Poultry production is still very profitable in Sri Lanka despite the high input costs. This is primarily due to high meat prices in the domestic market. The prices of dressed poultry meat rarely exceed $1,000/ton, ex-processing plant, in major producing countries. In Sri Lanka, this varies from $1,500 to $ 2000/ton.

5.4.4. Available incentives

Investments in food processing for the domestic market are eligible for a variety of incentives. The proposed investment is expected to pay no taxes during the first five years under the existing system of Board of Investments incentives.

A food processing project located outside Colombo with a minimum investment size of Rs. 2.5 million and employing more than 50 people will be eligible for a full tax holiday of five years. All inputs will be imported duty free during the project implementation period. The payroll tax for the expatriate staff will be established at the concessionary rate of 15% for a period of three years.

The broiler project meets all of the requirements for BOI incentives. Both the fixed investment and the employment created exceed the BOI requirements by a wide margin.

5.5 Investment Requirements and Profitability

5.5.1. Investment requirements

The total investment requirements of the project include fixed capital investments and permanent working capital. Interest costs during the investment phase are capitalized and are included in fixed capital investments.

Fixed capital investment

There are four distinct units in the proposed integrated unit. These are the parent stock operation, the hatchery based on the capacity of the parent stock unit, feed mill and processing plant. All rearing units are assumed to be owned by the individual farmers and investment in these is not included. A common administration unit manages all four of these units.

Reliable utilities is critical for the whole operation. This is particularly important for hatchery where constant temperatures have to be maintained in the incubators and hatchers as well as cold store where eggs collected daily will be stored for up to one week. It is assumed that all units will be on the same site and will be served by common utilities.

Investment cost estimates are given separately for each of these units. This breakdown and the details of prices given in Table 5.4 is designed to allow calculation of costs for each input and output: i.e. hatchery eggs, day old chicks, feed, and dressed meat. Each of these inputs and products are available in the market and there is an established market price. It would be highly desirable to calculate the costs of each under the project and compare these with the market prices. This will allow assessments of the efficiency of each component of the project and should be undertaken at the feasibility stage.

The estimate of investment requirements (Table 5.4) is based on actual conditions in Southern Area for local costs. This includes building and utilities. The machinery costs are collected from a variety of sources. Major sources of information were Chambers of Industry in Hambantota and Galle, and the Agricultural Enterprise Project of USAID.

All machinery costs are landed costs in Sri Lanka. They generally represent quotations from manufacturers adjusted for transport to Sri Lanka. Under the present BOI scheme, all machinery will be imported duty free. The exception will be a 4.5% defense levy charged on all imports and this is included in the costs presented in Table 5.4.

The range of alternatives is very wide for costs for all investment components. The investor may choose expensive machinery and building materials to reduce costs of maintaining the equipment and to insure high product quality. It is also possible to choose a low cost investment option and aim to compete on product prices.

The low cost option is probably very viable for the processing plant. The same is also true of feed mill, but the need to palletize the feed may be pressing and this will increase the investment costs by an additional Rs. 20 million. All prices should be reviewed and finalized at the feasibility stage.

Building costs are those of standard factories built in Hambantota. They include the provisions for all utilities in the building. The costs of utilities up to the parameter of the site are rough estimates and are based on representative conditions. They would very by a large margin depending on the actual location of the plant and whether basic services are available on that site.

The project is assumed to be on one site for simplicity of calculations. Actually, the project will be advised to acquire many sites for health reasons. The processing plant can not be located near any of the other units to control disease It would be desirable to spread parent stock over many sites to minimize the risk of disease spreading to all breading stock.

Provision has not been made for establishing a cold chain. The processing plant will probably need to establish a system similar to that of milk bars. Under this, the processor designates retail agents who allocate part or all of the store to the products of the company. At present, the cold storage chest is provided by the store owner. It will be a very profitable investment if the processor provided the retailers with these chests. This will not only insure product quality but it will also provide exclusive retail outlets to the processors.

The costs of these chests and the distribution fleet are not included at this stage. These should be explored at the feasibility stage. The feasibility study should also address, in detail, the question of the desired marketing strategy and its impact on retail prices.

Total fixed capital investment costs of a plant that may be built in Southern Area are estimated to be Rs. 57 million, a little over US$1 million. A minimum level of permanent working capital is estimated and included in total investment as discussed below.

Permanent working capital requirements

In addition to the fixed investment, financing is needed for purchase of parent stock birds, their rearing, and the operating costs during this period. Both the feed mill and the processing plant can have potentially very large permanent working capital needs which could exceed the fixed investments by a large margin.

In Sri Lanka, food industry transactions are on a cash basis. In cases where credit is provided, terms rarely exceed ten days and such credit is extended against a bank guarantee. Farmers will be paid cash for broilers against delivery. One month equivalent of raw material procurement

costs would seem to be sufficient for the permanent working capital for these purposes (Table 5.5).

The requirements could exceed those contained by a substantial margin if the feed plant undertakes a desirable level of storage for the feed ingredients. These raw material stocks insure feed quality consistency, and will provide price protection against market fluctuations.

Poultry meat prices also tend to have large seasonal price variations. Cool storage, and possibly blast frozen storing, will be required in the face of such changes. The stock financing requirements of this can also be substantial and these are not included in this study.

Operating costs

The major component of annual operating costs is feed. These are calculated simply at the market value of feed output. The actual cost to the company will be less. It will produce the feed by buying the feed ingredients. The cost of this feed will be less than the market price of finished feed. This is not attempted in this report and finished feed costs are taken to provide some safety against possible adverse price changes. The feed quality and implied composition is also difficult to specify without further details that can be dealt with only at the feasibility stage.

For some items, shortcuts for estimating actual costs were available and these were used. For poultry processing, for example, a custom service is available in the region. It costs Rs. 2.5 per bird to process the birds in the facilities provided by the employer (the integrator). This is the operating cost taken for the processing plant.

In other cases, a rough estimate of the number of workers is made. The wage bill and the social welfare charges are estimated to be Rs. 10,000 per worker per month. The utility costs are estimated from these known parameters. It is likely that the margin of error is small, because these costs are dominated by few items that are based on actual market costs.

Feed alone is 72% of total costs at full capacity utilization. It is over 50% even during the first year of operation. These high proportions of variable costs in total suggest that break-even points are at fairly low levels of capacity utilization (Table 5.3). The full utilization of the capacity could be spread over a number of years if the size of the regional market turns out to be smaller than the estimates.

The profitability of the investment is thus more effected by the relative prices of inputs and products than the full utilization of capacity. The emphasis should be placed on the production of a high quality product at competitive prices rather than full capacity utilization. Cooperation with an established local or international company will thus be highly desirable.

The size and the technology presented in this report probably reflects the lowest possible cost options without sacrificing technical efficiency. Overtime, the company can expand capacity, add new units such as palletising to the feed mill, and develop its own marketing infrastructure.

The initial investment contained in this study is probably too small to attract foreign private capital. It is likely to be undertaken by local industrialists. It is assumed that the entrepreneur will provide 40% of the total requirements as equity and the rest will be borrowed.

The cash flow indicates that there should be no repayment on the principal during the first two years. During that period, interest on the outstanding loan will be capitalized. The principal thus derived will be paid in eight equal installments and all loan will have been paid back at the end of year 10. It is unlikely that commercial banks will provide financing on these terms. Therefore, it is assumed that financing will be provided by a government development bank or through the refinancing facility of the Central Bank at concessional terms.

The rate of interest on the loan is assumed to be 3% above the actual inflation. This convention is adopted to avoid estimates of rates of inflation which could have a major impact on projects. With fixed interest rates, loans can crate large distresses if inflation is controlled. The opposite occurs with rampant inflation and the borrower enjoys windfall gains.

5.5.3 Project profitability

Base case

The project cash flow for the whole investment is given in the first part of Table 5.8. At full development, the project generates revenues of Rs. 67 million and has total costs of Rs. 54 million per annum. The estimated IRR is 22%.

Further analysis of profitability are not undertaken so as not to give a false picture of a high level of precision. This is not the case either for the costs or the prices. Nonetheless, the estimate of 22% is comparable to the financial rate of return. The economic IRR will be over 25% with proper adjustments. These adjustments will include disregarding the defense levy while calculating investment costs. All taxes on payroll and inputs will need to be ignored for the economic analysis.

The major factor that will lead to a lower economic IRR than the corresponding financial figure would be subsidies. There are no apparent subsidies in the poultry industry and no adjustment would seem to be necessary. The only significant item seem to be veterinary medicines given for free by the Ministry of Agriculture. The major beneficiaries of this subsidy seem to be farmers.

Sensitivity analysis

The impact of the likely adverse effects of product and input prices on the project IRR shows the project to be quite robust in terms of profitability. Two cases were investigated. In the first case, we assumed increased competition in the future and reduced the product prices by 10% were assumed, while all other costs remained unchanged. Another case represents a situation where costs are actually higher than those assumed in this report. All investment costs were increased by 10%. The impact of these cases on the IRR was as follows.

	IRR
Base Case	**22%**
Product price fall by 10%	**10%**
Costs increase by 10%	**11%**

The project will lose money if cost overruns and product price fall occurred at the same time. Similarly, a major delay in the pace of project built up will adversary affect the IRR.

At the feasibility stage, analysis should be undertaken separately for each output of the integrated operation: DOC, feed, and poultry meat. The results of these analysis and the studies of the industry structure will allow the entrepreneur to make final decisions on the scale of each component and the extent of desirable integration.

Two further cases could also be analyzed. In these, the analysis would include depreciation in project income since it is included in costs(one should include either depreciation or capital outlays, but not both in " cash out" stream). The other adjustment would be inclusion of permanent working capital charges in the project income after compounding it by the IRR.

Return to equity

The key measures of profitability in not the IRR of overall project, but the return to equity for the individual investor. A separate measure of return to equity is provided in the second part of Table 5.8. The table is constructed by including loans in " cash in " flow. At the same time, operating expenses are increased by interest costs and repayment of the principal. This simulates a case where all charges and income, except owner's equity, is taken into account. The IRR in this case increases to 45%.

It should be stressed that all profits in this report are in real terms. They exclude inflation and are expressed in fixed 1996 prices. The nominal return to the investment will be higher by the rate of inflation. The estimates of profitability in this report are thus very attractive.

5.5.4 Likely risks

The most critical risk in poultry production is disease. This became a problem in 1995. Not only the production suffered but the consumers stopped purchasing chicken under the fear that the disease was contagious.

Poultry production is the most industrialized segment of agriculture. The technical efficiency is very responsive to the quality of feed, genetic capacity of breeding material, and to the quality of husbandry. The government policies affecting input imports are absolutely critical and the industry should have the confidence that these will not change unpredictably. It is impossible to draw foreign capital and know how without this confidence.

The quality of care requires a high level of management expertise. This applies not only to management but to the labor force as a whole. The Sri Lankan labor market regulations may not insure that this labor input is reliably available.

Table 5.1 Production Cost Components in Selected Countries

(Unit: US$ per kg of poulty meat)

	Sri Lanka		USA	China	Thailand	France	Netherlands
	1996	1994					
Chicks	30	38	10.9	13.2	12.9	18.8	21.1
Feed	95	76	48.4	56.6	68.6	75.4	72.9
Other Costs	36	36	49.9	23.4	25.6	64.3	69.4
Total	161	150	109.2	93.2	106.5	158.6	163.4
Feed Prices ($/ton)	340	266	176	289	280	291	298
Selected Indicators: Feed Conversion Ratio	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mortality Rate (%)	5.5	5.6	5.0	5.1	5.7	5.0	4.9
Average Days at Slaughter	42-45		42	56	45	43	42
Weight At Slaughter (Kg)	1.6		1.9	2.6	1.9	1.9	1.8

Source: The Ag-Ent Project, June 1996

Table 5.2 Demand Projections for Poultry Meat in Southern Area, 1995-2015

Item	1995	1996	1997	1998	1999	2000	2005	2010	2015
Population	2,660	2,701	2,751	2,798	2,845	2,894	3,025	3,291	3,375
Formal Market Poultry Meat Consumption (1)	1	1.06	1.12	1.19	1.26	1.34	2.16	3.48	5.6
Total Consumption (ton)	2,660	2,863	3,081	3,330	3,854	3,878	6,574	11,453	18,900
Regional Demand (2)	2,660	2,785	2,916	3,053	3,196	3,347	4,620	6,403	8,848
Target Consumption	5,320					14,470	23,304	37,531	60,444

Assumptions:	1995-2000	2001-2010	2011-2015
Population Growth Rate (%)	1.7		
GRDP (% per Annum)	6	10	8
Market Growth Rate (%)	4.7	6.7	5.7

(1) Based on the Income and population growth parameters given above and income elasticity demand of 1.0
(2) Same as (1) with income elasticity demand of 0.5

Table 5.3 Integrated Broiler Operation: Basic Parameters

	Year			
	2	3	4...	...10
1. Parent stock chicken imports	4,000	6,000	6,000	6,000
Egg production (000 eggs)	250	500	750	750
Day-old chicken production (000)	440	660	660	660
2. Commercial broilers				
Broilers (000 birds)	418	627	627	627
Poultry meat production (000 tons)	535	802	802	802
Meat from spent hens		8	11	11
3. Feed consumption (tons)				
Parent stock	115	228	342	342
Commerical broilers	1,408	2,112	2,112	2,112
4. Broiler processing				
Spent layers (000 birds)		4	6	6
Broilers (000 birds)	418	627	627	627
5. Ratios	2.0	2.0	2.0	2.0
Live weight/broiler (kg)	1.6	1.6	1.6	1.6
Dressing ratio	0.8	0.8	0.8	0.8
Death rate (%)	5	5	5	5

Table 5.4 Investment Requirement of an Integrated Broiler Operation

(Unit: Rs. 1,000)

	Cost
1. Parent stock farm	
a. Rearing Unit	
Land (0.2 ha)	100
Building (600 sq. m)	420
b. Laying Unit	
Land (1.0 ha)	500
Building (1200 sq. m)	840
2. Hatchery	
a. Building (300sq. m)	510
b. Machinery & Equipment	2,500
c. Utilities	700
d. Cool storage	500
3. Feed Mill	
a. Building	4,000
b. Machinery (1)	
Plant (16,000)	16,000
Laboratory	970
c. Raw Material Storage	16,000
4. Processing Plant	
(1500 birds/hr)	
a. Equipment	6,000
b. Building	3,000
5. Utilities	
a. Electricity	1,000
b. Standby Generator	2,000
c. Water Supply	500
6. Project Administration	
a. Buildings	600
b. Office Equipment & Furniture	1,000
Total	57,140

(1) Excludes pelleting unit. This unit would cost an additional Rs 20 million.

Table 5.5 Income and Expenditures of an Integrated Broiler Operation (000 rupees)

(Unit: Rs. 1,000)

	Year				
	1	2	3	4	5
Income					
Sale of Dressed Meat			40125	60730	60730
Other Income (1)			4000	6100	6120
Sub-total			44125	66830	66850
Expenditures					
Investment	57140				
Permanent Working Capital		9566	10000		
Operating Costs					
Broiler Feed			21000	31680	31680
P.S. Feed		2150	4264	6395	6395
P.S. Birds		616	616	924	924
Labor		1800	4745	5300	5530
Slaughter House			1095	1600	1600
Parent Stock/ Hatchery		500	1000	1000	1000
Feed Unit		300	1200	1200	1200
Administration		1000	1500	1500	1000
Utilities		1200	1500	1500	1500
Other Costs		2000	2000	2000	2000
Sub-total	57140	19132	48920	53099	52829

(1) Broken and substandard eggs by-products for rendering.

Table 5.6 Input and Product Prices of an Integrated Broiler Operation

1	Parent Stock	
	Birds ($2.75/bird landed cost)	154.0
	Feed (Rs/kg)	18.7
	Day-old chicks (each)	25.0
2	Feed Mill	
	Feed Ingredients (Rs/kg)	
	Maize	11.0
	Poonac	9.0
	Rice bran	6.25
	Molasses	0.10
	Fish/meat meal	44.8
	Pre-Mix (5%)	28.0
	Concentrate feed (broiler)	50.0
3	Broiler sales	
	Eggs (Rs/100)	275.0
	Live broiler (Rs/kg)	60.0
	Dressed meat	75.0

Table 5.7 Projected Financing Schedule

(Unit: Rs. 1,000)

Year	Bank Loan Received	Interest	Repayment of Principal	Outstanding Loan
1	36,200	1,086	-	37,286
2	6,000	1,118	-	44,404
3	-	1,332	5,500	38,904
4	-	1,167	5,500	33,404
5	-	1,002	5,500	27,904
6	-	837	5,500	22,404
7	-	672	5,500	16,904
8	-	507	5,500	11,404
9	-	342	5,500	5,904
10	-	177	5,904	-

Table 5.8 Income and Expenditure Flows

(Unit: Rs. 1,000 in June 1996 Prices)

A: Total Investment

Year	Income	Expenditure	Net Income
1	0	60,140	-60,140
2	44,125	32,566	11,559
3	66,820	51,520	15,300
4	66,820	54,099	12,721
5	66,820	53,099	13,721
6	66,820	53,099	13,721
7	66,820	53,099	13,721
8	66,820	53,099	13,721
9	66,820	53,099	13,721
10	66,820	53,099	13,721
11	66,820	53,099	13,721
12	66,820	53,099	13,721
13	66,820	53,099	13,721
14	66,820	53,099	13,721
15	66,820	53,099	13,721
16	66,820	53,099	13,721
17	66,820	53,099	13,721
18	66,820	53,099	13,721
19	66,820	53,099	13,721
20	66,820	53,099	13,721

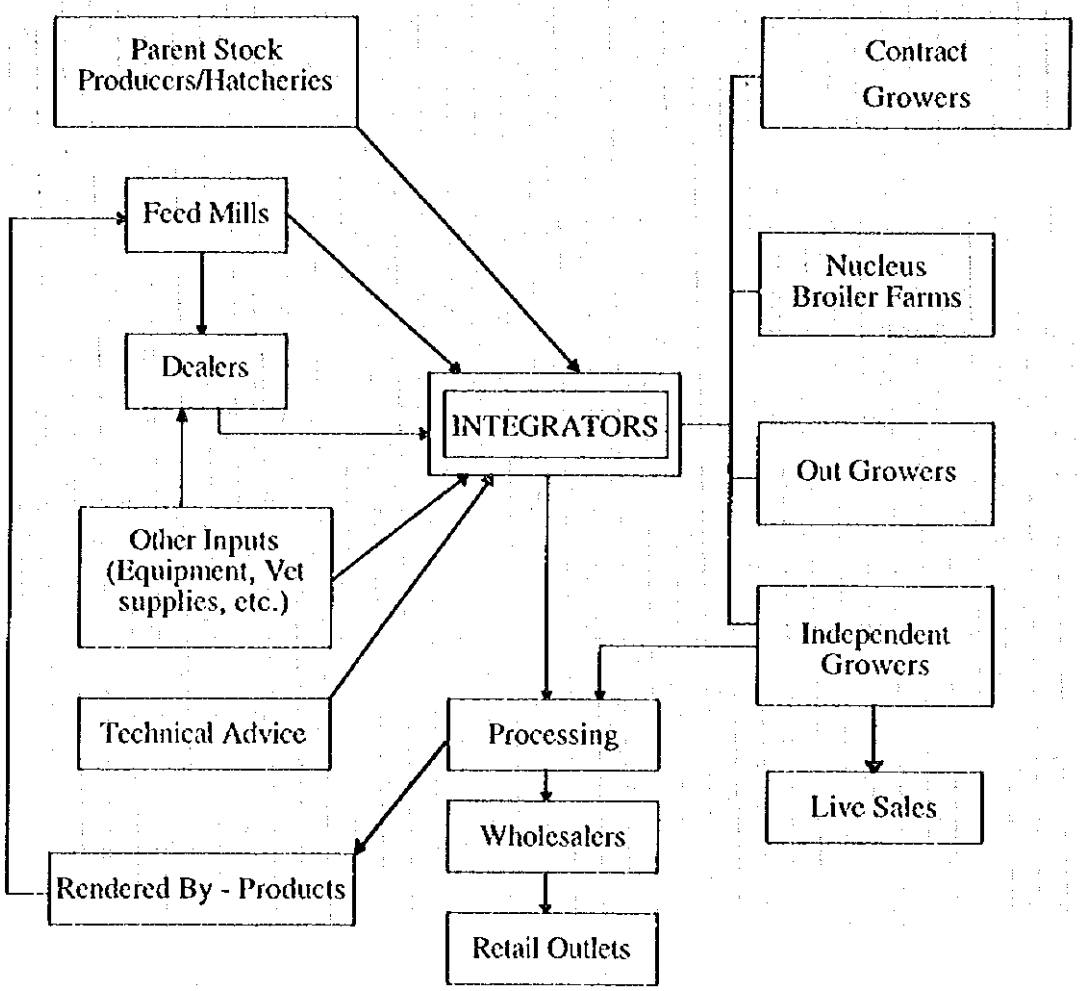
Project IRR 22%

B: Equity

Year	Income	Expenditure	Net Income
1	36,200	60,140	-23,940
2	50,125	32,566	17,559
3	66,820	58,352	8,468
4	66,820	60,766	6,054
5	66,820	59,601	7,219
6	66,820	59,436	7,384
7	66,820	59,271	7,549
8	66,820	59,106	7,714
9	66,820	58,941	7,879
10	66,820	59,180	7,640
11	66,820	53,099	13,721
12	66,820	53,099	13,721
13	66,820	53,099	13,721
14	66,820	53,099	13,721
15	66,820	53,099	13,721
16	66,820	53,099	13,721
17	66,820	53,099	13,721
18	66,820	53,099	13,721
19	66,820	53,099	13,721
20	66,820	53,099	13,721

Project IRR 45%

Figure 5.1 Integration Possibilities and Production Components in the Broiler Industry



Detailed Profiles/ Terms of Reference

PROJECT REPORT

PART 2 DETAILED PROFILES/TERMS OF REFERENCE

1. UMA OYA MULTIPURPOSE DEVELOPMENT

1.1 Background

The Government of Democratic Socialist Republic of Sri Lanka has been placing high priority on the development of Southern Area in pursuing more balanced socio-economic development of the Nation. As part of initial efforts to effect this priority policy, an integrated regional development master plan has been prepared for the Southern Area development to the year 2015 with the technical cooperation of the Japan International Cooperation Agency. The Master Plan has earmarked the Uma Oya Multipurpose Development as one of 27 anchor projects, and recommended a comprehensive feasibility study with environmental inventory and impact assessment to be carried out in the nearest future.

As part of the master planning for Southern Area development, a macro water balance analysis has been conducted by using a geographic information system. The analysis has clarified that the Uma Oya Multipurpose Development, if implemented with a few associated diversion schemes, would resolve all the water shortages foreseen for river basins in the dry zone of Southern Area. These shortages include the existing water shortage in the Kirindi Oya and the Malala Oya basins and additional shortages that would occur if all the irrigation schemes currently planned are implemented.

An existing pre-feasibility study of the Uma Oya project has been reviewed. It has been clarified that an alternative diversion alignment may be possible to enhance the project viability. This alternative will divert the Uma Oya water to the Weli Oya, a tributary of Walawe Ganga. The diverted water may be conveyed by contour canals to the Kirindi Oya. This scheme would naturally integrate the Weli Oya and the Mau Ara diversion schemes currently proposed as component projects of the Uma Oya.

1.2 Objectives

The prime objective of the proposed study is to formulate the most viable and implementable scheme to divert the Uma Oya water for various purposes. The most viable and implementable scheme should incorporate the following:

(1) adequate levels of maintenance flow for the downstream of the Mahaweli basin,
(2) optimal hydropower development scheme,
(3) optimal use of diverted water for irrigation with proper crop cycles, water management and facilities,
(4) minimal adverse environmental effects in the Uma Oya basin, its downstream areas, and Southern Area,
(5) minimal man-animal conflicts over land and water uses, and
(6) adequate social considerations for local people to be affected by the implementation.

Environmental inventory and impact assessment will be conducted as part of the study, covering both social and natural environment. A proper monitoring and evaluation system will be recommended for establishment as the project is implemented. Transfer of technologies related to the environmental inventory and impact assessment, and monitoring and evaluation as well as the engineering analysis and planning for the feasibility study will constitute another objective of the study.

1.3 Project Area

River morphology

The Uma Oya, one of the tributaries of the Mahaweli Ganga, originates from the central highland at the elevation 2,500 m, and flows toward the east first and then the north to join the Mahaweli Ganga at the upstream of the Rantembe reservoir. Proposed intakes on the Uma Oya and its tributary Mahatotila are located near the southern periphery of the Mahaweli Ganga, separated from Southern Area by the escarpment.

The Kirindi Oya and its tributaries, and tributaries of the Walawe Ganga originate in the southern slopes of the escarpment separating Southern Area and the Mahaweli Ganga basin. Both rivers flow southward through gently sloping and undulating terrains and drain in the Indian Ocean. The Malala Oya is flowing between these two major rivers.

Rainfall and runoffs

The upper most Uma Oya basin has annual average rainfall of about 1,890 mm. The annual average rainfall in the Kirindi Oya and the Walawe Ganga basins range from over 2,000 mm in the upper most catchment areas to some 1,200 mm near the coast. The runoff coefficient for rivers in the dry and the intermediate zones of Southern Area is much lower than for the Uma Oya. The runoff coefficient for the Walawe Ganga is about 30% and that for the Kirindi Oya and the Malala Oya is smaller.

Administration

Administratively, the Uma Oya basin largely falls in the southern part of Badulla district in Central province. The upper catchment area of the Kirindi Oya is largely in Moneragala district of Uva province, and its lower catchment area is in Hambantota district of Southern province. The upper catchment of the Walawe Ganga belongs mostly to Ratnapura district of Sabaragamuwa province and Moneragala district. Its lower catchment area is in Hambantota district. The Walawe river mainstream largely demarcates boundaries between the dry and the intermediate zones.

On-going projects

The Kirindi Oya Irrigation and Settlement Project (KOISP) area is located at the lowest reaches of Kirindi Oya near the river mouth to the Indian Ocean. The command area of KOISP is 12,869 ha, consisting of 6,823 ha in the right bank and 6,046 ha in the left bank, including 4,584 ha of old paddy fields fed by five old tanks. Annual average rainfall at this KOISP area is only about 1,000 mm, thus the Lunugamwehera reservoir was newly completed with about 190 MCM of effective storage capacity. The catchment area at this damsite is 914 km^2. This scheme currently faces serious water shortages due to higher than anticipated irrigation water uses and lower inflow into the Lunugamwehera reservoir.

The Walawe Left Bank Irrigation Upgrading and Extension Project is being implemented in stages. Project components include (1) upgrading and rehabilitation of existing irrigation facilities in 2,900 ha, (2) construction of irrigation and drainage facilities for 6,800 ha, (3) land reclamation for 5,240 ha of paddy and upland fields, and (4) provision of infrastructure including 1,200 ha land preparation, schools, medical centers, water supply systems and others. The Walawe basin will reach its in-basin development potential, if this project is fully implemented.

There exist two smaller diversion schemes proposed to solve localized water shortages within the Walawe and the Malala basins. The Mau Ara diversion would involve the

restoration of an ancient tank within the Walawe National Park on the Mau Ara, one of the tributaries of the Walawe Ganga. The purpose of the diversion is to relieve the existing water shortage in the Malala Oya basin. The Weli Oya diversion is designed to alleviate local water shortages and allow minor irrigation expansion in the upper catchment area of the Walawe Ganga.

1.4 Project

The project as originally planned by its pre-feasibility study consists of the following.

(1) Uma Oya intake dam : concrete gravity, height 30 m
(2) Mahatotila storage dam : rockfill, height 100-120 m, effective storage 60-100 Mm^3, high water level El 970-990 m, rockfill volume 6.8-11.5 Mm^3
(3) Headrace tunnel : diameter 3.20 m length 12.2-13.0 km
(4) Hydropower plant: installed capacity 128 MW, annual energy 370-400 MWh, available gross head 570-590m, maximum discharge 28 m^3/sec.

About 30 km long transmission line is required to connect with the Badulla substation. Whether a re-regulating dam is required or not shall be decided by the feasibility study taking into consideration the river conditions in the downstream reaches and social environmental conditions. If a re-regulation dam is required, possibility and economy of additional power generation shall be studied to harness the low head to be created.

The project has been modified subsequently. The project as reformulated involves a 24 km diversion tunnel to the upper reaches of the Kirindi Oya, and a 150 MW underground hydropower station to utilize the gross head of 750 m. The diverted water would be used for irrigation in the Kirindi Oya basin with 4,000 ha upstream of the Lunugamwehera reservoir, 1,350 ha and 2,500 ha committed under the KOISP Phase I and Phase II, respectively.

The Master Plan for Southern Area development has reviewed the existing proposals for the Uma Oya. A reservoir operation study has clarified that some 220 Mm^3 may be available, of which 180 Mm^3 may be diverted, allowing the compensation release to the downstream. The Master Plan has identified also an alternative diversion route to the Weli Oya that may be more viable from an overall development point of view.

1.5 Scope of Works

1.5.1 Phasing of the study

The study may be carried out in two phases as follows:

Phase I : Environmental inventory and comparative study to evaluate alternative schemes, and

Phase II : Environmental impact assessment, and comprehensive feasibility study.

1.5.2 Phase I works

The comparative study includes two kinds of works. One is to evaluate the effects of the Uma Oya diversion on the Mahaweli basin development. This will be done by reviewing the existing Mahaweli basin development plan (1) with, and (2) without the Uma Oya diversion. The other is to evaluate the alternative diversion routes from socio-economic and environmental as well as technical points of view.

The environmental inventory will be conducted covering both natural and socio-economic environment for both the Uma Oya basin and those basins where the diverted water may be used.

1.5.2.1 Inception work

The following tasks will be carried out as the inception work for the period of three months.

(1) Collection, review and analysis of existing study reports, data and information in technical, socio-economic, social and environmental aspects.
(2) Field reconnaissance on the related project areas to identify the locations of the required structure including promising alternatives sites and to delineate the areas and objectives to be surveyed and investigated.
(3) Preparation of general topographic map to the scale of 1/5,000 with 2-meter contours from aero-photos covering the Uma Oya catchment area and areas of proposed project structures, but not covering the river basins in the south.
(4) Determination of alignments for geological investigation and core drilling points.
(5) Preparation of an Inception Report describing findings, and detailed programs for investigations, analysis and studies in the subsequent stage with their purposes, methodology and formulation processes.

1.5.2.2 Detailed surveys and analyses

The second stage of Phase I will be conducted for five months. The following tasks will be carried out.

(1) Topographic mapping and surveys

This task will involve the following:

i) triangulation survey to fix the correct locations of all the required project structures,

ii) bench marks setting survey connecting all the project structures, and

iii) detailed topographic survey and mapping to 1/500 scale with 1 meter contours for the following structure sites:

a. Uma Oya intake dam site including tunnel inlet area,

b. Mahatotila storage dam site including spillway, headrace tunnel inlet site, tunnel outlet from the Uma Oya intake dam, and other facility sites for future construction, such as borrow pit area, quarry sites, and major construction facilities,

c. headrace tunnel outlet sites,

d. proposed penstock line sites,

e. proposed power house, outdoor switchyard and tailrace sites, and

f. re-regulation dam site, if required.

(2) Geological and geotechnical investigations

A ground geological reconnaissance will be carried out by a geologist along the alignment of diversion routes determined during the inception work as well as in the areas of proposed project structures. Core drilling will be undertaken at the points determined also through the inception work. Quantities of core drilling at different sites are:

Uma Oya intake dam site : 30m X 3 = 90m,
Mahatotila dam site : 500m in total,
penstock line sites : 20m x 5 x 2 = 200m,
power house sites : 30m x 4 x 2 = 240m, and
re-regulation dam site, if required : 30m x 3 = 90m,

for a total drilling length of 1,120 m at the maximum.

The results shall be compiled into an Appendix to the Interim Report with the geological maps, geological logs, Lugeon value sections and color photos of all the cores taken.

(3) Investigations for construction materials

Construction materials available in the vicinities of the project structures, such as sand and gravel, rock materials, soil materials and so forth, shall be investigated regarding their quality and available quantity within the economical range of the distance from the structures.

(4) Environmental inventory

Detailed data on natural and socio-economic environment will be collected through the first and the second stages of Phase I. Based on existing study reports, data and information collected and limited field surveys conducted during the inception work, areas and aspects of the environment to be investigated in detail will be determined. Detailed surveys and data collection will be carried out with the participation of local people, NGOs and research institutes. Collected data will be compiled and coded for subsequent use.

1.5.2.3 Comparative analyses and Interim Report

Based on the data collected during the early stages of Phase I, comparative analyses will be conducted, and an Interim Report will be prepared compiling all the outcomes during Phase I. This may take additional two months. The following tasks will be carried out.

(1) Evaluation of effects of the Uma Oya diversion on the Mahaweli basin development.

The existing plan for the Mahaweli basin development will be reviewed. Possible economic effects of the Uma Oya diversion will be evaluated as much as possible in quantitative terms. Possible social and environmental effects to the downstream areas will also be assessed at a preliminary level (the level of initial environmental examination; IEE) based on the environmental inventory.

(2) Comparative analysis of alternative diversion routes

The proposed alternative routes for diversion to the Kirindi Oya and the Weli Oya will be compared from socio-economic and environmental as well as technical points of view. The economic comparison should be quantified based on possible uses of the diverted water under each alternative as well as costs involved.

(3) Preparation of Interim Report

An Interim Report will be compiled including all the outcomes of works during Phase I. It will contain evaluation results of the Mahaweli basin development with or without the Uma Oya diversion, selection of a better diversion route with justifications, possible social and environmental effects at the IEE level, and other technical findings and analytical results.

1.5.3 Phase II works

Through the Phase I works, the maximum allowable level of water to be diverted and the preferred diversion route will have been determined. Taking these as given conditions, a comprehensive feasibility study will be carried out in Phase II together with environmental impact assessment for a period of about 12 months.

Generally, the following tasks will be involved.

(1) Supplemental surveys and investigations to complement the Phase I works.

(2) Formulation of an optimal use plan for the water to be diverted based on the following:
   i) determination of cropping patterns under irrigation and water management system,
   ii) estimation of water demand for irrigation, domestic and other uses,
   iii) determination of canal alignments for water conveyance and locations of related facilities,
   iv) consideration of social and environmental effects including man-animal conflicts, and
   v) complementary use of existing tanks.

(3) Detailed hydro-meteorological analysis to determine high and low flows in the Uma Oya and other related rivers, and reservoir operation studies to determine water yields for different scales of proposed dams.

(4) Formulation of an optimal plan for the Uma Oya Multipurpose Project with sizing of all the major structures and facilities.

(5) Basic design of all the major structures and facilities at a F/S level and cost estimate thereof.

(6) Estimation of benefits accruing from the project implementation.

(7) Economic and financial evaluation of the Project.

(8) Assessment of social and environmental impact of the Project.

(9) Preparation of a Draft Final Report compiling all the results of Phase II works.

The Draft Final Report will be submitted within 10 months from the commencement of Phase II for review by the Sri Lankan side. A Final Report will be compiled within two months from the receipt of comments by the Sri Lankan side on the Draft Final Report.

1.6 Expertise Requirements

This study will require a wide range of expertises as it will involve not only technical analyses and economic evaluation but also social and environmental considerations. Reconciliation of possible conflicts involved in the Project through plan formulation and local participation is also an important part of the study.

To satisfy these complex requirements, a team leader should not only be a senior water resources planner, but he should also have experiences in regional development planning, social development and participatory planning and development. Broad experiences in environmental science are also desirable. The team leader should be supported not only by engineers, geologist and surveyors but also by economists, sociologist and environmentalists.

A desirable team formation may be as follows. Required man-month input is also indicated

	Designation	Man-months
(1)	Team leader (regional water resources development planner)	12
(2)	Hydrologist (deputy team leader in Phase I)	10
(3)	Regional economist (deputy team leader in Phase II)	9
(4)	Sociologist	6
(5)	Environmentalist 1 (water environment)	10

(6)	Environmentalist 2 (fauna and flora)	5
(7)	Dam engineer	7
(8)	Power engineer	6
(9)	Mechanical engineer	4
(10)	Structural design engineer 1 (hydraulic structure)	6
(11)	Structural design engineer 2 (junior)	4
(12)	Geologist	10
(13)	Geotechnical engineer	4
(14)	Construction materials test engineer	4
(15)	Drilling supervisor 1 (senior)	5
(16)	Drilling supervisor 2 (junior)	8
(17)	Construction planner	4
(18)	Cost estimator	4
(19)	Topo survey supervisor 1 (senior)	5
(20)	Topo survey supervisor 2 (junior)	8
(21)	Project economist	6
	Total	137

1.7 Undertakings by the Government

In order to facilitate a smooth and effective implementation of the study, the Government will undertake the following as required.

(1) To assign a counterpart team which includes a full time project coordinator responsible for the field survey works and any matters arising throughout the study period.

(2) To arrange for the foreign experts all necessary immigration procedures such as entry, stay, exit and work permits and exempt them from income tax and charges of any kind imposed on or in connection with the living allowance remitted from abroad and from import and export duties imposed on their personal effects, and instrument and materials necessary for the services.

(3) To provide a sufficient office space with appurtenant furnitures and facilities in Colombo, during the period of the service.

(4) To provide official vehicles with drivers and fuel for execution of the services.

(5) To provide available data and documents, such as reports, drawings, topographic maps, statistics, data and information related to the execution of the services.

(6) To conduct field surveys and investigation of topography, geology, hydrology and environmental aspects including laboratory tests by employing the local firms under supervision of the expert of the study team.

2. SMALL HOLDER INTEGRATED FARMING PROMOTION

2.1 Background

Rainfed agriculture is widely practiced by the small holders sector in Southern Area. In the wet and intermediate zones, major crops in the rainfed agriculture are plantation crops such as tea, rubber and coconuts and minor export crops such as cinnamon, citronella and pepper. These tree crops are cultivated somewhat intensively, and bring a considerable level of incomes to the small holders. On the contrary, the rainfed agriculture in the dry zone is more primitive and its productivity is low comparing to that in the wet zone. Chena cultivation is the major production system in the dry zone. Under this production system, annual crops such as kurakkan, greengram, cowpea and groundnuts are cultivated during Maha season. In general, productivity is low in chena cultivation, and land degradation is an increasing problem due to expansion of chena areas. Beside these annual crops, the small holders usually grow fruits trees (such as banana, mango and papaya) in their home gardens, and many of them raise livestock such as cattle and buffaloes. However, productivities of fruits and livestock are also very low in the dry zone.

Livestock in the dry zone is raised as an insurance against drought that frequently occurs and reduces crop harvests. In recent years, however, grazing lands are decreasing due to increase of settlements. Use of crop residues and by-products for feeding is not a common practice, although those are available to a certain extent even in the dry zone. Most small holders allow free grazing for livestock raising. As a result, conflicts between crop agriculture and livestock are increasing.

Based on 1982 Agriculture Census, the number of small holders engaged in the chena cultivation in the dry zone districts (Hambantota, Moneragala and Ampara) is estimated at about 48,000 holders or about 51% of the total small holders (94,000 holders), and they cultivate about 42,000 ha of uplands. The average size of land is thus estimated at about 0.9 ha per small holding.

The present rainfed agriculture in the dry zone should be improved for bringing higher overall productivity and incomes. To do this, better combination of crops and livestock should be developed in more integrated manner based on area specific conditions. Better management system for grazing lands should also be developed and introduced. There is a potential for development of grazing lands in and around abandoned tanks which may keep

soil moisture longer than other rainfed areas even in the dry season. Once proper production systems are established, rainfed agriculture in the dry zone can be expanded to the potential prime uplands available for about 9,000 ha.

2.2 Description of Program

The program aims at enhancement of the existing rainfed agriculture in the dry zone in sustainable manner, and expansion of improved production systems to the potential lands for new rainfed agricultural development. Specifically, objectives of the program are as follows:

1) To establish integrated farming systems for small holders by combining livestock and crop cultivation for higher overall productivity and incomes, and
2) To protect rural environment in the dry zone from soil erosion and degradation by minimizing wastes and extensive agricultural practices.

Since domestic water supply is a prerequisite for the development of rainfed agriculture, this program would be implemented covering priority areas where domestic water supply is promising. In the case of new lands development, therefore, this program would be implemented in accordance with the progress of another proposed project of Groundwater Development in SEDZ.

In the first stage, a study would be carried out covering the existing and potential rainfed agriculture areas in the dry zone districts of Hambantota, Moneragala and Ampara. The study would clarify, among others, present production systems and technologies, availability of new technologies, new research works required for the development, potential for domestic water supply, and potential for grass land development. As a result of the study, priority areas for the pilot scheme development would be selected among potential areas. The priority for the pilot scheme development would be given to the existing rainfed agriculture areas where domestic water is available and grass land development is promising. Organizational aspects of the existing FOs or potentials for further development would also be an indicator for priority ranking. The study and planning would be carried out for one-year period.

In the second stage, the pilot scheme development would be carried out through farmer participation for about 10 schemes. The major works would be the development of proper supporting system to be provided by relevant agencies and the establishment and

strengthening of FOs. Construction works for improvement of domestic water supply systems and renovation of abandoned tanks for grazing land development would also be carried out. A consultant team would be hired to assist technically the construction works and institutional development which would be carried out by the executing agency and FOs. In parallel with the pilot scheme development, proposed research works would be commenced for the development of improved cultivation technologies and introduction of new varieties of annual crops and fruit trees. One year would be required for this development stage.

In the third stage, the pilot schemes would be operated with intensive supply of supporting services from the existing supporting agencies such as provincial agriculture and livestock in cooperation with DAPH, DOA, DEA, Land Commissioner and Faculty of Agriculture in University of Ruhuna. Demonstration farms would be established in each scheme area through farmer participation. Improved technologies including new varieties of fruit trees and crop combination would be demonstrated in the farms. The consultant team would be responsible for planning and monitoring of the pilot scheme operation. The proposed research works would be carried out continuously in this stage. This pilot scheme operation would be carried out for 5-year period.

In the fourth stage, improved production system to be established in each pilot scheme would be expanded to the other priority areas through providing well coordinated supporting services from relevant agencies. Some of new crop varieties (both perennial and annual crops) and proper technologies for the cultivation would be developed by the research institutes. These results would also be introduced to the pilot schemes and other priority areas. This expansion stage would need for another 5-year period.

Among the above four stages of the program, the first three stages would be a special project called "Small Holder Integrated Farming Promotion Project". Through implementation of the project, it is expected that the relevant supporting agencies including research institutes would have sufficient capability for the continuation of this program for operation of the forth stage program in well coordinated manner.

2.3 Program Components

The program, to be implemented over the 7-year period, would consist of the following components:

1) Study and planning,
2) Research works
3) Pilot scheme development, and
4) Pilot scheme operation.

(1) Study and planning

The proposed study would be carried out covering the following aspects:

1) Existing production systems in the rainfed agriculture,
2) Priority area selection for pilot scheme development based on soil, topography, water availability, farmers intention for the development, etc.,
3) Research requirements for rainfed agriculture development,
4) Possible production systems for pilot scheme development using readily available crop varieties and technologies (including tree crops, annual crops, forage trees, livestock, combination of crops and livestock, use of crop residues and by-products, bio-gas and organic fertilizer making, etc.),
5) Institutional establishment plan for pilot scheme development and operation,
6) Farmer organization development plan for construction, rehabilitation, marketing, rural credit, etc. by farmers themselves,
7) Training plan for farmers and FOs,
8) Construction plans (including design) for domestic water supply system improvement and abandoned tanks renovation for grass land development, and
9) Implementation plan for pilot scheme development.

The study would require in total 72 man-months of experts. Required input man-months of each expert would be as follows.

	Designation	Man-months
(1)	Team leader	10
(2)	Agronomist	10
(3)	Livestock expert	10
(4)	Agro-economist	5
(5)	Rural planner/sociologist	10
(6)	Institutional expert	6
(7)	Pedologist	5
(8)	Hydrologist	6
(9)	Hydro-geologist	5
(10)	Civil engineer	6
	Total	73

(2) Research works

Research works would be undertaken by the relevant research institutes including the Faculty of Agriculture, Ruhuna University. Important research works would be adaptability tests or trials for readily available crop varieties and production technologies in other countries or regions where climate is similar to SEDZ. Readily available technologies for bio-gas equipment and organic fertilizer making would also be tested by the relevant research institutes.

(3) Pilot scheme development

Ten pilot schemes would be developed in selected potential areas. The sub-components of pilot scheme development would be as follows:

1) Development of proper supporting system through establishment of close coordination and cooperation linkages among relevant agencies (including these for extension, AI, animal health care, credit, input supply and marketing),
2) Establishment and strengthening of FOs,
3) Training of farmers and FOs in FO management, production technologies, marketing, etc.,
4) Establishment of demonstration plots,
5) Implementation of land titling program for land registration, if it is required,

6) Construction works for improvement of domestic water supply system and abandoned tank renovation, and
7) Consultancy services for technical assistance for institutional development, construction works and preparation of monitoring plan.

(4) Pilot scheme operation

The sub-components for the operation of five pilot schemes would be as follows:

1) Operation of demonstration farms,
2) Production and distribution of seeds and seedlings to FOs and farmers,
3) Farmers/ FOs training for improved production technologies and FOs management, and
4) Consultancy services for technical assistance for the above operation and monitoring.

2.4 Implementing Arrangement

The executing agency of the study would be SDA. SDA would hire a consultant team for its implementation. Technical staff from relevant agencies such as Provincial Councils, DAPH, DOA, DEA, Land Commissioner and Faculty of Agriculture in University of Ruhuna would organize a counterpart team for the study.

Provincial Ministries of Livestock in the related provinces would be the implementing agencies for the development of pilot schemes. Each Provincial Livestock would hire a consultant team who provides technical assistance for institutional development, construction works and monitoring planning. The pilot scheme operation would also be carried out under this organizational arrangement.

A project coordination committee would be established in each province for smooth implementation of the project. The committee would be chaired by a provincial secretary. The committee members would be provincial and districts representatives from Agriculture, DEA, Land Commissioner, Angunakolapelessa research station and the Faculty of Agriculture in University of Ruhuna.

2.5 Project Costs

Only the cost required for the study is roughly estimated at Rs. 8.0 million assuming that local consultant costs would be Rs. 110,000 per man-month and all experts of the consultant team would be local consultants.

3. MARINE FISHERIES COMPLEX DEVELOPMENT

3.1 Background and Rationale

Marine fishing is an important economic activity in Southern Area providing direct employment to over 20,000 persons, with dependent fishing households of around 15,000 located in the coastal areas of Galle, Matara and Hambantota districts. In addition to direct employment, other employment is provided through activities such transport, marketing, ice production, boat workshops and net manufacture. The total coastal fish production of Southern Area was 45,617 tons in 1995 contributing about 30% to the national coastal fish production of 157,500 tons. In Sri Lanka, around 65% of the animal protein are from fish, and per capita domestic supply is decreasing, because of a domestic supply gap aggravated by ethnic disturbances and decline in the coastal fish production. Prospects for development of the offshore and deep-sea sector to supply protein are good, and therefore should be supported.

In 1995 the total number of operating fishing fleet in Southern Area was 5,198: 1,085 in Galle district, 2,023 in Matara district and 2,090 in Hambantota district, accounting for about 20% of the fishing fleet (18,985) in Sri Lanka Of the 5,198 fishing vessels, 2,010 (39%) are non-mechanized, 1,876 (36%) mechanized with outboard engines, 493 (9%) day boats with in-board engines and 819 (16%) multi-day boats. The existing fleet structure distinctly reflects an over-concentration of coastal boats. The present yields of small coastal pelagic fisheries are very close to the maximum, and the increase in yields would not result from the increasing the effort in coastal fisheries. The presence of 4,379 (84%) fishing vessels excluding the multi-day boats in Southern Area, cannot be the vehicle for a rapid increase in coastal production, in view of the decline in coastal fisheries resources and their limited range operations. It is therefore necessary to exploit the off-shore fishery.

The Government has built fishery harbours and related facilities including on-shore facilities to service the fishing industry. Of the total number of 11 fishery harbours in Sri Lanka, five harbours are located in Southern Area: namely Galle, Mirissa, Puranawella, Tangalle and Kirinda . Some of the on-shore buildings and facilities are in ruinous conditions with no maintenance or management. There are about 27 major anchorages in Sri Lanka, of which 12 are in Southern Area. Constraints and issues in the marine fisheries are basically related to the poor infrastructure and inadequate on-shore facilities as well as the inadequate knowledge of the resources, low levels of skills and technology.

Rehabilitation works are underway at the initiatives of the Government, but only in selected harbours and anchorages, and their scope is inadequate.

3.2 Objective and Main Features

The main objective of the marine fisheries complex development would be to assist in the development of off-shore and deep sea fish resources. Specifically, the objectives are:

- to allow some of the coastal operating fishermen to switch to more potential areas and improve their income;
- to improve fishing vessel operations, enabling fishermen to speedily locate fish, allow them longer fishing hours and carry sufficient ice for better preservation;
- to increase productivity through modern and appropriate technology in catching, handling and processing;
- to improve the quality of fish through education for better handling of fish from catch to market, and thereby adding value and increase in export; and
- to enhance or attract private sector participation in the development of relevant infrastructure.

The main features of the project are:

- Introduction of large fully equipped off-shore fishing vessels for exploiting pelagic species such as tuna, skipjack, billfish, etc.;
- Rehabilitation of the selected harbours;
- Upgrading of anchorages to fishing harbours;
- Provision of associated facilities at these locations;
  - slipways and cranes and winches,
  - boat repair yards and engine repair workshop,
  - marketing hall,
  - net mending sheds,
  - ice plants/cold stores,
  - fuel supply and storage tanks,
  - water supply and storage tanks,
  - management office and stores,
  - boundry walls or fences and security gates, and
  - access roads;
- Upgrading of the Tangalle Regional Fisheries Centre;

- Provision of electronic, communication and safety equipment;
- Training of off-shore skippers, engine and radio operators;
- Establishment of processing facilities for deep-frozen fish and prawns;
- Establishment of related industries such as packaging materials, fishing nets and gears, boat building and repair, plastic fish transport boxes, etc.;
- Fisheries resources research and study with associated facilities to conduct the following survey/research using a research/survey vessel (>50 tons) to be based in Tangalle:
  - resources survey continually,
  - MSY,
  - fishing methods and seasonality of fish species, and
  - training for navigation and fishing methods.

3.3 Location

The location proposed is Tangalle, where there is an existing harbour and a fisheries training center. Also Tangalle is ideally situated more or less in the center of Southern Area.

3.4 Project Cost

The estimated cost would be about Rs. 600 million.

3.5 Implementation Schedule

The implementation is to be in two phase; in Phase 1 rehabilitation works and upgrading would be carried out for those existing harbours and anchorages that are not included in the on-going ADB fisheries sector study. This would necessitate some coastal engineering survey for the selection of the anchorages. Provision of associated facilities are also included in this phase. In Phase 2 a marine fisheries development complex would be established.

(1) Phase - 1: Short to medium term (1997-2000)

- Coastal engineering survey to identify anchorages for upgrading to harbour, especially
- Physical Rehabilitation of the selected harbours

- Upgrading of anchorages to fishing harbours
- Provision of associated facilities at these locations

(2) Phase - 2: Medium to long-term (2001-2010)

The Marine Fisheries Complex is to be located in Tangalle linking with other fishery harbours and anchorages in Southern Area, and to be equipped with port facilities and on-shore facilities, ice plant/cold store, marketing facilities, processing facilities, communication facilities, marine research and training facilities, boat yards and repair workshop, etc.

3.6 Implementing Agency

The Implementing Agency would be CFHC, and close liaison with the relevant departments in MFAR, NARA, etc. should be maintained. A project advisory committee would be set up with representatives of relevant departments.

4. INTEGRATED WATERSHED MANAGEMENT IN THE WALAWE AND KIRINDI OYA BASINS

4.1 Background

Water shortage in the dry zone can be seen in two different levels. First, increasing population in the dry zone together with resettlement projects have caused severe illegal encroachment on tank catchment areas. Cattle/buffalo freely grazed around tanks destroy bunds and canal systems. Land degradation on the catchment areas and damage by animals shortened life period of tanks. Some of these tanks were abandoned or do not provide sufficient water for agricultural production. Moreover, malmanagement of tanks resulted in lowering of water level in wells around the tanks.

Second, unclear water right creates conflict between upstream and downstream communities. Resettlement projects with large tank development in the downstream overestimated available amount of water for irrigation. However, agricultural potential recognized by upstream communities especially in the Kirindi Oya basin requires more river water for cultivation. Expansion of lift irrigation undertaken by people living in riparian zone makes water shortage severe in the irrigated areas of downstream. Considering water right for people who live in riparian zone, lift irrigation can not always be illegal. Moreover, their activities are more efficient in water use than irrigated paddy in the downstream.

In order to solve the problems, several diversions have been proposed. However, diversion schemes are costly and may create another conflicts among people who live in different part of the river basins. In order to avoid unnecessary conflicts, in-basin development should be pursued with integrated management for both land and water in the context of watershed.

Presently the Shared Control of Natural Resources (SCOR) project has been implementing as a research-action project for integrated watershed management. Although the SCOR project is on a pilot basis with two small watersheds in the wet and dry zones, the integrated package with technology, organizations and resources have been yielding useful results. In addition, the on-going Institutional Strengthening for Comprehensive Water Resource Management project is to develop a national water policy, amend water-related legislation, and reorganize and strengthen the management of water sector institution. However, comprehensive planning in selected watersheds is not yet conducted.

The Walawe and the Kirindi Oya basins are typical dry zone watersheds in Sri Lanka which contain large reservoirs as well as many abandoned tanks. Integrated watershed management in these watersheds will enable to gain the most important experience applicable to other basins in the Country. Tank renovation, conservation farming and participatory forestry should be promoted as a package with appropriate technologies for efficient water use, proper legal commitment for land and water management and sufficient economic incentives to local people.

4.2 Objectives

The goal of the project is to demonstrate proper land and water resource management in the context of watersheds. A land use management plan based on wise use of water will be formulated through discussion among government agencies and representatives of each divisions and local communities.

The objectives of the project are presented as follows.

1) To establish institutional mechanism for an integrated watershed management;
2) To formulate land use management plans for the watersheds;
3) To develop guidelines/strategies in order to promote better land and water resource management and improve productivity and water use efficiency; and
4) To promote and implement specific sub-projects for better land and water resource management in the watersheds.

4.3 Project Components

(1) Project planning

The project will spend significant time for planning. Top-down and bottom-up planning will be conducted in order to establish consensus for better land and water resources management. In order to establish national consensus, a National Steering Committee will be formulated with relevant government agencies. Local coordinating committees will be created to encourage local participation in the planning process. Many workshops will be held in district/village level to make local people understand and participate in the project.

(2) Formulation of land use management plan

Bio-physical and socio-economic survey will be conducted to analyze existing natural conditions and land/water related problems and potential for the watersheds. Future water demand and supply for the basins will also be estimated. Based on these surveys and analyses with national, regional and local level planning, a land use management plan will be prepared by technical experts and representatives of local communities. The land use management plan will indicate a potential land use for efficient water resources management. The plan may include relocation of existing houses located at critical sites and legalization of encroachment with commitment to follow the project policy.

(3) Development of guidelines/strategies for wise water use

In order to promote the better land use suggested by the land use management plan, specific strategy will be elaborated. The strategy will include 1) prioritizing renovation/rehabilitation of abandoned tanks with strengthening farmers' organizations for maintenance, 2) technical assistance to farmers, local communities and NGOs concerning conservation farming on the upland for rainfed agriculture and participatory forestry on degraded land, slopes and tank catchment areas, and 3) creating awareness to cattle owners about damage of tanks by animals with appropriate punitive actions. In addition to the strategy, innovative models with efficient water uses will be studied. Land and water related legislation to support the strategy such as land lease and water right will be discussed with implementation of the Institutional Strengthening for Comprehensive Water Resource Management project.

(4) Implementation of selected schemes for in-basin development

The following five schemes will be implemented in the project.

Tank renovations

Tank renovation/rehabilitation will be promoted based on water potential and capacity of organizations for maintenance. The renovation includes strengthening bunds and improvement of water distribution systems.

Conservation farming

Conservation farming such as soil protection and mulching will be promoted at the especially important areas.

Participatory forestry

Participatory forestry will be promoted on critical areas such as catchment areas and bunds of tanks. Tree species which do not affect bunds and provide benefit to local communities will be selected. Ecological improvement for riverine forestry and associated wetlands will be introduced.

Livestock

Awareness programs will be conducted to cattle owners in order not to damage irrigated infrastructure. Appropriate punitive actions will be taken against offenders.

Model sub-project

Several models with new innovative technological schemes in tank management will be studied in the project and attempted with voluntary farmer groups.

4.4 Implementating Schedule

Project duration consists of two years for planning among government agencies and formulating land use management plans and strategy, and five years for implementation with mid-term evaluation.

4.5 Implementation Arrangement

The project will work at four different levels: national, provincial, watershed and subwatershed levels.

A National Steering Committee to be chaired by SDA will be formulated with provincial councils, divisional secretaries, related government agencies including Central Environment Authority, Agriculture Department, Forest Department, Irrigation Department, Department of Wildlife Conservation, Land Commissioner, Universities specialized in the subject and representatives of local NGOs to improve policies and processes and oversee the project implementation at the national level.

A provincial steering committee is to coordinate between different provinces and strengthen their institutional capacities. Local coordinating mechanism created under SDA will work for each watershed to discuss land and water conflicts between communities located at different part of watersheds. Sub-watershed committees will be formulated for

each sub-watershed by representatives of each division and local farmer1s organizations to study and analyze detail of the problems in the sub-watersheds and implement practical plan at the sub-watershed level.

4.6 Project Costs

The project will cost US$ 2 million for planning and formulating the land use management plan and US$ 4 million for project implementation.

5. ECO-TOURISM DEVELOPMENT IN THE KDN FOREST COMPLEX

5.1 Background

Sri Lanka has the highest biodiversity per area in Asia. The rate of endemic species is particularly high in southwest lowland rainforests. Based on the result of Conservation Reviews, conservation forests where non-extractive use is only allowed have been selected from forest reserves for biodiversity conservation. In southwest lowland rainforests, the largest remaining natural dense forest other than the strictly protected Sinharaja World Heritage is the Kanneliya, Dadiyagala and Nakiyadeniya (KDN) forest complex. The KDN forests are considered an area of exceptional endemicity as 17 % of the wet zone lowland endemic flora is confined to the southwestern front range forests, of which the KDN forests are the most prominent. The biodiversity surveys indicate that the species richness and diversity of flowering plants are still relatively high in the KDN forests though much of the resource value was destroyed by logging.

Presently Sri Lanka is suffering from high unemployment rate. Many people including educated youth are looking for jobs especially in the south. Tea and rubber cultivation is the main industries in the southwest wet zone. At present, the KDN forests are facing risk to be encroached for expansion of tea production.

The KDN forest complex is an ideal place for tourists from Colombo to stay overnight and as a day-trip from Galle or Hikkaduwa to enjoy nature. In order to increase awareness to nature conservation, people who are interested in nature including tourists should have opportunities to enjoy rainforests. At present no good accommodation is available in lowland forest area. Tourists who want to stay there have only choice to stay in the Sinharaja Kudawa camp with permission from the Forest Department (FD). In the KDN forests, there are several destroyed and abandoned bungalows which used to be owned by the State Plywood Corporation (SPC). Roads to these bungalows in the forests are relatively good though five bridges need to be reconstructed.

A conservation management plan for the KDN forests was prepared by IUCN and FD in April 1995 proposing construction of a conservation center and visitor lodges. However, implementation of the plan has not yet materialized.

5.2 Objectives

The objectives of the project are presented as follows:

1) To conserve biodiversity of the KDN forests;
2) To create job opportunities by tourism development for villagers who live in the vicinity of the KDN forests; and
3) To promote environmental education of villagers as well as visitors to the forests.

It is important to recognize that eco-tourism is a part of conservation activities. Therefore, the primary objective of the project is conservation, not tourism development. In general, three conditions are regarded to be important in eco-tourism: 1) nature conservation is the primary objective; 2) local people are empowered through the process of participation in the project; and 3) education is one of the important components in the project. Local communities are expected to be empowered through the project implementation and gain capacity to manage forested areas, and provided income from newly started tourism activities. The facilities constructed by the project are largely used for environmental education.

5.3 Project Components

The project will create tourism activities in the KDN forests with participation of local communities. The project will be designed by FD together with local communities. Several workshops will be held to organize a group for the project before the actual construction of tourism facilities. Infrastructure needed for tourism such as roads, hiking trails, bridges, conservation center and visitor lodges will be constructed or renovated based on the zoning of the management plan.

(1) Participatory planning

Participatory planning will be conducted in the project. Leaders of villagers who live in the buffer zone of the KDN forests are invited to participate in workshops. Three steps of workshops are held: 1) workshops to figure out the needs of the villagers, 2) workshops to inform villagers of ideas of the project, 3) workshops to organize groups to work for the project. FD organizes these workshops. A new community based organization is expected to be established for management of the project.

(2) Infrastructure development

Conservation center

This center would be designed to serve as:

- a focal point of the walking track system,
- the principal base for management operations and education center with programs for children, local adults, government and private enterprise officials, tourist groups and casual visitors, and
- a venue for extension, training and demonstration meetings related to the forest and buffer zone.

Visitor lodges

Visitors lodges will be constructed for accommodation; one near the entrance next to a nursery station and the conservation center and the other near the destroyed SPC circuit bungalow.

Visitor's shelter

Day trip visitor shelter is to be constructed near the second visitor lodge.

Bridges

Five abandoned bridges between conservation center and second visitor lodges are to be renovated.

RFO, BFO office and quarters

Office and quarters for a range forest officer and three beat forest officers will be constructed.

Boundary demarcation

Clear boundary along the KDN forests will be marked with local participation. Boundary inside the forests for zoning will be determined in the planning phase.

(3) Education, extension and research

Education and extension

Facilities constructed by the project is widely used for child education and training for local villagers.

Research

Research is conducted with project implementation. The important research topics are restoration and rehabilitation, participatory forestry, multiple-use forest research , conversion of mono-culture plantation to mixed cropping systems, human impact on forest, etc.

(4) Conservation Trust Fund

The Conservation Trust Fund is established to maintain the forest. Income to the fund includes visitor entrance fees, accommodation fees at the lodges, a proportion of the fees earned by guides and rangers, royalty from pine resin tapping, license fees to harvest forest products etc.

5.4 Implementation Schedule

Project duration is five years: Phase I for identification of local organizations and participatory planning (0.5 year), and infrastructure development (0.5 year); Phase II (2 years) to promote initial tourism activities until the first evaluation and Phase III (3 years) for further implementation.

5.5 Implementing Arrangement

As the forest department does not have jurisdiction over the buffer zone village lands, every intervention in this zone should be done in collaboration with the rural development programs identified by the District or Divisional Secretariats for effective participation and to avoid duplication of efforts.

The KDN Forest Management Committee will be formulated to direct management of the project. The member of the committee includes divisional forest officer in Galle (convenor), secretary to the Southern Provincial Council, secretary to the Southern Development Authority, secretaries of the relevant divisional councils, regional director of tea smallholding council, representative of the rubber extension services, range forest officers (Thawalama and Akressa), representative of the Tourist Board, and representatives of local NGOs and CBOs.

A local implementation committee will be established with range forest officers (coordinators), representatives of local NGOs and CBOs, and project assistants.

5.6 Project Costs

Project costs for five years are estimated as follows. Total project cost is approximately Rs. 32 million.

	(Unit: Rs. 1,000)
Participatory Planning	1,000
Road Repair	3,00
Bridges	3,00
Conservation Center	3,600
RFO Office and Quarters	1,500
BFO Office and Quarters	3,000
Visitors Lodges	4,000
Visitor1s Shelter	350
Vehicles	3,000
Education and Extension	1,500
Boundary Demarcation	5,500
Research	2,000
Technical Assistance	2,000
Monitoring and Evaluation	1,000
Conservation Trust Fund	1,000
Others	2,000
Total	32,050 (U$ 562,000)

6. TOURISM PROMOTION PROGRAM

To promote tourism not only in Southern Area but throughout Sri Lanka as well, the Ministry of Media, Tourism and Aviation, the Ceylon Tourist Board (CTB) and other organizations under the jurisdiction of the Ministry must undertake promotion activities with full understanding of the factors which influence tourism, as outlined in Part 2 Tourism, Sector Report 2. For promotion purposes, it is also important to emphasize so-called soft factors: hospitality, high-quality services, and activities to expedite the implementation of the proposed projects.

6.1 Exit Surveys

It is strongly recommended to continue the ongoing promotion programs as proposed by the CTB/UNDP master plan. Of particular importance is that people involved in the programs, CTB officials or hotel employees or like, are fully aware of the positive images of Sri Lanka in the eye of foreign tourists and feel self-confident about their own Country.

Also important for such programs are accurate statistics and information. CTB statistics are generally satisfactory. Attributes of foreign visitors are well documented so that CTB can practice market segmentation. However, in order to make promotional activities more effective, some more detailed information about the tourists is necessary: for instance, foreign tourists' country of origin, age, sex and occupation; whether they are members of group tours or in couples; which parts of Sri Lanka they visit and why.

For this purpose, it is essential to conduct exit surveys regularly. Foreign visitors leaving from the Colombo International Airport are surveyed once a month, twelve times a year, about their itinerary in Sri Lanka along with their attributes. To improve data accuracy, it is advisable to conduct the survey twice a month during the tourist season.

6.2 Activities to Enhance Popular Awareness of Tourism

In order to carry out tourism promotion in Sri Lanka as a key national policy, it is important to take steps to help the entire population correctly understand the nature of tourism and take pride in the Country's cultural heritage. People's awareness should be raised to such a level that they welcome tourists with hospitality while not accepting improper activities some tourists are engaged in. Two programs are recommended for CTB to implement to achieve the goal.

(1) Tourism Awareness and Training Program for School Teachers

Purpose:	To nurture a new generation of people aware of their Country's merits and able to talk to foreigners about their Country.
Subjects:	Factors influencing tourism activities; importance of the tourism industry and of the people engaged in it; effects of tourism on the national and regional economies.
Activities:	Despatching instructors to teachers' colleges and to in-service seminars attended by experienced teachers.

(2) Tourism Awareness Raising Program for NGOs

Purpose:	To enlighten people about the value of locally initiated tourism development and about the linkage relationship between tourism development and other sectors' projects.
Subjects:	National and regional benefits of tourism development, particularly direct and indirect effects on employment and income, and its multiplier effects.
Activities:	Stronger representation of CTB in SDA programs and CTB's participation in meetings with NGOs held by SDA.

These programs will not require a large investment and still be the most effective means to achieve the intended goal of enhanced awareness. They should begin immediately and be continued indefinitely.

6.3 Improving Service Techniques

Improvement of service techniques is an indispensable element of tourism promotion. If levels of services are high, tourists may feel satisfied even if the hotel charges are a little higher or the facilities are old. Tourists who leave Sri Lanka with a sense of satisfaction will surely join the reserve force of repeat visitors. They at the same time will become the most effective representatives of Sri Lanka as they encourage their friends and acquaintances to visit the Country. Their word-of-mouth public relations will very effectively help increase tourists to Sri Lanka. High-standard services are the best means to take advantage of this potential.

Essentially, good service derives from continuous adherence to the following principles by service personnel dealing with tourists.

Fundamental ideas:	- The guests come first. - All guests are equal.
Fundamental actions:	- Deal with guests with a smile. (Particularly reassuring to tourists.)
	- Be clean. - Fulfill their desires precisely. - Fulfill their desires promptly. (Giving a sense of satisfaction.)
	- Fulfill their desires quietly. (To sustain their sense of satisfaction.)
Learn to speak English politely:	- Makes tourists feel good.

As a way to train hotel workers etc., with the above service techniques, it is highly recommended to call in experts from countries with advanced hotel industries. The experts are stationed at the hotel schools to train CTB instructors. The instructors are then dispatched to individual hotels and tourism facilities to provide on-the-job training to their staff workers. The training focuses on how to practice the fundamental ideas and actions described above and on improving the trainees' English speaking ability. It may be worthwhile to emphasize again that the level of service skills will directly affect whether or not a hotel investment proves successful.

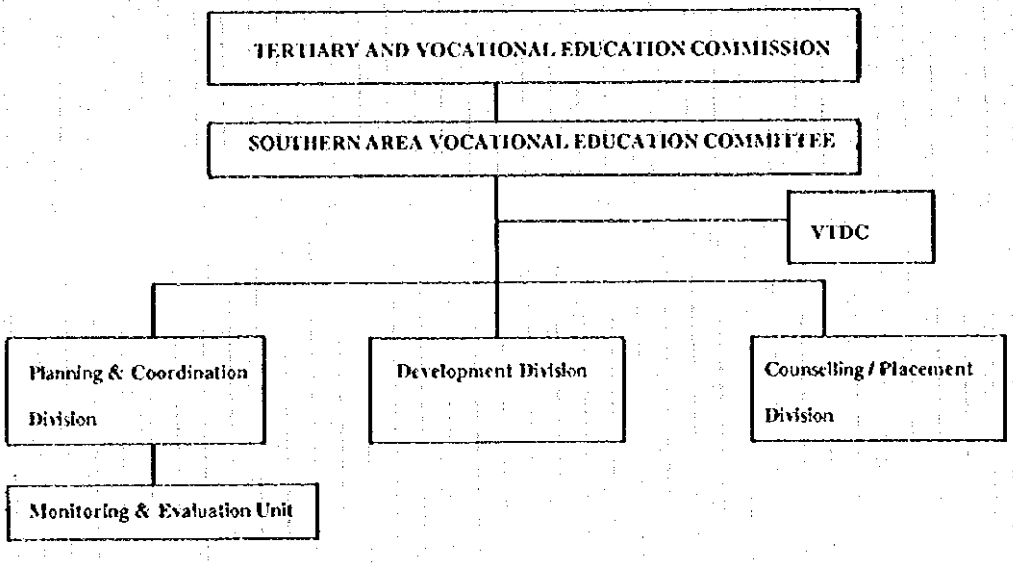
7. SOUTHERN AREA VOCATIONAL EDUCATION COMMITTEE

7.1 Project Rationale

The existing organization of technical and vocational education is characterized by a number of weaknesses, including vague responsibility, lack of coordination and integration, inflexible and overly centralized decision making, inefficient resource allocation, low staff capacity, and lack of information. A Southern Area Vocational Education Committee (SAVEC), to be located at Matara, will help overcome these deficiencies. SAVEC, under the Tertiary and Vocational Education Commission (TVEC), will have clearly articulated responsibility to coordinate technical and vocational education and assure that training is of industry standard. It will maintain a two way support system by contributing staff capacity to the central TVEC, while at the same time representing Southern Area's unique characteristics and needs. It will achieve consensus by acting as the link between government programmes, employers and workers to ensure a smooth transition from a government sponsored to a market maintained system.

7.2 Internal Organizational Structure

The recommended organizational structure for SAVEC is shown below.



7.3 Responsibilities

SAVEC will serve as TVEC's arm in Southern Area. It will expedite the time consuming tasks of gathering and analyzing information, consulting and consensus building that are needed to vitalize planning, coordination and regulation. Its recommendations to TVEC will be based on a thorough understanding of Southern Area's needs, thus reducing the time for approval and facilitating early actions. Specific tasks are clarified below.

7.3.1 Registration and accreditation

Much of SAVEC's planning, coordination and regulatory work will depend on detailed information on training institutions. SAVEC's first task will be to expedite institutional registration in Southern Area. Registration details are set out in the *Gazette of the Democratic Socialist Republic of Sri Lanka No. 887/8 - September 07, 1995.*

Acquisition of reliable information will require SAVEC to actively solicit and verify registration information. Announcements in newspapers and on radio will explain the purpose and benefits of registration, as well as provide details on submission and deadlines. Institutions that fail to register would not be considered for financial or other government support.

SAVEC will review each registration and identify those requiring additional verification. Vocational Training Development Committees (a project proposed by the Master Plan) can assist in verifying information. Once verification is completed, SAVEC will review applications to identify the institutions with the capacity to act as effective partners. It will facilitate TVEC's task by presenting recommendations for accreditation. Registration information also will be used as the basis for monitoring and evaluation (subsection 7.3.3).

7.3.2 Sectoral planning and coordination

SAVEC, working closely with VTDCs, will develop a medium term strategy and plan for system coordination and development.

(1) Strategy

In the first phase of the project, SAVEC will formulate an overall strategy for the medium term development of a training management and delivery system. A longer term strategy and

plan that respond to changes in Southern Areas' economy will be prepared in the second phase.

The strategy will identify the following:

1) a functional institutional framework for existing institutions (public and private) at the provincial, district, and division levels,

2) training guidelines and regulations for all institutions offering vocational and technical training, and

3) targets for development of a market responsive and shared cost training system.

(2) Plans

SAVEC will prepare a flexible medium term plan that focuses on regional and national labour market needs. Longer term planning will be undertaken once SAVEC and VTDCs are functional, the existing training programmes are coordinated, and capacity is raised to respond appropriately to training needs in new skill areas.

The plan will be predicated on current and projected labour market needs, but at the same time be adaptable to a rapidly changing market. It will coordinate efforts of existing institutions, as well as devise enterprise driven ways to supply skilled workers. In addition to sound analysis of market needs, the plan should incorporate the following essential elements:

1) detailed assessment of the capacity of existing institutions and identification of capacity building requirements,

2) mechanisms for cost and delivery sharing, including incentives for and cost recovery from the private sector and,

3) procedures for monitoring and evaluation of training quality and skill performance,

4) organizational procedures to assure continued coordination, including processes for consultation and information flow,

5) job seeker support services, and

6) procedures for guaranteeing gender and social equity.

7.3.3 Monitoring and evaluation

The position of a monitoring and evaluation unit (M&E) in SAVEC is intended to centralize, standardize, and assure information flow. The M&E unit will assist SAVEC and other organizations by identifying labour market requirements, evaluating existing institutions, and monitoring skill performance. The purposes of the M&E system are shown below.

Period	Purpose
Initial	Identify existing agencies which are competent, but need assistance to respond to a changing labour market
	Identify institutional capacity building requirements
	Establish a baseline for continuous progress monitoring and evaluation
Progressive	Measure training quality
	Measure performance of individual skills
	Evaluate labour market needs
	Evaluate gender and social equity in training

(1) Information from registration and accreditation

SAVEC will expedite and validate the registration process in Southern Area. Registration requires information in the following categories: entry qualifications, nature and scope of courses, duration of courses, standard of training, and degree of equivalency to national and

international course standards. This information will be used by the M&E unit for a number of purposes. First, it will help identify training institutions that are striving to deliver good quality training, but have insufficient funds to expand capacity to new skills. Second, it will identify measures to raise or expand capacity. Third, it will create a baseline against which training quality can be measured.

(2) Measurement of training quality and skill performance

Reliable measurement of training quality and skill performance will be essential to assure that the system is designed and continues to respond appropriately to a varied and changing labour market. The M&E strategy will use two kinds of methods: (1) measurement of objectively verifiable indicators and (2) tracer studies.

Technical assistance from a skilled monitoring and evaluation specialist will be needed to prepare a detailed design for both indicator measurement and tracer studies. The design should include:

- an M&E framework,
- targets for both training and employment outcome,
- verifiable indicators to measure progress toward achieving targets,
- tracer study contents,
- methods for data acquisition, analysis, and reportage, and
- process for implementing recommendations.

Table 7.1 shows indicative types of M&E information.

Table 7.1 Indicative M&E Information

	Illustrative Data Sets for M&E
Trainees	skill area, number, age, sex, origins, ethnic and social background, economic level, formal education level, previous employment history
Instructors	number, education/training (what, when, where), instructor experience (skill, length, location), certification, age, sex
Training	skills offered and enrolment in each, source of curricula, standard employed, number graduating from each course, duration of each course, entrance requirements, certification, employment performance
Skill Performance	For individuals: interval between training and job acquisition, job type/level, type and location of employer, salary and other remuneration and benefits, number of work days, duration of service (including discharge rates) For skill categories: unemployment rates, vacancy rates, correlations between training costs and employment outcomes

(3) Labour market assessment

There is little relationship between the current training system's supply and labour market demand. Hence, evaluations of skills for which training currently is offered will be inadequate to assess market needs. The M&E unit will work closely with VTDCs to evaluate current, and to project medium term, market requirements. Projections should carefully consider components of Southern Area development that are likely to produce medium and long term employment. The focus will be regional, with some attention to other areas of the Country where there is high employment potential.

(4) Gender and social equity

To raise the quality of life for the whole Southern Area, vocational training should be accessible to all persons, irrespective of gender or status. Targets and progress indicators should encompass gender and social equity issues to formulate policies and interventions for women and disadvantaged persons. These may include gender or low income group targeting, tailored entrance requirements, short term and part time courses, low cost government or NGO sponsored courses, and post employment training with costs shared by employers and employees.

(5) M&E process

Details of the process for monitoring and evaluation will be defined during system design. Some preliminary guidelines are given below.

Data acquisition

Data will be needed for two types of M&E activities: (1) measurement of progress against targets using established indicators and (2) tracer studies of training outcome.

Measurement of progress indicators can use registration information as a baseline. SAVEC would issue guidelines to a representative sample of registered institutions. The guidelines would identify the information needed to augment registration data, as well as information that will be provided by institutions on a regular basis (approximately every six months). The guidelines should include a data reporting format. A statistically meaningful sample would include about 25% of registered institutions, with heavier representation of institutions with high enrollment. A representative sample would include institutions with different sponsors, levels and types of skills, trainees and locations.

The M&E unit and Counselling and Placement Division, assisted by VTDCs and outside consultants, will collaborate in carrying out detailed studies tracing the employment outcome of a representative sample of graduates. The sample should be representative of both skill categories and types of graduates. In addition to acquisition of statistical information (frequency and details of employment), structured interviews with employed and unemployed graduates and employers would help evaluate training adequacy and identify measures to raise training quality. A standard data acquisition methodology should be used for tracer studies.

Data evaluation

Effective M&E should provide early warning of delays or weaknesses in the training system. A baseline for progress monitoring will be established and continuously updated with measurements against objectively verifiable indicators. An example of a measurable employment indicator is: the percentage of graduates who obtain employment in the skill area in which they were trained within three months.

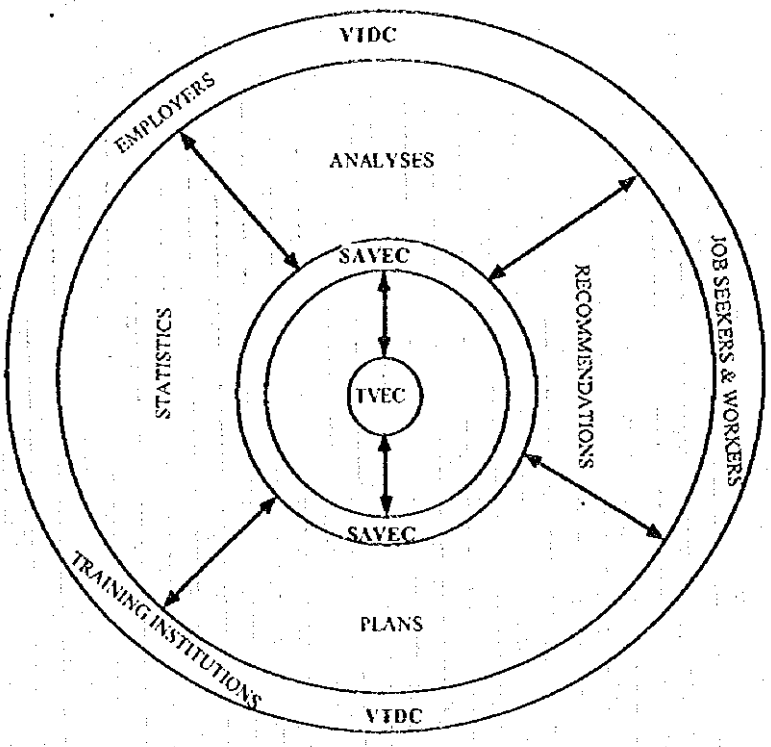
An M&E specialist will assist to establish targets, indicators, and analytical processes. Software packages can assist in organizing information. Geographical information system (GIS) software also will help use M&E data for modifying plans, making projections, and explaining differences in training outcome.

Tracer studies will combine quantitative analysis of statistical data with qualitative analysis of interview information. A guideline for analysis and reporting should be established for tracer studies.

Information flow

The M&E unit has been placed within the coordinating body (SAVEC) to expedite the flow of information, analyses, recommendations, and actions to and from SAVEC's divisions and all the other relevant people and organizations.

Illustrative Information Flow



7.3.4 Counselling and placement services

Counselling and placement services are virtually nonexistent in Southern Area, with the exception of a few private agencies supplying mainly technical fields. A government supported service will be required for the many unemployed persons who have little access to information on training, job opportunities and other ways to enhance their marketability.

A great deal of capacity building will be needed because counselling and placement skills are not well developed in Sri Lanka. Establishment of a central Counselling and Placement Service (CPS) within SAVEC is intended to jump start the process through SAVEC's direct relationship with VTDCs. During the second phase, counselling and placement services will be expanded to district locations compatible with emerging employment opportunities. In addition, costs for most services will be recovered, largely from employers.

(1) Responsibilities

CPS will offer three kinds of services: (1) training and employment counselling, (2) employment placement, and (3) dissemination of training and employment information.

Counselling for training and employment

CPS will complement secondary school counselling and guidance (proposed under the Master Plan's formal education strategy) by offering the following services:

1) aptitude testing;

2) skill choice counselling that assesses individual aptitude, personal preference, and expected work situation;

3) information on training institutions, including course information, instructor qualifications, training quality evaluations, placement performance, entrance requirements, application procedures, course duration, and costs;

4) information on employment potential of different skills, including current and projected vacancies, earning levels, and locations;

5) vocational skills and ethics course, including team work, negotiation, time management, verbal and written communication, and networking;

6) special services for women and disadvantaged persons, as indicated by assessment; and

7) visits to training institutions, businesses and industries.

Employment placement

CPS placement services will include the following (high priority is indicated by an asterisk):

i)* registration of job seekers, including personal information, type and location of employment preferred, training and experience, current and previous employment records, and availability;

ii)* listing of regional employment opportunities, including description of duties, duration, salary and other benefits, promotion potential, qualifications required, in-service training provided, and application procedures;

iii) national and international listings of employment opportunities;

iv)* open employment interviews with representatives of large enterprises;

v) arrangements for personal interviews;

vi) special services for women and disadvantaged persons, as indicated by assessment; and

vii) employee trials during which graduate trainees would receive in service training in special skills, followed by joint evaluation of trainee and training.

Information dissemination

As the system matures, CPS and VTDCs will combine efforts to reach a broader audience. Most costs for these activities can be recovered from businesses and industries and, in some cases, from job seekers. Some suggestions are listed below.

(a) A quarterly newsletter (in Sinhala and Tamil) containing notices of training and employment opportunities, advice columns, tips for job seekers, and in depth articles on various aspects of training and employment. Articles might be reproduced from newspapers and journals or furnished by experts in training and industry.

(b) Job fairs with business and industry booths providing information about the company and its employment opportunities, as well as pre-interview facilities.

(c) Employment recruitment directories containing short descriptions of companies and their employment opportunities and "postal cards" for applicants to send in information for pre-screening and interview arrangements.

(d) Radio employment "bulletins" giving information on training programmes, job openings, and tips for job seekers.

(e) A toll free telephone service giving information on major employment opportunities and taking employment registration information.

(2) Organizational relationships

Counselling and placement services should operate as the primary link between trainees and employers. To do so effectively will require continuous coordination between CPS and other players. VTDC, which unites all players toward a common goal, will act as the CPSs' principal partner. In addition to VTDCs, CPS should establish relationships, including guidelines and schedules for performing tasks, with a number of other entities. Some of the main objectives of these relationships are indicated below.

1) CPS will assist SAVEC Planning and Coordination Division to evaluate existing and project employment needs and devise cost sharing mechanisms for training, and counselling and placement.

2) CPS will help SAVEC Development Division identify special activities to support counselling and placement.

3) CPS will work closely with the M&E unit to build an information base on training graduates and to evaluate skill performance.

4) Training institutes, public and private, will provide CPS with information on training opportunities (details of courses, entrance requirements and processes, duration, costs) which CPS will assist training institutes to develop work behavior courses.

5) Secondary school and private counselling services will supply CPS with information on prospective trainees (numbers, skill and employment preferences, aptitudes, and kinds of assistance they will need) and CPS will supply information on training and employment opportunities.

6) Businesses and industries will support CPS logistically and financially. Most important will be provision of employment related information and payment for CPS services. In addition, the private sector will help orchestrate job fairs and other interview arrangements, as well as cooperate with the CPS and M&E to evaluate trainee and skill performance.

7.3.5 Special development activities

Like the central TVEC, SAVEC will be largely a planning and regulatory body. Its Development Division, however, will sponsor some special tasks to assure that the system offers productive and equitable training and shifts spontaneously from Government to private sector financing.

Special tasks to promote these goals will be identified by the strategy and planning exercises. Depending on the nature of the task, the Development Division may do the work itself, may contract independent consultants, or may collaborate with partner agencies. Indicative special projects are mentioned below.

(1) Coordinating with employer initiated training (EIT) projects.

(2) Helping develop a cadre of skilled planners, curricula developers, monitoring and evaluation specialists and counselling and placement practitioners.

(3) Providing grants to registered training providers who show competency, but have limited funds to raise capacity.

(4) Providing grants and other support to small businesses to develop technician level training.

(5) Collaborating with organizations to implement approved policies and incentives for employer initiated training programmes, including cost sharing mechanisms.

(6) Assessing women's and disadvantaged persons' employment and income conditions and identify needed programmes to assure equity in the training system. The study would consider existing conditions of training and employment, need for incentives or quotas, number and spatial distribution of women heads of household or women as the major source of household income, household conditions, preference for home based or outside employment and type of employment, and training needs.

7.4 SAVEC Staffing

7.4.1 Core staff

Essential SAVEC management, technical and administrative staff is indicated in Table 7.2. Most staff members will need capacity building to perform their tasks. Thus, initial development of SAVEC will be expedited through the services of technical assistance (subsection 7.4.4).

Table 7.2 SAVEC Core Staff

Programme Component	Category	Staff Designation	No.
Director's Office	Management	Regional Director	1
Planning & Coordination	Management	Division Director	1
Development	Management	Division Director	1
Counselling & Placement	Management	Division Director	1
Monitoring & Evaluation	Management	Unit Director	1
Planning & Coordination	Technical	Curricula Specialist	2
Development	Technical	Program Specialist	1
Monitoring & Evaluation	Technical	M&E Specialist	2
Counselling & Placement	Technical	C&P Specialist	3
Monitoring & Evaluation	Technical	Social Scientist	1
Monitoring & Evaluation	Technical	MIS Specialist	1
Monitoring & Evaluation	Technical	GIS Specialist	1
Director's Office	Support	Admin. Assistant	1
Planning & Coordination	Support	Admin. Assistant	1
Development	Support	Admin. Assistant	1
Counselling & Placement	Support	Admin. Assistant	1
Monitoring & Evaluation	Support	Admin. Assistant	1
Director's Office	Support	Computer Operator	1
Planning & Coordination	Support	Computer Operator	2
Development	Support	Computer Operator	2
Counselling & Placement	Support	Computer Operator	3
Monitoring & Evaluation	Support	Computer Operator	4

7.4.2 Qualifications

A detailed programme design will define the precise responsibilities of core staff, as well as identify pre-employment qualifications and post-employment capacity building measures. The suggestions presented here are intended as guidelines.

(1) All staff

All management and technical staff should have a thorough understanding of Southern Area's conditions and unique characteristics.

(2) Regional director

The Regional Director's primary responsibility will be to manage and coordinate SAVEC. Thus, the most prophetic qualifications for this job would be the ability to demonstrate long experiences and exceptional skills in the following areas:

- institutional management and coordination of large programmes,
- problem solving,
- leadership and team work,
- productive associations with the private and the public sector, and
- superior written and verbal communication.

(3) Division and unit directors

Many of the functional specialties are poorly developed in Sri Lanka and will require intensive capacity building. Capacity building will be more productive if staff members have at least some experience or expertise in a related technical field and vocational education, and have strong problem solving and analytical skills.

Division and unit directors will have administrative as well as technical functions. They should be able to demonstrate adequate proficiency in the same skills as required of the regional director and also in the following:

- knowledge in the division's functional area (planning, programme development, monitoring and evaluation, or counselling and placement);

- appropriate academic qualification;
- experience in the field of technical and vocational education and training; and
- recent professional development activities.

(4) Technical specialists

Technical specialists should have the following qualifications:

- adequate knowledge in or experience related to the technical specialty;
- appropriate academic qualifications;
- problem solving and analytical skills;
- effective team work and networking;
- good written and verbal communication skills (especially for counselling and placement staff); and
- familiarity with technical and vocational education and training.

7.4.3 Recommended staff procurement arrangements

SAVEC must be a dynamic organization. Its staff will not only launch a system, but will drive its components, often against competitive forces, toward the ultimate goal of productive and cost efficient training. Government employment conditions are unlikely to attract the highly committed and vigorous people needed to sustain that drive. At the same time, the prospect of working with SAVEC, with its high potential to have a profound impact on Southern Area and even the Country, will excite interest. SAVEC could attract the right kind of people by offering contractual appointments for a fixed time period (say five year increments) for regional director and division directors. The contractual approach would give flexibility to both employer (Government) and employee. Higher salaries and other performance based rewards would attract the best candidates, while allowing the employer to demand performance excellence.

7.4.4 Technical assistance

Table 7.3 shows recommended long and short term technical assistance needed for system design and development. Most technical assistance will provide some in-service training.

Table 7.3 Recommended Technical Assistance

Component	Description	Time (in person months)
Planning & Coordination	strategy/program design	36 (1st 3 years) 8 (next 2 years)
Planning & Coordination	employment forecast	6 (1st 2 years)
Planning & Coordination	regional curricula development	6 (1st 2 years) 6 (next 2 years)
Monitoring & Evaluation	system design & development	24 (1st 2 years) 9 (next 2 years)
	measurement & analysis	8 (1st 2 years)
	information MIS GIS	 12 (1st 2 years) 9 (1st 2 years)
Development*	equity assessment	6 (1st 2 years)
Counselling & Placement	system design & development	36 (1st 3 years) 12 (next 2 years)
	information dissemination	12 (1st 2 years) 6 (next 2 years)

*Technical assistance special projects will be determined during program design.

7.5 Capacity Building

The expertise level of the staff who are hired will determine the capacity building required. The strategy and programme design should include a staff capacity assessment and training programme. Preliminary recommendations for capacity building include the following.

(1) Capacity building should encompass a wide variety of mechanisms and venues and should take advantage of existing programmes, such as the UNDP/ILO and GTZ projects. In addition, a World Bank programme to strengthen formal education will include relevant skills such as curricula development and counselling and guidance.

(2) All staff should be trained in gender and social equity awareness.

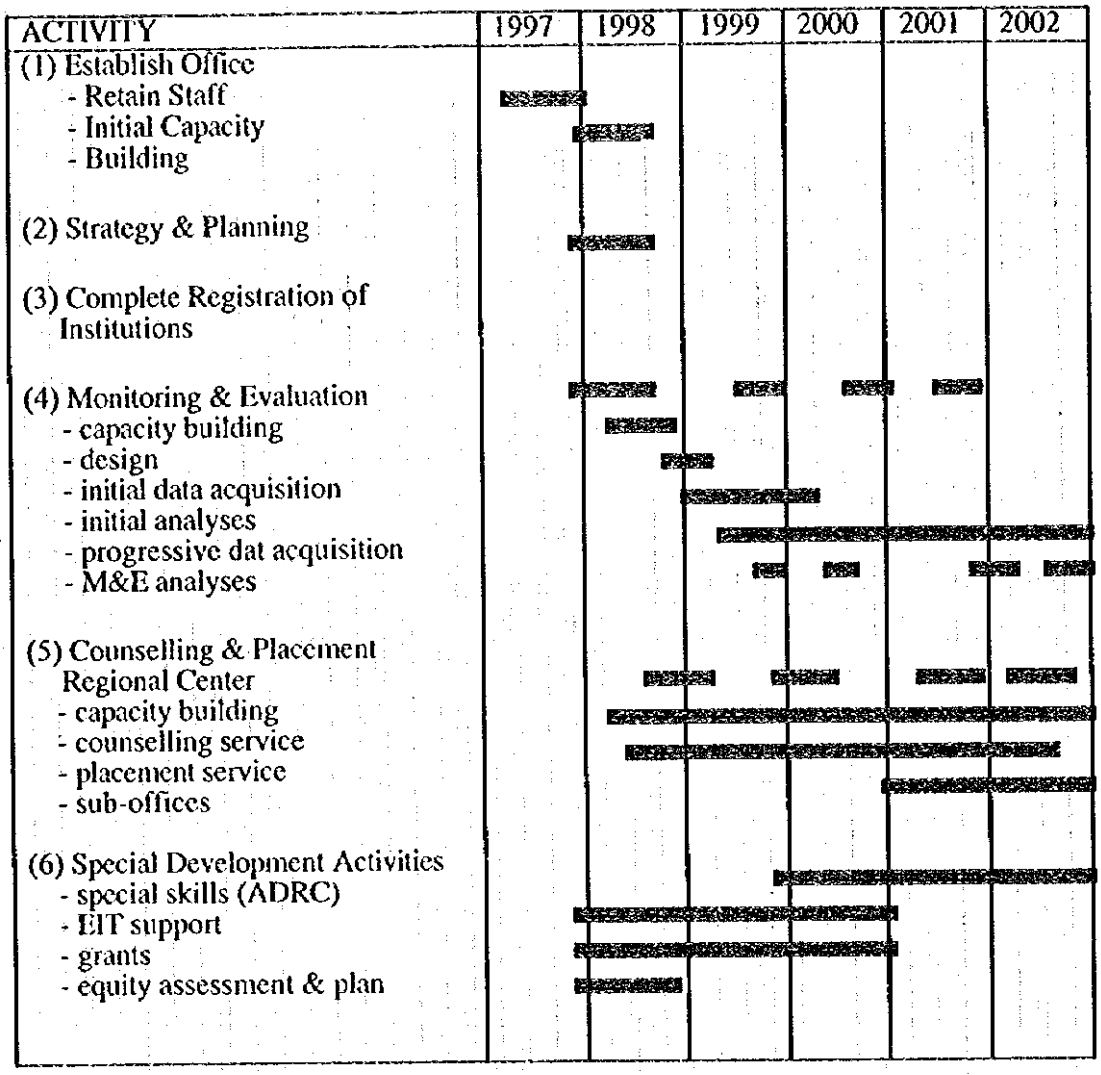
(3) At least one of the Counselling and Placement core staff should undertake long term training.

(4) SAVEC should link with similar institutions in such countries as Singapore, Malaysia and Australia, where employer initiated training is well developed. Long term training could be provided or arranged by these institutions. SAVEC staff would also make short term visits to observe operations.

7.6 Indicative Implementation Schedule

Some activities or components of activities must be completed or well under way before other tasks can be undertaken. The implementation schedule below is intended to assign priority and illustrate the order of activities.

SAVEC INDICATIVE IMPLEMENTATION SCHEDULE



7.7 Cost Estimate

The cost estimate is intended as a preliminary indication of costs (in 1996 terms) that would be incurred by project support to SAVEC development during the initial six years. To facilitate progress, local staff cost for the project period is included.

Table 7.4 Indicative SAVEC Project Costs (six years)

Item	Cost (in US $)
Technical Assistance long & short term	7,500,000
Staff	500,000
Equipment & Vehicles	600,000
Special Placement Activities	300,000
Fellowships & other outside Training	300,000
Total	9,200,000

Initial Environment Examination

PROJECT REPORT

PART 3 INITIAL ENVIRONMENTAL EXAMINATION

1. OUTLINE AND METHOD

1.1 IEE and EIA

This Master Plan Study has identified over one hundred thirty projects/programs for the Southern Area development. Some of them, however, may have adverse impacts on the natural and social environment when implemented. The Study Team has therefore conducted initial environmental examinations (IEEs) for 29 selected projects/programs to examine their potential negative impacts and assess the necessity for an environmental impact assessment (EIA).

Figure 1.1 shows the formal procedure of environmental impact assessment (EIA) as authorized by the Central Environmental Authority (CEA) and the Ministry of Transport, Environment and Women's Affairs (MTEWA). However, the term IEE used in this report is not exactly the same as the IEE process in the figure because the IEE procedure adopted by CEA is a detailed assessment which runs in parallel with EIA. By contrast, IEE used in this report is a less rigorous procedure preceding EIA and rather equivalent to the first two steps indicated in the figure: "Preliminary Information" and "Scoping."

1.2 Objectives of IEE

IEEs in this Study aim at preliminary environmental check of proposed projects. More specifically, their objectives are as follows:

1) To select projects or programs to be subjected to IEE with respect to certain criteria ("screening process");
2) To identify potential negative impacts of the selected projects/programs on the natural and social environment and examine their magnitude ("scoping process"); and
3) To judge whether further EIA is necessary and, if so, describe possible serious environmental impacts and proper assessment methods to be used in the EIA procedure.

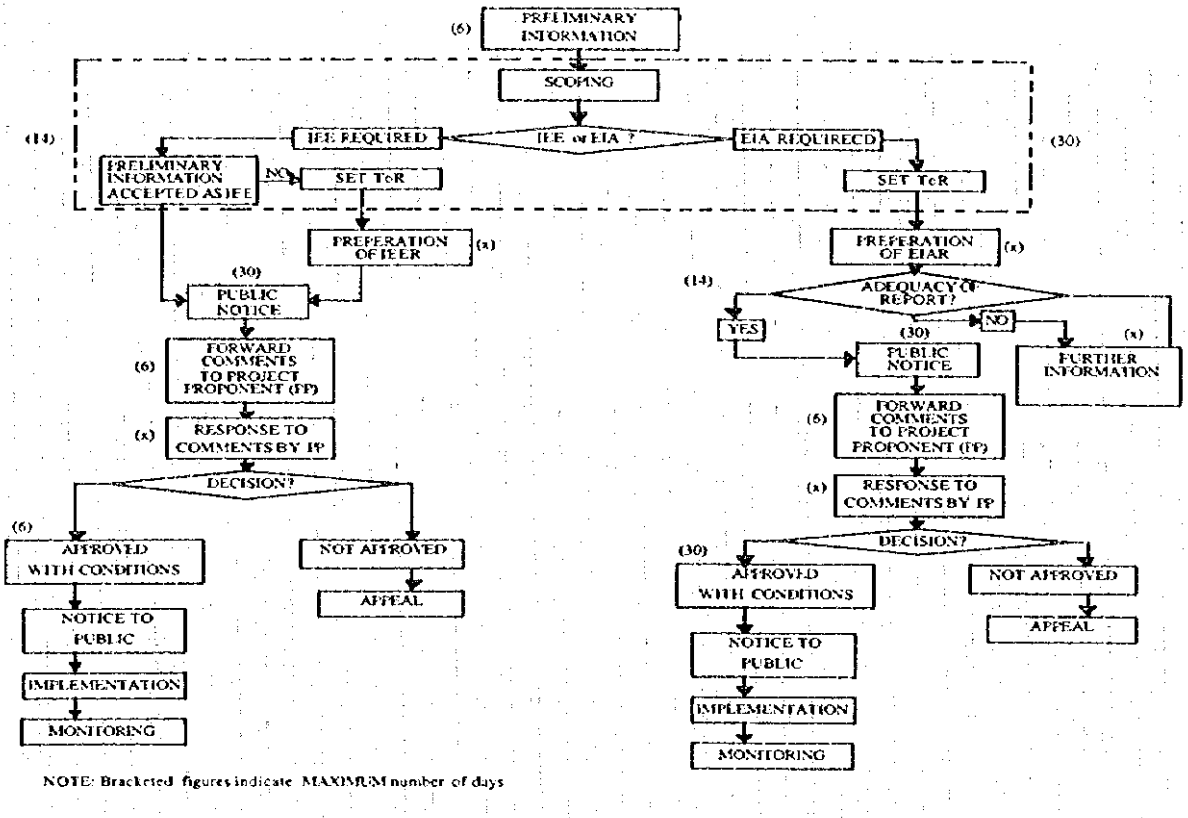


Figure 1.1 EIA/IEE Precedure

1.3 Methodology of IEE

An IEE is implemented in accordance with the work flows depicted in Figure 1.2. Up to Step 2: Checking, examinations are carried out by the environmental experts in close cooperation with the sector experts of the Study Team who have detailed knowledge about the projects/programs. Sector experts' comments on possible environmental impacts are given due consideration during the IEE procedure. In addition, field reconnaissance surveys and a careful review of the data and information collected in the previous stages are carried out by the environmental experts.

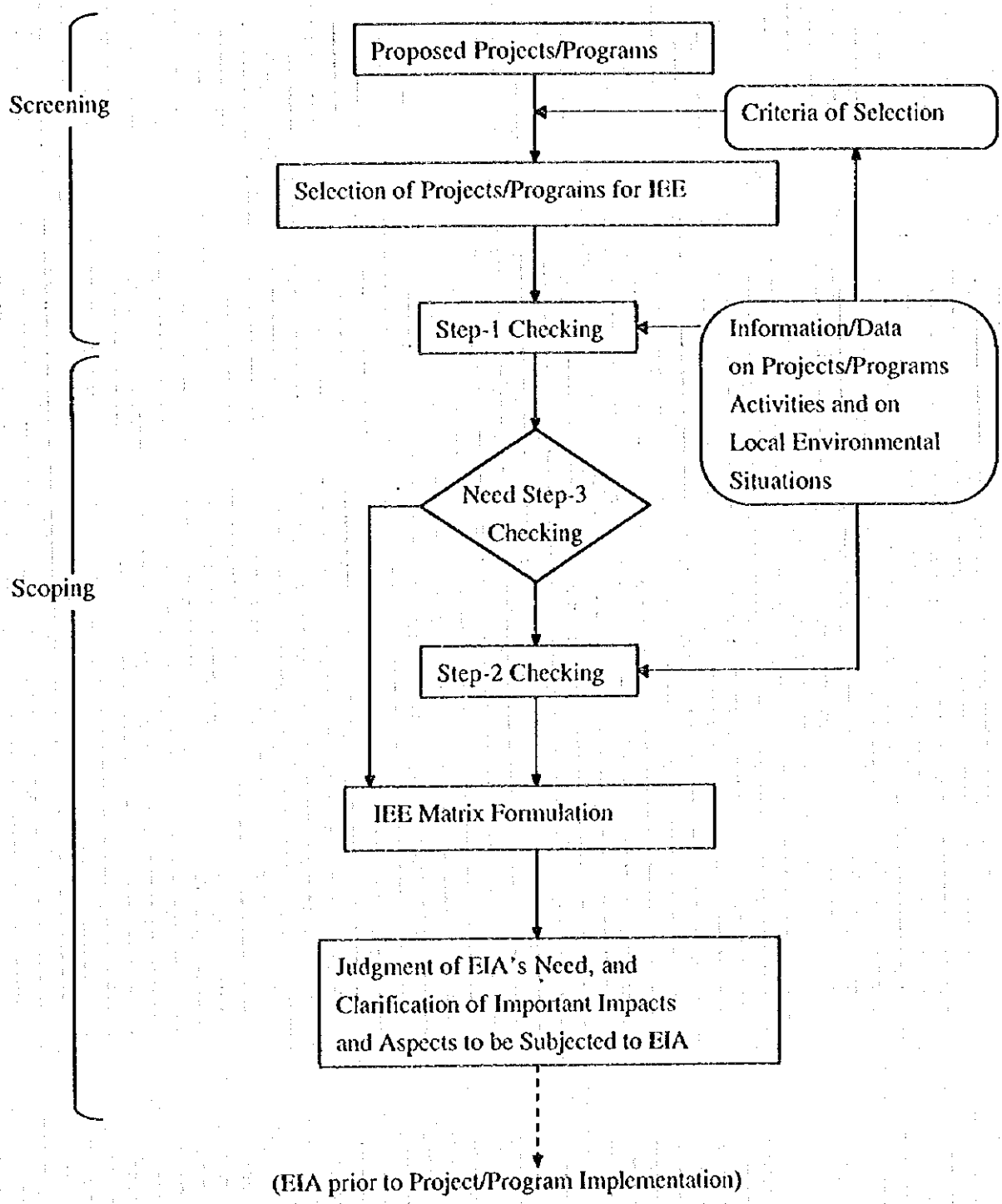


Figure 1.2 Procedure of Initial Environmental Examination

1.3.1 Criteria to select projects/programs for IEE

For the screening of the projects/programs to be subjected to IEE, the National Environmental Act is carefully referred to for official descriptions of projects and undertakings for which environmental approval shall be necessary.[1]

However, the above descriptions are generally too detailed to be suitable for the projects/programs under study here, most of them still being at the conceptual stage. Therefore, the following criteria are instead applied for selection, in line with the official selection principle of taking up those projects which are more likely to affect the environment in negative ways:

1) Projects and programs which are identified as anchor projects by the Team and that involve in some way or other large-scale physical work or intensive use of water or land; and
2) Projects and programs which are designated for urgent implementation but that do not appear socially or environmentally sound.

1.3.2 Two steps in the IEE checking system

A simplified IEE method is devised and used in this Study to deal with a large number of projects in limited time and in view of their generally preliminary descriptions (location, components, etc.) at this stage.[2] Nonetheless, all conceivable environmental items are covered by the method. The simplified IEE procedure consists of two steps.

(1) Step 1

For preliminary screening, a set of sector-specific questionnaires are prepared for the following sectors: agriculture, livestock, forestry, fisheries and aquaculture, hydropower,

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1 See "Annex 1: Prescribed Projects" in *Guidance for Implementing the Environmental Impact Assessment Process: No.2, A General Guide for Conducting Environmental Scoping*, CEA/MTEWA, 1995.

2 The method extensively draws on the following references:
Environmental Impact Assessment of Development Aid Projects: Check Lists for Initial Screening of Projects, NORAD, 1988.
Environmental Assessment of Official Development Assistance: Environmental Screening Guidelines for Country Program Managers, Australian International Development Assistance Bureau, 1989.

water supply and irrigation, transport, industry and thermal-power, mining, waste treatment and disposal, development of densely populated or urban areas, and tourism (Appendix 1). A general picture will emerge of possible impacts on the natural and social environment through answering the questions with "yes," "no" or "?" as judged from project/program activities and local environmental features.

"Yes" indicates a possibility of some negative impacts. A question mark "? " denotes a lack of sufficient information on the project/program itself or on the local environment to definitely say "yes" or "no." All projects or programs that have at least one "yes" or "?" among the answers are subjected to the next step of assessment with respect to more diverse environmental aspects. On the other hand, those projects/programs with all "no" answers are judged in no need of further environmental study including environmental impact assessment (EIA) for their implementation.

(2) Step 2

Unlike the sector-specific questionnaires used in the first step, the questionnaires for this step (check lists) are organized according to environmental elements and relevant management types. Those elements and management types are grouped into seven broad categories and a sheet of check list with itemized questions is prepared for each category:

Check list A:	soil erosion, topography, land degradation and flora/fauna to be under soil and land management;
Check list B:	water use, groundwater and water quality to be under water management;
Check list C:	resettlement, flora/fauna, religion/culture and local economy to be under biological management;
Check list D:	air quality and noise to be under air/noise management;
Check list E:	solid waste and water quality to be under waste management;
Check list F:	risk and hazard to be under risk and hazard management; and
Check list G:	religion/culture, land use, resettlement, health and local economy to be under social management.

Those check lists are included in Appendix 2. In the first step, respondents are directed to respective check lists to refer to in the second step (the last column of the questionnaires indicates which check list to go to next).

In going through the check lists, "yes" again means that negative impacts are expected on respective environmental items during the construction or operation stages. On the other hand, "?" implies that more information and data have to be collected and that quantitative/objective assessment on the related environmental items is to be carried out during the EIA procedure. All environmental items marked with "yes" or "? " in this step should be subjected to EIA. Generally, the larger the number of "yes," the deeper the environmental study should be to clarify measures to mitigate the negative impacts foreseen.

1.4 Results of IEE

1.4.1 Selected projects and programs for IEE

According to the selection criteria described earlier, the following 29 projects are selected for IEE in this Study:

Agriculture	SA-9	Home Gardens-Based Multi-Storey Farming
Livestock	SA-10	Smallholder Integrated Farming Promotion
Fishery	SA-11	Marine Fisheries Complex Development
Aquaculture	FI-1	Inland Fishery Re-Establishment Program
	FI-2	Prawn Farming
Industry	SA-13	Industrial Districts for Small- and Medium-Sized Industries
	IN-1	Integrated Urban Industrial Development Project
	IN-4	Training and Technology Institute (Center)
Tourism	TO-1	Galle Fortified City Conservation
	TO-3	Hotel School
Water Supply and Irrigation	SA-5	Uma Oya Multi-Purpose Development
	SA-8	Paddy-Based Mixed Farming Promotion
	WS-1	Weli Oya Diversion
	WS-2	Mau Ara Diversion
	WS-3	Menik Ganga Diversion
Transport	SA-1	Galle Port Development
	SA-2	Southern Highway
	SA-3	Intra-Regional Artery Road Establishment
	SA-4	Coast Line Improvement and Upgrading
	SA-20	Rural Road Improvement Program

	TR-2	Rehabilitation and Maintenance of National Highways
	TR-4	Provincial Road Rehabilitation
Hydropower	SA-5	Uma Oya Multi-Purpose Development
Thermal Power	SA-7	Coal Thermal Power Plant
Urban Development		
	UR-2	Sites and Services
Forestry	SA-25	Multiple-Use Forest Management
	SA-26	Eco-Tourism Development
Water Treatment and Disposal		
	SA-27	Appropriate Toilet Facilities for Households
	EN-6	Wastewater Treatment for Fishery Communities
	EN-8	Solid Waste Disposal Management

1.4.2 IEE summary matrix

Table 1.1 summarizes the results of the whole process of IEE. As a general rule, larger numbers in the matrix imply severer or more extensive negative impacts on the respective environmental items. A question mark (?) indicates that no definite assessment is possible due to unspecified project/program activities or to the lack of relevant environmental information. These results are based on the step-2 works of IEE as well as on additional studies on the selected projects/programs including review of the existing IEE/EIA reports concerned.

Table 1.1 IEE Results of the Selected Projects/Programs

Project No.	Environmental Item															
	L1	L2	L3	W1	W2	W3	B	A1	A2	E	R	S1	S2	S3	S4	S5
SA1		2		2		2	3		1	1			1	2		1
SA2	2	1		1	?	1	2	1	2		?	2	?	1	3	?
SA3	1	1		1	?	1	2	1	1			1	?	1	1	?
SA4				?					1		?	2				
SA5	2	1		3	?	1	3	?	?		1	2	?	?	1	1
SA7	?			1		1	2		?		1	?	?	1	?	1
SA8	2	1	1	1	2		?	1			1	?	1	1	1	
SA9	1			?	?	2										
SA10				?		2	?	?	?		1					
SA11						1	?			2						
SA13	?		?	?	?	?	?	?	?	?			?		2	
SA20																
SA25												1			1	
SA26	1						1	?	?	2						1
SA27																
FI1				2	?	?	1									
FI2	1			1		2	2				1	?	?	2	1	
IN2																
IN3																
TO1									1	?					1	1
TO3																
WS1	2	1		3	?	1	2	?	?		1	2	?	?	1	1
WS2	2	1		3	?	1	3	?	?		1	1	?	?	1	1
WS3	2	1		3	?	1	3	?	?		1	1	?	1	1	1
TR2	1			1		1	?		3		?	2			3	?
TR4	?			?		?			?			?			?	
UR2									2	2		3		2	2	
EN6									?			?			?	
EN8		1	1	?	?	2	1		2			1	?		2	

Notes: 1) Environmental items are classified as follows: L1 = soil erosion, L2 = topography, L3 = land degradation, W1 = water use, W2 = groundwater, W3 = water quality, B = flora and fauna, A1 = air quality, A2 = noise/offensive odor, E = solid waste, R = risk/hazard, S1 = resettlement, S2 = religion/culture, S3 = local economy, S4 = land use, and S5 = health.

2) Project codes are as follows: SA = anchor project/program, FI = Fishery, IN = Industry, TO = Tourism, WS = Water Supply and Irrigation, TR = Transportation, UR = Urban System, and EN = Environment.

2. IEE RESULTS BY PROJECT

Following are brief explanations of negative impacts expected for each of the selected projects/programs together with a judgment on whether EIA is necessary and some recommendations for the EIA stage.

2.1 SA-1: Galle Port Development

A large infrastructure project like this usually causes various kinds of environmental impacts. A comprehensive EIA is definitely required, in particular concentrating on "topography," "water use," "water quality," "flora and fauna" and "local economy."

In the light of sand sedimentation experienced at the Kirinda fishing port, detailed investigation is necessary on tidal currents, coastal sedimentation and erosion to prevent such topographical problems. With the proposed breakwater constructed, waters adjacent to the Lunuvila river mouth will become very calm and materials discharged from the river are likely to be deposited in a relatively narrow sea area in the vicinity of the mouth. It is advisable to undertake a simulation study and monitoring design on depth change around the river mouth as part of the EIA procedure.

Physical works of port development including dredging and berth construction will most likely damage water quality, affecting local water use like fishing and indigenous water-based flora and fauna. Especially, the planned breakwater will lead to water deterioration by closing the bay and blocking current circulation as exemplified by the Colombo port. Counter-measures such as construction of sewage disposal plants and direct discharge of some sewage into the outer sea should be considered in an environmental management plan of EIA. Reclamation will definitely damage marine species as well. Since turtles and coral reef are under protective regulations by the Ministry of Fisheries particularly in the Galle area, a biological survey should be conducted on marine ecology during the construction and operation stages. There also is a coral reef in the bay located at the base of the Rumassala hill, which is the only remaining reef in the bay. Particularly significant is the reef named "Buona-vista," which reportedly has a richer biodiversity than the Hikkaduwa or Kalpitiya Bar-reef Marine Sanctuary. Since reclamation is presently planned just in this sea area, protective measures including relocation of the reclamation site should be duly taken if the biological survey scientifically justifies the reef's conservation. Other causes of water pollution are oil seepage and waste dumping from ships using the port.

The dimensions of disposal facilities for oil and waste have to be specified in the EIA report based on the capacity volumes of receiving tanks and separation facilities for waste oil.

Construction works using heavy equipment and subsequent port operations will surely bring air pollution and noise problems in and around the bay. Air contamination level may be very low, however, because of the strong wind dispersing the pollutants. Noise levels, on the other hand, should be assessed and appropriate countermeasures should be proposed in the EIA management planning. Some beaches in the bay are now used for berthing fishing boats and some water areas for fishing activities. Local economy will be affected if these fishing activities vanish or are restricted as a result of reclamation and port operations. Appropriate compensation for the affected fishermen should be dealt with in compensation planning and monitoring of the EIA process.

In view of the historical/cultural values, development activities are regulated in and around the Fort located west of the bay. Also, the Rumassala hill, east of the bay, has religious and biological significance. These are places where local people and tourists enjoy these heritages. EIA should therefore deal with any negative impacts on these locations directly caused by the project. The present aesthetic value of these areas has to be preserved even if the project indirectly damages the scenic landscape to some extent.

With this project completed, the number of tourists coming to Galle as well as the city's population will increase. This possibly generates more solid waste. Although there are two garbage disposal areas with sufficient disposal capacity in the northeastern part of Galle, the city's garbage collection and treatment system should be reviewed in the light of the increased population and tourists. The increase in population and tourist arrival will also have some cultural impact on the local communities. Non-indigenous diseases may become a new health hazard. These environmental aspects have also to be examined through social assessment as part of EIA.

2.2 SA-2: Southern Highway Project (Colombo - Matara)

A full environmental check through EIA is definitely required. All environmental items except land degradation and solid waste are to be subjected to EIA, whereas "soil erosion," "flora and fauna," "noise," "resettlement" and "land use" should be examined in more detail.

Soil erosion and topographical change are potential problems since this project involves massive construction works for a new 138-km-long highway with five interchanges running through a hilly terrain in the wet-zone inland area.

The proposed highway passes over several rivers and possibly through wetlands or lagoons. Its construction works will potentially affect water use and water quality wherever such surface waters are extensively used by local people for fishing, drinking, irrigated farming, boating, etc. Furthermore, adverse impacts on groundwater need to be examined because little is known at present about groundwater in the inland area.

A highway project usually affects local natural ecology on a large scale. The route of the proposed highway has to be so aligned that fauna and flora are least affected because Galle and Matara districts have dense forests, dwindling mangrove forests and important wetlands. A biological survey is strongly recommended for terrestrial and aquatic ecosystems.

For densely populated areas, levels of air pollution, noise and vibration should be assessed to devise appropriate countermeasures. Such measures are necessary not only for the construction stage but throughout the operation stage as well.

As for social impacts, problems to be stressed in EIA include resettlement, problems related to land use change and disturbance of local economic activities during the construction. In addition, historical spots and cultural assets of significant importance should be investigated to conserve them. Impacts on local health conditions due to increased in-flow of construction workers and of tourists are unknown and thus to be examined in EIA. In addition, flooding risk of the project itself needs assessment because frequent flood occurrences have been reported around the project sites.

2.3 SA-3: Intra-Regional Artery Road Establishment

The environmental item that should be most stressed in EIA is "flora and fauna," although some other impacts are to be carefully checked as well.

A number of forests, wetlands and other important environmental resources in terms of flora and fauna are located on and in the vicinity of the project sites. This project consists of construction of new roads and rehabilitation of existing road sections. Therefore, in order to conserve significant flora/fauna species and their habitats, route selection should be duly done based on the results of biological examination of the EIA process.

This project will generally be implemented in sparsely populated areas. Its adverse impacts will therefore be limited compared with other road projects. However, there still exist some possibilities of soil erosion, topographic change, degradation of surface water and groundwater, and a resultant water-use problem downstream. Especially during the construction stage, air pollution, noise, resettlement, disturbance to local economy and land-use conflicts can be predicted where residential areas or cultivated land exists on and along the proposed routes. The roads should be so aligned as not to affect any existing religious/cultural asset. Potential health hazard during the construction stage has to be examined in EIA.

2.4 SA-4 : Coast Line Improvement and Upgrading

Under this railway project, social problems related to "resettlement" will be the focal point.

There are many squatters living extremely close to the railway track. For their safety as well as to implement the rehabilitation works, they may be resettled. EIA has to assess their living conditions, actual necessity of resettlement, relocation sites, etc. aiming at mitigating any adverse social impacts on them.

Since this project consists mainly of rehabilitation of the existing railways and bridges, negative impacts may be minimal except for the above resettlement issue. However, some rehabilitation works, in particular bridge improvement, will involve extensive civil works and operation of heavy machinery. For those works implemented near river mouths, degradation of water is likely to occur.

Some railway sections run through flood- and coastal erosion-prone areas. This implies natural risks inherent to the project. For instance, interior areas between Hikkaduwa and Akurala are highly subject to flooding due to severe sedimentation at river mouths. Also, line sections around Paiyagala in Kalutara district were seriously damaged by coastal erosion recently. EIA should deal with these adverse environmental consequences.

2.5 SA-5: Uma Oya Multi-Purpose Development

This project involves a large-scale water diversion and has to go under a thorough EIA study. A large part of EIA should deal with impacts on "water use" and "flora and fauna."

If this project is implemented, quantity and quality of water will necessarily be affected in the rivers associated with this scheme. In fact, various lives currently depend on the river flows. Local people utilize the river water for various purposes such as bathing, cattle feeding, drinking, irrigation, fishery and so on. Natural ecosystems have long established themselves in and along the rivers and wetlands nurtured by natural water flows and sustaining rich biodiversity. A wide range of natural habitats of important or endangered species have been identified on and around the proposed project sites: construction sites of diversion canals, Uma Oya, Weli Oya, Kirindi Oya, Uda Walawe National Park, and numerous wetlands, lagoons and tanks mid- and downstream. Adverse impacts, especially those on water use and fauna/flora, have to be assessed in extreme detail for each and every basin to be affected by the project. If any possible environmental influence is detected, the project should be redesigned (diversion route or water volume, for instance) or establish necessary artificial biotopes. The countermeasures for environmental conservation should be proposed as a major part of management and monitoring plans to be formulated through EIA.

Other environmental impacts to be closely examined for the construction stage include soil erosion, topographical change and water quality all of which also affect water use and flora/fauna. Changes in river flow will influence groundwater, while construction works will diminish air quality and make noise in villages near the construction sites. The project may also cause some social problems related to resettlement, religion/culture, local economy and health during the construction and operation stages. Particularly, the diversion alternative to the Weli Oya will involve resettlement. These impacts, however, remain possibilities at this stage where project details have yet to be finalized. All possible aspects have to be listed up for the EIA study.

EIA should also look into whether a warning system is necessary to protect water users downstream from a sudden rise of water level. There is a human life-related risk involved here requiring proper attention.

2.6 SA-7: Coal Thermal Power Plant

"Flora and fauna" is the most important environmental item, which should be assessed in EIA.

A site at Mawella was initially identified as suitable for the plant but was later rejected on environmental grounds. EIA is thus particularly necessary for this project to identify an

environmentally suitable location. In so doing, need to import the coal and transport it to the plant should be given prime consideration.

Due to lack of detailed data and information on project location, construction methodology and surrounding environmental features, it is difficult at this stage to pinpoint other possible adverse impacts on the local environment. Nonetheless, some impacts are clearly foreseen on the coastal environment since in any case the power plant will be located very close to the sea. Most significantly, creatures and plants living in the sea and coastal areas can be affected by construction works and by effluent from the plant during operation. To protect aquatic flora and fauna from potential damages, a biological study is necessary and a monitoring plan targeting fauna/flora should be proposed in EIA. Disruptions of water use such as coastal fishery and transportation as well as pollution of coastal water are other potential impacts.

If either an access road or the construction site is located in populated areas, local economy may be inconvenienced while noise will be caused by the construction works. On the other hand, air pollution can be excluded both for construction and operation stages since pollutants will be easily dispersed by the strong ocean wind. Necessity of resettlement, influences on religion/culture and land-use conflict are unclear without knowing the exact location of the plant. It is recommended that once the project location is fixed, EIA should cover such amenities and the social environment utilizing the results of socio-cultural survey of neighboring communities. Risk of coastal erosion should be assessed in order to avoid relocation or abandonment of the plant in the future.

2.7 SA-8: Paddy-Based Mixed Farming Promotion

EIA is necessary especially on "soil erosion" and "groundwater," while other impacts should also be clarified through EIA.

In Southern Area, some indications of soil erosion are visible such as gullying and downstream silt deposits. This is due to the improper present land use including unmanaged *chena*, cropping without conservation measures, overgrazing and unregulated logging. For this particular project EIA is necessary to prevent further soil erosion from taking place as a result of the project's activities. Also, this project covers a wide range of areas including marginal land on steep or hilly terrains. EIA has to see if any extreme topographical change may be caused by the proposed farming practices. Furthermore, agricultural chemicals, pesticides or herbicides applied under the project will affect land

adversely. EIA should establish an appropriate methodology of chemical application to mitigate land degradation.

This project will also affect water uses through the utilization of water resources. However, since project sites are numerous scattering over the region, the project's impacts on water uses such as contaminated effluents, siltation and water flow change cannot be specified. Nonetheless, good part of cultivated land under the project is drained by rivers or lakes on which a significant number of human population and natural lives rely for drinking water, fishing, habitat, etc. EIA has therefore to stress impacts related to water use to prevent future conflicts. For those areas where groundwater is an important water resource, impacts on the groundwater table and salinization should also be included in EIA.

Extent of adverse impacts on flora and fauna depends on the location and cannot be probed at this stage. Although the project will most likely be implemented on the existing cultivated land uncovered with forests or natural vegetation, it needs to be checked spot by spot whether any important flora or fauna could be affected by the extension activities.

Chemical usage under the project will cause a problem of air pollution, especially at the sites close to densely populated areas. It will be harmful to farmers themselves sometimes. Possible extent of this hazard and necessary countermeasures should be dealt with in EIA. Another hazardous element is increased vulnerability to natural disasters including flooding. EIA has to investigate susceptibility to natural disasters of cultivated land under the project and incorporate appropriate contingency plans into the environmental management plan.

There is some possibility of small-scale resettlement under the project. In addition, traditional *chena* cultivators in the dry zone will have to undergo significant changes in production technology, marketing practices and life style. The project thus has strong cultural aspects. It will also inevitably influence, for better or worse, local economy and land use in the dry zone through settlement or new land management policies. EIA should therefore clarify magnitude of such social impacts expected in the dry zone to mitigate any social conflicts with the existing *chena* practices.

2.8 SA-9: Home Gardens-Based Multi-Storey Farming

EIA should mostly concentrate on "water pollution." In addition, impacts on "water use" and "groundwater" are to be examined.

This project targets existing home gardens in Galle and Hambantota districts. Since severe cases of soil erosion have been reported in both districts, EIA has to assess the farming practices to be newly introduced under the project with respect to the potential of erosion. The project may inadvertently encourage farmers to grow promising fruit or aromatic plants on steep slopes which have been idle so far. If such potential proves high, appropriate anti-erosion measures should be planned through the EIA procedure.

The multi-storey farming on home gardens will use water but its source, volume or method of utilization is not known. Therefore, any possible impact on downstream water use or groundwater should be assessed. In addition, fruit plants and aromatic or herbal varieties usually require more chemical fertilizers and pesticides than other crops. EIA thus needs to identify any adverse impacts due to chemical applications. Water pollution can be aggravated by soil erosion.

2.9 SA-10: Smallholder Integrated Farming Promotion

Possible adverse impacts and their extent are not defined, because project sites will be located in varied environmental surroundings. EIA is necessary to clarify the following environmental impacts, especially "water quality" on a spot-by-spot basis.

Intensive cattle breeding has a potential of adverse impacts. Cattle dung and urine when accumulated will contaminate water flow affecting downstream water use. When smallholders' cattle yards are located close to wetlands or natural forests, flora and fauna can be affected through fodder collection, grazing, tree cutting and water pollution.

In case cattle yards are close to populated areas, noise and offensive odor will become a problem. It should be noted that intensive livestock breeding always carries a risk of severe prevalence of cattle diseases which will reduce farmers' income.

2.10 SA-11: Marine Fisheries Complex Development

This institution-oriented project will require a simple EIA study, with emphasis placed on "solid waste" and "water quality."

Fishery development projects usually have adverse impacts on marine resources. This project, by contrast, includes as one component a study entitled "fisheries resources inventory" study which will estimate the maximum sustainable yield (MSY) and advise on

appropriate fishing methods and training. If a management plan for sustainable fishery is formulated and implemented following this study, it will direct the project towards an environmentally sound approach.

On the other hand, EIA study should also probe into anticipated increase in waste consisting of fish residues at the landing area and from fish processing plants. With more fishing boats and vessels calling at the complex, water pollution is likely to occur due to oil seepage, waste dumping as well as harbor rehabilitation works if any.

2.11 SA-13: Industrial Districts for Small- and Medium-Sized Industries

For this project, EIA has to be implemented on each proposed location. Scoping for environmental items to be assessed is not definite because project locations have yet to be specified. The most significant impact might be social conflict related to "land use."

Each location-specific EIA should assess the following set of environmental items although extent of study may vary among the items and according to location: soil erosion, land degradation, water use, groundwater, water quality, flora and fauna, air quality, noise/offensive odor, solid waste, and religion and culture. Impacts depend on local environmental and social features as well as on the types of products to be produced in the districts.

Some of the districts may necessitate land acquisition. For such cases, adverse social influences of land use change are to be included in the respective EIA studies from the beginning.

2.12 SA-20: Rural Roads Improvement Program

This program is for rehabilitation of the existing rural roads. Furthermore, it will be implemented through local people's participation. Therefore, there would be little or no adverse effects on the natural or social environment. No further environmental study like EIA is advised for this program.

2.13 SA-25: Multiple-Use Forest Management

For this management project, social impacts related to "resettlement" and "land use" should be assessed in EIA.

This project will not bring about negative impacts on the natural environment because its major goal is sustainable forestry by means of protecting forests and soil and through conservation of natural flora and fauna. Implementation of this project, however, requires managed land use, that is, cessation of the current forest-cutting pattern or resettlement of people living on critical lands in Galle and Matara districts. These aspects should be carefully reviewed in EIA.

2.14 SA-26 : Eco-Tourism Development

EIA should stress on "soil erosion," "flora and fauna," "solid waste" and "health," even if this project respects local natural environment.

Promotion of tourism using attractive environmental resources will bring not only many outside tourists but also risk of soil erosion and damage to flora/fauna along the walking paths. These tourists will also leave solid waste and may spread diseases affecting the local health condition. Vehicles carrying them may cause air pollution and noise to local residents' annoyance. EIA should cover these aspects.

2.15 SA-27: Appropriate Toilet Facilities for Households

EIA is not necessary because of the nature of the project aiming at environmental improvement.

2.16 FI-1: Inland Fisheries Re-Establishment Program

EIA should be done prior to the program implementation. Environmental items to be closely assessed are "water use," "flora and fauna," "groundwater" and "water quality."

Inland fishery activities are closely related to terrestrial water systems. The project will affect water use of people living downstream, especially in Hambantota and Moneragala districts where water flow is generally scarce. Intensive aquaculture under the program will possibly affect existing ecosystems in negative ways. Ponds, tanks, lakes, lagoons and wetlands have long established fresh-water ecosystems sustaining local species of fauna and flora including birds, fish and mammals. Introduction of new fishing methods as well as expansion of aquaculture in those inland waters is likely to damage this water-sustained

biodiversity. A biological survey on the proposed sites has to be included as a major component of EIA.

Potential adverse impacts are also foreseen with groundwater and water quality, although their actual magnitude depends on each site's groundwater condition and fishing methods. EIA needs to assess the extent of such impacts thoroughly in order to devise environmental protective measures if necessary. Excessive pumping of groundwater or excessive feeding is very likely to take place.

2.17 FI-2: Prawn Farming

EIA has to be done stressing "water quality," "flora and fauna" and "local economy," also including assessment on "soil erosion," "water use," "risk," "resettlement," "religion/culture" and "land use."

This project is proposed for areas between Tangalle and Kirinda. It uses unproductive land which has been abandoned mainly because of poor soil conditions or lack of fresh water. The areas are rich in water surface like lagoons (e.g., Malala, Rekawa and Mawella), wet lands and lakes lined with mangrove forests. Some of them have been recognized as scientifically or biologically significant places. Particularly, the Bundala National Park is internationally renowned as a Ramsar wetland.

It is most likely that ponds created near water ways release excessively saline water to the main water courses destroying aquatic life through destruction of local ecological balance. The indiscriminate destruction of mangrove forests to set up prawn farms will also add to the damage. Natural breeding grounds for crabs, prawns and fish will possibly be lost. Therefore, an in-depth survey on ecological and biological impacts should be carried out prior to the final selection of the project sites so that the existing flora and fauna can be satisfactorily conserved.

For prawn farming, brackish water will be pumped daily from the lagoons into the ponds and the pond water will be sent back into the lagoon system. This operation will bring about potential adverse impacts both on water use and water quality (e.g., sulfides, nitrites, ammonia and other dissolved chemicals). While the quality of effluent water from prawn ponds is dependent on a range of factors including stocking density, feeding rate, water-exchange rate and pond preparation practices, its impact can be extensive if discharged without treatment. Not only the lagoons but also the connected rivers, canals and adjacent

coastal areas will be affected. Pollution may be particularly detrimental to tourism. EIA has also to pay due attention to adverse impacts on local economy. Prawn farms should not force the lagoon fishermen out of their traditional way of livelihood.

Construction works may aggravate soil erosion along the coastal line. Land acquisition for prawn farms may necessitate resettlement. Conflicts on land use may arise related to grazing land or coconut fields. Farms may damage religious or cultural assets especially when they are planned close to existing communities. Furthermore, prawn farms along the coast must carry an inherent risk of natural coastal erosion. Another risk involved in prawn farming is the disease outbreak, which is usually associated with semi-intensive and intensive production where viruses quickly spread among shrimps weakened by over-stocking and polluted waters. EIA has to assess those various impacts and to propose appropriate countermeasures.

One particular note about EIA for this project is that it should carefully study the past experiences in Puttalam district. Many farmers illegally constructed ponds there without any consideration of environmental consequences only to create enormous environmental and social problems. EIA for this project should therefore propose concrete mitigatory measures to the satisfaction of CEA.

2.18 IN-1: Integrated Urban Industrial Development Project

EIA is not necessary for this particular project which focuses on administrative and institutional aspects. However, longer-term necessity of EIA should be judged separately for those resource exploitation projects, infrastructure projects or industrial projects which will be further promoted in line with this integrated approach.

2.19 IN-4: Training and Technology Institute (Center)

EIA is not necessary because this project is least likely to have adverse impacts on the natural and social environment.

2.20 TO-1: Galle Fortified City Conservation

"Noise," "solid waste," "land use" and "health" are the environmental items to be examined in EIA.

During the construction phase, the noise level may rise due to physical rehabilitation works using heavy equipment. Special zoning to conserve historical buildings and scenery may conflict with the residents' needs on land use.

Once the project is completed, more tourists are expected to visit the Galle fortified city area. As population increases in and around the city, solid waste will naturally increase. At the same time, increased tourists may bring exotic diseases with them posing a new health risk to the residents. EIA should thus prepare a management and monitoring plan to mitigate negative impacts to the city by reviewing the waste and health treatment capacity available in the city.

2.21 TO-3: Hotel School

EIA is not necessary for this project as long as it does not involve a large-scale building construction.

2.22 WS-1, 2, 3: Diversion Projects for Weli Oya, Mau Ara and Menik Ganga

Full EIA studies should be carried out for all these diversion projects in association with EIA for the "Uma Oya Multi-Purpose Development" (SA-5) project. In the studies, environmental items such as "land degradation" and "solid waste" can be excluded because of the extremely limited impact on them.

All these diversion schemes will have some negative impact on the local natural and social environment since they will totally change the water regime in respective basins. Appropriate EIA procedures may differ depending on the project design. If only one diversion scheme out of the three is finally selected for implementation, EIA for that scheme will suffice. If some or all of them are jointly to be implemented, comprehensive EIA covering all the basins concerned has to be done to identify cumulative impacts and to formulate an overall environmental management plan.

If EIA is required to select from among the three alternative diversion schemes, however, EIA should be carried out for each scheme with emphasis on flora and fauna, water use, water quality, resettlement and religion/culture. Flora and fauna is the most important item since all the diversion schemes will affect natural forests and three national parks of Yala, Uda Walawe and Bundala.

It should be noted that EIA consultants for the Menik Ganga diversion scheme recommended to cancel it because of significant negative impacts on flora and fauna. According to the report:

> "Menik Ganga must be considered the life line of the Yala National Park. Any action that threatens the stability of the Yala National Park threatens also the planned development of the National Parks system. The river now runs dry for about three months in a year. With the diversion the river will run dry for about 10 months of the year. The effect on residual water availability in the river bed is likely to be drastic. Diversion interferes with a number of natural habitats and affects the stability of the plant communities."

2.23 TR-2: Rehabilitation and Maintenance of National Highways

"Noise," "resettlement" and "land use" are the most important environmental items to be assessed in EIA, although other items described below should also be carefully reviewed.

With this rehabilitation project, magnitude and extent of negative impacts will be limited compared with new road construction projects. However, noise level may rise due to construction works and increased traffic volume. Land-use conflicts may also increase in association with resettlement and set-back.

Civil work of the project may cause soil erosion on fragile land or damage flora and fauna along the highways. It is also possible that toxic substances used for bridge rehabilitation will pollute river water affecting water use downstream and in the sea. If construction workers are brought from outside, impact on the local health condition should also be assessed.

A special treatment against coastal erosion is strongly recommended for National Highway A2 since it runs through the coast where risk of erosion is the highest in Southern Area (i.e., Hikkaduwa, Boosa, Mahamodera, Kalugoda and Kaluwella).

2.24 TR-4: Provincial Road Rehabilitation

EIA should be done with almost the same scope as the one for the Rehabilitation and Maintenance of National Highways project above although adverse impacts will be much less because of a smaller population affected.