

Environmental Pollution And Its Challenges In Sri Lanka

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Abstract: Today pollution is occurring on a wide and unprecedented scale all over Sri Lanka. causing all-around damage to the atmosphere, water, land to the various elements of the environment and to the ecosystem itself. There are lots of man-made pollution and environmental degradation that the severe challenge ahead for all Sri Lankans. Pollution has been around as long as human have gathered as societies and carried out economic activity, though it is as varied with the time and increasing the seriousness. As a developing country, Sri Lanka has rapidly improved its economy and has undergone quick industrialization, which leads to increased energy consumption. Nowadays there are lots of environmental issues in Sri Lanka, but most harmful and increasing problems are deforestation, water pollution, and air pollution. So this article explores the environmental issues and their impacts on the people and animals in Sri Lanka.

Index Terms: Environment, Pollution, Air Pollution, Water Pollution, Industrialization, Sri Lanka

1 INTRODUCTION

Sri Lanka was a third world country and now industrially becoming into a developing country since the 1980s. After that, energy consumption has increased and the number of vehicles has rapidly increased in the last two decades. In 1985 hydro-electricity was enough to provide 90% of the country's electricity need. By now it has been reduced to 60%, because of the high energy consumption for households and industries. Nowadays thermal power plants provide a maximum percentage of energy consumption. At the same time, petroleum fuel consumption has also increased owing to the increase in the number of vehicles. Based on that, it can be concluded that economic development has a direct relation with the environmental pollution in Sri Lanka. Environmental conservation is widely distributed theme which is basically focused on preservation and improvement of the environment. Moreover, it includes that active order to protect the natural environment and ecosystems. Nowadays many international institutes are working on conserving the environment from the threats which humans have created on the natural environment. Sri Lanka is an island which has top biodiversity in the Asian region. However, the lack of effective environmental laws and policies has increased environmental conservation. Therefore, it is necessary to have urgent action to protect the environmental resources for the future.

2 AIR POLLUTION

Drastically increase in air pollution is a major problem for human health in most developing countries. Impacts of air pollution are not being properly addressed in Sri Lanka. Sri Lanka is rapidly urbanizing, by 2050, an estimated that 34% of the population will be settling in the cities when compared to 17% in 1990 [1].

The most promising reason for air pollution can be considered as the huge amount of gas and particulate matter emissions from the industries, thermal power plants and automobiles. In 1990 the total number of vehicles was 0.9 million, in 2007 it exceeded 3.1 million. Now it has reached 7.7 million according to the literature. [2] As Colombo is the commercial capital of Sri Lanka, it is the most environmentally polluted area and many projects have been launched to reduce the air pollution in Colombo. When considering the air quality in Sri Lanka, there are lots of populated and industrialized cities such as Kandy, Maharagama, Kurunegala, etc. The major air pollutants can be summarized and given in Table 1.

Table 1: MAJOR AIR POLLUTANTS

Class of pollutant	Example
Oxides of Carbon	Carbon monoxide, carbon dioxide
Oxides of nitrogen	Nitric oxide, nitrogen dioxide
Oxides of sulphur	Sulphur dioxide, Sulphur trioxide
Particulates	dust, soot
Inorganic compounds	Lead
Photochemical smog	Ozone, peroxyacy nitrates
Hydrocarbons	Benzopyrene, benzene

There are five main air pollutants based on the atmospheric concentration is listed below.

- Carbon Monoxide (CO)
- Sulfur Dioxide (SO₂)
- Nitrogen Dioxide (NO₂)
- Ozone (O₃)
- Particulate Matter (PM 10)

This analysis of data shows, the concentration of CO and N₂ were high at Colombo and the concentration of these five pollutants were large at Maharagama on average. Other major cities are also identified as highly polluted areas. [3] The national policy on urban air quality management was established in the year 2000 and the phasing of leaded gasoline in 2002. In 2003 low Sulphur diesel was introduced to the market. At the same time, the government banned the import of two-stroke three-wheelers in the year 2008 as a step forward. Vehicle emission testing programme also launched in the same year. Those are the main steps taken by the government to reduce urban outdoor air pollution [4]. For the first time, permissible ambient air quality standards were applied under the National Environmental Regulations in 1994 [5] with the publication of WHO air quality guidelines in 2005

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Table 2: SRI LANKAN AIR QUALITY STANDARDS.

Air	pollutant	Average time	Sri Lankan standard ($\mu\text{g}/\text{m}^3$)
Carbon monoxide		8hr	10000
		1hr	30000
		Any time	58000
Nitrogen dioxide		24hr	100
		8hr	150
		1hr	250
Sulfur dioxide		24hr	80
		8hr	120
		1hr	200
Ozone		1hr	200
Lead		Annual	0.5
		24hr	2
SPM		Annual	100
		24hr	300
		8hr	350
		3hr	450
		1hr	500
PM2.5		24hr	50
		Annual	25
PM10		24hr	100
		Annual	50

Air pollution from Thermal power plants

As mentioned earlier the contribution of thermal power electricity generation is increasing due to rapidly rising demand for electricity and lack of hydropower electricity because of the declining of the stream flow. Lakvijaya Power Station is Sri Lanka's first and the largest coal-fired thermal power plant which located in Norochcholai, Puttalam, on the southern end of the Kalpitiya Peninsula. Sulphur Dioxide and Carbon Dioxide are the main air polluting emissions from this power plant which can lead to serious harm to human health, global warming and acid rains. However, we are not focusing on air pollution control technologies in this power plant.

3 WATER POLLUTION

Pollution of water resources is another serious environmental problem in Sri Lanka. Water is essential for all living forms and other manmade things. Lots of people die every year from water-borne diseases such as typhoid, cholera and kidney diseases. In Sri Lanka, water pollution mainly results from domestic activities, agriculture and industries. Less amount of people are getting the opportunity to have access to municipal water. At the same time, local authorities do not monitor water quality well. The most important water pollutants are given in Table 3.

Table 3: WATER POLLUTANTS

Class of pollutant	example	Significance
Trace elements	Hg, Cd, Pb, Cr	health
Organic pollutants	Polychlorinated biphenyls, Pesticides, Petroleum wastes	cancer
Inorganic pollutants	Nitrate, phosphate	eutrophication
Sewage	Human and animal waste	Diseases, water quality, pathogens
Organic phosphates	detergents	eutrophication
Heat	Water from power plants	Reducing fish population
sediments	Slitting of lakes	Reduce capacity for power generation, floods

Algal blooms are the most dominating source for the originating of eutrophication. When the organic contents of the water body increases, it causes oxygen depletion and effects aquatic life. According to the recently conducted water quality examination of lakes in Kandy and Nuwara Eliya districts, the dissolved oxygen content of the lakes is very low to keep a considerable fish population [7]. The main reason for this pollution is the discharge of sewage, domestic and industrial waste directly into the streams. Mostly the domestic and industrial waste collected by municipal councils dumps them directly into rivers or garbage disposal areas near the water streams. Seepage from the garbage areas mix-up with streams and this discharge highly contains bacteria, organic content and heavy metals. In Sri Lanka, most of the industries discharge untreated wastage into water bodies. The water quality level according to the Dissolved oxygen content is given in Table 4.

Table 4: WATER QUALITY AND DISSOLVED OXYGEN CONTENT

Water Quality	Amount of Dissolved Oxygen (mg/l)
Excellent	8.0 – 9.0
Slightly	6.7 – 8.0
Moderately Polluted	4.5 – 6.0
Highly polluted	< 4.5

According to the water quality index, Meda-Ela (Kandy), Negombo lagoon and the Hamilton canal can be identified as highly polluted. The dissolved oxygen in this water body is too low for any aquatic life to survive. When the sewage discharge directly into the water bodies it supplies organic matter, nitrates and phosphate. That will help to grow blue or green algae (Macrocystis). This can also be happened due to industrial and agricultural activities. Some of these algae bloom emit toxins which are harmful to human and other animals,

- Hepatotoxins
- Endotoxins
- Neurotoxins

Are the three main types of toxins that produce from algae.

Pesticides

Pesticides can contaminate soil, water, turf and other vegetations. In addition to killing weeds and pests, these can be harmful to other organisms. One of the most dangerous problems of pesticide usage is surface water contamination. Because pesticides can reach surface water through runoff from treated plants and soil. Every year more than 3000 tons of pesticides are sprayed to the environment and most of that end in waterways. So it is necessary to monitor pesticides in water to determine such contamination which can cause long term health effects. Many types of pesticides with concentration in the ppb (parts per billion) range were found in the Mahaweli river near Peradeniya [8].

Deforestation

About 200 years back Sri Lanka was almost entirely covered by forests, That was 90% of the total land surface. As described above, with the increasing industrialization, the rate of deforestation rapidly accelerated. Timber demand increased and forests were cleared for various types of economical plantations, such as Tea, Rubber , Coconut etc. Chena cultivation spread more widely with devastating results on the forest cover. The government established ply-wood industries and other timber companies that mainly contribute to the deforestation, especially in the wet zone. Sri Lanka's natural forest cover has reduced from 80%to 16% over the last 100 years. According to the government, forest cover has shrunk back a further 5% over the 1990s. In the 21st century, threats to natural forest persist unabated and the national forest estate continues to be rapidly eroded [8]. The percentage of the forest area and the population growth is given in Table 5.

Table 5: DEFORESTATION PERCENTAGE

Year	Increasing population	human	% of forest cover
1881	2.4%		82%
1900	2.7%		70%
1956	11.2%		44%
1983	15.1%		27%
1992	17.4%		24%
1998	18.1%		20%
2002	19.2%		18%
2007	19.4%		17%

4 Conclusion

Environmental pollution is a huge issue in Sri Lanka with developing the economic background and the increasing of population. Most of the water resources are getting polluted by sewage which has a direct impact on human and animals.

There is also the possibility of water contamination through pesticides sprayed in agricultural activities. Therefore, it is important to monitor pesticides in drinking water as they have long term health effects. Air pollution also a major health hazard in Sri Lanka especially including main cities such as Colombo, Kandy, Gampaha, Maharagama. Ozone gases and fine particles are the most hazardous air pollutants. So it is an urgent necessity of Environmental action plans to control these pollutions in Sri Lanka to create a better living environment.

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