

CHAPTER I

INTRODUCTION

1.1 Basic concepts

Geological environment (geo-environment) is that part of lithosphere which directly influences the conditions of the existence and development of the Society, which man exploits and converts (Hrasna, 2002). The basic components of the geo-environment are rocks, relief, ground water and geodynamic phenomena. Relevant properties of the geo-components can be the factors of their other properties. However, some of them have effects on the quality of the environment and on land use too. These are integrated in to environmental-geologic conditions, which are complex of geo-component properties affecting the quality and/or the way of geo-environment and landscape exploitation. These properties of the geo-environment are called as geo-factors of the environment. Besides the geo-factors that provide possibilities of the geo-environmental exploitation called geologic potentials of the environment, there are other geo-factors of the environment, which limit or in a negative way affect the land use that are called geo-hazards. The environmental geologic condition can be expressed in a simplified map of significant geo-factors for land use planning. Geo-environmental studies are the study of air, land and water resources. The field integrates the study of the physical and cultural aspects of the environment to solve environmental problems. The main purpose of geo-environmental study is to ensure rational land use and its protection.

Land is a part of the landscape and can be defined as the physical environment consisting of relief, soil, hydrology, climate and vegetation insofar as they determine the land use. Soil is a part of the land and one of the most precious resources of the earth. Soil provides anchorage to the plants and furnishes nutrients and water for its growth and development besides supporting structures that man builds. Geologists consider soil as upper part of the weathered materials (regolith) resting on the bed rock and containing inorganic and organic nutrients. But to an environmentalist soil is a dynamic living layer forming the foundation of all ecosystems. Alluvial soils, covering the largest area in India is mostly ill-defined but most important soils from the agricultural point of view. Alluvial soils are formed on parent materials called alluvium, transported by different agencies viz- water, ice, gravity and wind. Geologically alluvium is divided into newer or recent alluvium and older alluvium. The old alluvium is also known as Bhangar and new alluvium is known as Khadar. The newer alluvium is sandy and light coloured but the older alluvium is more clayey and dark coloured. The older alluvium or high level alluvium was formed by deposition during or at the end of the Pleistocene period, consists of reddish to brown sandy alluvium.

1.2 The study area

The plains section of the Brahmaputra river basin in India extending from Sadiya to Dhubri is known as Brahmaputra valley of Assam. It is located in the north eastern corner of India between longitudes $89^{\circ}46' E$ and $96^{\circ}10' E$ and latitudes $25^{\circ}80' N$ and $27^{\circ}80' N$. The valley has a length of about 660 Km. and average width of about 70 km. The altitude of the valley ranges from 32 to 132 meters. It is bounded on the north by the Bhutan and

Arunachal Himalaya, on the east by the Patkai hills and its branches, on the south by the hills of Nagaland and the plateau of Karbi Anglong and Meghalaya and on the west by the plains of West Bengal. It covers about 72% of the total area of Assam.

The Brahmaputra valley of Assam is built up by the deposition of alluvium. The alluvium is divided in to old and new alluvium. The older alluvium forms slightly elevated terraces generally above the flood level. The new alluvium is observed in entire area of the active flood plain and also middle flood plain of the north and south banks of Brahmaputra. The highlands in the plain districts of Brahmaputra valley which are not subject to flood comprise old alluvial soils. These soils are generally formed in the valley on flat as well as slightly undulating areas. It is built up of alluvial materials washed down from the hill slopes. Slow external as well as internal drainage make these soils heavy textured. The colour of the surface soil is light yellow to pale brown; they are compact, very sticky and plastic. The texture of these soils become heavier with depth and has very low permeability. Being older in formation, these are comparatively more acidic in nature and unfit for crops that are sensitive to calcium depleted acidic condition. The acidic characters of these soils make them suitable for tea plantation as well as some other crops that can grow under acidic condition. These soils are some of the more manageable soils of the state in which improved agricultural technology can be introduced and alternative land use is possible (Sinha et al, 2004).

But till now no attempt has been made to conduct a comprehensive detailed study of these area. Therefore a need was felt to carry out a detailed geo-environmental study of the older alluvium area for better utilization and efficient management.

1.3 Objectives

Keeping in view all the above points the present investigation has been undertaken with the following objectives: -

- **To identify, characterize, classify and map the older alluvium soils**
- **To study the geo-environmental factors and processes of soil formation in the study area.**
- **To examine the paleohistory, present status and use of the soils in the area**
- **To identify the existing problems and to suggest strategies for better management of the land and its resources.**

1.4 Hypotheses

The older alluvium soils of the Brahmaputra valley are different from other adjacent soils of the area. Plantation crops mostly tea is grown in these soils in Assam. Therefore the present study has been undertaken with the following Hypotheses: -

- ✚ **The older alluvium soils of Brahmaputra valley of Assam are unique in their physicochemical characteristics and are significantly different from other adjacent soils.**
- ✚ **The older alluvium soils of Brahmaputra valley of Assam have high economic significance, especially in regard to tea plantations and timber trees.**