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**QUANTITATIVE ANALYSIS
OF RAINWATER FOR INVESTIGATION OF AIR POLLUTION
AT PERADENIYA**

**A PROJECT REPORT PRESENTED BY
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Rain is a natural process, an important part of the hydrological cycle, which is the only process which introduces water to the earth as droplets. Unpolluted rainwater shows an acidic pH value of about 5.6 due to dissolution of CO₂ and subsequent ionization. Other pollutants (SO₂, NO₂) released into the atmosphere due to natural events such as volcanic eruptions, lightening, and anthropogenic activities shift the natural pH of rainwater. Harmful atmospheric emissions (SO₂, NO₂, CFC) also result in, due to higher amounts of energy consumption needed to meet the demand of increasing population to have luxury life. Air pollution is the main contributor that changes the natural situation of the earth through Greenhouse effect, Ozone layer depletion and Acid rain.

Sri Lanka is an island, which is open to sea, and hence active air circulation can be seen over the entire island. Also, rain falls on the Indian Ocean region through monsoonal activities. Four natural changes occur in Sri Lanka, due to movement of Sun throughout the year: North-East monsoon, South-West monsoon and the two intermonsoonal periods. From November to January, North-East monsoon activates and cloudy air comes to Sri Lanka through India from the Bay of Bengal. From May to September South-West monsoon activates and air circulation occurs from the south of Sri Lanka.

This research project focuses on the central part of Sri Lanka, and it involves the analysis of rainwater samples collected at three different sites of approximately 1 km apart from each other. Research sites are situated at Peradeniya in the Kandy district. The main goal is to analyze rainwater samples for pollution parameters and to investigate the variation of these parameters collected for a period of five months. The specific parameters determined are rainfall, pH, conductivity, sulfate, nitrate, sodium,

calcium and magnesium. Replicate measurements were taken on weekly basis within the five month period to compute the mean value of each parameter.

Significant variations were seen in the samples of the three sites. The pH of some weeks was in the highly acidic region, which can cause harmful effect to the environment. Samples with low pH had high levels of nitrate and sulfate ions. The number of automobiles on the roads increases day by day and frequent traffic jam on the roads greatly affect the increase in the levels of acidic gases in the environment. Also, the Kandy city covers the mountains and the mountain ranges. Thus, atmospheric emissions are concentrated in that region. Therefore, acidity of rainwater increases and the dry deposition of such acidic gases can cause serious problems to this area.

Concentration of sulfate (SO_4^{2-}) and nitrate (NO_3^-) in some weeks of the sampling period showed high values without direct correlation with other parameters. Transboundary air pollution may affect the increase in concentrations of these ions. This transboundary effect may cause serious damage to the environment in near future which tend to accelerate deforestation, soil acidity, extinction of endemic and exotic fauna and flora. Thus, the Royal Botanical Gardens at Peradeniya will face such a bad effect. Also, the water of the river Mahaweli, the most spiritual water resources to Sri Lanka, will show acidity in near future.

Cations come to the environment with dust particles. Calcium ions in some rainwater samples were increased. This can be attributed to the presence of lime quarries and lime kilns in the Kandy region, which remove very condensed smoke into the environment. These ions may mix with the rainwater, and as a result, hardness of the rainwater and natural water bodies, can be increased. However, direct correlation of rainwater with the concentration of Na^+ was not obtained, although the concentrations of Ca^{2+} and Mg^{2+} were correlated with the rainfall and the dry climate.