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PROPOSED COMMUNITY WATER SUPPLY AND SANITATION PROJECT – II

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SECTORAL ENVIRONMENTAL ASSESSMENT

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CWSSP II

SECTORAL ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY

The GOSL's program for rural water supply and sanitation coverage will exclusively apply a demand-responsive approach, where communities will make formal requests for funding of services, which will be designed and constructed using a participatory approach. The communities will take full control of operation of services.

In view of the nature of the implementation approach, specific sites where future rural water supply and sanitation (RWSS) projects are to be implemented are not known at this stage. Therefore, for the purposes of complying with environmental requirements during project preparation, a Sectoral Environmental Assessment (SEA) has been carried out, in accordance with the specific requirements of the Bank's EA Sourcebook Update number 4, Sectoral Environmental Assessment.

The beneficiary communities will choose the type of water supply facilities. These will be of simple technologies, which could be operated and maintained by the community.

RWSS Project implementation will be based on a participatory approach. Beneficiary communities will actively participate in planning, take decisions, contribute towards the construction (a minimum of 20% of construction cost, mainly with unskilled labour), and will be entirely responsible for O&M of the scheme. The community will construct the scheme, through their Community Based Organisation (CBO). A Partner Organisation (PO), which would usually be an NGO, will mobilise the community, assist and guide them in planning and construction.

Sanitation facilities (individual household latrines) will be provided to the needy households. Beneficiaries will be paid cash subsidies in instalments to cover a part of the construction cost. The balance will be contributed by the beneficiary.

There will be many positive impacts due to implementation of the RWSS projects. This is evident from the experience of the previous projects. Through this study, some negative impacts have been identified, for which mitigation measures are identified and recommended.

The major negative impact is the possible conflicts due to different uses of water from the same source. This could be for agricultural use or for another drinking water supply schemes. In order to identify this potential problem early, and to take mitigatory actions,

due attention to this aspect will be paid at an early stage of the planning process. The reporting formats of the PO are designed to ensure this. As it was observed in previous projects, any such conflict could be resolved amicably within the community or among the communities involved. If it could not be solved among themselves, the Pradeshiya Sabha (the Local Authority) of the area could guide them.

Other negative impacts include the possibility of encroachment into ecologically sensitive areas such as wild life sanctuaries and forest reserves and depletion of flows in streams immediately downstream of the sources. At the planning stage, measures are recommended to avoid such possibilities. Reporting formats to be used by the PO include the specific monitoring of these aspects.

Further, damages to other utilities during construction, pollution of water due to inadequate protection of sources, unsafe water in pipelines, soil erosion and waste water stagnation at the water points are some other possible negative impacts. Measures are suggested in the implementation process to mitigate these.

There could also be temporary negative impacts during construction, such as flooding of excavations and dust pollution. In the proposed procedures, these have been addressed.

There is a possibility of improper siting of latrines close to water sources, leading to water pollution. Further, bad ordour and mosquito breeding are possible if the latrine pits get damaged. In order to avoid these, the procedures stipulate that selected sites for latrines be approved prior to construction, and also inspection visits to latrines during construction, prior to the approval of payment of subsidy instalments.

A monitoring plan is incorporated in the project implementation, to ensure due attention to environmental aspects.

Monitoring mechanism for environmental aspects during project implementation is embedded in the co-ordination and monitoring mechanism established for the Government's RWSS Program. The program monitoring mechanism, which will include monitoring of environmental impacts and implementation of the Environmental Management Plans will be at three levels. At the policy and regulation level, the RWSS Division of the Ministry of Housing & Plantation Infrastructure will be responsible for monitoring. Monitoring to ensure sub-project compatibility with the implementation of the Government's RWSS policy will be the responsibility of the Rural Water Supply and Sanitation Unit established under the Provincial Council, and the monitoring of individual sub projects will be by the respective Pradeshiya Sabhas. Monitoring of water quality will be undertaken at the sub-project level by the respective CBO's who will use simple indicative test kits for bacteriological monitoring and obtain the technical expertise of the National Water Supply and Drainage Board to undertake water quality analysis in instances where the simple test kits show possible contamination of the water sources.

1.0 INTRODUCTION

This Sectoral Environmental Assessment (SEA) of the rural water supply and sanitation sector in Sri Lanka is intended to fulfil the following objectives:

- to identify the nature and extent of Sri Lanka's water resources, as applicable to rural areas, their present conditions, use and trends, and relevant development policies as well as the extent of rural water pollution in Sri Lanka;

- to discuss the Government of Sri Lanka's (GOSL) policy on rural water supply and sanitation and the methodology and strategies of policy implementation in brief, and to identify potential environmental impacts of implementation of the policy, both positive and negative; and

- to identify preventive and mitigation measures of any adverse impacts to so that they can be incorporated into the design of rural water supply and sanitation projects as well as a monitoring plan.

1.1 Methodology Adopted to Carry out SEA

The methodology adopted for conducting the SEA was as follows;

- Review of relevant policies, documents, Acts and guidelines and identifying its relevance to rural water supply and sanitation (RWSS) programs to be adopted by GOSL;

- Review of documents pertaining to previous RWSS projects and identification of the problems which were encountered, and the mitigation measures taken;

- Discussions with officials at all levels of the Government who were engaged in field activities of the previous RWSS projects;

- Visits to rural areas where previous RWSS projects have been undertaken as well as districts where GOSL has identified as priority areas for future RWSS projects and observing potential environmental issues and mitigation actions;

- Group discussions with Community Based Organizations (CBOs) who were involved in previous RWSS projects and obtaining their views on problems encountered and the lessons learned;

- Discussions with a few selected NGOs who were involved in previous and on-going RWSS projects;

- Review of the results of socioeconomic surveys conducted for priority areas for RWSS projects.

2.0 WATER RESOURCES IN SRI LANKA

Historians studying the rise and fall of Sri Lanka's ancient hydraulic civilization have marvelled at its engineering and water resource management systems. Sri Lanka has relied on water resources during the last half century to produce staple food and energy, capped by the Mahaweli Development Project, which was the largest development project in the country's history. Sri Lanka suffers almost annually from droughts and floods. These and occasional cyclones and landslides are problems directly related to water resources. Total costs of these phenomena—economic and environmental—are high, but can only be roughly extrapolated from disaster assistance expenditure. In recent years the contamination of Sri Lanka's waters has added new and still rising economic and environmental costs, which have not even roughly been calculated.

2.1 Geographical and Geological Background

Sri Lanka's location between 6 and 10 degrees north of the equator and close to the Indian sub-continent, gives it a predominantly monsoonal and tropical climate. As an island in the northern half of the Indian Ocean, Sri Lanka is exposed to moisture-laden winds from the southwest and northeast.

Sri Lanka's highland massif in the south central part of the island, standing across the passage of monsoonal winds is undoubtedly the overriding geographical determinant of water resources. It creates high rainfall in the southwest and relatively dry regions in the east and north that covers over two thirds of the country. The central hills that rise above 2000 meters intercept the moisture laden monsoonal winds, particularly on the steeper western flanks of the island. The radial drainage pattern that carries surface water down from the high watersheds includes 103 distinct natural river basins that cover over 90 percent of the island; the remaining 94 small coastal basins contribute little to water resources. River basins originating in the wetter parts of the hill country are perennial, while many of those in the dry zone are only seasonal. Only a few river basins, such as the Mahaweli Ganga that drains 16 percent of Sri Lanka, carry water from the wet to the dry zone.

Geological formation that largely determine Sri Lanka's aquifer characteristics can be grouped into four categories:

- Ancient crystalline hard rocks spread over 90 percent of the island. These Pre-Cambrian rocks have poor primary porosities and their groundwater is often found in their joints, fissures and cracks;

- Sedimentary formations, that characterize most of the areas, include Miocene limestone areas of the north and the northwest;
- Surface alluvium, consisting of clays, sands and gravels in the riverine and coastal areas; and,
- Weathered over-burden in hard rock areas, which includes products of in-situ weathering, such as soil and gravely material that form localized acquifers.

Rates of groundwater recharge from rainfall vary from one geological formation to another. In general, it ranges from 10 percent to 30 percent in many areas of the dry zone. At least 10 percent of the irrigation flow which seeps down may be available for recycling.

2.2 Precipitation and Water Availability

Rainfall supplies nearly all surface and groundwater, supplemented by mist, fog and dew in certain areas. At higher elevations cloud water also contributes to the surface water flow. The mean annual rainfall of Sri Lanka is around 2000 mm which, distributed over the surface area of 65, 610 square kilometres, gives an average volume of 131, 230 million cubic meters of fresh water. What does not soon evaporate into the air runs off the surface or percolates into the soil to reach the sea as a riverflow. Annual average riverflow, at 31 percent of the rainfall equals 40,680 million cubic meters. The balance 90,550 million cubic meters is used and transpired by crops and natural vegetation or evaporates from the soil directly to the air. This simple approximation introduces the considerable variations in time and space that affect Sri Lanka's surface water balance.

2.2.1 Average Rainfall

Average annual rainfall varies spatially from 1,000 mm to over 5,500 mm. Maximum rainfall occurs on windward slopes of the central highlands. A large area of high rainfall on the southwestern flanks of the island is influenced by the strong southwest monsoon with a small area influenced by the northeast monsoon. These major river supplies are supplemented by the more widespread inter-monsoonal rains during April-May and September-October. Tropical depressions and cyclones of inter-annual variability also influence the rainfall during October-November. Mean annual rainfall declines rapidly towards the northwest and southeast, yielding minimal average rainfall along these coasts. The same complex topography of the central hill country that attracts heavy rainfall on windward slopes produces "rain shadows" on the leeward flanks, such as the Dumbara valley and the Uva basin.

2.2.2 Wet and Dry Zones

Rainfall divides Sri Lanka into wet and dry zones and an intermediate zone between the two. The wet zone of the southwest and central hill country averages 2,500 mm of rainfall, mostly throughout the year, while the remaining two thirds of the country in the north, east and southeast stays comparatively dry, averaging 1,500 mm, mostly the "Maha" season (October-January). It remains dry during the five months of the "Yala"

season (May-September). The southwestern flanks of the central hill country form the critical upper catchments of Sri Lanka's largest rivers. Over 65 percent of the wet zone catchment rainfall is discharged into rivers, with Kalu Ganga showing maximum discharge of 77 percent. Rivers rising in the drier eastern half of the hill country have runoff rainfall ratios of 20-40 percent.

2.2.3 Inter-annual Variability

Elements of Sri Lanka's surface water balance are subject to substantial annual variability so that consideration of averages can be misleading. Variations are about 10 percent annually in the wet zone, 15 percent in the dry zone and upto 20 percent in the east coast. The Maha season rainfall is far more variable than the Yala rainfall, due to the weaker northeast monsoon and irregularity of tropical depressions and cyclones during the Maha season. Maximum rainfall variability along the east coast results from landfalls of occasional tropical cyclones.

2.2.4 Extremes – Floods and Droughts

Floods and droughts constitute the extreme weather forms that disrupt Sri Lanka's economic and social life. During the last century, two drought years, 1950 and 1974 and three flood years, 1891, 1957 and 1963 affected 50 percent or more of the country. While widespread droughts of the above mentioned magnitude have not been severe over the last decade or so, sever localized droughts have been experienced, particularly in the Hambantota District of the Southern Province and in the Uva, North Western and North Central Provinces. The Hambantota District faces recurrent droughts on an annual basis. Due to the recent changes in the weather patterns, the droughts have become more severe and prolonged. While the mean annual rainfall in Sri Lanka is in the range of 2000 mm, the Hambantota District is fortunate if it receives 1000 mm annually making it a district experiencing about the lowest rainfall in the country. In addition to the water scarcity experienced due to prevalent droughts, growing competition for water resources among domestic, agricultural, industrial and commercial uses has resulted in critical water shortages in the Hambantota District.

2.2.5 Surface Water

Water that remains from rainfall after evapotranspiration and infiltration losses may generally be considered available surface water. Although surface water estimates vary significantly, depending on the studies conducted, Sri Lanka's total annual runoff appears to be 5.0 million hectare meters (HM). Much of this now serves irrigation and hydropower projects, and less than 3.3 million HM escapes to the sea. Over 60 percent of the water that does escape comes from the wet zone, which often creates flooding and waterlogging in lowlands. In the dry zone however, water utilization is much higher and runoff levels are substantially lower than in the wet zone. Efforts to quantify Sri Lanka's surface water potential have been based on available rainfall, streamflow, and reservoir replenishment data. Records show that Kalutara, Galle, Ratnapura, Kegalle and Colombo

Districts have over 2.4 meters in water depth, most of the dry zone districts have values below 0.03 meters.

2.2.6 Ground Water

Although information on available groundwater in different aquifer formations remains incomplete, Sri Lanka's largest, most studied aquifers lie in the north and northwest. Research since 1966 indicates that the Miocene limestones of the northwest extend over 200 kilometers in the northwestern and northern coastal areas, with aquifers becoming increasingly thick as they reach the coast. They are karstic with a high degree of secondary porosity. In the Vanathavillu basin, in the Northwestern Province, which spreads over some 40 square kilometers, the confined aquifer creates artesian conditions. Estimates of groundwater resources available in the Vanathavillu basin vary between 5-20 million cubic meters per year, with the higher figure indicating the ultimate potential. North of Vanathavillu, in the Murunkan basin, largely in the Northeast Province, deep tube well technology has developed over the last couple of decades to supply water for irrigation and domestic use. A relatively high yielding semi-confined aquifer system, has been located 15-25 meters below ground. The next major aquifer system, located in the Mulankavil basin, also in the Northeast Province, lies between the Pali Aru and Pallavarayankadu Aru, north of Mannar, covers 180 square kilometres. Average yield from tube wells in this region range from 15-35 litres per second.

Within the metamorphic complex covering over 90 percent of the Island, regional aquifers underlies 1-2 percent of the land—that underlain by quartzites or crystalline limestone bands within the metamorphic suite. In the extensive regions devoid of large aquifers, ground water resources depend on local long term recharge from rainfall infiltration and irrigation seepage. Unfortunately, too little is known about ground water in this large area. Therefore, any attempt to formulate a national policy on groundwater development for the metamorphic regions of Sri Lanka is confronted with enormous deficiencies in hydrogeologic data. Estimates of well yields outside the North and the Northwest illustrate the modest groundwater potential. In the Vavuniya district of the Northeast Province they range from 0.1 – 0.6 litres per second (l/s). In the Colombo district at two sites laterites have yielded a total of 3.5 l/s and 1.2 l/s; tube wells drilled upto 25 meters deep in the Trincomalee District recorded yields upto 0.4 l/s; wells sunk into quartzite formations in Melsiripura in the Kurunegala District and Kebettigollawa in the Anuradhapura District have recorded yields of 0.5 l/s for less than one meter of drawdown. Transverse valleys that dissect quartzite formations often create significant springs, as in the Matale District. Groundwater assessments in certain parts of the island such as in areas like the Hambantota District show very low groundwater yields.

Groundwater quality from limestone and metamorphic areas have been affected by chemical conditions. However, in many areas tube wells yield water of reasonable quality, occasionally affected by excessive salinity, hardness and fluoride content. Fluoride contamination in the groundwater is highest in the North Western Province and the Hambantota District of the Southern Province.

2.3 Water Use and Requirements

During Sri Lanka's hydraulic civilization in the first millennium, major population centres in the dry zone left the hill country watersheds largely undisturbed. Under colonial rule this pattern drastically changed. Coastal waters became heavily used for navigation and other purposes and hill country forests were progressively denuded for plantation agriculture. Development of irrigated agriculture in the dry zone gradually became the dominant state development policy in the latter period of the British rule. The Irrigation Department, established at the turn of the twentieth century, assumed control over most water resource programs. Renovation of most derelict irrigation works and new land settlement around them became major concerns in the 1930's and continued virtually unchanged after National Independence. Large schemes such as Gal Oya and Uda Walawe culminated in the Accelerated Mahaweli development Project. Nearly all major reservoirs have now been renovated.

To facilitate macro level planning for water resource management, the island has been divided into four main regions; the Mahaweli project region; Southeast dry zone region; Western wet zone region; and Northwest dry zone region. Today, Sri Lanka's only region with a water surplus is the Western wet zone. The most acute water deficit areas are Northwestern and Southeastern dry zones. The dry zone region of the Mahaweli basin however, with an estimated deficit of 199 million cubic meters, may nevertheless become self sufficient under improved water conservation and management.

In the future Sri Lanka's water resource development must increasingly focus on augmentation, rehabilitation and improved water management. The Government of Sri Lanka has several proposals for augmentation of water resources in some selected river basins. Of these proposals, the Government has accorded very high priority to augmentation of water resources of the Kirindi Oya basin in the Hambantota District of the Southern Province. The GOSL proposal is to divert water from the Menik Ganga to the Lunugamwehera Reservoir to serve the water needs of the communities of the lower reaches of the Kirindi Oya basin. The Government has also launched a scheme of village tank rehabilitations to address the water scarcity issues. This program has shown positive results, particularly where it has increased cropping intensities and rural water supply.

The quantities of water required for industrial and domestic uses are not so significant as for irrigation and hydropower generation. The total requirements were 665 million litres per day in 1973 and has now increased to 2820 litres per day in 2000. Quality and investment requirements of water supply projects for industrial and domestic water use will assume greater significance as demand increases.

2.4 Water Resources, Conditions and Trends

Conditions and trends of water resources are determined by natural factors and the impacts of their use for human benefit.

2.4.1 Local Rainfall Decreases

Studies of island wide rainfall trends have been attempted for several decades without conclusive results, but significant local trends have been observed in the annual rainfall or rainfall during agriculturally critical periods. For example, Nuwara Eliya has experienced a significant decline in annual rainfall during the last 100 years. The decline coincided with deforestation of the hill country for tea plantations, but this fact alone cannot explain a rainfall decrease of nearly 20 percent in a hundred years. Some still unknown meteorological change may be responsible for this rainfall decline, which also appears to have affected rainfall stations such as Abergeldie in the upper Mahaweli basin. However, data do not support the belief of many dry zone farmers that rainfall has been declining over the past generation or more, adversely affecting agricultural production; analyses of long period rainfall in Anuradhapura do not indicate significant progressive rainfall decline in recent decades. On the other hand more drought years have occurred over the last 30 years than during the first half of the twentieth century. This has been particularly true for the Hambantota District.

2.4.2 Increased Runoff

Available stream flow data cover shorter periods than those for rainfall and cannot provide meaningful time series analyses. Nevertheless the few studies that exist indicate a steady increase in the runoff/rainfall ratios as expected from deforestation. Such changes in river discharge trends stem largely from catchment area land use. Although data available on sediment discharges in the rivers of Sri Lanka do not suffice for time series analysis, in theory, increasing runoff/rainfall ratios indicate increased sediment transport from upstream and eventual increases in reservoir siltation. High siltation rates are evident in many dry zone tanks as well as up country reservoirs such as the Kandy Lake and Lake Gregory in Nuwara Eliya. A recent study of the Polgolla reservoir indicated that 44 percent of its capacity had silted up within a period of less than 12 years. Based on the current land use practices, it is quite probable that the new Mahaweli reservoirs such as Kotmale, Victoria and Randenigala may well be seriously affected by siltation during the first 30 years.

Temporal data for analysis of ground water resources trends are altogether lacking except perhaps in the Jaffna peninsula where a network of observation wells was maintained for a time before the civil conflict, by the Water Resources Board. Increased exploitation of groundwater for domestic use through large numbers of tube wells in hard rock areas of the dry zone requires careful monitoring to determine the impact on adjacent shallow wells and other surface waters.

3.0 WATER POLLUTION

Although Sri Lanka has largely small cities and a limited industrial base, with plenty of water for dilution of wastes, water pollution problems in the island is on the rise, particularly over the last decade. The major intentional or direct pressures on water

resources are agriculture, urbanization and industrialization that change land use patterns. Excessive use of agro-chemicals and chemical fertilizers, release of industrial effluents, domestic wastes & sewage and ad hoc disposal of municipal solid wastes into waterways cause unintentional (indirect) pressures. These pressures collectively interact resulting in complex impacts on water resources. Since the SEA is focussing on the rural water supply and sanitation sector, this section will be confined to water pollution due to rural activities rather than impacts due urbanization and industrialization.

3.1 Sources of Pollution

3.1.1 Agricultural Wastes

Agricultural waste results from agricultural practices and agro and livestock based industries in the rural sector. Nearly one third of Sri Lanka's land is cropped and on it farmers put two to eight times more fertilizer than other countries in the region, reaching levels as high as 77 kg/ha. Certain districts show annual application rates for paddy in the range of 124 kg/ha. Fertilizer application rates for the country in general show an upward trend over the past decade. Fertilizer pollution has become a potential hazard. Intensive agriculture patterns that were practiced in Jaffna prior to the civil conflict and currently in the Nuwara Eliya Districts have already caused pollution of surface waters by nitrates. Excessive nitrates can cause bowel and other diseases in children. With its extensive sugar cane plantations covering an excess of 25,000 ha, the Moneragala District is a potential recipient of fertilizer pollution.

Pesticide use has also risen dramatically. Paddy is the highest consumer of pesticides (equivalent to 70 percent of the imports), and the average rate of application between 1977-1983 increased from 1200 grams per ha to 1600 grams per ha. Between 50-60 percent of the farmers use at least twice the recommended dosage. A further consequence of agricultural practices on hilly terrain is the silt carried through the runoff along with fertilizers and pesticides. However, the lack of data clouds the understanding of the impacts of fertilizers and pesticides on waterways. No systematic studies have been undertaken and little or no published data on monitoring are available on pesticides and fertilizer levels in the runoff from cultivated land. Nor have studies systematically measured the potential pollution impacts of agricultural and livestock based industries in the island, such as pig and poultry farms. For example, paddy milling plants increased by 60 percent between 1980 and 1987 due to private sector mills. Although milling has caused localized pollution in the Northcentral and Northeast Provinces, it is not yet possible to determine the extent of the problem. It has, however, been established mills consume substantial quantities of water during the milling season, and their high BOD can cause pollution of wells and streams used for local drinking water.

3.1.2 Natural Factors

Background contributions of geological factors to water pollution cannot be overlooked when analysing water resource constraints and environmental conditions and trends. Geological conditions cause high fluoride levels in water in parts of Sri Lanka,

particularly in the Northcentral and Northwestern Provinces. Too much fluoride causes dental fluorosis and too little may result high dental caries. Eppawela and Anuradhapura have the highest groundwater concentrations, reportedly as high as 9 mg/l. In the Polonnaruwa District 15 percent of tube wells showed levels of fluoride above 2 mg/l. Excessive levels of fluoride that cause severe dental fluorosis among area residents result from fluoride leaching into groundwater from the area's fluoride rich apatite deposits. The Udawalawe region is also high in groundwater fluorine concentrations, due to serpentine deposits that contain 1000 to 2000 ppm fluoride. Pollution of groundwater occurs through a process of ion exchange.

3.1.3 Rural Sanitation

The census figures for rural areas in 1981 revealed that only 5 percent of the rural population had access to pipe borne water, 85 percent used wells, and the rest depended on streams and rivers. Between 30 and 40 percent of the wells in the Hambantota, Moneragala and Matale districts are unprotected and 25-30 percent of the rural populations in Moneragala and Hambantota areas depend on rivers and tanks for potable water. If similar trends occur elsewhere, rural sanitation problems will assume growing importance. Lack of sanitation facilities and practices will largely determine the exposure of rural populations to waterborne diseases.

Sanitation figures show that 44 percent of the rural population use pit and bucket latrines, while 36.5 percent use no latrine facilities whatsoever. In 7 of the 13 predominantly rural coastal districts, 60 percent of the residents have no sanitary facilities. In these same districts over the 90 percent of the population use wells, rivers, tanks and springs for water supply. Many water sources in the rural areas are unprotected. The result: a high proportion of the population is exposed to health risks associated with faecal contamination of water, either through groundwater pollution or from surface contamination. According to one study, "the poor water supply and excreta disposal systems have resulted in 40 percent of the Sri Lankan population being affected by typhoid, amoebic and bacillary dysentery, infectious hepatitis, gastro-enteritis, colitis and worm infections" (Hydrogeochemical Atlas of Sri Lanka).

3.2 Trends in Water Quality

Comprehensive water quality data on surface water, ground water, estuaries and coastal waters are not available, in part because of diffused resources management responsibilities. The Irrigation Department, Water Resources Board, National Water Supply and Drainage Board (NWSDB), National Aquatic Resources Agency (NARA), Mahaweli Authority of Sri Lanka (MASL) and Coast Conservation Department (CCD) all manage water resources and collect data. Many independent water quality studies by Universities and international agencies have been carried out with no cohesive force guiding the search for information or its ultimate use. With data scattered, unpublished, or available in unprocessed form, analysis becomes onerous, if possible at all. An attempt is being made here to project some coherent trends based on the data available

from some key rivers, groundwater in the Jaffna peninsula and areas subject to pollution and salt water intrusion as well as coasts and estuaries.

3.2.1 Kelani and Mahaweli Rivers

The Kelani and Mahaweli rivers pose different problems to rural populations that may seek its waters as a source of potable water. The Kelani, which is the second longest river in Sri Lanka, is 144.3 kilometers in length and drains an area of 2,278 square kilometres in the west zone that contains some of the most densely populated districts. Therefore, any use of this river for rural water supply will be confined to the upper reaches, or outside the Western Province. While the river is highly polluted, particularly with organic pollution, this phenomena is confined to the lower reaches. It is specifically in the last 50 kilometers before the river flows into the sea at Mattakkuliya in Colombo. Concentrating on the areas of the river and its tributaries that may be utilized for rural water supply, studies have shown that the levels of pollution are relatively low. The most significant cause of pollution is caused by fertilizer runoff. Pesticide contamination may not be serious yet because much of the Kelani catchment drains through plantations where pesticide use has been much lower than in areas of irrigated agriculture.

The Mahaweli, which is Sri Lanka's longest river with a length of 325 kilometers and a catchment area of 10,327 square kilometres, gives rise to a completely different set of issues regarding pollution, when the focus is rural water supply. For the first half of the river's length, it traverses through the wet zone and passes through several densely populated cities such as Kandy and Matale. From Kandy alone it receives substantial untreated urban waste water through the two main waterways draining the city—the Meda Ela and the Hali Ela—which together discharge a load of 712-1507 kg BOD per day from dense city centre developments. Municipal solid waste (MSW) disposal sites at both cities, Kandy and Matale, are on the banks of the Mahaweli. Since these sites are uncontrolled "open dumps", significant quantities of leachate is discharged into the river as well. Based on the composition of MSW in Sri Lanka studies have shown that the organic load in the leachate is in the range of 30,000 mg/l.

Low levels of industrialization have kept the industrial pollution of the Mahaweli below that of the Kelani, yet expansion of the agricultural and agro based industrial sector will require careful impact assessment of its pollutant contribution to the river. Nitrate concentrations have shown a definite increase along the direction of flow. Sewage also contributes to increased nitrate levels. However, although cities such as Kandy and Matale are discharging sewage into the Mahaweli, the greatest contribution to nitrate contamination is agrochemical usage in the catchment. Therefore, while the upper reaches of Kelani which may be tapped as sources of potable water for rural water supply may be relatively unpolluted, in the Mahaweli it is the polluted lower reaches of the river that may be used for rural water supply. While this may be the case, it is also anticipated, based on the few ad hoc studies conducted, that the turbulence during river flow and its associated aeration has resulted in significant levels of self purification resulting in lower levels of pollution in the river as it reaches the plains.

3.2.2 Other Rivers, Waterways and Water Bodies

Wastes from townships often discharge into small adjacent streams or rivers and ultimately reach the major waterways. Most of this waste is organic and could cause anaerobic conditions in some places. Rivers like the Walawe River have also been subjected to heavy loads of industrial wastes from one factory, black liquor from a paper mill, but such conditions can be corrected relatively easily.

3.2.3 Ground Water

Ground water is increasingly being used for potable water, especially in small towns and rural areas. The estimated ground water potential for the country is 780,000 HM per annum. For this water to remain safe, water extraction must not exceed the aquifer's replenishment capacity. Otherwise wells will run dry or in coastal areas invite brackish water intrusion. This problem has occurred in northern coastal areas and the northwest agricultural belt where ground water irrigates rice and cash crops. Demand for domestic water from ground water is rising in the Puttalam, Mannar, Paranthan, Killinochchi and Mullaitivu areas. Salt water intrusion into groundwater has occurred in the Hambantota area due to seepage from rainwashed dissolved solids. The most serious threats to ground water come from nitrate and bacterial contamination. Nitrate pollution is due as much to extensive use of agro chemicals as to the disposal of sewage effluent from pit latrine soakaways and septic tanks, which cause bacterial contamination of groundwater.

Data on distribution of nitrate in groundwater is available for the northern and northwestern costal areas that largely comprise miocene limestone. Limited monitoring in the Kalpitiya peninsula, intensively cultivated and irrigated, has shown considerable aquifer contamination by nitrates in fertilizer. Peak seasonal concentrations there reached four times the WHO guideline; concentration in groundwater beneath unfertilised land were substantially lower. Similarly, in agricultural and non-agricultural areas in the Jaffna peninsula, nitrate concentrations of over 200 mg/l have been recorded. Widespread water contamination in the peninsula results from agricultural washouts and pit latrine soakaways. Of the wells monitored in the peninsula, one study showed that 80 percent indicated unacceptable bacterial quality due to sewage.

Leaching of pesticides into groundwater may also occurs in these agricultural areas, but no analyses have been carried out due to lack of facilities and funding for monitoring.

3.2.4 Other Forms of Water Degradation

Throughout the country, each watershed is likely to have its own peculiar mix of water degradation problems. Along with water pollution from industrial facilities and urban communities, other adverse impacts on water quality may be significant as well. Land clearing, deforestation, and steep slope cultivation cause soil erosion and siltation that contributes to sedimentation and destabilized seasonal water flows in rivers.

3.3 Impacts

Economic, social, health and biological impacts of water pollution interlink and cannot be viewed in isolation. All impacts cannot be quantified but efforts can be made to improve our ability to measure the long and short term economic costs of water degradation and the lost benefits of water quality. The high economic costs of water pollution in Sri Lanka have not been comprehensively calculated. Pollution of surface and groundwaters requires costly treatment to meet potable water demands of expanding populations. Water borne diseases caused by polluted water, although not precisely evaluated, have increased costs of health care in cities, small towns and rural areas. Despite some improved health care, the numbers of people affected by waterborne diseases have increased. The frequent outbreaks of such diseases are evidence of the increased water pollution.

4.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 National Policy for Rural Water Supply and Sanitation

In 2001, the Government of Sri Lanka (GOSL) announced a National Policy for Rural Water Supply and Sanitation. The policy is based on the following principles:

(i) Fresh water is a finite and vulnerable resource essential to sustain life and ecosystems;
(ii) Water is a basic human need which warrants for equitable allocation;
(iii) Water has an economic value and should therefore be recognized as an economic good;
(iv) Provision of water supply and sanitation services should be people centred and demand driven;
(v) Provision of water supply and sanitation together with hygiene education should be recognized as integral components in all sector projects and programs;
(vi) Sector activities should be based on a participatory approach involving users, planners and policy makers at all levels;
(vii) The roles of the Government, Provincial Councils and Local Government Authorities should be to regulate and facilitate in the implementation of the sector activities while Community Based Organizations (CBOs), Private Sector and Non Governmental Organizations (NGOs) should be the providers of the services when required;
(viii) Users should be encouraged to own and manage the facilities and assets;
(ix) Users should be encouraged to share the capital investment incurred in the creation of the facilities;
(x) Users should bear the full responsibility of sustainable operations and maintenance of the facilities
(xi) Women should play a central role in the decision making process of the sector;
(xii) Private participation in the provision, operations and maintenance of the facilities and services should be encouraged; and
(xiii) All sector activities should be in harmony with the environment.

The new policy transfers the responsibility of provision of rural water supply and sanitation from the central government to the rural communities who will be assisted by the Pradeshiya Sabha's and Provincial Councils, with the central government playing the role of policy making, regulation, monitoring and evaluation. All future rural water supply and sanitation projects, regardless to the source of financing—be it donor assistance or GOSL funding—will be implemented by CBOs with technical assistance provided by the Provincial Councils and Pradeshiya Sabhas. The operation and maintenance will be the responsibility of the CBO's.

For purposes of this policy a rural area is defined to any Grama Niladhari (GN) Division with a Pradeshiya Sabha (PS) area where the population is less than 6000 persons. The role of the Government of Sri Lanka, through the Ministry of Housing and Plantation Infrastructure, is to (i) ensure all citizens have access to potable water and sanitation facilities; (ii) formulate necessary policies and legislation for the sector; and (iii) regulate sector development and management activities. As far as environmental impacts of the sector go, the Government has the following specific responsibilities: (i) determine and regulate water entitlement and allocation for the sub-sector; and (ii) facilitate the regulation of water quality by establishing standards. The primary responsibility of the Provincial Councils within the National Policy Framework is to : (i) ensure equitable allocation of resources; and (ii) quality and standard of services. With regard to the PCs responsibility towards the environment, the PCs are responsible for ensuring environmental harmony in all sector development activities giving due consideration to the conservation of water resources. The primary role of the Local Authorities within the National Policy Framework shall be to: (i) ensure quality and standards of service; (ii) determine tariffs; and (iii) equitable allocation of resources. Specifically the Las are expected to ensure environmental harmony in all sector development activities giving due consideration to the conservation of water resources. While each level of government has a responsibility to address environmental issues, the mandate appears somewhat general. However, the specific responsibilities of each level of government when it comes to addressing environmental concerns of rural water supply and sanitation projects, will be specified in greater detail in a separate section of this SEA.

The NGOs, CBOs and private sector who either jointly or singly have the mandate to implement rural water supply and sanitation projects, including operation and maintenance responsibilities, have the responsibility of conserving the environment with emphasis on water sources and watershed areas, according to the National Policy. The responsibility of implementing scheme specific environmental management plans rests with the body chosen to implement the rural water supply and sanitation projects.

The Government will provide the legal framework to support and guide the sector institutions in the performance of roles and functions of institutions. In addition, the Government will facilitate the formulation of an appropriate regulatory framework to regulate RWSS projects. The regulatory framework will be enacted by the PCs and LAs. The scope of such regulation will include, *inter alia,* extraction of water from natural sources to ensure equity and sustainability; allocation of water for different purposes

among users; (iii) water entitlements; (iv) conservation of water resources and watersheds, including proper drainage and prevention of pollution; and, (v) Standards of quality and levels of service for both potable water and sanitation;

4.2 National Environmental Framework

The consideration of environmental aspects of development activities in Sri Lanka is governed by the National Environmental Act No. 47 of 1980 as amended by Act No. 56 of 1988. The Act classifies different types of development activities, for which different requirements of environmental considerations are specified. Central Environmental Authority (CEA) is the institution established and empowered as the regulatory agency by the above Act.

According to the Act, certain "prescribed projects" require an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) depending on the severity of potential environmental impacts. The categories of these prescribed projects are indicated in the Gazette (Extraordinary) No. 772/22 of 24th June 1993. The IEEs or EIAs prepared for such projects should be presented to a "Project Approval Agency" for review and approval, prior to implementation.

Activities of this program, which is intended to improve the drinking water supply and sanitation conditions of the rural and small town communities, using low cost appropriate technology, are not classified as "prescribed projects" in the above Gazette. Hence, preparation of any IEE or EIA, under national law, is not required for these projects, nor is the prior approval process.

CEA is the enforcement authority under the Act. The environmental aspects of all activities carried out within a Divisional Secretary Area are monitored by the Divisional Secretary (DS), who is empowered under the National Environmental Act. There is an Environmental Development Officer (EDO), who is an employee of the CEA, to assist the DS in this regard. The EDO has the responsibility of monitoring environmental issues of projects that do not pose a serious threat to the environment. Rural water supply and sanitation projects fall within this category. Projects with potential for serious environmental impacts are monitored by the CEA directly from their headquarters in Colombo.

There are a number of policies and laws which include Acts and Regulations which have a bearing on utilisation of water resources and pollution. The National Environmental Action Plan developed by the Ministry of Environment and Natural Resources has recognised water resources among the highest priority areas of environmental concern. In fact, water is placed second in the order of priority.

The establishment of the Water Resource Council and the Water Resources Policy developed by the Council will have a strong impact on the domestic water sector. The Government has recognised the limitations of the segmented approach adopted by varied agencies in charge of water resulting in wastage of the valuable resource. Hence, the

concept of integrated water resource management has been developed by the Water Resource Council and it is gaining wide acceptance in the entire government system. All sub-sectors such as agriculture, industry, domestic water sector will have to work within the framework of the policy developed for the water resources by the Water Resource Council. The policy itself was developed after wide consultation with the endorsement of a committee represented at the highest level of ministries which are associated with water. The Water Resources Policy is to be approved by the Cabinet of Ministers shortly.

There are other Acts and Ordinances such as the Irrigation Ordinance, Mahaweli Authority Act etc., which impact on water resources. Although, the supply of domestic water is not included in the mandates of the Irrigation Department and Mahaweli Authority, the water released by them are used for drinking purposes by large numbers of people both in the dry and wet zones.

The Pradeshiya Sabha Act gives wide powers to Local Authorities to regulate the use of water for domestic purposes. The Act provides for enabling subsidiary legislation, which will empower the Local Authorities to enforce standards in respect of drinking water.

The National Environmental Act has the widest powers in regard to control of pollution and setting of standards etc. Since many of the industries and commercial ventures such as hotels etc., discharge their solid and liquid waste to water ways, standards have been laid down under the Environment Protection Licnces System (EPL). All enterprises discharging pollutants into the environment has to obtain an EPL which will be issued by the CEA based on the enterprise conforming to National Environmental Discharge Standards.

The Central Environmental Authority has its headquarters in Colombo and there are two sub offices in Matara and Matale districts. There is currently a proposal to "regionalize" the CEA to the five economic regions as identified by the Government. At the head office there is a highly skilled cardre of officers who are trained both overseas and in Sri Lanka on most aspects of environmental sciences. While several donors have funded institutional strengthening of the CEA over the years, there is a major institutional restructuring and strengthening project being financed by the World Bank which is on-going. There is a separate division to address the environmental pollution aspects headed by a Deputy Director General. There are Directors, Deputy Directors, Assistant Directors and Environmental Officers working in the division. Their main task is to prepare standards, to gazette them and to enforce the standards and regulations under the provision of the National Environmental Act and subsidiary legislation. There is a separate Legal Division which offers legal advice to the Board of Directors and engages in direct prosecution in courts of law.

The major constraint identified by the World Bank assisted institutional assessment studies was the approach adopted by the CEA in regard to enforcement of pollution prevention regulations. The World Bank study strongly advocated outsourcing some of the activities undertaken directly by the CEA such as laboratory analysis of polluting

material, etc., and recommended the accreditation of private laboratories. These proposals are in the process of being implemented at present.

One of the major problems faced in the implementation of standards was the prohibitive cost of testing the samples. A mobile laboratory service has been introduced to improve and expedite the testing of samples. These improvements will undoubtedly help the CEA to enforce pollution standards more effectively.

The CEA recruited two hundred and ninety four Environment Development Officers (EDOs) to assist the Authority to implement its programme. The majority of the EDAs possess University Degrees on Physical and Biological Sciences. Originally they were attached to the Pradeshiya Sabhas to assist them in the implementation of the EPL s. Lately they were attached to the Divisional Secretaries and they have been given a broader area of work in environmental protection.

The Divisional Secretaries are associated with multifarious development activities and it may not be possible to get their full attention for areas such as pollution control and standards enforcement etc. However, it has been noted that the contamination levels of potable waters are very high, particularly in small towns and also in agricultural areas due to heavy usage of agro chemicals. The Ministry of Housing & Plantation Infrastructure (M/H&PI) proposes to initiate a dialogue with the Ministry of Environment and Natural Resources and the Central Environmental Authority on the subject of enforcement of standards in regard to potable water.

The agencies outside NWSDB such as the Department of Irrigation should also have a responsibility of providing quality drinking water to the people.

The strategy used by M/H&PI as well as the Ministry of Environment and Natural Resources is to educate the people primarily through school children with regard to the standards of water required for drinking purposes. Steps are being taken to educate them on the simple techniques of treatment, filtration and boiling the water.

The National Environmental Act requires that any prescribed development project which includes industries, tourist centres, housing schemes should be cleared through the process known as Environmental Impact Assessment (EIA). The EIA regulations were passed in Parliament in 1991 which made it mandatory that these development projects and programmes should obtain EIA clearance. An alternate simplified process of an Initial Environmental Examination (IEE) is to be adopted for project and programmes where the environmental impacts are less.

There are similar provisions in the Provincial Environment Act of the North Western Province, which is currently the only province with its own environmental legislation.

The procedures and process to be followed in the EIA is clearly defined in the regulations and there is provision for public consultation. Members of the public have access to project proposals through appropriate agencies and they are given a one month time

period to make representations with regard to the proposals. The EIA procedures and guidelines encourage the agencies which are gazetted as authorised agencies under the regulations to visit the sites, give every opportunity to members of the public and affected parties to comment on the impact on the environment.

4.2.1 The EIA Procedure

While the average rural water supply and sanitation project is not considered a prescribed project, projects with potential for significant environmental impacts in the rural water supply and sanitation sector are subject to the EIA process. In the event that an EIA is required, the PAA in consultation with CEA, is responsible for subjecting the preliminary information to environmental scoping, in order to set the Terms of Reference (TOR) for the EIA. The TOR is prepared by a Technical Committee (TC) comprising experts in the relevant field, appointed by the PAA. In developing the TOR, the regulations provide for the PAA to consider the views of state agencies and the public.

Upon submission of the EIA by the proponent, the PAA is required to determine whether issues referred to in the TOR have been addressed and notify the proponent of any inadequacies within 14 days. In the event any inadequacies are identified, the proponent is required to make necessary amendments and resubmit the report. Once accepted, in addition to the EIA being forwarded to the CEA by the PAA, notice is also placed in the Government Gazette and in a national newspaper published daily in sinhala, tamil and English languages inviting the public to make written comments, if any, to the PAA within 30 days. The notification would specify the times and places at which the EIA would be available to the public. As a minimum the report would be available at the CEA, PAA and in a GOSL agency in the locality of the proposed project. The environmental regulations have provisions for public hearings on the project although it is not mandatory. The PAA is required to forward all comments, either written or raised during any public hearing, to the project proponent for review and response within 6 days of completion of the public comment period. The proponent is required to respond to all such comments in writing to the PAA.

The TC appointed by the PAA would then evaluate the EIA and require the project proponent to respond to any queries raised by the TC. The TC would also evaluate the adequacy of the proponent's response to any comments raised during the public comments period. Upon completion of the evaluation of the TC, the PAA with the concurrence of the CEA, would grant approval for the implementation of the proposed project subject to specified conditions or refuse approval for implementation of the project, with reasons for doing so. The notification must be made within 30 days of the receipt of responses from the proponent. The PAA is required to specify a period within which a the approved project should be completed. In the event the proponent is unable to complete the project within the specified period, written permission for an extension has to be obtained from the PAA, 30 days prior to the expiration date.

The PAA is responsible for forwarding a report which contains a plan for monitoring the implementation of the approved project, to the CEA, within 30 days from granting

approval. It is also the responsibility of the PAA to publish in the Government Gazette and in one national newspaper published in Sinhala, Tamil and English languages, granting approval for the project. It is mandatory that the project proponent inform the PAA of any alterations to the project as approved and/or the abandonment of the project. The PAA shall, where necessary, obtain fresh approval in respect of any such alterations that are intended to be made to the approved project. The PAA in consultations with the CEA, would also determine the scope and the format of the supplemental report required to be submitted for such alterations.

4.2.2 The IEE Procedure

Upon review of the preliminary information provided by the proponent, if the PAA determines that the project would have no long term adverse environmental impacts, an initial environmental examination (IEE) would be considered adequate. Under such circumstances, the proponent will be required to submit a detailed IEE for review and approval by the PAA. The IEE will identify potential environmental and social issues and the complexity of possible remedial actions. Upon reviewing the IEE, if the TC identifies any substantial environmental issues that may arise as a result of the proposed project, the proponent will be required to undertake a detailed EIA. In the event the IEE is considered adequate, then the project proponent is requested to prepare an Environmental Management Plan (EMP), to address any potential environmental and social issues as well as incorporate the PAA/CEA's approval conditions. The IEE review process is similar to the EIA review process, except for the level of detail and analysis involved, which is proportionate to the anticipated environmental and social impacts.

4.3 Requirements of the World Bank

The World Bank's Operational Policy OP 4.01, Environmental Assessments, describes the requirements of an Environmental Assessment (EA).

According to the Operational Manual - OP 4.01, there are four categories into which projects are classified;

> **Category A** includes projects, which are likely to have significant adverse environmental impacts that are sensitive, adverse or diverse. These impacts may affect an area broader than the sites or facilities subject to physical works.
>
> **Category B** includes projects with potential adverse environmental impacts on human populations or environmentally important areas - including wetlands, forests, grasslands and other natural habitats –that are less adverse than those of Category A projects.
>
> **Category C** projects are those likely to have minimal or no adverse environmental impacts.

Category FI projects are those, which involve investment of Bank funds through a financial intermediary, in sub projects that may result in adverse environmental impacts.

Under OP 4.01, the it appears that rural water supply and sanitation projects are classified by the Bank under Category B.

Projects financed with IDA resources normally need to comply with World Bank Operational Policies. World Bank OP 4.01 requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that these projects are environmentally sound and sustainable. EA is a process whose breadth, depth and type of analysis depends on the nature, scale and potential environmental impact of the proposed project. A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas including wetlands, forests, grasslands and other natural habitats are less adverse than those of Category A projects. These impacts are site specific; few if any are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects. The scope of an EA for Category B projects may vary from project to project, but it is narrower in scope when compared with Category A projects. Considering the scale of sub-projects and components to be financed under potential rural water supply and sanitation programs, serious adverse, long term environmental impacts are unlikely. Based on the experience of the IDA financed Sri Lanka – Community Water Supply and Sanitation Project (CWSSP), which is very similar in scope to the proposed second CWSSP, it is very likely that virtually all sub-projects and components, will at most be classified as Category B rather than Category A. However, since sub-projects to be financed under the proposed program are yet to be identified, a specific environmental assessment is not possible. Hence the Government of Sri Lanka has developed a SEA for the rural water supply and sanitation sector which will address typical environmental issues and identify mitigation measures that need to be taken.

World Bank OP 4.01 is very clear that for all Category A, Category B and Category FI projects proposed for financing under an IDA Credit, the developer must consult project affected groups and local non-governmental organizations (NGOs) about the projects environmental aspects and take their views into account. Such consultations should be initiated as early as possible, in the Project cycle. For Category A projects, such consultations should occur at least twice: (a) Shortly after environmental screening and before the TOR for the EIA are finalized; and (b) Once the draft EIA report is prepared. In addition, the developer is expected to consult with such groups throughout project implementation as necessary to address EIA related issues that affect them.

World Bank OP 4.04 on Natural Habitats states that the Bank does not support projects that, in the Bank's opinion, involve significant conversion or degradation of critical natural habitats. GOSL has agreed with IDA that no subprojects that provide water for

communities will fall within the purview of OP 4.04 will be eligible for financing under the proposed Second CWSSP Project.

5.0 PROGRAM DESCRIPTION

5.1 Objective and Scope of the Program

The development objective of the program is to increase access to water supply and sanitation in rural villages and small towns using a sustainable, participatory demand based development approach with the implementation decision making process being decentralized to the provincial and local authority levels.

In Sri Lanka, the national coverage by safe water supply assessed in the year 1993 was 61%. The coverage in rural areas and urban areas were 60% and 89%, respectively.

The corresponding coverage in satisfactory sanitation were 60% (national), 70% (rural) and 80% (urban).

The national program for rural water supply and sanitation will be implemented using the demand-based, participatory approach, as stipulated in the national policy.

5.2 Major Components of the Program

The program comprises the following key components:

- Water supply for rural villages;
- Sanitation for villages;
- Water supply and sanitation for small towns;
- Water supply and sanitation for schools; and
- Social fund for community development.

5.3 Types of Facilities

The water supply facilities to be provided will depend on the demand of the people. Possible options are:-

- Pipe borne gravity schemes;
- Pipe borne pumping schemes;
- Shallow wells (common);
- Shallow wells (private);
- Rainwater harvesting; and

- Extensions from existing schemes.

Sanitation facilities to be provided to beneficiaries will consist of;

- Off set pit latrines; and
- VIP latrines or direct pit latrines.

These will be given to individual households. This will be funded under the program for the most deserving in a community.

5.4 Methodology and Implementation Strategy of the Program in Brief

Project implementation is based on a participatory approach. Beneficiary households in selected communities must act collectively in applying for and in the planning, design and construction of facilities. The project provides technical assistance to selected communities and mobilises them to take decisions at all stages of the programme.

The beneficiaries will decide the level of contribution in cash and unskilled labour towards the capital cost of facilities to be constructed (a minimum of 20% of total capital cost is presently stipulated).

Potential beneficiary communities will be identified from applications submitted by communities. The local authority, political and administrative authorities of the area (Pradesiya Sabha), local NGOs and the respective Provincial Council will be involved in screening and selecting the communities for inclusion in a project.

Assistance of Partner Organisations (POs) will be provided to the community by the project for mobilising beneficiary households in the decision-making process and for planning and design of the water supply facilities for the selected communities. Planning of the facilities will be a participatory process and communities will decide on the facilities to be constructed and the service level by considering their affordability (both for capital and O&M costs), willingness to pay, availability of water resources, and the O&M implications of the selected technology.

Construction of common facilities will be carried out directly by the Community Based Organisation (CBO). Households will do the construction of their individual facilities under the guidance of the CBO, with appropriate technical advice. Partner Organisations will provide the specialised guidance and supervise the construction, with assistance from the PS's.

The CBO will manage the sanitation programme in their villages and the project will provide financial assistance for the construction of sanitation facilities. The PO will provide guidance on the location and construction of sanitation facilities.

Environmental protection and hygiene education programmes will also be organised as a part of the project by the PO, and will be carried out by the PO and CBO.

The beneficiary community will own the completed facilities. They will be responsible for operation and maintenance. The CBO will make necessary arrangements for collecting the appropriate tariff from the beneficiaries to meet the O&M expenditure. The Pradeshiya Sabha (PS) will provide backup support for O&M of pipe borne water supply schemes and tube wells.

The proposed social development fund will assist the community by providing matching funds in an event of a major breakdown and other activities.

5.5 EIA Study of the Proposed Augmentation of Water Resources of the Kirindi Oya Basin in the Hambantota District of the Southern Province

The Government has accorded very high priority to augment water resources of the Kirindi Oya basin and has requested IDA financing to implement such a proposal. A decision has been made by IDA management that the project will finance a full environmental impact assessment of the proposal to augment the water resources of the Kirindi Oya basin in the Hambantota District of the Southern Province. While the proposal calls for diverting water from the Menik Ganga through a canal (to be constructed) to the Lunugamwehera reservoir to satisfy the critical water needs faced by the communities in the Kirindi Oya basin, the study will take a broader view of the issue. The study will explore all viable options for augmenting the water resource needs of the communities in the Kirindi Oya basin. In the event the study also concludes that the diversion is the only feasible option, the study would then address the river basin management issues of the Menik Ganga basin and ensuring adequate downstream water flows for human consumption in the sacred city of Kataragama and environmental/ecological water needs of the Yala National Park, particularly during the drought periods. Considering the natural environment in the area, any proposed design for the diversion should be planned on an ecologically compatible basis. While the environmental assessment will be financed under the project, there is no commitment to finance the implementation until a full environmental review is undertaken after the completion of the EA.

6.0 ENVIRONMENTAL IMPACTS

6.1 Identified Positive Environmental Impacts

The following are the potential positive impacts of the proposed program, identified on the experience of the previous projects in the rural water supply and sanitation sector and from assessments, surveys and discussions with CBOs and NGOs who were involved in the past and on-going project activities.

- Improved health condition of the rural community due to the availability of adequate and better quality water and sanitation facilities;
- Reduction of poverty;
- Reduction of activities contributing to pollution of water sources;
- Source protection and catchment area protection;
- Construction of hygienic latrines and reduction of environmental pollution;
- Improved rural environment which leads to appreciation of land values;
- Reduction of forest clearing for fuelwood for boiling water;
- Reforestation in the catchment areas by the communities to protect the water sources;
- Improved nutrients and moisture condition in soil due to discharge of domestic waste - water into house gardens and vegetable plots, thereby promoting the good practice of home gardening; and
- enhancement of the self esteem and social acceptability of the individual beneficiaries by the use of latrines.

6.2 Possible Negative Impacts and Mitigation Measures

Water resources will be managed according to the principles of the National Water Resources Policy, which has been approved by the Cabinet of Ministers. Legislation to give effect to the policy is currently under preparation. The project has considered relevant sections of the policy during the design stage such as, management of water resources under the project will be based on decentralized decision making and will involve the participation of all stakeholders, communities will be involved in water quality monitoring, costs for the provision of water services such as a portion of the capital costs, operation and maintenance costs will be contributed by the community beneficiaries. The policy also recognizes property rights for water and a system of water rights will be based on the principle of proportionate stream flow, with prior appropriate rights, riparian and customary rights will be recognized during the allocation of water resources for sub-projects. Based on the above principles, individual water resource management plans will be a part of the environmental management plans, which will be monitored by the PS and RWSS Units of the PCs.

6.2.1 Social Conflicts due to Different Uses of Water from the Same Source

There is a possibility that the water source proposed for the water supply is already being used for some other purpose, usually for cultivation, or for a drinking water supply scheme for another community.

Past experience shows that usually the users of the sources for agricultural purposes are the same beneficiaries who expect the water from the proposed drinking water supply. Hence, in most instances, amicable settlements in user-sharing arrangements are possible at the planning stage by the CBO / PO.

When another community is involved in sharing the water, the CBO discusses all issues with the other community, prior to sub-project implementation, and comes to an amicable settlement. Further, the PS, being the responsible authority could intervene and suggest an amicable settlement.

The allowable level of abstraction of water from a proposed source is based on an assessment of requirements downstream. The proposed process ensures that such situations are identified early, and consensus of all parties is reached prior to finalisation of the selection of the source. In the review of the various water supply options, this will be a prime consideration. Agreements for user-sharing would be signed by all parties concerned and a plan of action would be agreed on to monitor and ensure that all conditions of the agreement are met in the long-term.

6.2.2.Encroachment into ecologically sensitive areas, such as wild life sanctuaries and forest reserves

The water sources proposed for gravity schemes could sometimes be located in forest reserves, away from human settlements. The forest reserves belong to the Government (under the Forest Department or the Divisional Secretary) or Plantation Sector. There is a procedure for obtaining permission for utilising these sources for purposes such as drinking water supply. If the land belongs to the Government, upon the request from the CBO, the DS instructs the Grama Niladhari, (GN is the village level government officer) for a report regarding the location of the source. When he confirms according to the available survey plans that the land belongs to the government, DS issues a letter giving the permission. If the land belongs to the Forest Department, the PS, upon the request of the CBO or the PO, writes to the District Forest Officer of the Forest Department. He

obtains a report from the Beat Officer in charge of the relevant area, and forwards his recommendation to the Conservator-General of Forests of the Department, who grants the permission.

Construction activities at the point of tapping of the springs and streams are confined to a limited area, and not destructive to the environment. The method used for abstraction of water from the springs and streams should be such that it will not disturb the natural condition of these sources, which fact is strictly observed during construction. No heavy machinery will be used for construction, nor heavy transport involved, requiring road construction or clearing of jungle. Mostly, due to the nature of the terrain, the transport of construction materials will be made manually to the site. No rock blasting is permitted, as it could disturb the spring. Further, damming of streams to make large reservoirs will not be required. Excavations done for the spring boxes or weirs across the streams will be minimal. After the construction, routine visits by the caretaker will ensure the proper condition and functioning of the intake, and minimal impact to the environment.

6.2.3 Depletion of flow of streams immediately downstream of the intakes

The water sources tapped for pipe borne water supply schemes could be springs, streams or rivers. In the case of sources which have limited yield, a considerable percentage of the yield of the source could be required for the proposed drinking water supply scheme. Hence, the flow of the water course could be depleted immediately downstream of the intake structure. This could also affect the natural moisture content of the soil in the immediate neighbourhood downstream.

However, in most cases, this would be a very localised occurrence, as the natural springs in the neighbourhood and in downstream locations would contribute to the downstream flow of the water course, and hence, will not cause much adverse effect.

During the planning stage of sub projects, the minimum yield of a source is assessed by monitoring the flow regularly over a long period of observation (at least for six months). Then, a safe yield is determined by applying a factor of safety on this minimum observed yield (usually about 0.5), which is the basis of utilising the yield from the particular source for the pipe borne water supply scheme. Thus, at the planning stage, utilisation of the entire source for the proposed scheme is not intended, and a good proportion of the flow, especially during rainy seasons, is ensured downstream. An assessment of the water requirements of all current and potential users will be made and agreements will be signed for user-sharing.

During the scheme operational stage, there is a possibility that the beneficiaries, in an attempt to increase and expand their water supply, would try to capture the entire yield of the source. An assessment of the long-term requirements of the community will be made at the planning stage. In addition, O&M agreements will specify that communities will need to get clearance from the local authorities for increased rates of abstraction.

6.2.4 Damage to other utilities

There is a possibility that other utilities will get damaged due to laying of pipe lines. This is particularly so in the case of roads and drains. In rural areas, other types of underground facilities, such as underground telephone or electricity cables, are not usually present.

At the design stage, the determination of the pipe routes will be made to ensure that the damage is minimum to roads. In fact, this will be a prime factor considered for the purpose of reducing the capital cost of schemes as well.

If any road damage is likely to occur, this will be identified during the design stage, and the necessary funds will be included in the cost estimate for the purpose of reinstatement. At the construction stage, the required payments for reinstatement will be made to the relevant maintenance authority, so that they could reinstate the roads according to their specifications.

6.2.5 Pollution due to inadequate protection of intakes and wells causing unsatisfactory raw water quality

A risk of pollution exists if inadequate protection is provided to the sources selected. Sources which require no treatment or disinfection are generally selected. However, the water quality of sources may become unsafe due to human activities around or upstream of the sources in the future.

The existing upstream conditions, as well as potential for activities in the future will be assessed closely during the planning stage, including consultations with parties concerned.

The design will include proper protective measures in the intake, such as puddle clay layers above the spring intakes, concrete covers to the chambers, etc. Further, the planning will include the protection to the surroundings of the sources, with fences erected where necessary, and trees planted. Under the implementation of the environmental action plan, participatory activities will be identified for source protection, and long term plans will be formulated together with the community for source and catchment area protection.

Adequate source protection measures will be included in the post project activities planned, in a participatory manner, and enforcement of protection measures through the relevant authorities (Local Authority, Divisional Secretary, Village Coordinating Committee and Grama Niladhari) will be established in the coordination network among the stakeholders.

In the case of shallow wells, construction will include drainage facilities so that the waste water will flow away from the well either to a natural drainage point, a soakage pit or a vegetable plot, at a safe distance away.

Further, especially in the case of common wells, a bucket will be initially provided within the construction cost to prevent contamination through the buckets which are used to draw water,. Users will be requested to maintain a separate bucket for this purpose. In many instances in the previous project, it was observed that the people keep a small container with water and soap near the well so that the user could wash hands before handling the bucket and rope. Such good practices would be promoted in the proposed project.

Rope pump installations will also be promoted, instead of the conventional bucket and rope, which will have no possibility of contamination.

6.2.6 Unsafe water in pipe lines

The contamination of water could occur in pipe borne water supply schemes due to improper maintenance of structures, or breakage of pipe lines.

Proper construction of facilities with adequate quality supervision will minimise this problem. For this purpose, where the construction of schemes are likely to be difficult or complicated, the project will require the CBO to recruit an adequately qualified technical person for day-to-day supervision of work. The assessment of the need of such a person will be made in each sub project, at the time of appraising the sub project proposal. Further, well qualified supervision staff to be provided by the Partner Organisation to advise on construction and to assure quality will be ensured. Regular checking by the project staff, and sample technical auditing by independent consultants will further ensure this.

Caretakers nominated by the CBO will be trained on preventive maintenance aspects. To retain trained caretakers and also to ensure regular preventive maintenance, a payment system for care takers will be encouraged.

As an additional preventive measure, provision will be made in the pipe borne water supply schemes for introducing chlorination.

6.2.7 Nitrate and Fluoride Contamination in Water

Excessive use of agricultural chemicals have resulted in excessive nitrate contamination in certain water sources. Identification of water sources results in an initial water quality test. If the nitrate levels exceed Sri Lanka standards, there is no alternative but to seek another uncontaminated source since expecting a community based organization to undertake nitrate removal from the water source on a sustainable basis is not possible due to constraints of technical capacity and expense. Therefore, the proposed strategy is to seek alternative water sources in such instances.

Fluoride contamination of ground water is an issue, particularly in the North Western and Southern Provinces (Hambantota District). However, Sri Lanka has had extensive experience dealing with issues related to fluoride contamination in ground water in rural areas during the 1980's and 1990's in rural water supply projects funded by the Governments of Finland and Denmark. Under technical and financial assistance through the projects financed by the above mentioned donors, simple, low cost filters were developed and used extensively in rural areas. Communities have been trained by NWSDB to maintain such filter systems. It is proposed that this same filtration systems be used in communities that are faced with fluoride contaminated water sources. NWSDB could be contracted to train communities on operation and maintenance of the filter systems.

6.2.7 Soil erosion

Soil erosion is possible along the trenches excavated for the pipelines, if they are on a slope.

In most places where the slope is very steep, the design will require the use of GI pipes. In such instances, the pipes will be installed above ground, and the occurrence of any soil erosion will not take place.

In places where the pipe lines are to be buried, erosion will be prevented by providing a stepped pattern of backfilling, and turfing will also be provided. Schemes designed to have a large proportion of pipelines laid on such slopes, would be supervised more closely.

Regular inspection of pipe lines by the caretaker under the preventive maintenance programme will detect any erosion and the preventive measures would be taken, using community O&M funds.

6.2.8 Flooding of excavations and dust pollution

Flooding of excavations and dust pollution will be of a temporary nature, arising during the construction period.

Trenches will not be kept open for a long time, but will be closed soon after laying the pipe line. If they happen to be kept open during the night, adequate protection measures will be arranged, such as night lamps. Dust pollution will be minimised by providing adequate site cover.

6.2.9 Waste water stagnation

At common water points (stand posts, tube wells with hand pumps and shallow wells), there is a possibility of stagnation of waste water, giving rise to mosquito breeding and/or pollution of water sources.

The experience from the previous project shows that this possibility is usually minimal as people make use of this waste water in an effective and productive manner. In the rural areas, people divert the wastewater to vegetable plots, tea plant nurseries, etc. This will be encouraged in the proposed project, thus minimising this potential problem. Further, the hygiene education programmes planned under the project will include awareness for prevention of this problem. The CBO and VCC will also be required to take adequate preventive measures.

Where there is no adequate drainage discharge point in the vicinity, appropriate soakage pits will be provided.

6.2.10 Improper siting of latrines near water sources

If the latrines are sited too close to the water sources, there is a possibility of the source getting polluted.

In the sanitation program, the procedure requires a potential beneficiary to make an application for subsidy, and the CBO officials and VCC members will inspect the site and approve the application, subject to all design considerations. The necessary training in latrine design and siting will be provided to the CBO officials and VCC members assigned to implement the sanitation program in each village. The latrine construction will be monitored in subsequent inspections made at the time of part payments.

6.2.11 Bad Odours and Mosquito Breeding in Damaged Latrine Pits

If the latrine pits are damaged during usage, there is a possibility of mosquito breeding and emanating bad odours.

Proper construction of sub structure will minimise such possibilities.

To ensure this, inspection of the construction will be made prior to the payment of instalments (there will be three instalment payments), thus allowing time for corrective action during construction.

7.0 ANALYSIS OF ALTERNATIVES

At the planning stage of the sub project, several alternatives will be identified for the provision of water supply, and the most appropriate one will be selected by the community. In this selection, environmental considerations will be a prime factor. This will be ensured in the process of implementation with the proper monitoring system.

8.0 MITIGATION PLAN

8.1 Environmental Assessment of Sub Projects

The possible adverse effects and the suggested mitigation measures and procedures discussed above are mostly based on the experience of previous projects. During previous projects, these actions were incorporated in the implementation procedures.

To ensure that such measures are effected during project implementation, an environmental assessment checklist has been prepared for each type of system (Annex 1). All sub-project proposals will include a section covering the relevant checklist and the mitigatory actions as identified above, together with any additional site-specific issues. The reporting format is given in the Annex. Supervision of sub-project implementation will include monitoring of these actions.

Detailed implementation procedures have been developed in view these requirements, and appropriate training modules have been prepared for training of relevant personnel in this respect.

8.2 Environmental Management Plan

As a part of the sub project implementation process, an environmental management plan (EMP) will be prepared by each community. This will be initiated at the community mobilisation stage of the sub project cycle.

The process involves identification of environmental problems specific to each sub project and each household during the participatory survey. In the survey format, a few simple questions will be asked about the environmental conditions around the household. Beneficiary households will fill this questionnaire, with assistance of the small group representatives. With the review of these identified problems and requested needs of improvements, an environmental improvement plan will be formulated in a participatory manner. The CF of the PO will take the initiative in formulating this plan. Participation of the CBO executive committee, and help of the Development Environmental Officer of the DS Office, health officials and the PS is expected in this exercise. The plan will be discussed with the small groups before implementation.

In the plan, simple, but widespread environmental improvement aspects will be identified, appropriate to the particular situations. The proper drainage facilities around the households and water points, improvement of garbage disposal and composting, prevention of soil erosion of home gardens, promotion of organic farming, appropriate utilisation of land, generation of biogas, protection of catchment areas, prevention of pollution of water ways, reduction of the usage of non biodegradable materials etc. could be some of the actions that could be planned. As the beneficiary households will gain direct benefits from the action plan including enhancement of their immediate environment and income, this will be easier and more effective in implementation.

A continuous monitoring of the implementation of this action plan has been incorporated in the project design. The progress reporting of this action plan will be an item in the agenda of the monthly meeting of the CBO in the village. Further, the PO will be required to report the progress together with regular reports.

9.0 ENVIRONMENTAL MANAGEMENT AND TRAINING

The Ministry of Environment and Natural Resources (M/E&NR) has developed an institutional plan for environmental management with World Bank assistance. Some of the proposals are being implemented at present. It would be useful for the M/H&PI to work within the framework of the institutional plan for environmental management as developed by the M/E&NR. This framework provides for a mechanism of environmental management at the policy level. The plan proposed two senior committees to develop policies relating to environmental management. At the apex level is the "Committee on Integrating Environment and Development Policy (CIEDP) chaired by the Secretary, Ministry of Finance and Planning, with representation from eight ministries at the level of Secretaries. This Committee has the responsibility to ensure inter sectoral environmental management is ensured, particularly with regard to policies and their implementation. At the second level is the "Committee on Environment Policy and Management (CEPOM)" meant to look at the environmental impacts of individual sector activities. There is a separate CEPOM established for water resources which works in collaboration with the Water Resource Council.

At individual sub project level the impacts of project activity on environment will be assessed on a regular basis. Until adequate technical capacity is built up in all levels of

Government as it pertains to RWSS, all programs will include a TA component to ensure relevant staff are exposed to the required training. Local training institutions, such as the Centre for Environmental Studies at the University of Peradeniya, are available to undertake such training. The impacts to be managed would include not only the physical environment but also the social environment, as well. This would necessitate creating a public awareness in the community, the CBOs and the NGOs. The clear message to the community would be that protection of environmental assets would be in their own long-term interests.

10.0 ENVIRONMENTAL MONITORING PLAN

10.1 Long Term Sector Monitoring

The RWSS program of the Government of Sri Lanka, will not only create institutions at village level for utilising the water resources but also for the protection of the sources of water including the water sheds and catchments. The same institutions should take steps to prevent the pollution of water sources.

A number of studies undertaken on water sources have indicated that depletion of water is partly caused by erratic rainfall pattern as well as by the rapid runoff. This is linked to loss of vegetation, which retains the moisture in the soils. Water sources planning has to seriously consider the environmental impacts of development.

It is not possible for the water sector to look after all environmental concerns as developments outside the sector contribute to environmental degradation leading to water depletion and pollution. This is true of the sanitation sector as well. Unless the industrial sector and other commercial sectors have their own plans of proper solid and liquid disposal which contaminates water ways it is not possible for a single agency such as the NWSDB to chemically treat the water to bring it to required standards. Hence, an integrated approach to environmental monitoring of all sectors has been recommended. This should require close interaction between the Ministry of Environment and Natural Resources and Central Environmental Authority, M/H&PI and all projects and programmes relating to the water sector coming under its purview.

9.2 Sub-Project Monitoring

The primary responsibility of monitoring the activities such as selecting the water sources, resolving the conflicts of usage, providing adequate protection measures to the water sources, siting of latrines, and proper construction of latrines will be vested with the community. Being the owners and co-financiers of the sub projects, they will effectively fulfil this task, if adequate knowledge and awareness is imparted to them.

During implementation, construction activities will be carried out giving a high priority to the environmental aspects by the CBO. The PO and RWSS Units at the Provincial and PS level will independently monitor compliance with agreed environmental criteria. Further, the coordinating committees established at the village, divisional, district and national levels will monitor the environmental aspect of the activities carried out by the project The institutions which enforce the Environmental Act will be represented in the coordinating committees at different levels. The relevant organisations involved in this respect are Divisional Secretary, PS, District Secretary, Provincial Council, Forest Department, Dept. of Irrigation, and where relevant, State Plantation Authorities. Environmental compliance of simple sub-projects would be monitored by the District Environmental Officer, who is stationed at the Divisional Secretariat in Local Authority areas. In cases of complex sub-projects, the CEA would be responsible for monitoring environmental compliance under the National Environmental Act.

After the completion of the construction of water supply facilities, the CBO, being the owners of the facilities, will monitor the environmental aspects within the area, and will monitor the conditions, enforce and regulate the controls among the membership. They will also be a party for an MOU to be signed among the CBO, PS and DS, for the purpose of long term co-ordination, co-operation and support. The issues concerning environmental aspects will be included in the MOU.

With regard to water quality monitoring, it has been agreed with the Ministry of Housing and Plantation Infrastructure that a phased approach will be adopted. In the first phase, the National Water Supply and Drainage Board (NWSDB) will be commissioned to undertake a water quality survey and mapping exercise in the provinces where the project will be operational. Ground and surface water sources as well as a selection of existing dug wells will be tested for physical and chemical parameters recommended for testing in potable waters by the World Health Organization (WHO). In a second phase and based on the survey data, potential pollutants will be identified for testing by the NWSDB when sub-project locations and water sources are identified. In the final and third phase, the NWSDB will also provide training for Public Health Inspectors of the Pradeshiya Sabha's (PHI/PS) and community members to undertake routine water sampling using simple, easy to use indicator test kits. These test kits provide a quick positive/negative result. In the case of positive test results, water samples will be collected by PHI/PS and communities and transported to the nearest Regional NWSDB Water Testing Laboratory for detailed analysis. Once the water samples have been analyzed, NWSDB will be contracted by the PS/communities to assist in preparing a remedial plan. If the water supply can be treated within the available resources and ability of the communities with technical assistance from the NWSDB, attempts to treat the water source will be attempted. But in the event that it is not technically or financially viable to treat the water supply/source on a sustainable basis, the source will have to be abandoned. The RWSS Units of the PC's with the technical assistance of the regional NWSDB office (if required) will then commence the identification of a suitable unpolluted source with community involvement. The fund that will be established by the community for

operation and maintenance of the water system will have to be used to pay for development of the new source.

In addition, the environmental issues will be monitored through existing administrative structure (Grama Niladhari at the village level and DS at the divisional level) and health department structure (FHW and PHI at the village level and Medical Officer of Health at the divisional level).

The Unit proposed to be established under the PS, the RWSS Cell, will monitor the environmental aspects of the schemes constructed within the PS area. This will also be a unit, which any affected party could approach for advice or to make a complaint. This unit will closely co-ordinate with the DS of the area, who is empowered under the National Environmental Act.

Any issues arising could be discussed and decided at the divisional level co-ordinating committee held every month. When the water supply and sanitation sector co-ordination committees are established at the divisional level as proposed, it will be a good forum to discuss the environmental issues.

The unit which has been established under the Provincial Council for co-ordinating and monitoring the sector activities at the provincial level, including future development and resource utilisation aspects, will also be a party to monitor the environmental aspects in the future at the provincial level.

Any environmental issues related to the sector could be discussed at the water supply and sanitation sector co-ordination committee established at the provincial level.

11.0 PUBLIC CONSULTATION

Public consultation is an integral part of the sub project implementation process. The community is involved effectively in taking decisions during the planning process at least on three occasions, for the purpose of selecting and finalising options for water supply. The community is free to make observations, request for clarifications or forward their requests at these occasions, which will be paid due attention and consideration. The fairness and effectiveness of conducting these meetings will be monitored through the monitoring mechanism of the project.

Apart from the above, the public has the opportunity to forward their opinions and any concerns regarding the project implementation to the relevant authorities through the grievance redressal mechanism, which will be effectively maintained at all levels.

In keeping with the policy to consult stakeholders at every stage of project identification, development and implementation, this principle will be extended to the EIA study of the proposal to augment the water resources of the Kirindi Oya basin (which will be financed under the project) as well. A Steering Committee has been appointed by the Government

to develop the Terms of Reference for the study, guide the consultants in conducting the EIA and consult with the public. This committee includes environmental NGO's, academics who specialize in natural resource management issues and interested members of civil society as well the relevant government agencies. This will ensure broad consultations in conducting the study. This is in addition to the requisite public comment period and public consultations stipulated in the National Environmental Act.

ANNEX 1

SUB-PROJECT ENVIRONMENTAL ANALYSIS FRAMEWORK

Scope and Structure of the Environment and Social Assessment

The Environmental Analysis (EA) would cover the following issues, depending on the complexity of the respective sub-project. If the sub-project gives rise to complex environmental issues, the EA would have to address all relevant sub-headings in the Framework. If the sub-projects are considered to be of marginal environmental impact, then an environmental checklist to be developed as part of the Operations Manual will be used. The environmental checklist will be designed in such a manner to highlight possible complex environmental issues which would then call for an in-depth analysis. Based on the experience of past RWSS projects it is anticipated that only the checklist will be adequate for a majority of sub-projects. However, the Framework given below is comprehensive, since the sub-project sites and potential environmental issues are not yet identified. Therefore, a comprehensive framework is given below, with the ability to reduce the complexity of the environmental analysis to suit the specific sub-project.

Policy, Legal and Administrative Framework:

A brief description of the policy, legal and administrative setting under which the proposed project is to be implemented.

Project Description:

A brief description of the nature and objectives of the proposed project and how it functions or operates, including the proposed location and why it was chosen.

Baseline Data:

This section would include a brief description and evaluation of the current environmental and social situation in the project area. This would include a qualitative description of the existing environmental and social conditions in the project area.

Environmental Impacts:

This section would identify potential environmental impacts that would arise as a result of the proposed project. All cumulative effects should be considered – positive and negative, direct and indirect, long term and short term.

Social Impacts:

A brief description of the social conditions in the project area including an estimate or the number of people to be relocated (if any), distribution of population in the project area, a

brief discussion of the local economy and primary sources of income, the presence of significant cultural and infrastructure facilities that will be affected by the project.

Preliminary plans for relocating affected people and a preliminary assessment of land acquisition requirements and a determination of whether the land required for the project falls into conservation areas or tribal lands or other special areas, if applicable should be discussed.

Description of indigenous groups affected by the project including significant unique characteristics of the cultural tradition of the of the groups and special economic resources of the group. Preliminary plans for protecting and enhancing the integrity of the indigenous groups, if applicable.

Analysis of Alternatives:

This section would address alternatives for potential water sources and technology. This should be a documentation of the community discussion on selection of sources and technology.

Mitigation Measures:

This section would include a detailed explanation of how the potential environmental and social impacts identified above could be mitigated.

Monitoring Plan:

This section should include a long term plan for monitoring to ensure that there no adverse impacts due to the project.

Environmental Management Plans:

Considering the nature and complexity of the sub-projects and technical assistance to be financed under the Credit, it is unlikely that any major or irreversible environmental impacts will be encountered. Therefore, the most important section of the EA would be the section on Environmental Management Plans (EMPs). EMPs should be prepared after taking into account comments from both PAA and IDA as well as any clearance conditions. In view of this, a more detailed explanation of EMPs are given below.

Prediction of potential adverse environmental and social impacts arising from project activities will be at the core of the environmental impact assessment process. By following the procedure described above, the environmental assessments to be conducted under the Project will be able to identify environmental and social impacts as a result of implementing the sub-projects. While impact identification is important, an equally essential element of this process is to develop measures to eliminate, offset or reduce impacts to acceptable levels during implementation and operation of the sub-projects.

The integration of such measures into project implementation and operation is supported by clearly defining the environmental requirements within a EMP. EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EIA and implementation and operation activities. The plan outlines the anticipated environmental impacts, the mitigatory measures to minimize these impacts, responsibilities for mitigation, timescales, costs of mitigation and sources of funding.

World Bank guidelines state that detailed EMP's are essential elements for Category A projects, but for many Category B projects, a simple EMP alone will suffice. While there are no standard formats for EMPs, it is recognized that the format needs to fit the circumstances in which the EMP is being developed and the requirements which it is designed to meet. The EMP will address the following aspects:

- Summary of Impacts
- Description of Mitigation Measures
- Description of Monitoring Programs
- Institutional Arrangements
- Implementation Schedule and Reporting Procedures
- Cost estimates and sources of funds

The EMP will clearly describe and justify the proposed mitigation measures and facilitate public consultation, as required by OD 4.01, and encouraged by the PAA. Accordingly, consultation with affected people and NGOs will be an integral part of all Category A projects and is recommended for Category B projects.

It is very likely that most sub-projects will involve only a EMP which will be prepared by the community based on the issues highlighted in the environmental checklist.

Annex 2

SUGGESTED FORMAT FOR ASSESSMENT OF NEGATIVE ENVIRONMENTAL ASPECTS, AND SUGGESTED MITIGATORY MEASURES

(Note : - This check list will be incorporated into one of the three Planning and Design Reports which is produced for each sub project by the PO)

Aspect	**Assessed Degree of Impact (Severe, Moderate, Mild, Not Applicable)**	**Action taken/suggested to alleviate / mitigate impact**
Social conflicts due to different uses of water from the same source		
Encroachment into ecologically sensitive areas, such as wild life sanctuaries and forest reserves		
Possible depletion of streams immediately downstream of the intakes		
Possible damage to other utilities, such as roads, drains, telephone, electricity services		

Aspect	**Assessed Degree of Impact (Severe, Moderate, Mild, Not Applicable)**	**Action taken/suggested to alleviate / mitigate impact**
Possible contamination due to inadequate protection of sources		
Unsatisfactory raw water quality		
Unsafe water in pipe lines		
Soil erosion		
Flooding of excavations and nuisance of dust		

Aspect	**Assessed Degree of Impact (Severe, Moderate, Mild, Not Applicable)**	**Action taken/suggested to alleviate / mitigate impact**
Waste water stagnation and pollution of water sources		
Improper siting of latrines near water sources		
Bad odours and mosquito breeding in damaged latrine pits		
(State any further aspects identified and solutions suggested)		

Aspect	**Assessed Degree of Impact (Severe, Moderate, Mild, Not Applicable)**	**Action taken/suggested to alleviate / mitigate impact**