.0		Deeper than 2.0	6.3							
Paddy	2	Shallower than 0.2	23.2	Paddy	2	Shallower than 0.2	12.3	Paddy	2	Shallower than 0.2	8.2	Paddy	2	Shallower than 0.2	13.6			
		0.2 to 0.5	56.5			0.2 to 0.5	34.5			0.2 to 0.5	13.7			0.2 to 0.5	42.7			
		0.5 to 1.0	8.3			0.5 to 1.0	65.5			0.5 to 1.0	49.7			0.5 to 1.0	84.7			
		1.0 to 2.0	0.0			1.0 to 2.0	77.3			1.0 to 2.0	0.0			1.0 to 2.0	97.6			
		Deeper than 2.0	0.0			Deeper than 2.0	0.0			Deeper than 2.0	0.0			Deeper than 2.0	1.9			
	5	Shallower than 0.2	18.2		5	Shallower than 0.2	11.6		5	Shallower than 0.2	11.2		5	Shallower than 0.2	13.0	5	Shallower than 0.2	13.0
		0.2 to 0.5	32.8			0.2 to 0.5	35.8			0.2 to 0.5	23.4			0.2 to 0.5	42.7			
		0.5 to 1.0	26.3			0.5 to 1.0	67.3			0.5 to 1.0	79.6			0.5 to 1.0	77.7			
		1.0 to 2.0	54.8			1.0 to 2.0	98.5			1.0 to 2.0	2.8			1.0 to 2.0	140.0			
		Deeper than 2.0	27.7			Deeper than 2.0	0.0			Deeper than 2.0	0.0			Deeper than 2.0	23.1			
	10	Shallower than 0.2	27.0		10	Shallower than 0.2	11.8		10	Shallower than 0.2	12.0		10	Shallower than 0.2	12.0	10	Shallower than 0.2	12.0
		0.2 to 0.5	60.5			0.2 to 0.5	37.5			0.2 to 0.5	29.3			0.2 to 0.5	41.5			
		0.5 to 1.0	103.0			0.5 to 1.0	68.8			0.5 to 1.0	85.3			0.5 to 1.0	74.8			
		1.0 to 2.0	162.8			1.0 to 2.0	111.5			1.0 to 2.0	22.8			1.0 to 2.0	148.8			
		Deeper than 2.0	69.8			Deeper than 2.0	3.3			Deeper than 2.0	0.3			Deeper than 2.0	50.8			
	25	Shallower than 0.2	42.0		25	Shallower than 0.2	12.7		25	Shallower than 0.2	11.5		25	Shallower than 0.2	10.1	25	Shallower than 0.2	10.1
		0.2 to 0.5	115.4			0.2 to 0.5	41.1			0.2 to 0.5	37.1			0.2 to 0.5	38.6			
		0.5 to 1.0	241.4			0.5 to 1.0	70.8			0.5 to 1.0	75.4			0.5 to 1.0	72.8			
		1.0 to 2.0	340.3			1.0 to 2.0	127.5			1.0 to 2.0	66.9			1.0 to 2.0	139.2			
		Deeper than 2.0	136.5			Deeper than 2.0	20.3			Deeper than 2.0	3.2			Deeper than 2.0	100.0			
50	Shallower than 0.2	55.0	50	Shallower than 0.2	14.0	50	Shallower than 0.2	9.5	50	Shallower than 0.2	8.3	50	Shallower than 0.2	8.3				
	0.2 to 0.5	166.3		0.2 to 0.5	44.8		0.2 to 0.5	43.5		0.2 to 0.5	35.5							
	0.5 to 1.0	365.0		0.5 to 1.0	72.5		0.5 to 1.0	49.5		0.5 to 1.0	72.5							
	1.0 to 2.0	493.0		1.0 to 2.0	137.8		1.0 to 2.0	121.5		1.0 to 2.0	117.5							
	Deeper than 2.0	193.0		Deeper than 2.0	37.0		Deeper than 2.0	7.0		Deeper than 2.0	147.3							

Table 3.3.3 Direct Flood Damage per Hectare with Inundation Depth (1/4)

Ja Ela Basin (1/2)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	4,162,180	7,397,978	10,347,294	13,678,792
	Area (ha)	0.0	0.0	0.0	0.0	0.0
	Direct Damage (Rs.)	0	0	0	0	0
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,371,365	5,992,362	8,381,308	11,079,821
	Area (ha)	0.0	0.0	0.0	0.2	0.0
	Direct Damage (Rs.)	0	0	0	1,260,522	0
Rural	Unit Damage (Rs./ha)	157,823	1,824,422	3,242,780	4,535,564	5,995,870
	Area (ha)	5.3	15.1	5.7	20.4	4.2
	Direct Damage (Rs.)	842,597	27,518,280	18,600,806	92,403,930	25,341,970
Total		842,597	27,518,280	18,600,806	93,664,452	25,341,970

(1/5)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	4,162,180	7,397,978	10,347,294	13,678,792
	Area (ha)	0.0	0.0	0.0	0.0	0.0
	Direct Damage (Rs.)	0	0	0	0	0
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,371,365	5,992,362	8,381,308	11,079,821
	Area (ha)	0.0	0.0	0.0	0.5	0.0
	Direct Damage (Rs.)	0	0	0	3,878,764	0
Rural	Unit Damage (Rs./ha)	157,823	1,824,422	3,242,780	4,535,564	5,995,870
	Area (ha)	9.0	33.0	14.2	75.4	36.8
	Direct Damage (Rs.)	1,422,088	60,116,880	45,965,627	342,181,946	220,388,484
Total		1,422,088	60,116,880	45,965,627	346,060,710	220,388,484

(1/10)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	4,162,180	7,397,978	10,347,294	13,678,792
	Area (ha)	0.0	0.0	0.0	0.0	0.0
	Direct Damage (Rs.)	0	0	0	0	0
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,371,365	5,992,362	8,381,308	11,079,821
	Area (ha)	0.0	0.0	0.0	0.5	0.0
	Direct Damage (Rs.)	0	0	0	4,190,654	0
Rural	Unit Damage (Rs./ha)	157,823	1,824,422	3,242,780	4,535,564	5,995,870
	Area (ha)	14.8	50.3	49.7	114.0	72.7
	Direct Damage (Rs.)	2,327,890	91,677,208	161,328,324	517,054,279	436,199,574
Total		2,327,890	91,677,208	161,328,324	521,244,933	436,199,574

(1/25)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	4,162,180	7,397,978	10,347,294	13,678,792
	Area (ha)	0.0	0.1	0.3	0.0	0.0
	Direct Damage (Rs.)	0	532,386	1,892,555	0	0
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,371,365	5,992,362	8,381,308	11,079,821
	Area (ha)	0.1	0.0	0.0	0.4	0.4
	Direct Damage (Rs.)	37,304	0	0	3,340,945	4,251,670
Rural	Unit Damage (Rs./ha)	157,823	1,824,422	3,242,780	4,535,564	5,995,870
	Area (ha)	23.9	74.2	114.7	158.8	125.1
	Direct Damage (Rs.)	3,778,075	135,284,755	371,925,259	720,108,733	749,931,591
Total		3,815,379	135,817,140	373,817,814	723,449,677	754,183,261

(1/50)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	4,162,180	7,397,978	10,347,294	13,678,792
	Area (ha)	0.0	0.3	0.5	0.0	0.0
	Direct Damage (Rs.)	0	1,248,654	3,698,989	0	0
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,371,365	5,992,362	8,381,308	11,079,821
	Area (ha)	0.3	0.0	0.0	0.3	0.8
	Direct Damage (Rs.)	87,493	0	0	2,514,392	8,863,857
Rural	Unit Damage (Rs./ha)	157,823	1,824,422	3,242,780	4,535,564	5,995,870
	Area (ha)	31.8	93.0	173.0	190.3	167.5
	Direct Damage (Rs.)	5,018,772	169,671,250	561,001,006	863,117,801	1,004,308,298
Total		5,106,265	170,919,904	564,699,995	865,632,193	1,013,172,155

Table 3.3.3 Direct Flood Damage per Hectare with Inundation Depth (2/4)

Kalu Oya Basin (1/2)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	3,979,300	7,000,538	9,801,534	12,989,032
	Area (ha)	1.2	15.7	3.4	2.5	0.5
	Direct Damage (Rs.)	441,783	62,637,027	24,023,552	24,194,353	6,006,451
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,223,233	5,670,436	7,939,243	10,521,116
	Area (ha)	0.0	3.0	6.3	3.6	1.1
	Direct Damage (Rs.)	0	9,699,536	35,852,176	28,701,090	11,969,723
Rural	Unit Damage (Rs./ha)	157,823	1,744,260	3,068,569	4,296,339	5,693,526
	Area (ha)	3.5	17.1	17.7	23.8	0.0
	Direct Damage (Rs.)	557,602	29,838,641	54,372,737	102,424,018	0
Total		999,385	102,175,205	114,248,465	155,319,461	17,976,174

(1/5)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	3,979,300	7,000,538	9,801,534	12,989,032
	Area (ha)	1.4	17.5	7.1	5.2	0.6
	Direct Damage (Rs.)	520,814	69,708,306	49,429,116	51,186,336	8,271,944
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,223,233	5,670,436	7,939,243	10,521,116
	Area (ha)	0.0	3.4	6.3	5.1	2.0
	Direct Damage (Rs.)	9,296	11,105,629	35,592,064	40,161,902	21,161,568
Rural	Unit Damage (Rs./ha)	157,823	1,744,260	3,068,569	4,296,339	5,693,526
	Area (ha)	4.5	18.8	21.2	30.6	0.0
	Direct Damage (Rs.)	702,414	32,719,507	64,973,635	131,636,796	0
Total		1,232,524	113,533,442	149,994,815	222,985,034	29,433,512

(1/10)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	3,979,300	7,000,538	9,801,534	12,989,032
	Area (ha)	1.8	17.5	10.5	7.8	0.8
	Direct Damage (Rs.)	630,092	69,637,742	73,505,650	75,961,888	9,741,774
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,223,233	5,670,436	7,939,243	10,521,116
	Area (ha)	0.5	3.8	6.0	6.5	2.8
	Direct Damage (Rs.)	145,821	12,087,122	34,022,615	51,605,076	28,933,068
Rural	Unit Damage (Rs./ha)	157,823	1,744,260	3,068,569	4,296,339	5,693,526
	Area (ha)	5.3	19.3	24.5	34.8	0.5
	Direct Damage (Rs.)	828,571	33,576,998	75,179,945	149,297,782	2,846,763
Total		1,604,484	115,301,863	182,708,209	276,864,746	41,521,605

(1/25)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	3,979,300	7,000,538	9,801,534	12,989,032
	Area (ha)	2.4	15.8	16.5	12.1	0.9
	Direct Damage (Rs.)	855,859	62,847,241	115,790,231	118,682,231	11,656,557
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,223,233	5,670,436	7,939,243	10,521,116
	Area (ha)	1.5	4.2	5.3	9.1	4.0
	Direct Damage (Rs.)	436,276	13,465,295	29,963,896	72,275,087	41,656,943
Rural	Unit Damage (Rs./ha)	157,823	1,744,260	3,068,569	4,296,339	5,693,526
	Area (ha)	6.6	19.1	30.4	39.7	5.5
	Direct Damage (Rs.)	1,039,229	33,239,437	93,262,332	170,447,356	31,490,825
Total		2,331,364	109,551,973	239,016,460	361,404,674	84,804,326

(1/50)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	360,053	3,979,300	7,000,538	9,801,534	12,989,032
	Area (ha)	3.0	13.3	22.0	16.0	1.0
	Direct Damage (Rs.)	1,080,158	52,725,719	154,011,837	156,824,543	12,989,032
Urban Area 2	Unit Damage (Rs./ha)	291,643	3,223,233	5,670,436	7,939,243	10,521,116
	Area (ha)	2.5	4.5	4.5	11.5	5.0
	Direct Damage (Rs.)	729,106	14,504,547	25,516,961	91,301,289	52,605,579
Rural	Unit Damage (Rs./ha)	157,823	1,744,260	3,068,569	4,296,339	5,693,526
	Area (ha)	7.8	18.3	35.8	42.8	10.5
	Direct Damage (Rs.)	1,223,128	31,832,738	109,701,348	183,668,494	59,782,019
Total		3,032,392	99,063,004	289,230,147	431,794,326	125,376,630

Table 3.3.3 Direct Flood Damage per Hectare with Inundation Depth (3/4)

Greater Colombo Basin (1/2)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	0.1	6.0	13.1	0.0	0.0
	Direct Damage (Rs.)	50,752	21,405,513	81,865,328	0	0
Urban Area 2	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	4.8	2.1	21.4	0.0	0.0
	Direct Damage (Rs.)	2,436,086	7,491,930	133,734,200	0	0
Rural	Unit Damage (Rs./ha)	121,475	2,038,016	3,648,230	5,037,778	6,597,430
	Area (ha)	18.0	27.5	56.1	0.0	0.0
	Direct Damage (Rs.)	2,186,547	56,045,429	204,665,722	0	0
Total		4,673,385	84,942,872	420,265,250	0	0

(1/5)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	2.4	13.3	24.5	0.0	0.6
	Direct Damage (Rs.)	1,218,043	47,448,887	153,106,911	0	7,255,262
Urban Area 2	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	5.2	5.0	34.2	0.0	0.0
	Direct Damage (Rs.)	2,639,093	17,837,927	213,724,750	0	0
Rural	Unit Damage (Rs./ha)	121,475	2,038,016	3,648,230	5,037,778	6,597,430
	Area (ha)	22.3	46.4	93.0	15.3	0.3
	Direct Damage (Rs.)	2,708,889	94,563,924	339,285,422	77,078,003	1,979,229
Total		6,566,025	159,850,738	706,117,083	77,078,003	9,234,491

(1/10)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	5.3	18.3	30.0	2.8	2.8
	Direct Damage (Rs.)	2,689,844	65,286,814	187,477,851	25,133,400	33,857,891
Urban Area 2	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	5.3	7.3	36.3	4.8	0.0
	Direct Damage (Rs.)	2,689,844	26,043,374	226,848,199	43,085,829	0
Rural	Unit Damage (Rs./ha)	121,475	2,038,016	3,648,230	5,037,778	6,597,430
	Area (ha)	25.3	58.0	107.8	42.5	1.8
	Direct Damage (Rs.)	3,073,314	118,204,905	393,279,231	214,105,563	11,875,375
Total		8,453,003	209,535,094	807,605,281	282,324,792	45,733,266

(1/25)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	10.9	25.6	35.2	22.4	2.6
	Direct Damage (Rs.)	5,531,944	91,330,189	219,974,011	201,067,201	31,439,470
Urban Area 2	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	5.1	10.8	31.0	22.7	0.0
	Direct Damage (Rs.)	2,588,341	38,529,923	193,727,112	203,760,065	0
Rural	Unit Damage (Rs./ha)	121,475	2,038,016	3,648,230	5,037,778	6,597,430
	Area (ha)	29.6	73.3	116.5	101.6	5.0
	Direct Damage (Rs.)	3,595,656	149,386,544	425,018,835	511,838,240	32,987,152
Total		11,715,941	279,246,656	838,719,958	916,665,506	64,426,623

(1/50)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	17.5	32.5	37.5	47.8	4.3
	Direct Damage (Rs.)	8,881,562	115,946,528	234,347,313	429,063,045	51,996,047
Urban Area 2	Unit Damage (Rs./ha)	507,518	3,567,585	6,249,262	8,976,214	12,092,104
	Area (ha)	4.8	14.3	18.5	45.5	0.0
	Direct Damage (Rs.)	2,436,086	51,016,472	115,611,341	408,417,752	0
Rural	Unit Damage (Rs./ha)	121,475	2,038,016	3,648,230	5,037,778	6,597,430
	Area (ha)	33.8	86.0	112.8	174.0	9.0
	Direct Damage (Rs.)	4,105,850	175,269,342	411,520,383	876,573,364	59,376,874
Total		15,423,497	342,232,343	761,479,037	1,714,054,161	111,372,921

Table 3.3.3 Direct Flood Damage per Hectare with Inundation Depth (4/4)

Bolgoda Basin (1/2)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	310,953	4,341,022	7,643,268	10,600,337	13,961,639
	Area (ha)	0.4	1.1	1.1	0.0	0.0
	Direct Damage (Rs.)	124,381	4,775,124	8,407,595	0	0
Urban Area 2	Unit Damage (Rs./ha)	251,724	3,517,694	6,193,727	8,589,688	11,313,141
	Area (ha)	0.1	1.9	0.0	0.0	0.0
	Direct Damage (Rs.)	25,172	6,683,619	0	0	0
Rural	Unit Damage (Rs./ha)	155,772	1,710,045	2,997,983	4,197,453	5,565,810
	Area (ha)	13.5	32.5	12.6	2.7	0.2
	Direct Damage (Rs.)	2,102,928	55,576,450	37,774,591	11,333,122	1,113,162
Total		2,252,482	67,035,193	46,182,186	11,333,122	1,113,162

(1/5)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	310,953	4,341,022	7,643,268	10,600,337	13,961,639
	Area (ha)	0.9	2.6	3.5	0.0	0.0
	Direct Damage (Rs.)	279,857	11,286,658	26,751,439	0	0
Urban Area 2	Unit Damage (Rs./ha)	251,724	3,517,694	6,193,727	8,589,688	11,313,141
	Area (ha)	0.4	4.6	0.2	0.0	0.0
	Direct Damage (Rs.)	100,689	16,181,392	1,238,745	0	0
Rural	Unit Damage (Rs./ha)	155,772	1,710,045	2,997,983	4,197,453	5,565,810
	Area (ha)	10.3	59.4	38.2	4.9	1.3
	Direct Damage (Rs.)	1,604,457	101,576,651	114,522,967	20,567,518	7,235,553
Total		1,985,003	129,044,701	142,513,152	20,567,518	7,235,553

(1/10)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	310,953	4,341,022	7,643,268	10,600,337	13,961,639
	Area (ha)	1.0	3.0	5.0	0.5	0.0
	Direct Damage (Rs.)	310,953	13,023,067	38,216,342	5,300,169	0
Urban Area 2	Unit Damage (Rs./ha)	251,724	3,517,694	6,193,727	8,589,688	11,313,141
	Area (ha)	0.8	5.3	1.5	0.0	0.0
	Direct Damage (Rs.)	201,379	18,643,778	9,290,590	0	0
Rural	Unit Damage (Rs./ha)	155,772	1,710,045	2,997,983	4,197,453	5,565,810
	Area (ha)	8.0	61.0	55.5	8.5	2.5
	Direct Damage (Rs.)	1,246,180	104,312,722	166,388,081	35,678,347	13,914,524
Total		1,758,511	135,979,567	213,895,012	40,978,516	13,914,524

(1/25)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	310,953	4,341,022	7,643,268	10,600,337	13,961,639
	Area (ha)	0.8	2.7	6.8	4.9	0.5
	Direct Damage (Rs.)	248,762	11,720,760	51,974,224	51,941,652	6,980,819
Urban Area 2	Unit Damage (Rs./ha)	251,724	3,517,694	6,193,727	8,589,688	11,313,141
	Area (ha)	1.3	4.8	4.2	0.5	0.0
	Direct Damage (Rs.)	327,241	16,884,931	26,013,651	4,294,844	0
Rural	Unit Damage (Rs./ha)	155,772	1,710,045	2,997,983	4,197,453	5,565,810
	Area (ha)	4.9	45.8	77.7	15.4	4.4
	Direct Damage (Rs.)	763,285	78,320,044	232,943,313	64,640,770	24,489,563
Total		1,339,288	106,925,735	310,931,189	120,877,266	31,470,382

(1/50)

Area	Item	Inundation Depth (m)				
		Shallower than 0.2	0.2 to 0.5	0.5 to 1.0	1.0 to 2.0	Deeper than 2.0
Urban Area 1	Unit Damage (Rs./ha)	310,953	4,341,022	7,643,268	10,600,337	13,961,639
	Area (ha)	0.5	2.0	8.0	9.8	1.0
	Direct Damage (Rs.)	155,476	8,682,044	61,146,146	103,883,305	13,961,639
Urban Area 2	Unit Damage (Rs./ha)	251,724	3,517,694	6,193,727	8,589,688	11,313,141
	Area (ha)	1.8	3.5	7.0	1.0	0.0
	Direct Damage (Rs.)	453,102	12,311,929	43,356,086	8,589,688	0
Rural	Unit Damage (Rs./ha)	155,772	1,710,045	2,997,983	4,197,453	5,565,810
	Area (ha)	2.5	22.3	94.8	22.3	6.3
	Direct Damage (Rs.)	389,431	38,133,995	284,208,830	93,603,193	35,064,601
Total		998,010	59,127,968	388,711,062	206,076,186	49,026,240

Table 3.3.4 Probable Flood Damage

(Unit: Rs.)

Basin	Return Period	General Assets				Total of Direct Damage	Disturbance to Business Activities	Damage to Infrastructure	Total of Probable Damage
		Urban 1	Urban 2	Rural	Paddy				
Ja Ela	2	0	1,260,522	164,707,584	1,190,310	167,158,415	9,958,086	46,471,069	223,587,571
	5	0	3,878,764	670,075,025	3,083,394	677,037,183	40,437,227	188,707,061	906,181,471
	10	0	4,190,654	1,208,587,274	8,513,021	1,221,290,950	72,766,676	339,577,820	1,633,635,445
	25	2,424,941	7,629,919	1,981,028,413	17,744,243	2,008,827,516	119,464,996	557,503,316	2,685,795,828
	50	4,947,643	11,465,742	2,603,117,126	25,801,209	2,645,331,721	157,171,831	733,468,543	3,535,972,094
Kalu Oya	2	117,303,166	86,222,526	187,192,998	3,654,924	394,373,613	23,443,121	109,401,233	527,217,968
	5	179,116,516	108,030,459	230,032,352	4,190,584	521,369,911	31,030,760	144,810,212	697,210,882
	10	229,477,146	126,793,703	261,730,059	4,620,577	622,621,485	37,080,054	173,040,254	832,741,794
	25	309,832,120	157,797,497	329,479,180	5,488,644	802,597,441	47,826,528	223,190,463	1,073,614,432
	50	377,631,289	184,657,482	386,207,729	6,214,177	954,710,677	56,909,790	265,579,020	1,277,199,487
Greater Colombo	2	103,321,593	143,662,215	262,897,699	713,752	510,595,258	30,592,890	142,766,822	683,954,970
	5	209,029,103	234,201,770	515,615,467	1,183,583	960,029,923	57,530,780	268,476,975	1,286,037,679
	10	314,445,801	298,667,247	740,538,388	1,627,804	1,355,279,239	81,219,086	379,022,402	1,815,520,727
	25	549,342,815	438,605,442	1,122,826,427	2,342,420	2,113,117,103	126,646,481	591,016,911	2,830,780,496
	50	840,234,495	577,481,651	1,526,845,813	3,047,059	2,947,609,018	176,673,718	824,477,349	3,948,760,084
Bolgoda	2	13,307,101	6,708,791	107,900,254	4,659,359	132,575,505	7,674,969	35,816,521	176,066,994
	5	38,317,954	17,520,827	245,507,145	6,001,784	307,347,710	18,080,756	84,376,859	409,805,325
	10	56,850,530	28,135,747	321,539,854	6,769,390	413,295,520	24,391,568	113,827,317	551,514,404
	25	122,866,218	47,520,667	401,156,975	7,592,706	579,136,567	34,292,632	160,032,281	773,461,479
	50	187,828,611	64,710,805	451,400,051	8,120,538	712,060,004	42,236,368	197,103,051	951,399,423
Project area	2	233,931,859	237,854,053	722,698,534	10,218,344	1,204,702,791	71,669,067	334,455,645	1,610,827,503
Total	5	426,463,574	363,631,820	1,661,229,989	14,459,344	2,465,784,727	147,079,523	686,371,107	3,299,235,357
	10	600,773,476	457,787,351	2,532,395,574	21,530,792	3,612,487,193	215,457,384	1,005,467,792	4,833,412,370
	25	984,466,094	651,553,524	3,834,490,995	33,168,013	5,503,678,626	328,230,637	1,531,742,972	7,363,652,235
	50	1,410,642,038	838,315,681	4,967,570,718	43,182,984	7,259,711,420	432,991,706	2,020,627,962	9,713,331,088

Table 3.3.5 Annual Average Flood Damage

Basin	Return Period	Exceedance	Difference of Exceedance	Damage (Rs. Million)		Annual Damage (Rs. Million)	
				Amount	Average	Segment	Cumulative
Ja Ela		1.00					
	2	0.50	0.50	224	112	56	56
	5	0.20	0.30	906	565	169	225
	10	0.10	0.10	1,634	1,270	127	352
	25	0.04	0.06	2,686	2,160	130	482
	50	0.02	0.02	3,536	3,111	62	544
Kalu Oya		1.00					
	2	0.50	0.50	527	264	132	132
	5	0.20	0.30	697	612	184	315
	10	0.10	0.10	833	765	76	392
	25	0.04	0.06	1,074	953	57	449
	50	0.02	0.02	1,277	1,175	24	473
Greater Colombo		1.00					
	2	0.50	0.50	684	342	171	171
	5	0.20	0.30	1,286	985	295	466
	10	0.10	0.10	1,816	1,551	155	622
	25	0.04	0.06	2,831	2,323	139	761
	50	0.02	0.02	3,949	3,390	68	829
Bolgoda		1.00					
	2	0.50	0.50	176	88	44	44
	5	0.20	0.30	410	293	88	132
	10	0.10	0.10	552	481	48	180
	25	0.04	0.06	773	662	40	220
	50	0.02	0.02	951	862	17	237
Project area Total		1.00					
	2	0.50	0.50	1,611	805	403	403
	5	0.20	0.30	3,299	2,455	737	1,139
	10	0.10	0.10	4,833	4,066	407	1,546
	25	0.04	0.06	7,364	6,099	366	1,912
	50	0.02	0.02	9,713	8,538	171	2,083

Table 3.6.1 Cost Benefit Stream for Ja Ela Basin

(Unit: million Rs.)

Year	Cost	O&M	Total Cost	Flood	Land	Benefit	B-C
1	279.95		279.95			0	-279.95
2	279.95		279.95			0	-279.95
3	839.84		839.84			0	-839.84
4	839.84		839.84			0	-839.84
5	559.89		559.89			0	-559.89
6		20.00	20.00	51.98	387.93	439.91	419.91
7		20.00	20.00	54.58	387.93	442.51	422.51
8		20.00	20.00	57.31	387.93	445.24	425.24
9		20.00	20.00	60.17	387.93	448.10	428.10
10		20.00	20.00	63.18	387.93	451.11	431.11
11		20.00	20.00	66.34	387.93	454.27	434.27
12		20.00	20.00	69.66	387.93	457.59	437.59
13		20.00	20.00	73.14	387.93	461.07	441.07
14		20.00	20.00	76.80	387.93	464.73	444.73
15		20.00	20.00	80.64	387.93	468.57	448.57
16		20.00	20.00	84.67	387.93	472.60	452.60
17		20.00	20.00	88.90	387.93	476.83	456.83
18		20.00	20.00	93.35	387.93	481.28	461.28
19		20.00	20.00	98.02	387.93	485.94	465.94
20		20.00	20.00	102.92	387.93	490.85	470.85
21		20.00	20.00	108.06	387.93	495.99	475.99
22		20.00	20.00	113.47	387.93	501.39	481.39
23		20.00	20.00	119.14	387.93	507.07	487.07
24		20.00	20.00	125.10	387.93	513.03	493.03
25		20.00	20.00	131.35	387.93	519.28	499.28
26		20.00	20.00	137.92	387.93	525.85	505.85
27		20.00	20.00	144.82	387.93	532.74	512.74
28		20.00	20.00	152.06	387.93	539.98	519.98
29		20.00	20.00	159.66	387.93	547.59	527.59
30		20.00	20.00	167.64	387.93	555.57	535.57
31		20.00	20.00	176.03	387.93	563.95	543.95
32		20.00	20.00	184.83	387.93	572.75	552.75
33		20.00	20.00	194.07	387.93	582.00	562.00
34		20.00	20.00	203.77	387.93	591.70	571.70
35		20.00	20.00	213.96	387.93	601.89	581.89
36		20.00	20.00	224.66	387.93	612.59	592.59
37		20.00	20.00	235.89	387.93	623.82	603.82
38		20.00	20.00	247.69	387.93	635.61	615.61
39		20.00	20.00	260.07	387.93	648.00	628.00
40		20.00	20.00	273.07	387.93	661.00	641.00
41		20.00	20.00	286.73	387.93	674.65	654.65
42		20.00	20.00	301.06	387.93	688.99	668.99
43		20.00	20.00	316.12	387.93	704.04	684.04
44		20.00	20.00	331.92	387.93	719.85	699.85
45		20.00	20.00	348.52	387.93	736.45	716.45
Net Present Value			2,159.55			2,900.61	
						IRR	12.9%
						B-C (million Rs.)	741.06
						B/C	1.34

Table 3.6.2 Cost Benefit Stream for Kalu Oya Basin

(Unit: million Rs.)

Year	Cost	O&M	Total Cost	Flood	Land	Benefit	B-C
1	187.80		187.80			0	-187.80
2	187.80		187.80			0	-187.80
3	563.39		563.39			0	-563.39
4	563.39		563.39			0	-563.39
5	375.59		375.59			0	-375.59
6		13.00	13.00	55.71	365.90	421.60	408.60
7		13.00	13.00	58.49	365.90	424.39	411.39
8		13.00	13.00	61.42	365.90	427.31	414.31
9		13.00	13.00	64.49	365.90	430.38	417.38
10		13.00	13.00	67.71	365.90	433.61	420.61
11		13.00	13.00	71.10	365.90	436.99	423.99
12		13.00	13.00	74.65	365.90	440.55	427.55
13		13.00	13.00	78.39	365.90	444.28	431.28
14		13.00	13.00	82.30	365.90	448.20	435.20
15		13.00	13.00	86.42	365.90	452.32	439.32
16		13.00	13.00	90.74	365.90	456.64	443.64
17		13.00	13.00	95.28	365.90	461.17	448.17
18		13.00	13.00	100.04	365.90	465.94	452.94
19		13.00	13.00	105.04	365.90	470.94	457.94
20		13.00	13.00	110.30	365.90	476.19	463.19
21		13.00	13.00	115.81	365.90	481.71	468.71
22		13.00	13.00	121.60	365.90	487.50	474.50
23		13.00	13.00	127.68	365.90	493.58	480.58
24		13.00	13.00	134.07	365.90	499.96	486.96
25		13.00	13.00	140.77	365.90	506.66	493.66
26		13.00	13.00	147.81	365.90	513.70	500.70
27		13.00	13.00	155.20	365.90	521.09	508.09
28		13.00	13.00	162.96	365.90	528.85	515.85
29		13.00	13.00	171.11	365.90	537.00	524.00
30		13.00	13.00	179.66	365.90	545.56	532.56
31		13.00	13.00	188.64	365.90	554.54	541.54
32		13.00	13.00	198.08	365.90	563.97	550.97
33		13.00	13.00	207.98	365.90	573.88	560.88
34		13.00	13.00	218.38	365.90	584.27	571.27
35		13.00	13.00	229.30	365.90	595.19	582.19
36		13.00	13.00	240.76	365.90	606.66	593.66
37		13.00	13.00	252.80	365.90	618.70	605.70
38		13.00	13.00	265.44	365.90	631.34	618.34
39		13.00	13.00	278.71	365.90	644.61	631.61
40		13.00	13.00	292.65	365.90	658.54	645.54
41		13.00	13.00	307.28	365.90	673.18	660.18
42		13.00	13.00	322.64	365.90	688.54	675.54
43		13.00	13.00	338.78	365.90	704.67	691.67
44		13.00	13.00	355.72	365.90	721.61	708.61
45		13.00	13.00	373.50	365.90	739.40	726.40
Net Present Value			1,446.16			2,805.91	
						IRR	17.4%
						B-C (million Rs.)	1,359.75
						B/C	1.94

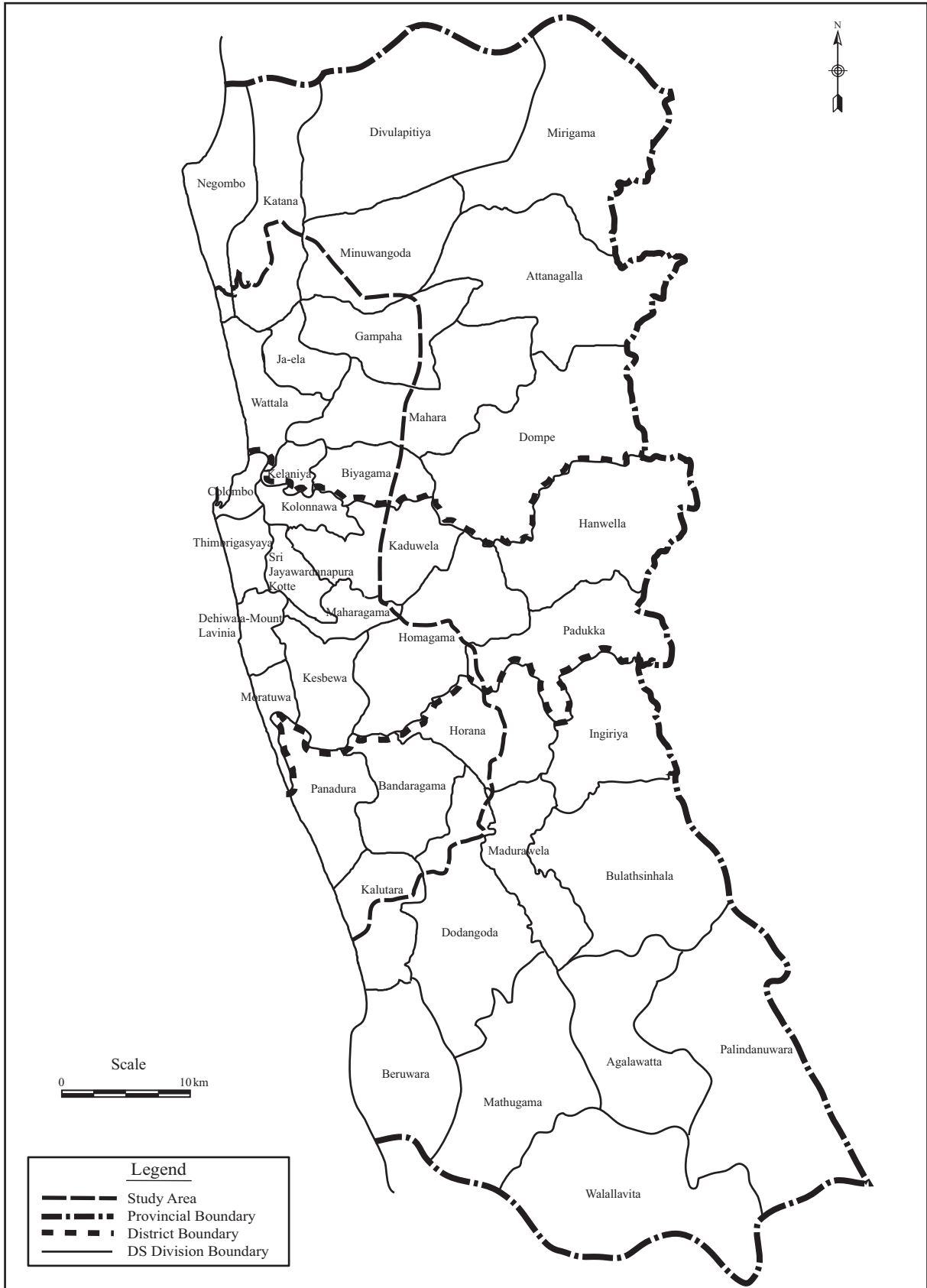
Table 3.6.3 Cost Benefit Stream for Greater Colombo Basin

(Unit: million Rs.)							
Year	Cost	O&M	Total Cost	Flood	Land	Benefit	B-C
1	333.38		333.38			0	-333.38
2	333.38		333.38			0	-333.38
3	1000.14		1000.14			0	-1000.14
4	1000.14		1000.14			0	-1000.14
5	666.76		666.76			0	-666.76
6		24.00	24.00	78.18	808.19	886.37	862.37
7		24.00	24.00	82.08	808.19	890.28	866.28
8		24.00	24.00	86.19	808.19	894.38	870.38
9		24.00	24.00	90.50	808.19	898.69	874.69
10		24.00	24.00	95.02	808.19	903.22	879.22
11		24.00	24.00	99.77	808.19	907.97	883.97
12		24.00	24.00	104.76	808.19	912.96	888.96
13		24.00	24.00	110.00	808.19	918.19	894.19
14		24.00	24.00	115.50	808.19	923.69	899.69
15		24.00	24.00	121.28	808.19	929.47	905.47
16		24.00	24.00	127.34	808.19	935.53	911.53
17		24.00	24.00	133.71	808.19	941.90	917.90
18		24.00	24.00	140.39	808.19	948.59	924.59
19		24.00	24.00	147.41	808.19	955.61	931.61
20		24.00	24.00	154.78	808.19	962.98	938.98
21		24.00	24.00	162.52	808.19	970.72	946.72
22		24.00	24.00	170.65	808.19	978.84	954.84
23		24.00	24.00	179.18	808.19	987.37	963.37
24		24.00	24.00	188.14	808.19	996.33	972.33
25		24.00	24.00	197.55	808.19	1005.74	981.74
26		24.00	24.00	207.42	808.19	1015.62	991.62
27		24.00	24.00	217.80	808.19	1025.99	1001.99
28		24.00	24.00	228.69	808.19	1036.88	1012.88
29		24.00	24.00	240.12	808.19	1048.31	1024.31
30		24.00	24.00	252.13	808.19	1060.32	1036.32
31		24.00	24.00	264.73	808.19	1072.92	1048.92
32		24.00	24.00	277.97	808.19	1086.16	1062.16
33		24.00	24.00	291.87	808.19	1100.06	1076.06
34		24.00	24.00	306.46	808.19	1114.65	1090.65
35		24.00	24.00	321.78	808.19	1129.98	1105.98
36		24.00	24.00	337.87	808.19	1146.07	1122.07
37		24.00	24.00	354.77	808.19	1162.96	1138.96
38		24.00	24.00	372.50	808.19	1180.70	1156.70
39		24.00	24.00	391.13	808.19	1199.32	1175.32
40		24.00	24.00	410.69	808.19	1218.88	1194.88
41		24.00	24.00	431.22	808.19	1239.41	1215.41
42		24.00	24.00	452.78	808.19	1260.97	1236.97
43		24.00	24.00	475.42	808.19	1283.61	1259.61
44		24.00	24.00	499.19	808.19	1307.38	1283.38
45		24.00	24.00	524.15	808.19	1332.34	1308.34
Net Present Value			2,572.86			5,727.18	
					IRR		19.5%
					B-C (million Rs.)		3,154.31
					B/C		2.23

Table 3.6.4 Cost Benefit Stream for Bolgoda Basin

(Unit: million Rs.)							
Year	Cost	O&M	Total Cost	Flood	Land	Benefit	B-C
1	402.58		402.58			0	-402.58
2	402.58		402.58			0	-402.58
3	1207.74		1207.74			0	-1207.74
4	1207.74		1207.74			0	-1207.74
	805.16		805.16			0	-805.16
5		25.00	25.00	146.51	875.18	1021.69	996.69
6		25.00	25.00	153.83	875.18	1029.01	1004.01
7		25.00	25.00	161.52	875.18	1036.70	1011.70
8		25.00	25.00	169.60	875.18	1044.78	1019.78
9		25.00	25.00	178.08	875.18	1053.26	1028.26
10		25.00	25.00	186.98	875.18	1062.16	1037.16
11		25.00	25.00	196.33	875.18	1071.51	1046.51
12		25.00	25.00	206.15	875.18	1081.33	1056.33
13		25.00	25.00	216.46	875.18	1091.64	1066.64
14		25.00	25.00	227.28	875.18	1102.46	1077.46
15		25.00	25.00	238.64	875.18	1113.82	1088.82
16		25.00	25.00	250.58	875.18	1125.76	1100.76
17		25.00	25.00	263.10	875.18	1138.29	1113.29
18		25.00	25.00	276.26	875.18	1151.44	1126.44
19		25.00	25.00	290.07	875.18	1165.25	1140.25
20		25.00	25.00	304.58	875.18	1179.76	1154.76
21		25.00	25.00	319.80	875.18	1194.99	1169.99
22		25.00	25.00	335.79	875.18	1210.98	1185.98
23		25.00	25.00	352.58	875.18	1227.77	1202.77
24		25.00	25.00	370.21	875.18	1245.40	1220.40
25		25.00	25.00	388.72	875.18	1263.91	1238.91
26		25.00	25.00	408.16	875.18	1283.34	1258.34
27		25.00	25.00	428.57	875.18	1303.75	1278.75
28		25.00	25.00	450.00	875.18	1325.18	1300.18
29		25.00	25.00	472.50	875.18	1347.68	1322.68
30		25.00	25.00	496.12	875.18	1371.30	1346.30
31		25.00	25.00	520.93	875.18	1396.11	1371.11
32		25.00	25.00	546.97	875.18	1422.16	1397.16
33		25.00	25.00	574.32	875.18	1449.50	1424.50
34		25.00	25.00	603.04	875.18	1478.22	1453.22
35		25.00	25.00	633.19	875.18	1508.37	1483.37
36		25.00	25.00	664.85	875.18	1540.03	1515.03
37		25.00	25.00	698.09	875.18	1573.27	1548.27
38		25.00	25.00	733.00	875.18	1608.18	1583.18
39		25.00	25.00	769.65	875.18	1644.83	1619.83
40		25.00	25.00	808.13	875.18	1683.31	1658.31
41		25.00	25.00	848.54	875.18	1723.72	1698.72
42		25.00	25.00	890.96	875.18	1766.14	1741.14
43		25.00	25.00	935.51	875.18	1810.69	1785.69
44		25.00	25.00	982.29	875.18	1857.47	1832.47
Net Present Value			3,082.73			6,850.50	
					IRR		19.2%
					B-C		3,767.77
					(million Rs.)		
					B/C		2.22

Figures



*The Study on Storm Water Drainage Plan
for the Colombo Metropolitan Region
in the Democratic Socialist Republic of Sri Lanka*

Figure 1.2.1
DS Divisions in the Study Area

JAPAN INTERNATIONAL COOPERATION AGENCY

SUPPORTING REPORT (1)

ANNEX 2 : INSTITUTION AND LEGISLATION

**THE STUDY ON STORM WATER DRAINAGE PLAN
FOR THE COLOMBO METROPOLITAN REGION
IN
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**

FINAL REPORT

VOLUME III : SUPPORTING REPORT (1)

ANNEX 2 : INSTITUTION AND LEGISLATION

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CHAPTER 1 PRESENT INSTITUTIONAL FRAMEWORK

1.1 Central Government Agencies

All ministries are listed in Table 1.1.1 and the agencies related to the storm water drainage works are shown in Table 1.1.2 along with demarcation of their current responsibilities. The current status of these relevant agencies is described below.

1.1.1 Executing Agencies

- (1) Sri Lanka Land Reclamation and Development Corporation (SLLRDC),
Ministry of Housing and Plantation Infrastructure

Colombo District (Low-lying Area) Reclamation and Development Board, the former Sri Lanka Reclamation and Development Corporation, was established in 1968 by Act No. 15 of 1968. The objectives of the Board were 1) to reclaim and develop every reclamation and development area declared by the Minister, which included lowland, marshy, waste or swampy areas and 2) to have the custody, management and control of lands comprising such areas.¹

General powers of the Board include 1) to acquire, hold or take on lease any property, or to mortgage, pledge, sell or otherwise dispose of any property, 2) to undertake the preparation and execution of development schemes in the areas, 3) to cause the construction of roads in the areas, and 4) to cause the construction of works for the provision of public services in the areas including surface water drainage, sewerage and disposal of sewage, lighting and water supply.

The Act was subsequently amended in 1976, which allows the Board to sell reclaimed lands. Further amendments were done in 1982 allowing acquisition and vesting of lowlands in any part of the country. The name of the Board changed to the present one at that time.

The canals and waterways in and around Colombo were handed over from the Irrigation Department to SLLRDC for maintenance in 1979. Since then, SLLRDC has been expanding its responsibilities for canal and waterway maintenance. The present major maintenance activities include Hamilton, Dutch, St. Sebastian, Dematagoda, Diyamanua Oya, Kirillapone and Dehiwara Canals and Diyawanna Lake.

¹ Colombo District (Low-lying Areas) Reclamation and Development Board Act No. 15 of 1968

SLLRDC has 1,696 staff including 619 casual employees. The permanent staff consists of 132 executive and managerial staff, 105 supervising staff, 179 clerical staff, 88 secretaries and 573 operators and mechanics. , Canal Development & Maintenance Division has responsibility for maintenance of canals, having a workshop with 355 staff and relevant heavy equipment and machinery.

(2) Irrigation Department (IRD), Ministry of Irrigation and Water Management

IRD is the old organization and no acts exist for its establishment. The relevant statutes describing responsibilities and powers of IRD are the Irrigation Ordinance No. 48 of 1968² and the Flood Protection Ordinance No. 4 of 1924³. IRD is responsible to undertake irrigation and drainage works, conservation of catchments of rivers and major reservoirs and flood protection for the area declared by IRD.

IRD is, in principal, responsible for inter-provincial irrigation schemes, whilst the Provincial Irrigation Departments are responsible for provincial irrigation schemes.

Waterways can be grouped into three categories by objectives, 1) irrigation schemes, 2) flood protection and drainage schemes and 3) drainage and salt-water exclusion schemes. IRD is responsible for major irrigation schemes (over than 1,000 acres) and medium schemes (200 to 1,000 acres), whilst the Provincial Irrigation Departments or the Agrarian Development Department is responsible for minor schemes (less than 200 acres). Flood protection and drainage schemes and drainage and salt-water exclusion schemes can be handled by either IRD or the Provincial Irrigation Departments, based on the principal above.

IRD has 5,000 employees and is operating the Irrigation Training Institute at Galgamowa for all staff of irrigation related organizations including local authorities, NGOs, private companies and farmers.

1.1.2 Agencies Responsible for Land Use Planning and Regulation

(1) Urban Development Authority (UDA), Ministry of Western Region Development

The Urban Development Authority Law No. 41 of 1978 provides for the establishment of UDA to permit integrated planning and implementation of economic, social and physical development of urban development areas in the country, which are specific areas declared by the Ministry.

² This Ordinance provides for the charging of irrigation rates, constitution of district agricultural committees and construction and maintenance of irrigation works.

³ This Ordinance enables the declaration of any area in Sri Lanka to be a flood area for the protection of such areas subject to damage from floods.

UDA is vested with strong powers to execute, regulate and control development plans in urban development areas, which includes 1) to formulate and implement an urban land use policy, 2) to develop environmental standards and prepare schemes for environmental improvements, 3) to acquire and hold any movable or immovable property or dispose of same, 4) to formulate and execute housing schemes, 5) to cause the clearance of slum and shanty areas and to undertake their redevelopment, 6) to approve, coordinate, regulate, control or prohibit any development scheme or project, or any development activity, of any government agency and 7) to regulate any planning projects or schemes prepared by any government agency⁴.

In order to perform the responsibilities vested by the Law, UDA had 1,449 staff as of November 2001, which consisted of 1,327 permanent, 89 contract-based, 8 daily-based and 25 trainee employees. Distribution by professions is 210 planning staff, 62 project staff, 35 administrative staff, 13 legal staff, 58 financial staff, 4 engineers, 14 GIS staff, 112 technical staff and others.

(2) Agrarian Development Department (ADD), Ministry of Agriculture and Livestock

ADD was renamed from Agrarian Services Department by the Agrarian Development Act No. 46 of 2000. Objectives of the Act are to ensure maximum utilization of agricultural land for agricultural production by introducing clear restrictions to be imposed on persons using agricultural land for non-agricultural purposes.

In the definition by ADD, any land can be divided into two types, low land and high land. The low land is divided into two categories, paddy fields (including abandoned paddy fields) and marsh. The high land has several categories including agriculture, urban, forestry, park and so on. The categories covered by the Department are paddy fields in the low land and agricultural land in the high land. Marsh is an area of SLLRDC coverage.

There exists a strong demand to develop paddy land, particularly in urban and urbanizing areas such as Colombo, Gampaha, Karutara, Galle and Kandy. Development of paddy land by land filling requires the permission of the Commissioner-General of ADD, for which several steps are needed as described in Figure 1.1.1. ADD receives over 1,000 proposals for land filling of paddy land every year, of which, 100 to 150 proposals are approved.

⁴ Extracted from Section 8 in Urban Development Authority Law No. 41 of 1978, its amendment No. 4 of 1982, and No. 44 of 1984.

In case of illegal land filling in paddy and abandoned paddy lands, the Act empowers ADD to take legal actions such as the removal of earth and imposing of fines. ADD took such legal actions for 37 cases in 2000. In case of illegal land filling in other lands within UDA declared areas, UDA is empowered to take legal actions. Although local authorities are also empowered to take legal actions for illegal land filling within their respective administrative boundaries, they usually ask UDA or ADD to take legal actions in order to avoid intervention by local politicians.

ADD has 13,000 staff and 25 district offices. There are 9,600 Agrarian Research and Production Assistants at the village level and 542 Agrarian Development Committees covering all the country.

1.1.3 Agencies Related to Land Acquisition and Resettlement

(1) Ministry of Land

By the Land Acquisition Act, the Ministry of Land has a sole responsibility to acquire land, which is owned by state, local authority or private companies/individuals, for public projects approved by the central government.

The Land Registration Department (LRD) is responsible for registration of land titles. These records are maintained and updated by district offices under the supervision of LRD. The responsibility of the Land Valuation Department is the estimation of land prices, based on market price, for compensation, which is paid to land owners in the case of local authorities or private companies/individuals. The Land Commissioner's Department is in charge of alienation for the State land.

(2) Urban Settlement Improvement Program (USIP), Ministry of Urban Public Utilities (Non-cabinet rank)

USIP was initially a Project Unit established in 1999 under the Ministry of Urban Development to execute the World Bank funded Community Infrastructure Improvement Project in CMR. Two JBIC funded projects have been added, the Community Development Component of the Kaluganga Project and the Human Settlement Component of the Lunawa Environment Improvement & Community Development Project.

USIP aims at facilitating the development of sustainable community based environmental infrastructure services in the under-served settlements on a participatory and partnership basis. Therefore, housing development and shanty relocation are not, in principle, the scope of USIP, although USIP is assigned to the shanty relocation component in the Lunawa Project. NHDA and UDA are the organizations responsible for housing development in rural and urban areas,

respectively. The Urban Housing Division of NHDA is officially responsible for relocation of legal and illegal dwellers for public projects, while USIP may undertake activities of relocation on a project basis.

USIP is promoting community contracts for basic infrastructure improvement in the under-served communities. This approach is used for drainage development, maintenance and solid waste management, for which, the above on-going projects are budget sources.

USIP has 20 employees at present, which will be increased to 30 when the Lunawa Project commences.

(3) National Housing Development Authority (NHDA), Ministry of Housing and Plantation Infrastructure

NHDA was established by the National Housing Development Authority Act No. 17 of 1979. This act empowers the Authority to promote housing development and to directly engage in the construction of flats, houses and other living accommodations in urban and rural areas. However, these activities in the urban areas were handed over to UDA and since then NHDA has been focusing on housing development for lower income groups in the rural areas only.

The Urban Housing Division of NHDA used to be under UDA, where the Division was assigned for shanty relocation in the JBIC funded Greater Colombo Flood Control and Environment Improvement Project Phase-I. The Division shifted to NHDA after the recent administrative reform by the new cabinet.

The current major responsibilities are 1) relocation of legal and illegal dwellers for public projects, 2) renewal and redevelopment of urban housing, 3) sale of land after relocation, 4) land acquisition. The Division now has 20 staff.

1.1.4 Regulatory Agency

(1) Central Environmental Authority (CEA), Ministry of Environment and Natural Resources

CEA was established by the National Environmental Act No. 47 of 1980. The powers, functions and duties of the Authority include to require the submission of proposals for new projects and changes in existing projects and to require any local authorities to comply with any recommendations relating to environmental protection.

As for land use management, CEA is responsible to formulate and recommend a land use scheme, which includes 1) a scientifically adequate land inventory and classification system, 2) determination of present land use, 3) comprehensive and

accurate determination of the adaptability of land for various economic activities, 4) a method for exercising government control over the use of land and 5) a policy for influencing the location of new areas for resettlement of persons and the methods for assuring appropriate controls over land use. Land use plans for areas declared by UDA are finalized by UDA in consultation with CEA for environmental aspects.

CEA organized an inter-ministerial committee called the Committee on Environmental Policy and Policy Management (CEPON), an agency to provide guidelines, approval and monitoring related to environmental preservation. There are five CEPONs currently working, 1) urban and industries, 2) land, 3) fishery, 4) energy and 5) biodiversity. CEPONs are operated by a co-chair of both Secretaries of the Ministry of Environment and the Ministry related to each CEPON. SLLRDC and UDA are members of CEPON for urban affairs and industry.

CEA has 630 staff including 300 staff working at local authorities as District Environmental Officers. Over 250 staff are scientists or engineers and 20 % of the total staff are highly educated having master, Ph.D., and equivalent qualifications.

1.1.5 Other Related Agencies

(1) Survey Department (SD), Ministry of Land

SD is one of the departments under the Ministry of Land and has 7,000 staff. A responsibility of SD is basic map development for the entire country. Based on which, planning agencies, such as LUPPD, UDA, CEA and NPPD, develop maps for their own objectives.

Since SD has a responsibility to maintain cadastral maps, it is in the process of preparing cadastral maps for selected areas, where the land titling programs will start on a pilot basis⁵.

(2) Land Use Policy Planning Division (LUPPD), Ministry of Land

LUPPD is one of the divisions in the Ministry of Land and has 200 staff. The major responsibility of LUPPD is to maintain and update maps for state land, based on the basic maps developed by SD, and to develop land use policy plans. These maps are used for land use planning in various planning agencies. In order to update these maps, LUPPD provides staff to the Divisional Secretary with training to survey the current land use conditions. This information is then fed back to revise the maps.

⁵ Public Investment Program 1999-2001, Department of National Planning, Ministry of Finance & Planning, 1999

One of the recent achievements of LUPPD is the establishment of the Land Data Bank, by computerizing information on 85,000 ha of unutilized state lands⁶.

However, since UDA is also working on mapping development in urban areas, LUPPD currently focuses on mapping development in the agricultural land.

(3) National Physical Planning Department (NPPD), Ministry of Western Region Development

NPPD was established in 2000 by the Town and Country Planning (Amendment) Act, No. 49 of 2000. The responsibility of NPPD is to develop and implement the national physical plan with the object of promoting and regulating integrated planning of the economic, social, physical and environmental aspects of land in the country. Planning capacity of this young department, however, is currently limited due to understaffing with only 11 professional staff (5 planners, 3 architects and 3 engineers) and therefore, currently, it is largely backed up by UDA.

One of their current major activities, together with 15 external Sri Lankan consultants, is the formulation of a policy for the State Physical Plan, which is scheduled to be approved in 2002. The State Physical Plan will be the highest level physical plan in the country, based on which, Provincial Councils and Municipal Councils will develop their own physical plans, including land use plans.

(4) National Water Supply and Drainage Board (NWSDB), Ministry of Housing and Plantation Infrastructure

NWSDB, established by the National Water Supply and Drainage Board Law No. 2 of 1974, has a mission to provide for the provision of a safe and adequate drinking water supply and sewerage facilities for the entire nation and all related economic activities in the country. Their major activities include 1) investigations for surface and ground water sources, 2) planning, design and construction of water supply and sewerage schemes in urban and rural areas, 3) operation and maintenance of water supply and sewerage facilities ensuring quality, reliability and satisfactory services, 4) supply of water in bulk to local authorities, and 5) provision of technical assistance for water supply and sewerage to local authorities, state agencies and private/public industrial establishments.

The current major activity of NWSDB is to improve and expand water supply services. Although some activities related to sewerage and water treatment are being

⁶ Same as the above source.

conducted, these are very marginal due to much the higher priority placed on water supply. NWSDB has around 7,000 employees and five regional offices.

(5) Coast Conservation Department (CCD), Ministry of Fisheries and Ocean Resources

CCD was established in 1981 by the Coastal Conservation Act and is currently under the Ministry of Fisheries and Ocean Resources. The Act mandated CCD to establish a coastal zone management plan to provide the framework for the regulation and control of development activities within the coastal zone. The Act also mandated the issuance of permits to regulate a wide range of development activities to be undertaken within the coastal zone. The permits will be issued only for activities involving no adverse effects on the stability, productivity and environmental quality of the coastal zone.

For implementation of the storm water drainage development projects, permission is required for lake dredging and sea outfall breaching works.

(6) Others

Other relevant central government agencies are the Road Development Authority (RDA), Sri Lanka Railways (SLR), the Central Electricity Board (CEB) and Sri Lanka Telecom (SLTL). These agencies might be supporting agencies for relevant utility diversions in the implementation stage of the storm water drainage master plan, if development areas include their facilities.

1.2 Local Authorities, Ministry of Home Affairs, Provincial Councils and Local Government

As for hierarchy of local authorities, there are two administrative structures, 1) for projects/services from the central government and 2) for activities originated from local authorities. In the former structure, the Western Provincial Council consists of three districts (Gampaha, Colombo and Kalutara), which are further divided into 38 divisional secretaries. In the latter structure, the Western Provincial Council consists of 5 Municipal Councils (Colombo, Sri Jayewardenepura Kotte, Dehiwara-Mt. Laviniya, Moratuwa and Nigombo), 12 Urban Councils and 28 Pradeshiya Sabha. Geographical boundaries of local authorities in these two structures are not always identical.

1.2.1 Western Provincial Council

The area of the Western Provincial Council (WPC) is almost identical to the study area. Under the Chief Secretary of the Council, there are five Ministries (Provincial

level Ministries), one of which is the Ministry of Land, Irrigation, Transportation and Local Governments. Under this Ministry, there is the Department of Local Governments, which has a Local Government Committee. This Committee has the responsibility of coordination of the Municipal Councils, Urban Councils and Pradeshiya Sabhas.

In case of canal construction, a coordination meeting is held by all stakeholders including WPC, Municipal Councils, Urban Councils and Pradeshiya Sabhas and relevant central government agencies to make an appropriate plan. WPC is not in charge of canal construction and its maintenance.

IRD has a system of 9 water level gauging stations in the Kelani River Basin for flood forecasting. IRD forecasts by using these data, rainfall records and weather forecasting by the Meteorology Department. Based on flood forecasts by IRD, the Meteorology Department gives warnings and evacuation orders by means of broadcasting through TV and radio.

The responsible agency for flood fighting is the Social Service Department in the local authorities guided by the local mayor or the flood authority. Local authorities specify and inform people of safe shelters such as temples and public buildings and evacuation routes in advance, and Community Leaders guide people in cooperation with the Social Service Department. In cases of serious flooding, military forces are used to rescue flood victims.

As for disaster recovery, Grama Sewa Officers (village service officers), stationed in each village, help people by requesting water and food from the government through the Divisional Secretary.

1.2.2 Municipal Councils

There are four Municipal Councils (MC) in the study area, Colombo (CMC), Sri Jayewardenepura Kotte (KMC), Dehiwara-Mt. Laviniya (DMMC) and Moratuwa (MMC). Administrative capacities vary among MCs.

CMC has 12,500 staff (9,500 permanent staff), whilst KMC, DMMC and MMC have 1,000, 2,200 and 700 staff, respectively. KMC, DMMC and MMC have 2, 7 and 1 engineer(s) in the Municipal Engineer's Departments, respectively, whilst CMC has 25 engineers just in the Water Supply and Drainage Division, which is under the Municipal Engineer's Department.

Since CMC has much more revenue compared to other MCs, only half of the personnel cost is covered by the central government, whilst all the personnel cost of the other MCs is covered by the central government.

As for canal construction in CMC, main canals and a part of secondary canals have been developed by the Irrigation Department or SLLRDC and a part of the secondary canals and all tertiary canals and roadside drainages have been developed by CMC. Responsibility for construction and maintenance for secondary canals is not clear and therefore it is decided on a case-by-case basis. Canals developed by CMC are, in principal, maintained by CMC and it is considered that CMC has enough capacity to provide canal maintenance services in terms of personnel, equipment and budget. CMC started maintenance services of drainage canals 8 years ago.

Other MCs construct and maintain tertiary canals and roadside drains. However, although they have the responsibility to maintain main and secondary canals after construction by the central government⁷, SLLRDC dredges these canals upon request from MCs due to a lack of personnel and equipment in the MCs. These include Hamilton Canal, Dutch Canal, Diyamanua Oya Canal, Dehiwara Canal, Bolgoda Canal, Lunawa Ela Canal, Peliyagoda Canal and Diyawanna Lake. The cost is charged to the MCs.

MCs are expected to develop their physical plans. The CMC Physical Plan has already been approved by CMC. Since MCs do not have sufficient capacity of planning staff, their physical plans are developed together with UDA, which are authorized with an approval by the MCs.

One of the most serious problems in the MCs is illegal land filling and encroachment by shanties. Although MCs are empowered to file an action against these illegal activities⁸, there have only been rare cases due to a shortage of personnel in charge and budget constraints. MCs approve proposed projects of land filling, only if SLLRDC approves.

In terms of cooperative activities among MCs, there are the Mayors Forum and the Sri Lanka United Municipal Council Association. However, these activities seem limited to only discussions on revenue.

1.2.3 Urban Councils

An Urban Council (UC) consists of a Chairman, Vice Chairman, several Council Members, officers in charge of services such as health and technical and administrative and staff. Most of the UCs have over 100 staff, but a very limited

⁷ Every Municipal Council shall cause all public drains, culverts, gutters and watercourses to be so constructed, maintained. Section 100 (1), Municipal Councils Ordinance, 1987

⁸ No building shall be occupied until the Council has given a certificate that such building, as regards construction, drainage and other respects conforms to the provision of this Ordinance. Every person who occupies any building in contravention of this section shall be guilty of an offence, and shall be liable on conviction to a fine. Section 127 (1) and (3), Municipal Councils Ordinance, 1987

number of university graduates. The Chairman is selected by election. The annual revenue is around Rs. 1-2 million, with which the Council provides all services described below. All personnel cost is covered by the central government. Most of the UCs have a very limited number of computers.

Major activities of UCs include maintenance of roads and drainages⁹, garbage collection, approval of proposals for building construction and land filling and tax collection. All rivers and major canals are maintained by the Irrigation Department or Provincial Irrigation Department.

There is the Sri Lanka United Urban Council Association (SLUUA) to discuss common issues among UCs. The President of the SLUUA is the Chairman of the Gampaha Urban Council.

1.2.4 Pradeshiya Sabhas

There are 28 Pradeshiya Sabhas (PS) in the study area. The major activities and responsibilities are the same as for the UCs¹⁰. A PS consists of a Chairman, Vice Chairman, several Council Members, officers in charge of services such as health, physical planning, water works, utilities and public welfare.

Maharagama PS and Kesbewa PS have 240 and 180 staff, respectively. Many of the other PSs have fewer staff. No engineers are available and only a few technical officers are working on various tasks including planning, land management, maintenance of local roads, street lighting, garbage collection, drainage maintenance approval of land filling and so on. Computer facilities are also quite limited in all PSs.

1.3 Issues and Constraints

Acts, laws and ordinances discussed in Chapter 1 are summarized in Table 1.2.1. Each of them has been amended several times and therefore it is observed that there is some overlapping, duplication and inconsistency among these acts, laws and ordinances, which results in unclear demarcation of responsibilities among central and local government agencies related to the storm water drainage. These are discussed more in detail in Chapter 3.

⁹ The Urban Council shall maintain, repair, enlarge, alter, and improve all or any of the public drains, culverts, gutters and watercourses in the town. Section 105 (1) Urban Councils Ordinance (Incorporating Amendments up to 16th April, 1987)

¹⁰ Pradeshiya Sabhas Act No. 15 of 1987

Through the study works, the following major issues and constraints to implementation of the storm water drainage works are found.

(1) Unclear Responsibilities Among Government Agencies for Storm Water Drainage Works

The SLLRDC, the Irrigation Department (IRD), the Provincial Irrigation Department (PIRD) and local authorities are responsible organizations for developing and maintaining waterways including rivers, canals and all other channels. Out of these, waterways, rivers and irrigation canals have been developed and maintained by IRD or PIRD. It is, however, the current situation that those rivers and canals function also as an important urban drainage channel with which small drainage channels from urban/town areas are connected. Especially in the study area, paddy cultivation tends to be abandoned and the paddy fields are filled to meet the land demand due to urbanization. It is, therefore, presumed that there are many irrigation canals that are not maintained by the irrigation related agencies, but actually function as storm water drainage channels in the study area.

SLLRDC has developed and maintained storm water drainage only in the declared areas. The responsibility of the local authorities is limited to maintain urban drains and watercourses. Other than that, there are many small channels and natural streams for which the responsible organization is not clear.

As mentioned above, it is the current situation that many rivers and canals are kept from proper maintenance or improvement due to unclear work demarcation among river work related organizations and this eventually causes flooding problems.

(2) Lack of Authorized Land Use Plan

Based on the State physical plan, Provincial Councils develop provincial physical plans. Then, referring to provincial physical plans, local authorities develop their own physical plans. Based on these physical plans, UDA develops physical plans for areas declared by Gazette for specific urban development areas. Based on these physical plans, line agencies, such as SLLRDC, NWSDB (National Water Supply and Drainage Board), NHDA, IRD, RDA (Road Development Authority), CEB (Ceylon Electricity Board), SLR (Sri Lanka Railway) and CCD (Coast Conservation Department), develop various plans to achieve their missions.

However, it is the current situation that there is no authorized land use plan. Therefore, the line agencies tend to develop their development plans to serve their own interests, and it causes conflicts among development plans. These development plans, such as land filling for urbanization and road construction, may

cause serious loss of detention capacity in low land areas, which causes storm water flooding .

(3) Malfunction of the Regulation System for Low Land Development

There exists an official evaluation/approval process for low land development as shown in Figure 1.1.1. However, this system can be presumed to not work properly due to the following reasons.

- 1) No comprehensive statute relating to land use regulation exists. (Legal actions by UDA or local authorities, which are empowered to take legal action to stop, demolish, punish and fine may be restricted because of this.)
- 2) The Planning Committee in SLLRDC, with participation from UDA and CEA, is to evaluate all land filling proposals submitted by government agencies, local authorities, private companies/individuals at the last stage of the existing evaluation/approval process, however the evaluation system doesn't function effectively because of the predominance of UDA in legal power and because relevant agencies which undertake development works do not participate in the committee.
- 3) There is no concrete guideline for evaluating proposals for land filling, especially from the viewpoint of the affect to the detention function of the low land.
- 4) This system might deteriorate due to political pressure and other factors, to the point that the approved physical and environmental plans and the scientific drainage analysis could be totally ignored.

(4) Insufficient Resources for Storm Water Drainage Works

SLLRDC and the local authorities are the main organizations that undertake storm water drainage works. The constraints of the respective organization are described below.

1) SLLRDC

The SLLRDC has been increasing managerial staff, technical staff and other employees including laborers, and O&M equipment through undertaking large scale storm water drainage projects for this 10 years. Therefore, the SLLRDC has staff together with the knowledge/experience required and O&M equipment for managing storm water drainage works as an agency for planning, implementation and O&M at present.

However, the number of staff and equipment may not be sufficient for undertaking O&M works in the broad area of the Greater Colombo canal

system where rapid siltation, growth of weeds and garbage dumping by canal side residents are observed, and for undertaking O&M of urban drainage facilities. And if, in the future, the responsible area is extended, it will be required to take over drainage channels from other agencies, the actual undertaking of maintenance works on request/contract basis from local authorities and providing training for the staff of local authorities which do not have proper maintenance capacity. This will necessitate further development of the human resources and an increase in O&M equipment to meet these future needs.

2) CMC

The responsibility of CMC for storm water drainage works is mainly to clean and repair underground drainage systems and small drain channels in the built up area. As far as looking into the responsibility and the staff structure, CMC is considered to have enough managerial staff. However, the total channel length to be maintained is quite long (approx. 350 km) and most of the channels are not well maintained. This implies a shortage of technical and operation staff together with a shortage of O&M equipment and tools, especially light equipment such as tractors, water pumps and generators. It seems the budget allocated for storm water drainage is not enough compared to the total length of drain channel to be maintained.

3) Other local authorities

The drainage related activities of the other local authorities are to clean and repair small drain channels including roadside ditches. Most of the local authorities have no engineers and only a few technical officers manage, with assistance of supervisor level staff, not only drainage related works, but maintenance of other infrastructures and public health related works as well. Typically, equipment owned by most of the local authorities is limited to one backhoe and several tractors and this equipment is not used exclusively for storm water drainage maintenance.

An urgent increase of staff and equipment may not be required for the present work duty and volume for channel maintenance. Considering the annual revenue scale (generally several tens of million rupees), it is actually difficult for those local authorities to increase staff and equipment for maintaining a storm water drainage system. However, as urbanization to the outskirts of the existing urban area extends, drainage facilities will also increase and proper maintenance works will be required of the local authorities. Therefore, an

increase in staff and equipment should be considered.

In the major municipal councils in the Greater Colombo area, the improvement of the storm water drainage systems are now being carried out by SLLRDC or is about to commence. Those systems are to be transferred to the local authorities. The strengthening of all levels of staff together with O&M equipment will be an essential issue to undertake the maintenance works and for further improvement of drainage systems including planning and construction by local authorities themselves.

CHAPTER 2 INSTITUTIONAL DEVELOPMENT PLAN

In section 1.3, critical constraints in implementation of storm water drainage projects were identified, including 1) unclear responsibilities among government agencies for storm water drainage works, 2) lack of an authorized land use plan 3) malfunction of the regulation system for lowland development, and 4) insufficient resources for storm water drainage works. In this chapter, an institutional development plan is proposed to eliminate the first three constraints. The fourth constraint is discussed in Chapter 3.

2.1 Demarcation of Responsibilities for Storm Water Drainage Works among Agencies

As for planning, implementation and O&M for flood control/storm water drainage facilities, the following demarcation of responsibilities is proposed in order to develop a clear institutional arrangement considering the present situation of the related activities in the study area.

- 1) Related organizations for the above activities are SLLRDC, local authorities and the Irrigation Department (IRD).
- 2) SLLRDC is responsible for all the works related to storm water drainage in the declared areas and local authorities are responsible for those in their respective local areas.
- 3) The IRD is responsible for all the works related to flood control in inter-provincial river basins that extend over two or more provincial areas.
- 4) Road side drains are usually constructed by the Road Development Authority (RDA) together with roads. Taking the normal practice of the maintenance into consideration, local authorities are to maintain the roadside drains in the respective local areas, except those facilities, which are attached to a high grade road such as Katnayake Expressway.

The proposed demarcation is tabulated below.

Proposed Demarcation of Responsibility for the Storm Water Drainage

Objective Area	Planning	Construction	Maintenance
<u>Within Provincial Basin</u> Declared Area by SLLRDC Area of Local Authority Road Side Drain	SLLRDC LA RDA	SLLRDC LA RDA	SLLRDC LA LA
<u>Inter-provincial Basin</u> Irrigation Canals and Rivers Situated in the Inter-provincial Basin	IRD	IRD	IRD

Since the demarcation of work for urban drainage is not clear under the current legislative setting, the Colombo District (Low-lying Area) Reclamation and Development Board Act and the Ordinances of local authorities should be amended to establish a clear demarcation as proposed above.

Meanwhile, it is the current situation that the work capacity of local authorities except Colombo MC (CMC), are too small to undertake the storm water drainage works based on the above demarcation. Therefore, the above demarcation for local authorities is considered to be a long term target and SLLRDC's assistance in planning, implementation and O&M will be needed to achieve the target. As a short term measure, planning and implementation of storm water drainage by SLLRDC and transfer to local authorities are proposed.

2.2 Lowland Management by SLLRDC

As discussed in the Section 4.8 of Main Report (Non-structural Measures for Storm Water Drainage), the retention function of lowlands including paddy field and marsh is an important factor to develop an effective storm water drainage system. Proper extent of the lowlands in the study area should be kept from land filling for flood alleviation and natural conservation.

However, in spite of a general recognition of the importance of low land function, it is the current situation that the areas to be preserved are not clearly identified and both legal and illegal fillings are proceeding for various development purposes without proper land use plans.

At present, there exists a process for evaluation, permission and regulation of land development in which UDA, local authorities and SLLRDC are involved (refer to Figure 1.1.1). However, this process is complicated and does not seem to function properly. Therefore, in order to simplify the process and to materialize an effective lowland use regulation, especially for storm water retention, it is proposed to

establish lowland management by SLLRDC. For this purpose, the following actions are proposed.

(1) Empowerment of SLLRDC

It is proposed that SLLRDC become the sole agency for lowland management related to storm water drainage works with the following tasks.

- 1) Evaluation/approval of land filling proposals in coordination with UDA, CEA, local authorities and line agencies for development works
- 2) Development of a data base of land filling proposals
- 3) Monitoring of illegal land filling

In order to implement the above duties and functions, legislative empowerment of SLLRDC is necessary and the following amendment should be made to the Colombo District Low-lying Area Reclamation and Development Board Act:

- 1) Any land filling projects in low land areas declared under the SLLRDC Act have to be approved by SLLRDC in written form.
- 2) SLLRDC can take an immediate legal action or issue an injunction order to any person who acts in contravention of the Act in the declared area.
- 3) No constructions are allowed on any areas declared as canal reservation by SLLRDC. A legal action can be taken by SLLRDC for contravention of the Act.

(2) Formulation of Land Use Plan

Establishment of an authorized land use plan at each level, national, sub-national and local authority should be urged. Authorized land use plans will give clear guidelines for the land use regulation activities including evaluation and approval of land filling proposals, monitoring of illegal land filling and legal action for contravention. The most important objective of the land use plan is to demarcate clearly each land area by the expected function. In the plans, lowland areas which will contribute to storm water retention should be clearly shown, and further could be divided into some zones by each category as follows:

- 1) Strictly reserved zone for retention purpose
- 2) Reserved zone for retention of minor flood but to be used for nature parks and so on
- 3) Reserved zone for retention of major flood but to be used for urban parks and community parks and so on, and some high ground parts of the area to be used for housing schemes

(3) Combined Activities with Local Authorities

Under the existing legislative system, local authorities are empowered to take a legal action to stop, demolish, punish and fine. However, considering the malfunction of this regulation function due to insufficient work resources, political pressure and other local specific constraints, it is proposed to utilize the function of local authorities in combination with SLLRDC's lowland management. Under this cooperation system SLLRDC and local authorities can organize a network for effective monitoring and regulation of land filling for the broad area including SLLRDC's declared areas and the areas of local authorities. This combination will be useful for the lowland management from the basin-wide aspect.

(4) Achievement of Social Understanding on Lowland Management

In addition to the actions proposed above, it is important to take actions to achieve social understanding on the lowland management. It will be possible to execute substantially the function and duty on land use regulation through the actions such as the opening of the land use plan to the public, presentation of the importance to preserve lowland areas showing flood inundation hazard maps to the public and public awareness on land use regulation with the mass media. These activities by SLLRDC and local authorities will be necessary for sustainable lowland management.

CHAPTER 3 HUMAN RESOURCES DEVELOPMENT PLAN

Human resource development for the storm water drainage sector is one of the key issues for the executing agencies, that is, SLLRDC and local authorities. In this chapter, a training package for SLLRDC and local authorities is proposed for a short term aspect for O&M and a long term aspect for the overall capacity building.

3.1 Short Term Plan

3.1.1 SLLRDC

In order to ensure the successful implementation of the O&M works, SLLRDC should attempt to strengthen the capability of handling the O&M activities. In this context, it is proposed that a strengthening program for the O&M staff of SLLRDC utilizing the existing O&M manual shall be mobilized by SLLRDC itself. This program will aim at strengthening various routine activities, such as leadership, motivation creation, teamwork, collaborations, responsibility, communication and performance evaluation. Among others, the subjects to be taken up in the program may be as follows:

- 1) Create awareness of the objectives of the program among all O&M related staff
- 2) Review the functions and responsibilities of each work section, and revise if some of them are duplicate or obscure
- 3) Assess staff capability, including qualifications, experience, tasks and duties assigned
- 4) Assess appropriateness of number of staff assigned to each work section
- 5) Designated performance targets or goals to be attained by each work section
- 6) Conduct workshops from time to time to discuss issues arising from the actual O&M works and to evaluate the functions/duties being achieved by the sections

At the same time, the results of this program should be reflected in the O&M manual for continuous improvement.

3.1.2 Local Authority

The work forces of local authorities have practical knowledge as to maintenance works for existing small drains. In addition, for the purpose of developing additional knowledge of O&M technologies for regular maintenance of storm water drainage systems in urban areas, a series of training programs are required for the

engineers and technical officers of local authorities. Especially for the major MCs in the Greater Colombo area, establishment of this training program should be considered soon. As a short term objective, on-the-job training and lectures under the leadership of SLLRDC will be regarded as a practical method for improving the capability of local authorities. On-the-job training by SLLRDC is proposed to execute the following step according to the O&M policy mentioned in Section 4.11.1 in the Main Report.

- 1) During the 1st year after transfer of drainage facilities to the local authority O&M works are undertaken by SLLRDC together with the staff of the local authority. During this period, staff of the local authority achieve O&M knowledge by joint-operation with SLLRDC staff.
- 2) During the 2nd year after transfer of drainage facilities to the local authority O&M works are undertaken by the local authority under the supervision of SLLRDC. Required equipment and machinery are also transferred by SLLRDC.
- 3) During the 3rd year after transfer of drainage facilities to the local authority O&M works are undertaken by the local authority. SLLRDC staff visits the work site, at least once a week, for inspection, monitoring and advice.

The lecture programs will include the following:

- 1) Lectures on the management of O&M works
- 2) Lectures on health and safety procedures
- 3) Preparation of O&M manuals (involving Consultants hired by SLLRDC)
- 4) Lectures on O&M manuals
- 5) Lectures on procedures of coordination with other institutions and community organizations

The above program for local authorities should be applied also for local authorities in rural areas according to the progress of development of storm water drainage facilities in the areas.

3.2 Long Term Plan

From the long term aspect, it will be necessary to establish overall training programs to continuously develop the capability of staff at all levels in the responsible organizations for storm water drainage works. In this section, a framework of the training programs for human resources development is proposed for each target group in SLLRDC and local authorities.

3.2.1 Target Training Participants

(1) SLLRDC

SLLRDC will be the sole government agency to be responsible for storm water drainage in the country. As shown in Table 3.2.1, there are over 1,000 permanent staff working in 13 divisions.

Among these divisions, the Division of Research and Design is the most important section and is in charge of planning, design and approval of storm water drainage projects and land filling proposals on request from UDA or local authorities.

The Division of Canal Development & Maintenance and the Division of Plant & Equipment are also playing important roles for O&M for storm water drainage. A mission of the Department of Reclamation & Planning is partly related to storm water drainage works. The Departments of Human Resource Development & Administration, Finance and Lands & Marketing are supporting sections to make storm water drainage works smooth.

Analyzing the current work performance of SLLRDC, it is proposed that training should cover not only engineering & technical areas but also managerial/administrative and social development areas. In this connection, the numbers of target training participants in SLLRDC are proposed as shown in Table 3.2.1.

(2) Local Authorities

The study area consists of 5 MCs, 12 UCs and 28 PSs. As for storm water drainage works, staff allocation and therefore activities vary among local authorities. CMC has 250 staff including 25 engineers in the Division of Water Supply and Drainage. Although other MCs have a few engineers, they are in charge of all engineering and technical works in the local authorities, which implies no professional staff are available in these MCs. UCs and PSs have no engineers but have a few technical officers. They are in charge of all technical works in the local authorities, which again implies no specialized staff available for storm water drainage works.

Taking this present understaffing in all local authorities except CMC into account, it is proposed to allocate staff specialized in storm water drainage works in each local authority, as shown in Table 3.2.2. These staff are the target training participants for storm water drainage.

3.2.2 Training Package

The training package is proposed to strengthen capabilities of staff in charge of storm water drainage, as shown in Table 3.2.3. The training package consists of four categories, i.e., managerial and administrative, technological and technical, social development and O&M.

Managerial and administrative training courses are divided into three groups, i.e., general management and administration, computer literacy and information management. Technological and technical training courses are divided into three groups, i.e., planning, design and drawing and construction management. Social development training courses are divided into four groups, i.e., land management, community development, awareness campaign and relocation of settlement. O&M training courses are divided into two groups, i.e., Operation of O&M equipment and O&M management. Each group has some modules.

Table 3.2.3 indicates the types of modules, training duration, pre-requisites and candidates for training providers. There are three training types, that is, lecture or conventional classroom training, practical training by using facilities and workshops. The contents of proposed training modules are presented in Table 3.2.4.

3.2.3 Training Providers

There are plenty of training providers offering various training courses in Sri Lanka. One of the key issues to achieve a successful development of the storm water drainage system in the study area is human resource development for officials of central and local government agencies, NGOs and communities in the fields of managerial and technical areas. Training providers offering training relevant to the proposed storm water drainage plan are the Sri Lanka Institute of Development and Administration (SLIDA), the National Institute of Business Management (NIBM), the Center for Housing Planning & Building (CHPB), the Sri Lanka Institute of Local Governance (SLILG) and the Provincial Training Unit of the Western Provincial Council (PTU/WP). Some NGOs also have the capability to provide training in specialized areas of their activities.

(1) Sri Lanka Institute of Development and Administration

The Sri Lanka Institute of Development and Administration (SLIDA) was established by the SLIDA Act No.9 of 1982 under the Ministry of Public Administration. It is regarded as the premier public sector training organization for the development of knowledge and improvement of managerial skills of senior and middle managerial

cadres in public administration. In addition, SLIDA also undertakes management consultancy services for public entities.

SLIDA has six services divisions by training areas, 1) management and organization, 2) human resource management and public administration, 3) development management, 4) skill enhancement and languages, 5) financial and assets management and 6) information systems. SLIDA has 22 permanent faculty members and external faculty members.

There were 73 training courses offered in 2001, which consists of 3 one-year diploma courses, 1 ten-week certificate course, 8 fifteen-days certificate courses, 36 five-days certificate courses and 25 short courses. Two diploma courses are offered on a full-time basis and one diploma is for part-time participants.

Participants from government agencies and local authorities are free of charge, whilst participants from authorities, corporations, private companies and NGOs are charged around Rs. 1,000 per day. Therefore, since the revenue from training fees is limited, the operation cost of SLIDA mostly comes from the government budget.

As for staff training in local authorities, SLIDA targets only higher managerial levels such as the mayor and chief engineer. SLIDA is also providing trainers' training for the Management Training Development Unit in Provincial Councils. The staff of the Unit, in turn, provides training to staff in MCs, UCs and PSs.

(2) National Institute of Business Management

The National Institute of Business Management (NIBM), currently under the Ministry of Enterprise Development and Industrial Policy, was established in 1968 with a mission to improve the competitiveness of Sri Lankan business enterprises by enhancing productivity through the development of management skills and systems.

The major activities of NIBM are training, consulting and research in the fields of productivity, management and information technology. NIBM has 130 permanent staff including 38 faculty members and 60 external faculty members. NIBM has two branch training centers in Kandy and Kurunegala.

NIBM has a vast international training network. NIBM is offering a 2-year B.Sc. Degree Program in Management of Information Systems in collaboration with the University College Dublin, the National University of Ireland and a Sri Lankan local partner of the Asian Productivity Organization in Japan. NIBM is also playing a leading role as a member of the Association of Management Development Institutions in South Asia, the Association of Sri Lankan Institutes of Management, and the Council of the Institute of Management of Sri Lanka. Furthermore, NIBM

has a domestic network to share resources with various relevant national training institutes such as the Sri Lanka Evaluation Association and the Management Development Institute.

Training courses offered by NIBM in 2001 were one two-year B.Sc. course, 13 one-year diploma courses, 14 four-month certificate courses and other various short courses. There are estimated to be 600 annual training participants in productivity, 3,000 in management and 3,000 in information technology. Approximately 60% of the participants are from the private sector, while the rest are from the government and relevant agencies. Participants from local authorities are very few.

(3) Center for Housing Planning & Building

The Center for Housing Planning & Building (CHPB) is a training and research institute, which is a department in the Ministry of Housing and Plantation Infrastructure. CHPB was established in 1979 and currently has 11 staff, including 4 permanent teaching staff, and 180 external teaching faculties on the roster.

The major activity is to deliver training for staff in central government agencies, local authorities, private companies, NGOs and individuals in broad areas of housing, human settlement development, urban infrastructure and urban development. CHPB focuses on technical training, since there are quite a few managerial training institutes. There are around 1,000 annual training participants.

One of the projects recently implemented by CHPB, in cooperation with the National Building Research Organization (NBRO) and UDA on the initiation of the Asian Disaster Preparedness Center in the Asian Institute of Technology, Bangkok, funded by USAID is the Sri Lanka Urban Multi-Hazard Disaster Mitigation Project. CHPB developed training modules and materials such as community based disaster management, natural disaster mitigation, risk control planning and guidelines for mitigating damages to dwellings in flood-prone areas.

Another project implemented by CHPB together with SLIDA and the Sri Lanka Institute of Legal Governance (SLILG) is the Urban Development and Low Income Housing Project, funded by ADB. CHPB developed training modules and materials in general courses in the areas of construction management and in specific courses such as consideration of natural hazards in construction.

(4) Sri Lanka Institute of Local Government

The Sri Lanka Institute of Local Government (SLILG) was established by an Act of Parliament, No. 31 of 1999 with a mandate of institutional strengthening and capacity building of Provincial Councils and Local Governments. The main mission of SLILG

is to provide technical and job-oriented training for trainers of provincial councils, who, in turn, provide training to staff of local authorities. SLILG has 33 faculty members and 20-30 external resource persons. One of the specialized areas in SLILG is a partnership approach to encourage participation of all parties such as government agencies, NGOs, Community Based Organizations (CBOs) and community people. Their experience includes consulting and training services for relocation and community development in the Negombo area.

(5) Provincial Training Unit of the Western Provincial Council

The Provincial Training Unit of the Western Provincial Council (PTU/WP) has a responsibility to provide training for all staff working for 45 local authorities in the Western Province, which is approximately 26,000 staff in 900 kinds of positions. PTU/WP is planning to provide 15,000 staff with 354 training programs in 2002. This training covers managerial and administrative areas as well as technical areas. In addition, NGOs also can be training providers, particularly in the field of social development.

3.3 Cost Estimate for Training

3.3.1 Training Modules and Allocation of Participants

Table 3.3.1 describes the target groups of each training module by occupational classifications, that is, senior manager, engineer/middle manager, technical officer and administrator. It also describes the target training participants of each training module by organization, that is, target departments of SLLRDC, CMC, other MCs, UCs and PSs. Based on this matching of training modules and target participants, the total participants in each training module is calculated. An accumulated number of participants in all training modules is about 5,500.

3.3.2 Cost Estimation of Implementing All Training Modules

The total cost to implement the proposed training package is estimated based on the proposed unit costs offered by training providers as shown in Table 3.3.2. It is assumed that costs of meals and local transportation are Rs. 180 and Rs. 150 per man-day, respectively. In addition, half of the training cost is added for follow-up activities, in which training participants assemble several times to share and discuss problems, constraints and experiences with instructors and participants, recognizing that it is not easy for participants to achieve expected outcomes just from attending training. The estimated total cost to implement the training package is Rs. 83.5 million.

3.3.3 Training Schedule and Annual Budget

The above proposed training package should be implemented immediately due to urgent needs to upgrade all staff in charge of storm water drainage works in SLLRDC and local authorities. However, taking various constraints such as shortage of budget and resource persons for training into consideration, the realistic implementation schedule of the proposed training package is developed, as shown in Table 3.3.3.

Since the proper O&M activities for the existing canals are urgently needed at present and the participatory approach should be encouraged to make people become involved in monitoring illegal activities, it is scheduled to complete all training related to O&M and the awareness campaign within the first three years. Considering some construction projects for storm water drainage may start within a couple of years, training courses such as planning, design and drawing, land management and relocation of settlements are scheduled to complete within five years. On the other hand, some training courses are scheduled to complete in ten years, since long term continuous efforts are required to improve the areas such as general management and administration, information management, construction management and community development.

The following should be considered to achieve a successful implementation of the proposed training package:

- 1) The Division of Human Resource Development and Administration in SLLRDC should be responsible as an overall coordinating body to implement the training package, since SLLRDC knows training needs best.
- 2) The proposed training schedule should be considered as a rolling plan in order to make a flexible arrangement, since training needs change all the time.
- 3) Participants should be carefully and fairly selected based on their job assignment of storm water drainage works.
- 4) Training providers should be carefully selected for each training module by tender.
- 5) In order to minimize budget constraints, SLLRDC should provide professional coordination with training providers by which some training modules such as general management and administration can be available free of charge for staff in local authorities and concessionary training fees for staff in SLLRDC.

CHAPTER 4 PROPOSED ACTION PLAN

Figure 4.1.1 shows the proposed action program for the institutional development plan and human resource development plan. It is assumed that the action program is to be completed with 10 years.

The development plans for all local authorities located in the Western Region are scheduled to be completed and gazetted within 5 years by UDA, according to the UDA development schedule. All institutional development plans discussed are scheduled to be completed within 2 years by amending the relevant Acts, through which the improved legislative setting for storm water drainage works and the management of lowlands will be in place. The human resource development plan is scheduled to be implemented shortly after the 6 month preparation period.

Tables

Table 1.1.1 List of Ministries

Cabinet rank		Non Cabinet rank	
1	Ministry of Policy Development & Implementation	29	Ministry of Human Resources Development Education & Cultural Affairs
2	Ministry of Power & Energy	30	Ministry of Employment & Labour
3	Ministry of Transportation, Highways & Aviation	31	Ministry of Public Administration, Management & Reforms
4	Ministry of Finance	32	Ministry of Tertiary Education & Training
5	Ministry of Defense	33	Ministry of Mass Communication
6	Ministry of Agriculture & Livestock	34	Ministry of Social Welfare
7	Ministry of Enterprise Development, Industrial Policy & Investment Promotion	35	Ministry of Water Management
8	Ministry of Constitutional Affairs	36	Ministry of Irrigation
9	Ministry of Foreign Affairs	37	Ministry of Parliamentary Affairs
10	Ministry of Port Development & Shipping	38	Ministry of Housing Development
11	Ministry of Eastern Development & Muslim Religious Affairs	39	Ministry of School Education
12	Ministry of Housing & Plantation Infrastructure	40	Ministry of North-West Region Development
13	Ministry of Fisheries & Ocean Resources	41	Ministry of Samurdhi
14	Ministry of Women's Affairs	42	Ministry of Youth Affairs & Sports
15	Ministry of Justice, Law Reform & National Integration	43	Ministry of Assisting Foreign Affairs
16	Ministry of Buddha Sasana	44	Ministry of Rehabilitation, Resettlement & Refugees
17	Ministry of Irrigation & Water Management	45	Ministry of Home Affairs, Local Government & Provincial Councils
18	Ministry of Environment & Natural Resources	46	Ministry of Estate Infrastructure
19	Ministry of Home Affairs, Provincial Councils & Local Government	47	Ministry of Hindu Affairs
20	Ministry of Health, Nutrition & Welfare	48	Ministry of Industries
21	Ministry of Interior	49	Ministry of Small Holder Development
22	Ministry of Plantation Industries	50	Ministry of Urban Public Utilities
23	Ministry of Tourism	51	Ministry of Highways
24	Ministry of Southern Region Development	52	Ministry of State Transport
25	Ministry of Western Region Development	53	Ministry of Assisting Vanni Rehabilitation
26	Ministry of Central Region Development	54	Ministry of Land
27	Ministry of Rural Economy	55	Ministry of Commerce & Consumer Affairs
28	Ministry of Co-operatives	56	Ministry of Economic Reform, Science & Technology

Table 1.1.2 Responsibilities of Government Agencies Related to the Storm Water Drainage

Related Agencies		Planning	Reclamation	Development	Land Acquisition	Shanty Relocation	Flooding
		Mapping Physical Planning Specific Planning	Approval Construction Planning	Approval Construction Planning	Price Estimation Land Registration Cadastral Survey	Relocation Infrastructure Development Relocation Site Development Coordination Planning	Flood Forecasting Flood Warning Flood Fighting Disaster Recovery
I. Central Government Agencies							
1. Geographic Survey Agencies							
Survey Department, Min. of Land	SVD	x			x		
Land Use Policy Planning Div., Min. of Land	LUPPD	x					
2. Planning Agencies							
National Physical Planning Department, Min. of Western Regional Development	NPPD	x x					
Urban Development Authority, Min. of Western Regional Development	UDA	x x	x x	x		x	
3. Implementing Agencies for Water Management							
Sri Lanka Land Reclamation and Development Corporation, Min. of Housing and Plantation Infrastructure	SLLRDC	x	x x x	x x x x		x x x x	
National Water Supply and Drainage Board, Min. of Housing and Plantation Infrastructure	NWSDB	x					
Irrigation Department, Min. of Irrigation and Water Management	IRD	x		x			x x
4. Resettlement Agencies							
Urban Settlement Improvement Project, Min. of Urban Public Utilities	USIP					x x	
Urban Housing Division, NHDA, Min. of Housing and Plantation Infrastructure	UHD						x
5. Regulatory Agencies							
Agrarian Development Department, Min. of Agriculture and Livestock	ADD						
Central Environmental Agency, Min. of Environment and Natural Resources	CEA	x					
Coastal Conservation Department, Min. of Fisheries & Ocean Resources	CCD	x					
6. Land Acquisition Related Agencies							
Min. of Land	MOL				x x x x		
7. Other Related Agencies							
Road Development Authority, Min. of Highways	RDA	x					
Ceylon Electricity Board, Min. of Power and Energy	CEB	x					
Sri Lanka Railways, Min. of Transportation, Highway and Aviation	SLR	x					
Meteorological Department	MLD						x
II. Local Authorities, Min. of Home Affairs, Provincial Councils and Local Government							
Western Provincial Council	WPC	x		x			x x
Municipal Councils (Colombo, Dehiwala-Mt. Lavinia, Kotte, Moratuwa)	MC	x	x	x x		x x	x x
Urban Councils	UC	x	x	x x		x x	x x
Pradeshiya Sabha	PS	x	x	x x		x x	x x

Table 1.2.1 List of Statutes and Relevant Agencies

Acts, Law and Ordinances	Relevant Agencies	Main Objectives
Land tenure State Lands Encroachments Ordinance State Lands Ordinance State Land (Recovery of Possession) Act Land Acquisition Act	MOL MOL MOL MOL	Regulation to protect all State land from encroachment by unauthorized possession or occupation Regulation to preserve and use all State lands for public purposes Recovery of all State lands from parties in unauthorized possession or occupation Acquisition of any lands for the public purposes
Land use National Environment Act Agrarian Services Act	CEA ADD	Regulation of land use to preserve environment in any declared areas Regulation for maximum utilization of agricultural land for agricultural production
Water management Colombo District (Low-lying Areas) Reclamation and Development Board Act National Water Supply and Drainage Board Law Irrigation Ordinance Flood Protection Ordinance	SLLRDC NWSDB IRD IRD	Reclamation and development of a low-lying, marshy, waste or swampy area Development, operation and distribution of an water supply for the public Responsibility to undertake irrigation and drainage works and conservation of catchments of rivers Flood protection for the areas declared as flooding areas
Urban development Town and Country Planning Ordinance Urban Development Authority Law National Housing Development Authority Act	NPPD UDA NHDA	Development and implementation of the national physical plan to integrate planning of various aspects Development and implementation of the physical plan of urban development areas Development and promotion of housing for lower income group in the rural areas
Local authority Municipal Councils Ordinance Urban Council Ordinance Pradeshiya Sabhas Act	MC UC PS	Functions and operations of Municipal Council Functions and operations of Urban Council Functions and operations of Pradeshiya Sabha

Table 3.2.1 Training Participants of SLLRDC for Storm Water Drainage Work

Section	Current Staff Allocation			Target Training Participants		
	Senior Manager	Staff	Others	Senior Manager	Staff	Others
1 Secretary to the Board	1	1	8			
2 Chief Internal Auditor	1	1	21			
3 Legal Section	1	2	4			
4 Security Management Section	1	1	137			
5 Human Resources Development & Administration	1	10	111	1	2	
6 Finance	1	8	65	1	2	
7 Lands & Marketing	1	4	22	1	2	
8 Stores & Supplies	1	7	21			
9 Canal Development & Maintenance	1	18	119	1	18	6
10 Reclamation Development & Planning	1	10	73	1	3	4
11 Research & Design	1	20	32	1	20	8
12 Construction	1	12	97			
13 Plant & Equipment	1	9	311	1	9	16
Total	13	103	1,021	7	56	33

A2 - T4

Table 3.2.2 Proposed Staff Allocation in Local Authorities for Storm Water Drainage Works
(Participants/year)

Number of LA	CMC	Other MCs	UC	PS	Total
	1	4	12	28	Trainees
1.Senior Manager	1	1	1	0	17
2.Engineer/Middle Manager/Superintendent	14	2	1	1	62
3.Technical/Health Officer	21	2	1	1	69
4.Administrator	5	2	1	0	25
Total	41	7	4	2	173

Table 3.2.3 Training Modules and Candidates of Training Providers

Training Modules	Lecture (L), Practice (P) or Workshop (W)	Duration (days)	Prerequisite	Candidates of Training Providers						
				SLIDA	NIBM	CHPB	SILG	PTU/WP	SLLRDC	NGOs
I Managerial and administrative training course										
1 General management and administration										
I-1-a Certificate in project management	L	15		x	x		x	x		
I-1-b Effective communication	L	5		x	x		x	x		
I-1-c Problem solving and decision making	L	5		x	x		x	x		
I-1-d Local government finance	L	5		x	x		x	x		
2 Computer literacy										
I-2-a Certificate in computer application	P	20		x	x		x	x		
I-2-b Computer applications for beginners	P	5		x	x		x	x		
I-2-c Word processing using MS Word	P	5	I-2-b	x	x		x	x		
I-2-d Spread sheet processing using MS Excel	P	5	I-2-b	x	x		x	x		
3 Information management										
I-3-a Database management	P	5	I-2-a or I-2-d	x	x					
I-3-b Office administration	L	5		x	x					
I-3-c Computerized accounting systems	P	5		x	x					
I-3-d Introduction of management information systems	L	3	I-2-a or I-2-d	x	x					
II Technological and technical training courses										
1 Planning										
II-1-a Theory and practice of planning and implementation for storm water system	L	0 3		x						
II-1-b Public procurement management	L	5		x						
II-1-c Sustainable urban environmental management	L	5		x						
II-1-d Disaster management	L	5		x						
II-1-e Natural disaster mitigation	W	6				x				
II-1-f Construction consideration in flood prone areas	W	3				x				
2 Design and drawing										
II-2-a drainage system	P	30				x	x	x		
II-2-b Introduction of auto CAD	P	15	I-2-a or I-2-b			x				
3 Construction management										
II-3-a Construction planning & progress control	L	3				x	x			
II-3-b Financial planning & cost control	L	3	II-3-a			x	x			
II-3-c Supervision of construction works on site	L	3	II-3-b			x	x			
III Social development training courses										
1 Land management										
III-1-a Legal procedures of land acquisition	W	5					x	x		
III-1-b GIS and EMIS for storm water drainage system	P	30					x	x		
2 Community development										
III-2-a Research and survey methodology	L	15		x						
III-2-b Introduction of participatory approach	W	3					x			x
III-2-c Community institutional building	W	3	III-2-b				x			x
III-2-d health hazard	W	5	III-2-c			x	x			x
3 Awareness campaign										
III-3-a Public awareness	W	3		x			x			x
4 Relocation of settlements										
III-4-a Relocation procedure of settlement	W	3	III-1-a			x	x			x
IV O&M training courses										
1 Operation of O&M equipment										
IV-1-a Operation of O&M equipment for open canal	P	10	Driving license							x
IV-1-b Operation of O&M equipment for storm water drainage	P	10	Driving license							x
2 O&M management										
IV-2-a Planning and programming for O&M works	L	3								x
IV-2-b Introduction of O&M activities	L	5								x

Table 3.2.4 Contents of Proposed Training Modules (1/7)

I. Managerial and administrative training courses

1. General management and administration

Course No.	I-1-a
Course title	Certificate in project management
Objectives	<ul style="list-style-type: none"> • Identify and formulate a project • Prepare a project report • Implement and monitor a project • Evaluate a project
Contents	<ul style="list-style-type: none"> • Project concept and project cycle • Implementing, monitoring and evaluation of a project • Financial and personnel management for project implementation • Assessment of project implementation
Course No.	I-1-b
Course title	Effective communication
Objectives	<ul style="list-style-type: none"> • Understand the barriers and problems in communication • Appreciate the importance of active listening • Design a communication acceptable to target audience • Appreciate the differences in various communication situations • Appreciate the important elements and also limitations in each type of
Contents	<ul style="list-style-type: none"> • Communication process within the Sri Lankan cultural framework • Communication barriers in the public sector organizations • Group, public and mass communication for effectiveness and efficiency • Verbal and non-verbal communication for better understanding • Electronic communication to manage large organizations
Course No.	I-1-c
Course title	Problem solving and decision making
Objectives	<ul style="list-style-type: none"> • General decision options • Analysis decision options • Make effective decisions under uncertainty and risk
Contents	<ul style="list-style-type: none"> • Situational analysis and problem identification • Problem analysis (tree diagram) • Techniques (fish bone, force field analysis, pareto analysis) • Individual and group decisions • Group techniques (Brain storming, Delphi technique)
Course No.	I-1-d
Course title	Local government finance
Objectives	<ul style="list-style-type: none"> • Understand the local government financial management systems and procedures
Contents	<ul style="list-style-type: none"> • An introduction to local government financial management • Legal framework of local government • Rules, regulations and procedures pertaining to local authorities in financial • Revenue collection and accounting • Local government budgeting • Internal auditing

2. Computer literacy

Course No.	I-2-a
Course title	Certificate in computer application
Objectives	<ul style="list-style-type: none"> • Apply computers effectively for their day-to-day office work
Contents	<ul style="list-style-type: none"> • Word processing using MS Word • Calculations using MS Excel • Presenting information using MS Power Point • Database management using MS Access • Internet and E-mail • End user computing and office automation

Table 3.2.4 Contents of Proposed Training Modules (2/7)

Course No.	I-2-b
Course title	Computer applications for beginners
Objectives	<ul style="list-style-type: none"> • Use computer for document creation and calculation • Use the Internet for extracting information • Use the E-mail as an efficient communication tool
Contents	<ul style="list-style-type: none"> • Hardware and software • Key board operation and mouse skills • Files and folders • Word processing and calculations
Course No.	I-2-c
Course title	Word processing using MS Word
Objectives	<ul style="list-style-type: none"> • Create attractive and error free documents
Contents	<ul style="list-style-type: none"> • Basic Windows operations • Word processing concepts • Preparation of documents using MS Word
Course No.	I-2-d
Course title	Spread sheet processing using MS Excel
Objectives	<ul style="list-style-type: none"> • Use computers effectively for work involving calculations • Guide subordinates to use computers effectively for calculations
Contents	<ul style="list-style-type: none"> • Basic Windows operations • Theoretical concepts of spreadsheets • Performing calculations and creating graphs using MS Excel

3. Information management

Course No.	I-3-a
Course title	Data base management
Objectives	<ul style="list-style-type: none"> • Use computers effectively for data storing and information processing • Guide subordinates to use computers for creating and maintenance of databases
Contents	<ul style="list-style-type: none"> • Concepts and definitions of database management systems • Creating and manipulating data tables using MS Access • Forms, queries and report generation
Course No.	I-3-b
Course title	Office administration
Objectives	<ul style="list-style-type: none"> • Develop competencies needed by office managers • Enhance their understanding of office systems and procedures • Effective record keeping
Contents	<ul style="list-style-type: none"> • The nature and scope of office administration • Office management competencies • Office systems and procedures • Systematic record keeping system • Rules and regulation in office administration
Course No.	I-3-c
Course title	Computerized accounting systems
Objectives	<ul style="list-style-type: none"> • Develop skills in designing computerized accounting systems for their organizations and familiarize with standard accounting packages
Contents	<ul style="list-style-type: none"> • Introduction to computerized accounting • Modular approach to accounting system • Control and security • Use of packages in General ledger, Debtors and Creditors ledger stores accounting, Inventory Control etc.
Course No.	I-3-d
Course title	Introduction of management information system (MIS)
Objectives	<ul style="list-style-type: none"> • Using the potential of management information systems for assisting managerial decision-
Contents	<ul style="list-style-type: none"> • MIS for operations and management • An overview of hardware, software, telecommunications and database management • End user computing and office automation

Table 3.2.4 Contents of Proposed Training Modules (3/7)

II. Technological and technical training courses

1. Planning

Course No.	II-1-a
Course title	Theory and practice of planning and implementation for storm water drainage system
Objectives	<ul style="list-style-type: none"> • Enhance their knowledge and understanding of the conceptual framework of planning for storm water drainage system • Develop skills in environment and organizational analysis, strategic planning and implementation in relation to storm water drainage system
Contents	<ul style="list-style-type: none"> • Concept of planning for storm water drainage system • Analytical tools • Monitoring systems • Performance evaluation and analysis • Preparation of a plan
Course No.	II-1-b
Course title	Public procurement management
Objectives	<ul style="list-style-type: none"> • Enhance their knowledge and skills in public procurement management and improve the efficiency of public tenders
Contents	<ul style="list-style-type: none"> • Fundamentals of public procurement • Method of procurement and procurement planning • Bidding documents • Pre and Post qualification of tenders • Bid evaluation and award of contracts • Assessment of completion reports
Course No.	II-1-c
Course title	Sustainable urban environmental management
Objectives	<ul style="list-style-type: none"> • Understand the basic concepts of urban environmental management and enhance their knowledge of the different factors related to urban environmental management
Contents	<ul style="list-style-type: none"> • Urban policies in relation to urban environmental management • Urban land use pattern and land management • Urban waste generation and waste management
Course No.	II-1-d
Course title	Disaster management
Objectives	<ul style="list-style-type: none"> • Develop their knowledge on mitigation, planning and assessing damages arising from
Contents	<ul style="list-style-type: none"> • Prevention, preparedness and mitigation of disasters • Disaster legislation and development of institutional framework • Emergency measures in disaster management • Rehabilitation, reconstruction and implementation • Assessment of damages caused by disasters
Course No.	II-1-e
Course title	Natural disaster mitigation
Objectives	<ul style="list-style-type: none"> • Enhance their knowledge and understanding of the practical tools for hazard and vulnerability assessment at the local level; structural measures and non-structural measures such as land use planning, building codes, tax incentives • Gain practical insights into the building of financial, political, administrative and community support for disaster mitigation
Contents	<ul style="list-style-type: none"> • Hazard assessment, tools and techniques • Risk and vulnerability assessment • Topography and land use • Multiple hazard risks and loss estimation • Land use planning to reduce risks • Information systems and data sources • Safe design of urban infrastructure • The built environment: guideline, codes and regulations • Emergency preparedness planning

Table 3.2.4 Contents of Proposed Training Modules (4/7)

Course No.	II-1-f
Course title	Construction consideration in flood prone areas
Objectives	<ul style="list-style-type: none"> • Develop their capabilities to recognize the areas in the respective LAs prone to natural • Develop their skills to implement suitable mitigatory measures with proper land use planning • Strengthen their knowledge to implement suitable structural mitigatory measures during
Contents	<ul style="list-style-type: none"> • Types of floods (riverine, flash, coastal and local floods) • Flood plain zoning (prohibited, restricted and warning zones) • Construction consideration in flood prone areas • Achieving sustainable development in hazard prone areas • Measures to be taken in improving existing development works (maintenance and • Guideline for flood resistant construction

2. Design and drawing

Course No.	II-2-a
Course title	Basic skills for design and drawing for storm water drainage system
Objectives	<ul style="list-style-type: none"> • Strengthen their skills to make design and drawing for storm water drainage system
Contents	<ul style="list-style-type: none"> • Appreciation of storm water drainage system • Design principles and their application • Regulation in relation to storm water drainage system • Design and drawings for canal, dike, culvert, water gate, pump station and so on • Environmental consideration for storm water drainage projects • Introduction to basic quantities and estimates

Course No.	II-2-b
Course title	Introduction of auto CAD
Objectives	<ul style="list-style-type: none"> • Acquire basic skills to use auto CAD
Contents	<ul style="list-style-type: none"> • Introduction to computers • Basic operation of auto CAD • Learning functions of auto CAD • Practical methods to apply auto CAD for civil works

3. Construction management

Course No.	II-3-a
Course title	Construction planning & progress control
Objectives	<ul style="list-style-type: none"> • Acquire practical skills to manage construction projects by proper planning and progress
Contents	<ul style="list-style-type: none"> • Contract types and procedures • Construction planning and resource planning • Progress control • Tendering procedure • Computer application for construction planning and progress control

Course No.	II-3-b
Course title	Financial planning & cost control
Objectives	<ul style="list-style-type: none"> • Acquire practical skills to manage construction project by proper financial planning and cost
Contents	<ul style="list-style-type: none"> • Basic concept of financial planning • Basic techniques to develop financial planning • Cost control • Book keeping and accounting systems for construction projects • Computer application for financial planning and cost control

Course No.	II-3-c
Course title	Supervision of construction works on site
Objectives	<ul style="list-style-type: none"> • Strengthen practical knowledge and know-how to supervise construction works on site
Contents	<ul style="list-style-type: none"> • Management concepts and functions • Site office organization • Practical skills for store's inventory control • Labor productivity and personnel management • Safety and accident prevention at construction sites • Quality control and inspection • Management of construction equipment • Computer application in supervision of construction sites

Table 3.2.4 Contents of Proposed Training Modules (5/7)

III. Social development training courses

1. Land management

Course No.	III-1-a
Course title	Legal procedures of land acquisition
Objectives	<ul style="list-style-type: none"> • Understand land related laws and acquire knowledge of legal procedure of land acquisition
Contents	<ul style="list-style-type: none"> • Introduction of land related laws • Understanding the current conditions of land ownership • Practical procedures to acquire land for public purposes from State, LAs and private company/individual
Course No.	III-1-b
Course title	GIS and EMIS for storm water drainage planning
Objectives	<ul style="list-style-type: none"> • Acquire skills to use GIS and EMIS (Environmental Management Information System) for storm water drainage planning
Contents	<ul style="list-style-type: none"> • Introduction of GIS and EMIS • Understanding benefit and limitation of GIS and EMIS • Basic skills to use GIS and EMIS for storm water drainage planning • Application techniques to use GIS and EMIS for storm water drainage planning

2. Community development

Course No.	III-2-a
Course title	Research and survey methodology
Objectives	<ul style="list-style-type: none"> • Develop skills in undertaking and conducting a research study • Develop skills required to compile questionnaires carrying out surveys and tabulation of data and presentation of survey results
Contents	<ul style="list-style-type: none"> • Research methodology, design and techniques • Sampling techniques and data collection methods • Tabulation, analysis and presentation of data • Research proposal writing
Course No.	III-2-b
Course title	Introduction of participatory approach
Objectives	<ul style="list-style-type: none"> • Understand concept and practice of participatory approach • Enhance knowledge and skills to undertake participatory approach • Experience actual participatory approach through practices
Contents	<ul style="list-style-type: none"> • Concept and definition of participatory approach • Different approaches of participatory approach • Methodology to analyze problems and constraints • Development techniques of project design matrix • Case studies • Practical training to conduct participatory approach by participants
Course No.	III-2-c
Course title	Community institutional building
Objectives	<ul style="list-style-type: none"> • Understand benefits and create willingness to form community based organizations (CBOs) among community people • Understand of roles and responsibilities of LAs and CBOs • Acquire knowledge and skills for sustainable activities of CBOs
Contents	<ul style="list-style-type: none"> • Concept and definition of CBOs • Methodology to form CBOs • Procedure for registration of CBOs • Roles and responsibilities of LAs and CBOs • Accountability, transparency and credibility to maintain CBOs properly • Managerial and administrative skills to operate CBOs • Introduction of community contract system • Case studies for community institutional building

Table 3.2.4 Contents of Proposed Training Modules (6/7)

Course No.	III-2-d
Course title	Community based disaster management for flood and health hazard
Objectives	<ul style="list-style-type: none"> • Enhance knowledge of the framework for community based disaster management • Acquire the practical tools for community based risk assessment • Understand practical method for capacity building at local level
Contents	<ul style="list-style-type: none"> • Community based disaster management process • Disaster crunch model • Hazard, vulnerability and capacity assessment • Tools for community based risk assessment • Identification of risk reduction measures • Advocacy and conflict resolution • Early warning and evacuation • Livelihood options

3. Awareness campaign

Course No.	III-3-a
Course title	Public awareness
Objectives	<ul style="list-style-type: none"> • Enhance their knowledge and understanding of the principles and techniques of effective public awareness • Develop skills to maintain good public awareness
Contents	<ul style="list-style-type: none"> • Needs and benefit of public awareness • Public awareness and communication • Process of public awareness campaign • Methods and techniques to improve public awareness • Practical measures for awareness campaign

4. Relocation of settlement

Course No.	III-4-a
Course title	Relocation procedure of settlement
Objectives	<ul style="list-style-type: none"> • Understand relevant laws and regulations • Acquire practical methods for relocation of settlement • Understand roles and responsibilities of central government organizations, LAs and CBOs
Contents	<ul style="list-style-type: none"> • Current legislative conditions related to relocation of settlement • Details of practical procedure for relocation of settlement • Roles and responsibilities of central government organizations, LAs and CBOs • Importance of awareness campaign and creation of cooperative behavior • Understanding National Involuntary Resettlement Policy and related guideline • Case studies from the past projects

Table 3.2.4 Contents of Proposed Training Modules (7/7)

IV. O&M training courses

1. Operation of O&M equipment

Course No.	IV-1-a
Course title	Operation of O&M equipment for open canal
Objectives	<ul style="list-style-type: none"> • Understand mechanism of O&M equipment • Learn how to operate equipment
Contents	<ul style="list-style-type: none"> • Brief explanation on mechanism of machines and equipment • Explanation on type of machine and equipment by work purpose • Basic operation in yard • Applied operation in field • Safety operation
Course No.	IV-1-b
Course title	Operation of O&M equipment for storm water drain
Objectives	<ul style="list-style-type: none"> • Understand mechanism of O&M equipment • Learn how to operate equipment
Contents	<ul style="list-style-type: none"> • Brief explanation on mechanism of machines and equipment • Explanation on type of machine and equipment by work purpose • Basic operation in yard • Applied operation in field • Safety operation

2. O&M management

Course No.	IV-2-a
Course title	Planning and programming for O&M works
Objectives	<ul style="list-style-type: none"> • Understand purpose of O&M plan • Overview of management principles • Learn planning and programming know-how
Contents	<ul style="list-style-type: none"> • Introduction – purpose of O&M plan • Description of maintenance organization • How to plan and program work • Planned inspection for work monitoring • Performance standard • Health and safety considerations
Course No.	IV-2-b
Course title	Introduction of O&M activities
Objectives	<ul style="list-style-type: none"> • Understand necessity of O&M works • Learn O&M method
Contents	<ul style="list-style-type: none"> • Introduction – purpose of O&M works • Routine activities – open canals, storm water drains, retention areas • Reactive maintenance – incidents and emergencies • Reporting • Health and safety considerations

Table 3.3.1 Training Modules and Target Training Participants

Training Modules	Lecture (L), Practice (P) or Workshop (W)	Duration (days)	Target Groups		Target Training Participants										Sub-total	Total participants			
					SLLRDC					LA									
					Senior manager	Engineer & middle manager	Technical officer	Administrator	Research & Design	Reclamation Development & Planning	Canal Development & Maintenance	Plant & Equipment	Lands & Marketing	Finance			Human Resource Development & Administration	CMC	Other MCs
I Managerial and administrative training course																			
1 General management and administration																			
I-1-a Certificate in project management	L	15	x			1	1	1	1	1	1	1	1	1	4	12	0	684	24
I-1-b Effective communication	L	5	x	x	x	x	29	7	25	26	3	3	3	41	28	48	56		269
I-1-c Problem solving and decision making	L	5	x	x	x		29	7	25	26	3	3	3	36	20	36	56		244
I-1-d Local government finance	L	5	x	x	x									36	20	36	56		148
2 Computer literacy																			
I-2-a Certificate in computer application	P	20		x			20	3	18	9	2	2	2	14	8	12	28	848	118
I-2-b Computer applications for beginners	P	5	x	x	x		29	7	25	26	3	3	3	36	20	36	56		244
I-2-c Word processing using MS Word	P	5	x	x	x		29	7	25	26	3	3	3	36	20	36	56		244
I-2-d Spread sheet processing using MS Excel	P	5	x	x	x		29	7	25	26	3	3	3	36	20	36	56		244
3 Information management																			
I-3-a Database management	P	5	x	x	x		29	7	25	26	3	3	3	36	20	36	56	694	244
I-3-b Office administration	L	5	x	x	x	x	29	7	25	26	3	3	3	41	28	48	56		269
I-3-c Computerized accounting systems	P	5		x								2		14	8	12	28		64
I-3-d Introduction of management information systems	L	3		x			20	3	18	9	2	2	2	14	8	12	28		118
II Technological and technical training courses																			
1 Planning																			
Theory and practice of planning and implementation for storm water system																			
II-1-a	L	30	x	x			21							15	12			810	48
II-1-b Public procurement management	L	5	x	x			21	4	19	10		3		15	12	24	28		136
II-1-c Sustainable urban environmental management	L	5	x	x			21							15	12	24	28		100
II-1-d Disaster management	L	5	x	x	x		29							36	20	36	56		177
II-1-e Natural disaster mitigation	W	6	x	x	x		29	7						36	20	36	56		184
II-1-f Construction consideration in flood prone areas	W	3		x	x		28	6						35	16	24	56		165
2 Design and drawing																			
Basic skills for design and drawing for storm water drainage system																			
II-2-a	P	30		x	x		28							35	16	24	56	201	159
II-2-b Introduction of auto CAD	P	15		x			20							14	8				42
3 Construction management																			
II-3-a Construction planning & progress control	L	3	x	x	x		29	7						36	20	36	56	552	184
II-3-b Financial planning & cost control	L	3	x	x	x		29	7						36	20	36	56		184
II-3-c Supervision of construction works on site	L	3	x	x	x		29	7						36	20	36	56		184
III Social development training courses																			
1 Land management																			
III-1-a Legal procedures of land acquisition	W	5	x	x	x	x	29			3				41	28	48	56	225	205
III-1-b GIS and EMIS for storm water drainage system	P	30		x			20												20
2 Community development																			
III-2-a Research and survey methodology	L	15	x	x			21							15	12	24	28	631	100
III-2-b Introduction of participatory approach	W	3	x	x	x		29							36	20	36	56		177
III-2-c Community institutional building	W	3	x	x	x		29							36	20	36	56		177
III-2-d Community based disaster management for flood and health hazard	W	5	x	x	x		29							36	20	36	56		177
3 Awareness campaign																			
III-3-a Public awareness	W	3	x	x			21							15	12	24	28	100	100
4 Relocation of settlements																			
III-4-a Relocation procedure of settlement	W	3	x	x			21							15	12	24	28	100	100
IV O&M training courses																			
1 Operation of O&M equipment																			
IV-1-a Operation of O&M equipment for open canal	P	10		x	x			6	24	25				35	16	24	56	371	186
IV-1-b Operation of O&M equipment for storm water dra	P	10		x	x			6	24	25				35	16	24	56		186
2 O&M management																			
IV-2-a Planning and programming for O&M works	L	3	x	x			4	19	10					15	12	24	28	322	112
IV-2-b Introduction of O&M activities	L	5		x	x	x	6	24	25					40	24	36	56		211
															Grand total	5,539			

Table 3.3.2 Cost Estimation for Proposed Training Packages

Training Modules	Cost estimate										
	Duration (days)	Total participants (person)	Total training days (man-day)	Unit training cost (Rs./man-day)	Training cost (Rs.1,000)	Follow-up activity cost (Rs. 1,000)	Meal cost (Rs. 1,000)	Local transportation cost (Rs. 1,000)	Total training cost (Rs.1,000)	Unit training cost (Rs./man-day)	Course fee (Rs.1,000/participant)
I Managerial and administrative training course											
1 General management and administration											
I-1-a Certificate in project management	15	24	360	1,336	481	240	65	54	840	2,334	35.01
I-1-b Effective communication	5	269	1,343	1,336	1,795	897	242	201	3,135	2,334	11.67
I-1-c Problem solving and decision making	5	244	1,218	1,336	1,628	814	219	183	2,843	2,334	11.67
I-1-d Local government finance	5	148	740	1,336	989	494	133	111	1,727	2,334	11.67
2 Computer literacy											
I-2-a Certificate in computer application	20	118	2,350	1,336	3,140	1,570	423	353	5,485	2,334	46.68
I-2-b Computer applications for beginners	5	244	1,218	1,336	1,628	814	219	183	2,843	2,334	11.67
I-2-c Word processing using MS Word	5	244	1,218	1,336	1,628	814	219	183	2,843	2,334	11.67
I-2-d Spread sheet processing using MS Excel	5	244	1,218	1,336	1,628	814	219	183	2,843	2,334	11.67
3 Information management											
I-3-a Database management	5	244	1,218	1,336	1,628	814	219	183	2,843	2,334	11.67
I-3-b Office administration	5	269	1,343	1,336	1,795	897	242	201	3,135	2,334	11.67
I-3-c Computerized accounting systems	5	64	320	1,336	428	214	58	48	747	2,334	11.67
I-3-d Introduction of management information systems	3	118	353	1,336	471	235	63	53	823	2,334	7.00
II Technological and technical training courses											
1 Planning											
Theory and practice of planning and implementation											
II-1-a for storm water system	30	48	1,440	1,336	1,924	962	259	216	3,361	2,334	70.02
II-1-b Public procurement management	5	136	678	1,336	905	453	122	102	1,581	2,334	11.67
II-1-c Sustainable urban environmental management	5	100	500	1,336	668	334	90	75	1,167	2,334	11.67
II-1-d Disaster management	5	177	885	1,336	1,182	591	159	133	2,066	2,334	11.67
II-1-e Natural disaster mitigation	6	184	1,105	1,150	1,271	635	199	166	2,271	2,055	12.33
II-1-f Construction consideration in flood prone areas	3	165	495	1,150	570	285	89	74	1,018	2,055	6.17
2 Design and drawing											
Basic skills for design and drawing for storm water											
II-2-a drainage system	30	159	4,770	1,150	5,486	2,743	859	716	9,802	2,055	61.65
II-2-b Introduction of auto CAD	15	42	630	1,150	725	362	113	95	1,295	2,055	30.83
3 Construction management											
II-3-a Construction planning & progress control	3	184	552	1,150	635	318	99	83	1,135	2,055	6.17
II-3-b Financial planning & cost control	3	184	552	1,150	635	318	99	83	1,135	2,055	6.17
II-3-c Supervision of construction works on site	3	184	552	1,150	635	318	99	83	1,135	2,055	6.17
III Social development training courses											
1 Land management											
III-1-a Legal procedures of land acquisition	5	205	1,025	1,150	1,179	589	185	154	2,106	2,055	10.28
III-1-b GIS and EMIS for storm water drainage system	30	20	600	1,336	802	401	108	90	1,400	2,334	70.02
2 Community development											
III-2-a Research and survey methodology	15	100	1,500	1,336	2,004	1,002	270	225	3,501	2,334	35.01
III-2-b Introduction of participatory approach	3	177	531	1,150	611	305	96	80	1,091	2,055	6.17
III-2-c Community institutional building	3	177	531	1,150	611	305	96	80	1,091	2,055	6.17
III-2-d health hazard	5	177	885	1,150	1,018	509	159	133	1,819	2,055	10.28
3 Awareness campaign											
III-3-a Public awareness	3	100	300	1,146	344	172	54	45	615	2,049	6.15
4 Relocation of settlements											
III-4-a Relocation procedure of settlement	3	100	300	1,150	345	173	54	45	617	2,055	6.17
IV O&M training courses											
1 Operation of O&M equipment											
IV-1-a Operation of O&M equipment for open canal	10	186	1,857	2,000	3,713	1,857	334	278	6,182	3,330	33.30
IV-1-b Operation of O&M equipment for storm water drainage	10	186	1,857	2,000	3,713	1,857	334	278	6,182	3,330	33.30
2 O&M management											
IV-2-a Planning and programming for O&M works	3	112	335	1,150	385	192	60	50	687	2,055	6.17
IV-2-b Introduction of O&M activities	5	211	1,053	1,150	1,211	606	190	158	2,164	2,055	10.28
Grand total		5,539	35,833		47,805	23,902	6,450	5,375	83,532		

Meal (Rs./man-day)	180
Local transportation (Rs./man-day)	150
Unit training cost of SLIDA (Rs./man-day)	1336
Unit training cost of CHPB (Rs./man-day)	1150
Unit training cost of SLLRDC (Rs./man-day)	2000

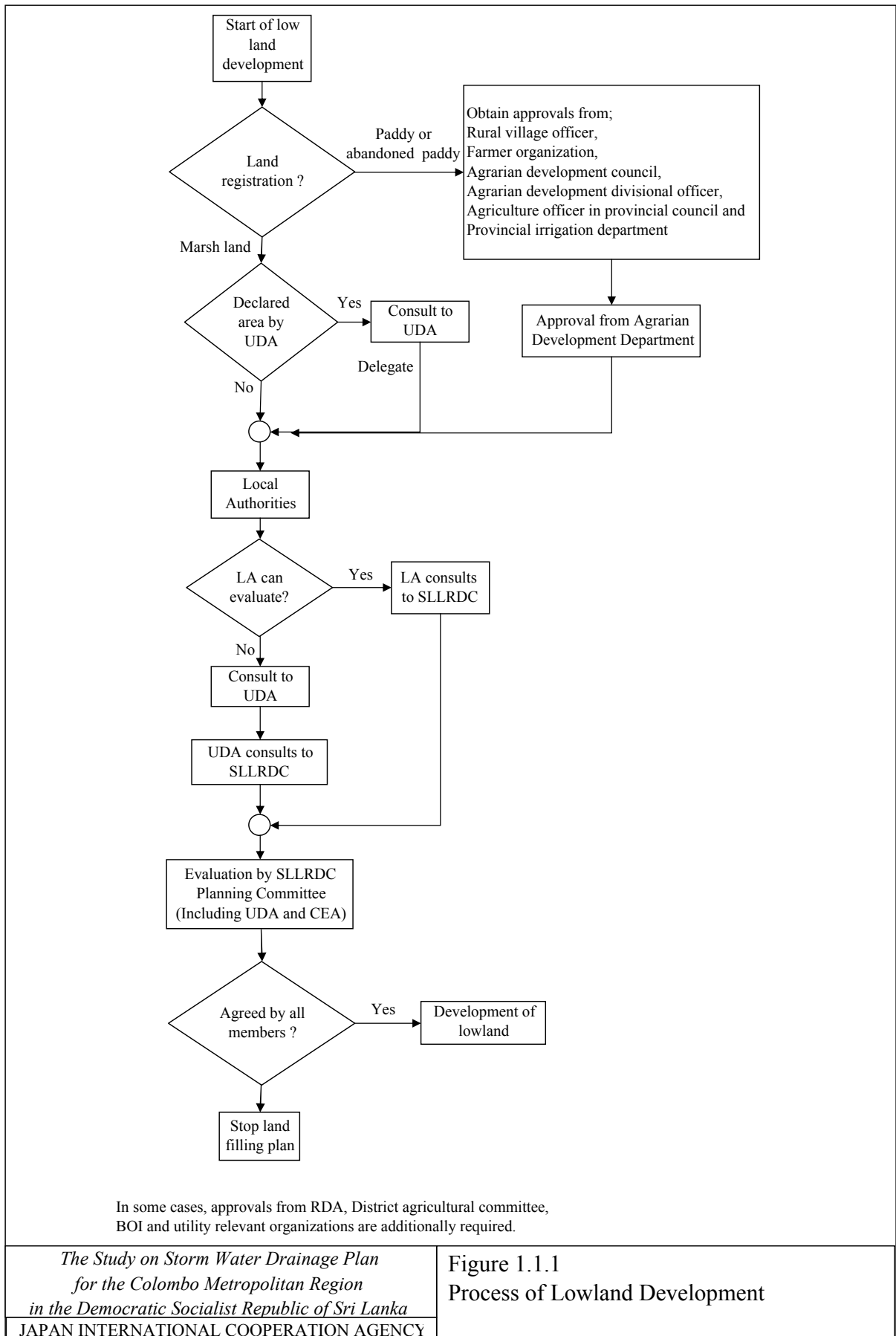
Note: Some training courses, for example, courses under the category of I) Managerial and administrative training courses, are regular courses operating by some public training providers. These trainings can be available by free of charge or by concessionary fees.

Table 3.3.3 Training Schedule and Annual Budget

Training Modules	Training Participants (Person)										
		Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	Total	1	2	3	4	5	6	7	8	9	10
Managerial and administrative											
I training course											
General management and											
1 administration	684	68	68	68	68	68	68	68	68	68	68
2 Computer literacy	848	170	170	170	170	170	170	170	170	170	170
3 Information management	694				99	99	99	99	99	99	99
Technological and technical											
II training course											
1 Planning	810	162	162	162	162	162					
2 Design and drawing	201	40	40	40	40	40					
3 Construction management	552			69	69	69	69	69	69	69	69
III Social development training courses											
1 Land management	225	45	45	45	45	45					
2 Community development	631	63	63	63	63	63	63	63	63	63	63
3 Awareness campaign	100	33	33	33							
4 Relocation of settlements	100	20	20	20	20	20					
IV O&M training courses											
1 Operation of O&M equipment	371	124	124	124							
2 O&M management	322	107	107	107							
Grand total	5,539	833	833	902	737	737	300	300	300	300	300

Training Modules	Training Cost (Rs. 1,000)										
		Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	Total	1	2	3	4	5	6	7	8	9	10
Managerial and administrative											
I training course											
General management and											
1 administration	8,546	855	855	855	855	855	855	855	855	855	855
2 Computer literacy	14,015	2,803	2,803	2,803	2,803	2,803					
3 Information management	7,548				1,078	1,078	1,078	1,078	1,078	1,078	1,078
Technological and technical											
II training course											
1 Planning	11,464	2,293	2,293	2,293	2,293	2,293					
2 Design and drawing	11,097	2,219	2,219	2,219	2,219	2,219					
3 Construction management	3,406			426	426	426	426	426	426	426	426
III Social development training courses											
1 Land management	3,507	701	701	701	701	701					
2 Community development	7,502	750	750	750	750	750	750	750	750	750	750
3 Awareness campaign	615	205	205	205							
4 Relocation of settlements	617	123	123	123	123	123					
IV O&M training courses											
1 Operation of O&M equipment	12,364	4,121	4,121	4,121							
2 O&M management	2,852	951	951	951							
Grand total	83,532	15,022	15,022	15,447	11,249	11,249	3,109	3,109	3,109	3,109	3,109

Figures



Item	Year									
	1	2	3	4	5	6	7	8	9	10
I Development Plans for Local Authorities										
a Develop and gazette development plans for LAs in Western Region by UDA	[Bar]									
II Institutional Development										
a Amendment of relevant Acts for clear demarcation of responsibilities for construction and O&M	⊙									
b Amendment of the SLLRDC Act for										
1 Appointment of SLLRDC as a sole government agency for lowland management	⊙									
2 Setting-up of clear policy for lowland development	⊙									
c Non-structural measures										
1 Introduction of mandatory construction of retention facilities by legislation			⊙							
2 Development of flood hazard map			⊙							
III Human Resource Development										
a Preparation of the training implementation by SLLRDC	[Bar]									
b Managerial and administrative training course										
1 General management and administration	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
2 Computer literacy	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
3 Information management	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
c Technological and technical training courses										
1 Planning	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
2 Design and drawing	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
3 Construction management	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
d Social development training courses										
1 Land management	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
2 Community development	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
3 Awareness campaign	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
4 Relocation of settlements	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
e O&M training courses										
1 Operation of O&M equipment	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]
2 O&M management	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]	[Bar]

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Figure 4.1.1
 Proposed Action Program for Institutional
 Development and Human Resources Development