

Water for Industry

Sunidha Senaratne¹

1. Introduction

Under World Water Assessment Programme, Ruhunu river basins have been selected from Sri Lanka for the study, namely, Walawe Ganga, Kirindi Oya, Malala Oya and Menik Ganga.

This paper focuses on the water for industry. Compared to the water for other uses such as agriculture, domestic water supply, health and sanitation, water for industry has not been studied comprehensively. Considering the emphasis on industrial development in the future development plans, it is essential that accurate assessment of the water for industries be made.

The terms of reference of the study included the following:

- Reviewing the types of existing industries in Ruhunu Basins;
- Assessment of the present water use by the type of industry and evaluation of the total water demand and use in industries sector;
- Assessment of the contribution by industrial sector to water resource development and contribution to source area protection;
- Assessment of methodologies adopted for environmental protection;
- Assessment on the capacity of the industries and strategies adopted to maintain quality standards and to use the water more efficiently, such as using of lower standard water, re-use, efficient use in the process etc; and
- Assessment of the scope of future industrial development, future plans and targets and projected water needs of the basins, and suggest basic indicators.

Upon subsequent decision, the aspects of the policies on industrial development, the institutions responsible for implementation of these policies and the relevance of the policies on water and industry were also included in the paper.

Special references are made at relevant places, to the applicability of the indicators suggested at the Workshop on Indicator Development (February 2002, Rome).

2. Industrial Development In Sri Lanka

2.1 Policies and Regulations

There are two important documents on industrial development, namely, the Industrial Promotion Act (1990) and the Master Plan for Industrialisation and Investment Promotion in Sri Lanka (in 2000).

The **Industrial Promotion Act** specifies, among other things, the authority of policymaking and implementation. A high level **Industrialization Commission**, established at national level will advise the Government on policy matters, plans and programmes on industrial promotion. Further, the Commission will ensure the provision of institutional mechanism for industrialisation; prepare

¹ Consultant, Water Supply and Drainage Board.

plans for provision of industrial infrastructure services and product and marketing information infrastructure.

An **Advisory Council (Industrial Policy Council)** is also planned, which include the members of the above Commission and representatives of private sector industrialists, which is a forum to discuss issues and advice the Minister on actions to promote industry.

There are **Regional Industrial Services Committees** in every province, to advice the Minister and the relevant Chief Minister on the development of industry within the province, prepare plans, promote and facilitate industrial development and assist investors.

The **Master Plan for Industrialisation and Investment Promotion in Sri Lanka (in 2000)**, states it's objectives as;

Developing manufacturing sector for:

- ◆ sustainable development of Sri Lanka in first decade of 21st century;
- ◆ generation of employment opportunities in urban and rural areas;
- ◆ enhancement of productivity and competitiveness through technology upgrading, diversification and generalization; and
- ◆ creation of environmental friendly and sustainable society.

The philosophy is a “free business environment with clear and appropriate Government directions.”

The plans will be in two stages: Stage 1 on Consolidation of Foundation (2000 –2004) and Stage 2 on Acceleration of Growth (2005 – 2010). This will concentrate on seven selected industries as “target industries”. The development plan will be “knowledge based” and “technology intensive”, compared to the presently adopted “Resource based” and “labour intensive” approach.

Small and Medium Industries (SMIs) which account for nearly 90% of establishments, 70% of employments and 55% of the gross value added in manufacturing sector at present, will be given an emphasis under this plan.

The present distribution of industries in the country is uneven, with heavy concentration (more than 75%) in Colombo and Gampaha. (The contributions made by Hambantota, Ratnapura and Moneragala districts are only 0.9%, 0.2% and 0.9% respectively.) In the Master Plan, there will also be rgionalization of industries, which will help redress this situation.

During the Stage 1 of development, emphasis will be on:

- ◆ Institutional reforms
- ◆ Infrastructure development
- ◆ Fiscal incentives

During Stage 2 of development, emphasis will be on:

- ◆ Acceleration of growth
- ◆ Fiscal incentives
- ◆ R&D support

2.2 Institutions Responsible

The organisations dealing with industrial development at the national level are:

- ◆ Ministry of Enterprises Development, Industrial, Policy and Investment Promotion (MEDIPIP) (previously the Ministry of Industrial Development)
- ◆ Ministry of Economic Reform, Science and Technology
- ◆ Ministry of Human Resource Development, Education and Cultural Affairs
- ◆ Board of Investment (BOI)
- ◆ Export Development Board (EDB)
- ◆ Industrial Development Board (IDB)

Apart from the above, various other ministries (eg. Ministry in charge of Samurdhi Affairs, Ministries in charge of Regional Development) at national level and relevant provincial ministries in Provincial Councils carry out industrial development at different extents. The responsibilities and functions are presently duplicated and overlapping.

Under the Master Plan, several restructuring is proposed, including the involvement of private sector. This includes establishment of SMI Development Corporation (SMIDEC), establishment of Industrial Policy Council, and activation of Regional Industrial Services Committees.

2.3 Industrial Development Policy and Water

The Government has recognised the importance of supplying water for the industries in the water allocations for various sectors. In the recently approved **National Water Resources Policy (April 2000)**, states that “finding adequate water supply for industry is becoming a serious problem because the industrial water needs have typically not been included in water resources development plans”. It also states that Board of Investment, which is responsible for export oriented industry, who select areas for industrial development where availability of infrastructure including water supply is a major factor, can not identify the sufficient number of locations due to lack of water supply. Policy states that industrial water requirements should be taken into account in water resource planning and in selecting the locations of industrial development zones.

The Policy document further indicates that the present pricing policy of the National Water Supply and Drainage Board is to have a higher tariff for industrial and commercial users (including tourist hotels) than for domestic users. Presently, this is at a ratio of about 1:6. However, NWSDB try to reduce this to 1:4 in future tariff adjustments. The Policy states that according to the international experience, the industrial sector is most responsive to price changes, with 10% increase of price resulting in reduction of demand by about 5% to 13%. However, the Policy also states that the tariff alone may not be an effective tool to conserve water in our industrial sector, but education and awareness programmes would be needed.

Under the demand management concept, the Policy states that both public and private sector users will be encouraged to adopt water saving technology and recycling and reuse of wastewater wherever appropriate.

Availability of water supply has become an important consideration at present in selecting the locations for Industrial Estates, Industrial Parks and Science Parks. Proper industrial pollution management also has been given priority in the industrial development strategies.

In the annual surveys to be conducted by the MEDIPIP, data on water (which were not collected earlier) such as the availability of water sources, utilisation of water source, the quantity consumed, and waste water disposal methods are planned to be collected in future. In the industrial development planning in three river basins, it was found that much emphasis is given to the availability of water, with special studies conducted.

No specific attention has been paid to the industries in other national policies established in relation to water supply such as Urban Water Supply Policy (by NWSDB), National policy for Rural Water Supply and Sanitation Sector, (RWSS Division, MHPI), National Policy on Private Sector Participation in Water Supply and Sanitation (MHPI) and Policy Statement – Water Supply and Sanitation (Draft) (NWSDB).

(With respect to the applicability of indicators, *integration of water and industry policies* is found to be relevant in the above aspect. It was found that some attention has been paid to this aspect, although more specific measures need to be adopted.)

3. Usage and Sharing of Water in the Basins

The comparative usage of water by different sectors was assessed in each basin, based on the available details of the existing studies.

In the *Walawe River Basin*, the major water user is the agricultural sector. There are a few large reservoirs in the basin, Samanalawewa reservoir (mainly for hydropower generation), Uda Walawe reservoir, Chandrikawewa, Ridiyagama Wewa, Hambegamuwa Wewa and Mau Ara Wewa (mainly for irrigation) being prominent.

The water uses have been estimated as 1084.8 MCM/year for irrigation sector, 335.9 MCM/year for hydropower in 1999. Comparatively, the assessed industrial requirement is only 3.24 MCM/year, or about 0.3% of the irrigation requirement.

In Kirindi Oya River Basin, the major water user is the agricultural sector. Among the irrigation reservoirs, the prominent are Lunugamwehera reservoir, Weerawila tank, Tissa Wewa, Yoda Wewa and Handapanagala Wewa.

The water uses in the basin have been assessed as 242.5 MCM/year for irrigation sector, and the assessed water requirement for industries at present is 0.22 MCM/year, which is about 0.1% of the irrigation requirement.

In Menik Ganga River Basin, there are no major reservoirs. However, extensive agricultural activities including large plantations take place within the basin, with the agricultural sector being the major water user. The present irrigation requirement of water has been assessed as 58.1 MCM, and the present industrial water requirement is assessed to be 10.39 MCM/Year, or about 0.7% of the irrigation requirement.

In the River Basin of Karagan Oya, Malala Oya and Embilikala Oya, no much agricultural activities take place. An irrigation reservoir, Badagiriya tank, is located within Malala Oya basin. There are a few lakes with brackish water situated within these basins, prominent being Bundala Lewaya, Malala Lewaya and Embilikala Kalapuwa.

Hambantota town is situated within these three basins, and many industries are located within this area, including salt industries, hotels, fishery harbour and ice plant.

The water requirement in urban center is obtained from Walawe river, through the pipe borne water supply scheme. Any further developments will also have to depend on water supply from Walawe River.

(The indicator, *industry within inter-sectoral allocation mechanism* is found to be useful in the above aspect. Although no formal allocation is made at present, in future, in the event of water rights allocations as suggested in the National Water Resources Policy, this will be an extremely useful indicator.)

4. Industries in the Basins

The details of existing industries were gathered from the Department of Census and Statistics, recently established district level Chambers of Commerce, District Secretariats (Kachcheris), Industrial Development Board, Tea Small Holdings Authority, Local Authorities (Pradesiya Sabhas-PS) and District Offices of the National Water Supply and Drainage Board (NWSDB).

Details of future industries were obtained from several sources, including district level Chamber of Commerce, PSs, Urban Development Authority and Southern Development Authority.

In this study, the hotels also were included, although the main attention was given to the manufacturing industry.

4.1 Existing Industries

The majority of the areas in the basins under consideration are rural in nature, where the activities are predominantly agriculture based. Hence, presently, there are no many manufacturing industries existing in these basins.

Standard classification of industries is shown in Annex 1. Based on the existence of industries in the basins and in consideration of water usage, a different classification was made in this study. (Annex 2 shows the types of industries, and the category according the standard classification of industries):

The existence of these types in each basin is as follows:

Table 1 . Existence of Industries.

Type of Industry	Existence of Industries			
	Walawe Basin	Kirindi Oya Basin	Menik Ganga Basin	Malala Oya & Other Basins
Hotels and rest houses	√	√	√	√
Garment factories	√	√	√	√
Paper Industry	√		√	
Salt based industries				√
Ice plants				√
Sugar cane processing	√		√	
Paddy processing	√	√	√	√
Plantation industries	√	√	√	
Automobile repair and service	√	√	√	√
Building material manufacturing	√	√	√	
Harbour/ Fishery Harbour			√	√
Other	√	√	√	√

Although Hambantota area is well known for fishery industry, no fish processing industries were found in the area.

4.2 Proposed Industries

There are some extensive development proposed in the area including industrial development, some of which are presently implemented under the Southern Development Programme and Ruhunupura Development Programme.

Among the industries planned, following are the prominent:

- Airport & allied industries
- Oil refinery
- Flour mill
- Power generation plant

4.3 Ownership of Industries

The ownership of industries varies, depending on the factors such as the type, the amount of investment, etc. Broadly, the assessment made on sample basis of the existing and planned industries indicated the following:

Table 2. *Ownership of Industries.*

Type of Industry	Ownership					
	Govt	Semi Govt	Multi national companies	Private local companies	Small enterprises	Individuals
Hotels and rest houses	√			√	√	√
Garment factories				√		
Paper Industry	√		√			
Salt based industries	√	√		√	√	
Ice plants		√		√		
Sugar cane processing		√	√	√		
Paddy processing				√	√	√
Plantation industries				√	√	
Automobile repair and service					√	√
Building material manufacturing					√	√
Harbour/ Fishery Harbour	√					
Other				√	√	√
Airport (proposed)	√					
Oil refinery (proposed)			√			
Power generation (proposed)			√			

(Ownership of the industrial enterprises is an indicator suggested by the Indicator Development Workshop in Rome, which was found to be appropriate in this current study.)

5. Usage of Water by Industries

The usage of water by industries was assessed based on the information gathered on the samples investigated. Broadly, the usage of water in the industries could be categorised as follows:

- Usage category 1 – For main process of production/services
- Usage category 2 – For activities assisting the main process (such as cooling, heating, fire fighting, washing etc)
- Usage category 3 – For basic requirements (eg. for consumption of the workers, sanitary facilities, gardening etc.)

Based on this categorisation, the usage of water for the industries encountered in the basins are as follows:

Table 3. Usage Categories of Water by Type of Industries.

Type of Industry	Water Usage Category		
	Category 1	Category 2	Category 3
Hotels and rest houses	✓		✓
Garment factories		✓	✓
Paper Industry	✓	✓	✓
Salt based industries	✓	✓	✓
Ice plants	✓		✓
Sugar cane processing	✓	✓	✓
Paddy processing	✓	✓	✓
Plantation industries		✓	✓
Automobile repair and service	✓		✓
Building material manufacturing	✓		✓
Other			✓
Harbour/ Fishery Harbour		✓	✓
Airport (proposed)	✓	✓	✓
Oil refinery (proposed)		✓	✓
Power generation (proposed)		✓	✓

5.1 Present Water Usage in the Study Area

Based on the findings of the study, the assessed quantity of usage of water by the existing industries are as follows:

Table 4. Usage of Water by Industries – Walawe River Basin.

No	Type of Industry	Assessed Total Consumption (MCM)	Remarks
1	Hotels and rest houses	0.03	
2	Garment factories	0.03	
3	Paper Industry	2.8	Presently, Embilipitiya mill is running at under-capacity
4	Sugar cane processing	0.2	
5	Paddy processing	0.03	Only some paddy processing industries use water for the production (boiling the paddy)
6	Plantation industry	0.09	Mainly tea processing
7	Automobile repair and servicing	0.01	Service stations, located in almost all town centres use water for in plenty, and produce much polluted wastewater
8	Building material manufacturing	0.03	Many brick kilns and cement based product manufactories
9	Other	0.01	Small industries, gem cutting industries etc

Table 5. Usage of Water by Industries - Kirindi Oya River Basin.

No	Type of Industry	Assessed Total Consumption (MCM)	Remarks
1	Hotels and rest houses	0.04	
2	Garment factories	0.03	
3	Paddy processing	0.01	Majority of paddy processing industries do not use water for the production
4	Plantation industries	0.09	
5	Automobile repair and service	0.01	
6	Building material manufacturing	0.01	In town centres
7	Harbour/fishery harbour	0.01	Kirinda fishery harbour
8	Other	0.02	

Table 6. Usage of Water by Industries - Menik Ganga River Basin.

No	Type of Industry	Assessed Total Consumption (MCM)	Remarks
1	Hotels and rest houses	0.03	
2	Garment factories	0.01	
3	Sugar cane processing	0.25	
4	Paddy processing	0.01	Only some paddy processing industries use water for the production (boiling the paddy)
5	plantation industries	0.07	
6	Automobile repair and service	0.01	
7	Other	0.01	In town centres

Table 7. Usage of Water by Industries - Karagan Oya, Malala Oya and Embilikala River Basins.

No	Type of Industry	Assessed Total Consumption (MCM)	Remarks
1	Hotels and rest houses	0.05	
2	Garment factories	0.01	
3	Salt Industries	0.02	Including iodized salt productions
4	Ice plants	0.01	
5	Automobile repair and service	0.01	In Hambantota and Ambalantota towns

The industrial development expected through Ruhunupura Development programme, which is considerable, will have a very high demand for water.

(*Water requirement for industries* is an indicator suggested by the Indicator Development Workshop, which was useful for the study. In addition, *the category of the water usage* was found to be another indicator which is quite appropriate.)

6. Water Source Development and Protection

6.1 General

From the sample of industries investigated, it was observed that the water sources used by existing industries vary, depending on the nature of water usage, quantity required and the availability.

When the consumption is considerably high, separate sources (or intakes) are arranged. In urban areas where there is a public water supply, generally the industries tend to use the water from these, but in many cases where large quantities of water is required, it was observed that they maintain a separate supply too, usually from a dug well. Such cases are more prominent where the public water supply is subject to curtailments.

In places located away from public water supply schemes, the water is obtained from separately developed water sources. Tea industries in particular have their own sources developed.

6.2 Source Development by Industries

The usage of water source by the type of industries was found in general as follows:

<u>Type of Industry</u>	<u>Source of Water/ Source Development Aspect</u>
Hotels and rest houses	Use the public water supply, and in many instances, a private source (usually a dug well, in few cases, deep bore holes).
Garment factories	Use public water supplies where available.
Paper industry	Use own water supply, from an existing source (irrigation reservoir – Chandrika Wewa)
Salt based industries	Use the public water supply
Ice plants	Use the public water supply
Sugar cane processing	Use their own supply from the river
Paddy processing	Many places use their own dug well sources
Plantation industries	Use own sources, usually gravity fed from springs or streams
Automobile repair and service	Use own water sources (wells) and/or public water supplies
Building material manufacturing	Use own water sources (wells, streams), sometimes with public supply as stand-by
Harbour/ fishery harbour	Use public water supply

In the proposed Ruhunupura development, according to the present preliminary plans, the water supply will be developed by the Government (Department of Irrigation and National Water Supply and Drainage Board) as a basic infrastructure facility. Hence, the development of water sources by individual industries will not be needed, except in case of large water requirements.

6.3 Source Protection Measures by Industries

Source protection measures by the industries are applicable only when they use their own water supply systems. Even then, this is possible when the source is located within their property. Thus, tea plantations are recorded to have taken measures for source protection within their own boundary, such as preserving the forest cover, prohibiting human activities etc. This is possible because usually the tea plantations consist of large tracts of land, in which the water source also is located.

In case of industries using individual wells as the source or an alternative source, the surroundings are kept clean, as a source protection measure.

Where the industries are using water from public water supply systems, there is no specific contribution from the industries towards source protection, apart from the payment of tariff for the consumption of water.

7. Methodologies Adopted for Environmental Protection

7.1 Methods of Effluent Discharge

The effluent discharges from the industries vary from discharging to an open drain to effluent treatment. From the field observations, following are found to be the methods used.

<u>Method of discharge of effluent</u>	<u>Industries predominantly practicing</u>
Discharging to open drain leading to open space, natural drains or public drains	Small industries and non-water based industries (eg. garment factories, iodised salt packaging industries, cottage type industries, tea industries), and some automobile service stations
Discharge to soakage pits excavated within the premises	Small scale water based or non water based industries (eg. hotels, garment factories), some automobile service stations
Discharge to septic tanks	Hotels and rest houses
Treatment	Paper mills at Embilipitiya (using detention ponds, and discharge to the river at high river flows)

The discharge of solid waste from the factories is another aspect that should be considered in relation to water quality and environmental protection. It was observed that some industries dispose their solid waste in ways that are harmful to the water and environment. Dumping the waste into streams and rivers were encountered frequently.

In contrast, there was a practice by tea processing industry, which was observed to enhance environmental protection. The waste tea dust is used in the tea plantations as mulch, which improves water retention in the soil.

7.2 Quality of Effluent Discharge

The quality requirements of the discharge of the industrial effluents are stated in the SLS Standards “Tolerance Limits for Industrial Effluents Discharged into Inland Surface Waters” (SLS No 652:1994). The regulating authority is the Central Environmental Authority, which is supposed to implement the quality regulations through the Divisional Secretaries and the Environmental officers attached to them. They usually take action when specific complaints are received.

In addition, the new industries need to comply with environmental regulations by the local authorities before granting approval.

From the observations made, the industries encountered in these basins do not pose major threat to environment. However, the paper mills in Embilipitiya, with its effluent “black liquor” with high concentration of caustic soda, keeps the effluent in detention tanks, and at high flows in the river, discharge it into Walawe river. At such times, even though the dilution is high, the management of the paper mills inform the downstream users about the intended discharge, especially the drinking water supply authorities. During these discharges, water is not extracted for the drinking water supply purposes. At present, such discharges are carried out once in 5 years. However, the production of the mill is running at under-capacity at present, (production of about 135 tonnes/month compared to the mill capacity of 1000 tonnes/month), and if the production is increased, the frequency of discharge will proportionately be higher than this.

Further, the vehicle service stations discharge their wastewater containing oils and grease in the manner that pollute natural watercourses. In plantation industries, the effluent from rubber factories containing acid sometimes flow into the streams.

The other industries at present do not have major problems of discharging the effluent with respect to the quality. The salterns, after extracting the salt by evaporation and precipitation process, discharge the remaining brine with high concentrations of minerals back to sea, which gets diluted. The garment and textile industries in these areas do not have any process of dyeing. The effluent from sugar factory is discharged into a natural watercourse, which gets diluted.

7.3 Present Water Re-use

The majority of the area of the basins under consideration falls in dry zone, with low rainfall. Hence, potential is high for the reuse of water. There are some examples of water reuse, among the industries investigated.

The paper mills at Embilipitiya produce two different kinds of effluents: “Black liquor” which contain high content of sodium hydroxide, and “white liquor”, which contain mainly organic matter. The management of the mill allow the people in the area to tap this white liquor from the discharge canal for agricultural purposes.

There was another instance observed where the effluent from a garment factory has gone through a process of settling, has been used for other purposes such as toilet flushing etc.

However, instances of reuse of water at present are not very common.

7.4 Efficient Use of Water in Manufacturing Operations

From the discussions with the officials of the paper mills, it was revealed that there are certain studies carried out at present to extract the useful chemicals from the effluent “black liquor” from the mill, and reuse the chemicals as well as the effluent. It was stated that this is in research stage yet.

Apart from above, evidence of effective use of water or the use of lower standard water were not encountered.

(In the above context, the indicator suggested by the Indicator Development Workshop, *adoption of environmental management systems and standards* was found to be useful. However, it was found that it is more practicable to divide this into several, viz. *adoption of source protection measures, methods of disposal of effluent and solid waste, requirement for compliance with environmental regulations, adherence to the effluent quality standards and measures taken to conserve and re-use the water.*)

8. Scope for Future Industrial Development

The Government has made a renewed effort to launch an intensive industrial development in Ruhunupura, covering parts of the three basins under consideration. The area, being in dry and arid zones, will need very good and reliable water supply facilities required for the industries to attract the prospective investors.

Ruhunupura Industrial Development will mainly be in the area bound by Walawe river on the west, Kirindi Oya on the east, Udawalawe to Thanamalwila road on the north and the sea on the south.

Since the proposals are still in preliminary stage, the exact types of industries that will be established and their water requirements are not clearly identified. The development plans include twelve different clusters within the identified area, to be developed in a phased implementation. The water demands are assessed on an assumed consumption pattern with a model (domestic consumption – 55%, commercial and industrial consumption – 35%, socio-cultural, administrative and recreational consumption – 10%) developed based on the water consumption pattern in Colombo area. Accordingly, the total water demand projected for the year 2030 has been assessed to be slightly below 100 MCM per year. This includes the requirement of the proposed harbour (assumed as 100CM per ship, based on 10 ships arriving per day in 2005, increasing to 60 ships per day in 2030), and airport in Sooriyawewa (assumed as 50 CM per aircraft, based on 10 aircrafts arriving per day in 2005, and increasing to 60 per day in 2030.) Although this time schedule seems to be ambitious, more realistic estimates could be expected during feasibility study stage.

Presently, it was learnt that various options for the supply of water are being studied by the Department of Irrigation in collaboration with the National Water Supply and Drainage Board. The proposed options are based on collection of floodwaters and drainage water from rivers in the area, mainly from Walawe River, Kirindi Oya and Menik Ganga in detention reservoirs, and utilising them throughout the year.

There is no differentiation at present, regarding the respective requirement of quantities of water for different industries in relation to the required quality. Hopefully, this may be looked into in

locating the industries in relation to the water sources, and feasibility and detailed designs of the supply of water, so that all the water required for the area need not be treated extensively to achieve the WHO drinking water quality standards. The proposed power plant, where a considerable quantity of water for cooling etc would be required, (and paper mill in Buttala) could be such industries, which should pay attention to this fact.

These new proposals will require a considerable investment, and will have to be carried out in phased manner, in par with the development. The total amounts of investments needed are not assessed yet.

There are certain other proposals also for industrial development within the basins. One major proposal is a paper mill proposed for construction by private sector in collaboration with a foreign company in Buttala within Menik Ganga basin. However, this is also in preliminary stage, and the assessment of water requirements is not available at present.

9. Use of Indicators

Several of the suggested indicators at the Workshop on Indicator Development (February 2002, FAO, Rome) were found relevant and applicable, and during the study, these were used in varying degrees. Appropriate comments are made at the relevant sections, with further suggestions for new indicators.

Some other indicators suggested were found to be not so applicable in this current study. (i.e industrial contribution to the national economy, benefit distribution of economic wealth and return of water from the industries).

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Annex 1 . Categorisation of Industries

Main Categories

1. Agriculture, Livestock and Fisheries
2. Mining and Quarrying
3. Manufacturing Industries
4. Electricity, Gas and Water
5. Construction
6. Wholesale and Retail Trade, Restaurants and Hotels
7. Transport and Communications, Postal and Telecommunications
8. Banking, Insurance and Real Estate etc.
9. Ownership of Dwellings
10. Government Services
11. Private Services

Sub-Categories Under Manufacturing Industries

12. Food, Beverages & Tobacco
13. Textile, Wearing Apparel and Leather Products
14. Wood and Wood Products
15. Paper & Paper Products Printing and Publishing
16. Chemicals, Petroleum, Coal, Rubber and Plastic Products
17. Non- metallic Mineral Products
18. Basic Metal Products
19. Fabricated Metal Products, Machinery and Equipment
20. Other Manufacturing
21. Services

Annex 2. Categories of Industries Encountered in the Study Area

(Note : The relevant category according to the standard classification of industries is shown within brackets)

Category of Industry	Examples
Hotel and rest houses (Wholesale and Retail Trade, Restaurants and Hotels)	Tourist hotels (with and without swimming pools), hotels catering to local tourists, pilgrim's rests
Garment factories (Manufacturing Industries - Textile, Wearing Apparel and Leather Products)	Clothes manufacturing factories.
Paper industry (Manufacturing Industries – Paper & Paper Products Printing and Publishing)	Paper manufacturing mills in Embilipitiya
Salt based industries (Mining and Quarrying - Other mining)	Salterns (manufacturing salt from sea water), industries purifying the salt from salterns, factories making iodized salt
Ice plants (Agriculture, Livestock and Fisheries)	Factories manufacturing ice for the fishing industry
Sugar cane processing (Manufacturing Industries– Food manufacturing)	Two major sugar cane processing industries with sugar factories (Sevanagala and Pelwatta), and some small industries to manufacture jaggary
Paddy processing industries (Agriculture, Livestock and Fisheries)	Rice mills (with and without boiling of paddy)
Plantation industries (Agriculture, Livestock and Fisheries)	Tea factories and rubber factories
Automobile repair and service industries (Manufacturing Industries - Fabricated Metal Products, Machinery and Equipment)	Service stations and garages
Building material manufacturing (Manufacturing Industries - Non- metallic Mineral Products)	kilns for clay bricks, manufacturers of cement blocks
Harbour / Fishery harbour (Agriculture, Livestock and Fisheries)	Hambantota and Kirinda facilities
Other	Other types of industries including bakeries, gem cutting industries, manufacturers of ice cream and candy, laundries, saw mills etc