

Review on Study of Evaluation of Physio-Chemical Characteristics of Reservoir Water Feed by Polluted River and Its Effect on Soil Property & Crop Nutrient

Suryawanshi Aditi¹ Prof. Mr. A.B.Saner² Prof. Swapnil Joshi³

¹Student ²Head of the Department ³Professor

¹Department of Geotechnical Engineering ^{2,3}Department of Civil Engineering

^{1,2,3}Matoshri college of Engineering Nasik,, India

Abstract— The geotechnical engineering problems induced by pollution are more and more serious. Soil is an important part of our agriculture. The clay is affected by erosion mostly, come next is silty clay and silt. The project stated that the soil physical property changed evidently, liquidity factor and compressibility decreases after pollution. More and more scholars became aware of the soil pollution problems. On the whole, the studies for polluted soil are not enough, especially, soil has the characters of variability and rationality, which makes the mechanical property of soil varied in a complicated way. An understanding of physical and chemical condition of any soil is essential for proper implementation of the other management practices. Therefore the physico-chemical study of soil is very important because both physical and chemical properties which affect the soil productivity. This knowledge will create awareness among the farmers about economic productivity and also create awareness among geotechnical engineers that how soil pollution by different pollutant causes a serious geo-environmental problem that adversely affects the engineering property of soil.

Keywords: Soil Composition, Role of Physico-Chemical Properties, Soil Pollution, Precautionary Measures

I. INTRODUCTION

A. GENERAL

Soil is one of the most important resources of the nature. Environment pollution is a burning topic of the day. Air, water and soil are being polluted alike. Soil being a "universal sink" bears the greatest burden of environmental pollution. It is getting polluted in a number of ways. There is urgency in controlling the soil pollution in order to preserve the soil. Pollution may be defined as an undesirable change in the physical, chemical and biological characteristics of air, water and soil which affect human life, lives of other useful living plants and animals, industrial progress, living conditions and cultural assets.

The polluted soil property is a crossing scientific problem of environment engineering and geotechnical engineering, which is becoming to a hot researching point. The geotechnical engineering problems induced by pollution are more and more serious. The importance of soil as a reservoir of nutrients and moisture for the production of forage and plant species has been recognized since the beginning of the forest management as a science.

B. Role of Physico-Chemical Properties in Soil Quality

1) PH

pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in water. pH is a most important physical properties of soil. It has great effects on solute concentration

and absorption in soil. Soil pH is an important consideration. If the pH is less than 6 then it is said to be an acidic soil, the pH range from 6-8.5 it's a normal soil and greater than 8.5 then it is said to be alkaline soil. The pH of cotton soils was found to be in the range of 7.5-8.4. It is a good indicator of balance of available nutrients in the soil. The exchangeable chromium has weak bond with soil particle which is easily influenced by pH (Shu-fen Cheng 2014).

2) Texture

Soil having different textural groups, on basis of the proportion of different sized particles. Soil texture directly influences soil-water relation, aeration and root penetration. It also effect on the nutritional status of soil. Soil texture can be expressed significantly by its electrical conductivity. Clay textured soil is highly conductive while sandy soil are poor conductors

3) Moisture

Moisture is a most important physical property of soil. The absorption of nutrients is depends on the moisture of the soil. The water content of soil is also much related to its texture and structure. The soil moisture commonly depends on void ratio, particle size, clay minerals, organic matter and ground water condition. Wetness depends largely on the porosity of a soil, and for that reason clayey soil, which have a high porosity generally have larger water content than sandy soils

4) Soil Temperature

Temperature of the soil is an important property because it influences the chemical, physical and biological processes associated with plant growth. Soil temperature fluctuates with season, time of day, and local climatic conditions. The major source of heat is sun and heat generated by the chemical and biological activity of the soil

5) Electrical Conductivity

Electrical conductivity is a very quick, simple and inexpensive method to check health of soils. It is a measure of ions present in solution. The electrical conductivity of a soil solution increases with the increased concentration of ions. Electrical conductivity varies with depth and its range of variation was less in upland profile, probably occurred due to slope of land surface, high permeability and high rainfall, responsible to leach out alkali and alkaline bases.

6) Nitrogen

Nitrogen is a most important fertilizer element. Plants respond quickly to application of nitrogen salts. This element encourages above ground vegetation growth and gives a deep green colour to the leaves. Plants root take up nitrogen in the form of NO₃ and NH₄.

7) Phosphorus

Phosphorus is a part of every living cell in plant. It is one of the most important micronutrient essential for plant growth. Phosphorus is most often limiting nutrients remains present

in plant nuclei and act as energy storage. It helps in transfer of energy.

8) Potassium

Potassium is not an integral part of any major plant component but it plays a key role in a vast array of physiological process vital to plant growth from protein synthesis to maintenance of plant water balance

9) Soil Organic Matter

Soil organic matter is an important property of soil. If the soil is poor in organic matter then it enhances the process of soil erosion. If the soil organic matter is present in soil then this soil is useful for the agricultural practices. Organic matter may be added in the soil in the form of animal manures, compost, etc. The presence of higher content of organic matter in the soil can be another plausible reason for lowering of the pH

10) Sources of soil pollution:-

There are two type of sources which pollute the soil: Agricultural sources and non-agricultural sources.

11) Agricultural sources:

Soil pollution comes from different sources including agriculture and animal husbandry. Some of the agricultural practices lead to soil pollution. They are animal wastes, use of long lived Pesticides, herbicides, fungicides, nematodes, etc. fertilizers and some agricultural practices.

12) Non-agricultural sources:

Soil pollution by non-agricultural sources is usually the direct result of urban sprawl caused by rapidly increasing population and a rapidly per capita output of waste related to our modern way of life. Its materials that find their entry into the soil system have long persistence and accumulate in toxic concentration and thus become sources of pollution. Some of those most important soil pollutants are inorganic toxic compounds.

II. PROBLEM STATEMENT

Present study focus on Environment pollution is a burning topic of the day. Air, water and soil are being polluted alike. Soil being a "universal sink" bears the greatest burden of environmental pollution. It is getting polluted in a number of ways. There is urgency in controlling the soil pollution in order to preserve the soil fertility and increase the productivity. Generally most pollutants are introduced in the environment by sewage, waste, accidental discharge or else.

III. OBJECTIVE

The objectives of the current study can be recognized as follows:

- To study accumulation of pollutant in soil and water.
- To check pollution characteristics and category in soil.
- To analyze how the human activities contribute in soil and water contamination.
- To study some relation between soil physical properties and its pollution environment.
- To check how the polluted water and soil make serious changes in soil physical property.

IV. SCOPE OF THE STUDY

The importance of soil as a reservoir of nutrients and moisture for the production of forage and plant species has been recognized since the beginning of the forest management as a science, It is necessary to know details about different physio-chemical parameters such as colour, temperature, acidity, hardness, pH, sulphate, chloride, DO, BOD, COD, alkalinity used for testing of water quality & soil property. Heavy metals such as Pb, Cr, Fe, Hg etc. are of special concern because they produce water or chronic poisoning in aquatic animals. Some soil analysis reports with physic-chemical parameters have been given for the exploring parameter study.

V. METHODOLOGY

A. Study Area

MIDC has planned to develop an industrial area on 400.35 hector of land about 278.08 hector of land has come in possession of MIDC. MIDC has provided the entire basic infrastructure such as roads, street lights, and water supply pipe lines in this area. MIDC has constructed an earthen dam on Motinala to fulfil the requirement of water of the industrial and agricultural area. MIDC has provided water supply scheme of 4.50 MLD capacities. Presently the consumption of water is about 2.20 MLD. The rate of allotment of industrial plot is Rs.100.00per Sqm.

B. Method

Physico-chemical parameters: Physico-chemical parameters conductivity in $\mu\text{S/cm}$, pH, Turbidity in NTU and temperature in $^{\circ}\text{C}$ were measured using digital millimetres in three sites, S1, S2 and S3 from January to June .

C. Data analysis:

Descriptive Statistics (mean, graphs) and inferential statistics (Univar ate analysis) were used through SPSS Version 16 application.

VI. LITERATURE REVIEW

S NO	NAME OF THE PAPER	YEAR	AUTHOR	CONTENT
1	Effect of soil pollution on geotechnical behaviour of soil	2009	P.V. Sivapullaiah	The main objective of this study was to check behaviour of soil due to pollutant interaction. The ground pollution arises from the impact of past and current industrial activity and due to improper disposal of waste generated by society. The changes in the behaviour of soil

				contaminated with variety of pollutant lead to mineralogical changes.
2	Engineering Properties and Treatment of Hydraulically Reclaimed Saline Soil in Coastal Area	2014	Ling Jianming, Yang Yulin	Author evaluate the engineering properties such as salinity content, particle composition, limited water content, compaction characteristic, capillary water characteristic, resilient modulus, California Bearing Ratio (CBR), shear strength
3	Remediation of soils contaminated with chromium using citric and hydrochloric acids	2014	Shu-Fen Chenga, Chin-Yuan Huang	The effects of soil particle size and chromium fractionation on Cr leaching were also investigated. About 90% of chromium in the studied soil existed either in residual form or bound to iron and manganese oxides, and Cr fraction distributions were similar for all soil particle sizes.
4	Effect of oil contamination on Geotechnical property of clayey soil	2015	Swaroop S. S, Rani V	The object of this study is to analyse different laboratory testing program to study the effect of motor oil contamination together with the effect of contamination duration on geotechnical properties on different soil. The studied property include Permeability, Strength and Atterberg limit.
5	Changes in property of soil due to disposal of waste	2016	B. G. Borude K. A. Patil	The study finds that the increase in population and industrialization, there is increase in construction activities in cities and industrial area leaving very little location of good soil for new project. The waste from industrial areas loose the desired geotechnical propertiss
6	Impact of Geotechnical properties due to Industrial and hydrocarbon contaminated soil	2017	Sohail Ayub	This research includes the soil contamination by industrial effluents and hydrocarbon contaminant has affected adversely soil health and crop productivity. Such action have an impact on engineering property of soil such as shear strength and volume change
7	Water Pollution in India: Its Impact on the Human Health	2017	Subodh Kumar , Hari Mohan Meena	The study finds that the right to access clean water is not specifically guaranteed either by the constitution of India or by any other Acts. Duty is imposed on the state to provide clean water and prevent and control the water pollution. The present study reveals that Water pollution is a major issue in India
8	Geotechnical properties of effluent-contaminated cohesive soil and their stabilization using industrial by-product	2018	Muhammad Irfan, Ahmed Qadri	The research include the study of the rapid urbanization in various metropolitan areas in Pakistan has force developer to construct in places that were previously use as dumping site for industrial influent. It has long being recognise that change in pore fluid chemistry can exerts a strong effect on soil strength characteristics.
9	Urban wastewater reuse in agriculture for irrigation in arid and semi-arid regions	2020	Sayyed-Hassan Tabatabaei, Negar Nourmahnad	Author attempts have been made to compensate irrigation water shortage through widespread wastewater application as a low-quality water resource for agriculture. The existing wastewater treatment plants do not have sufficient capacity to treat such a huge volume of wastewater. In arid and semiarid region, soil type as well as climate is different from the others, so the aim of this paper is the review of literature on the effects of wastewater reuse in agriculture.
10	Pollution Characteristics and Ecological Risk Assessment of Heavy Metals in Sediments of the Three Gorges Reservoir	2020	Lujie Shui , Xiaojie Pan	The data were evaluated and analyzed using multiple methods, including the potential ecological risk index, the geoaccumulation index (Igeo), and cluster analysis. The results show that the tributary surface sediments were polluted by heavy metals to a certain extent. Cu, Zn, Pb, and Cr have been enriched in sediments in recent years

VII. CONCLUSIONS

At present, the majority of our land resources are degraded. Therefore, it is important to maintain the soil health and increasing agricultural production. The environmental problems associated with fertilizers application, a number of problems arise from the use of pesticides. These include persistence in the environment, toxicity in soil, vegetation and water supplies and its application for human health. The persistence and toxicity of many pesticide compounds dependent on a number of soil characteristics. It also help to the farmers about the proper supply of nutrients for healthy growth and to increase the yield of crop, Due to excess use of chemicals soil quality decreases.

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