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POLLUTION ASSESSMENT OF VELLAYANI SOIL

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Abstract: The purpose of this article is to assess soil pollution in the Thiruvananthapuram District of Kerala, South India. Soil Pollution occurs due to waste generated from industry. Pollution is defined as the introduction of pollutants into the natural environment that creates negative effects. Although natural occurrences can cause soil contamination, they can also be caused by human activity such as manufacturing, extractive industries, improper waste management, transportation, or agriculture. Nowadays, industries may be found in Vellayani. A majority of these are small-scale industries and agricultural industries. Soil is contaminated with heavy metals due to industrial waste. Chemical Analysis of soil samples primarily revealed the presence of iron and sulphur above permissible limits.

Index Terms - **Soil Pollution, Chemical Analysis, Industrial Waste, Heavy Metal**.

I. INTRODUCTION

Soil contamination is caused by the presence of man-made chemicals or other changes in the natural soil environment as part of land degradation. It is commonly caused by industrial activities, agricultural chemicals, or inappropriate waste disposal. Iron, sulphur, lead, and other heavy metals are the most often used substances. Heavy metal pollution is the most serious environmental issue, particularly in developed countries. These wastes have a significant impact on clay content and soil mineralogy. In addition, soil parameters such as consistency limits, shear strength, compressibility, pH, swell-shrink behavior, and permeability may change. This change or modification in soil qualities and structure necessitates the use of various remediation approaches.

The discharge of heavy metals into the environment has become a main issue because their buildup in the environment may have hazardous effects on living species. Heavy metal pollution has negative impacts on both the surface and subsurface environment. There are several heavy metals on the globe. The pollution is caused by the abundance of metals in the Trivandrum region.

II. MATERIALS AND METHODS

A. STUDY AREA

The study was carried out in the Vellayani area, Vellayani is on the banks of Vellayani Lake, the only freshwater lake in the Thiruvananthapuram district. Illegal sand mining, pollution, and land reclamation are taking their toll on the lake. The area consists of agricultural industries are located in the area. Over some time, the Vellayni region has been under severe ecological degradation due to municipal sewage, land drainage, and industrial effluent disposal.

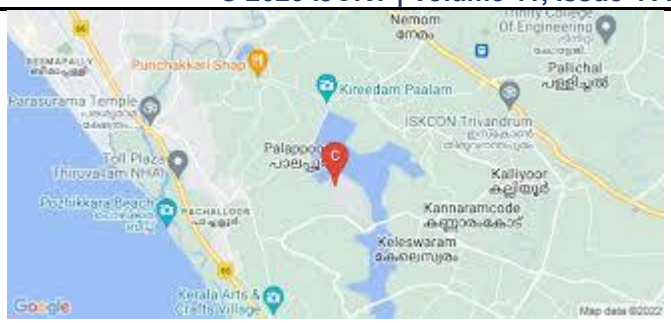

Fig:2.1. Map showing the study area

B.MATERIALS

The soil was collected from the Vellayani region.

1) SOIL

The soil used in this study is collected locally from Vellayani, Thiruvananthapuram district. Fig 2.2 shows the picture of collected soil.

Fig:2.2 Vellayani soil

The properties of the soil are studied and the results are tabulated in the table: 2.1

Table :2.1 Properties of Soil

PROPERTY	VALUE
Coefficient of Uniformity(c_u)	2.59
Coefficient of Curvature(c_c)	1.32
Coarse Sand(%)	4
Medium Sand(%)	52
Fine Sand(%)	43
IS Classification	SP
Specific Gravity	2.6
Cohesion(kg/cm^2)	0.14
Angle of internal friction, ϕ	37^0

C. METHODOLOGY

The soil is collected from the Vellayani region. The Chemical Analysis is done by Soil Analytical Laboratory, Thiruvananthapuram. The properties of the soil are studied and the results are tabulated in Table: 2.1.

CHEMICAL ANALYSIS

The chemical analysis of the soils was determined by collecting the soil samples. Atomic Adsorption Spectroscopy is done on the collected soil samples to analyse the heavy metals present in the collected soil samples. These tests were conducted in Central Soil Analytical Laboratory near Parottukonam, Thiruvananthapuram.

III. RESULTS AND DISCUSSIONS

The chemical analysis was carried out as per EPA standards tabulated in Table 3.1

Table: 3.1 SOIL ANALYTICAL RESULTS

Iron(ppm)	Copper(ppm)	Manganese(ppm)	Zinc (ppm)	Sulphur (ppm)
105.37	2.76	35.36	11.55	313.28

Soil Analytical test conducted at Central Soil Analytical Laboratory, Thiruvananthapuram. 5 ppm is the permitted iron content in the collected soil sample.105.37 ppm is obtained iron content from this soil sample. 10 ppm is permitted sulphur content, and 313.28 ppm is obtained. The predominant contaminant is Iron and sulphur in the analysis.

IV. CONCLUSION

This study was focused mainly on the pollution assessment of soil samples collected from a contaminated site in Vellayani, Kerala. The iron and Sulphur concentration of soil samples collected from the Vellayani region was found to be over the permitted limits. According to the analytical results, iron and sulphur was the most predominant pollutant in the soil sample, and the corresponding percentage increases indicated the source of the pollution.

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