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Impact of Interazonal Soils on Biota and Discontinuous distribution of plant communities: A Geographical View

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Abstract
The study of Biogeography is concerned with plants and animals. Phytogeography avails scientific study of their distribution in space over time. The geographic objectives of their study are to elucidate the properties of geographical regions. Biota indexed for the distributional pattern. Geographers Soil texture and structure are the most significant qualities and influence vegetation by affecting drainage aeration, moisture, and nutrient availability to plants. Biotic communities are associated with a certain type of sites, soils, terrain, climate, and fauna. Spatial classification of the potential natural vegetation is an indicator of the physio-climatological characteristics of the landscape. The present study carried out the impact of interzonal soils on biota and discontinuous distribution of plant communities by studying floral literature in a systematic approach. Soil texture and structure are the most significant qualities and influence vegetation by affecting drainage aeration, moisture, and nutrient availability to plants. Biotic communities are associated with certain types of sites, soils, terrain, climate, and fauna. Spatial classification of the potential natural vegetation is an indicator of the physio-climatological characteristics of the landscape. The present study carried out the impact of interzonal soils on biota and discontinuous distribution of plant communities by studying floral literature in a systematic approach.

Keywords: *Biogeography, Phytogeography, Geographical Regions, Biota, Soil Texture, Biotic Communities, Natural Vegetation, Systematic Approach.*

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I. INTRODUCTION

In recent years the study of Biogeography often blending the courses of Ecology has gained importance worldwide. The propagation area and the elucidation of geographical regions having homogeneity of plant and animal, species in regard to climate, topography, and other environmental factors.

The data collection and the concepts formulated by the early naturalist like Carlos Linnaeus (1707-1778), Alexander Von Humboldt, Alfred Wallace, and Charles Darwin, biogeography distinguished itself by two completely distinct lines of investigation, namely taxonomic and ecological. The geographer's approach, however, has been influenced and determined more by ecological than taxonomic concepts.

Ecology constitutes the main theme of bio-geographical studies for a scientific understanding of the distribution of 'taxa' is of equal significance in unveiling the inter-relationships of a particular plant and animal species in the ecosystem. It was Theophrastus (327-288 BC) who for the first time wrote the 'Natural History of Plants distinguishing the forms of growth and the forms of life. Buffon (1707-1788), the great geographer and naturalist while studying animal distribution over the globe formulated the theory that the animals spread from the poles over the earth. In his book called 'Historie Naturelle', he propounded the idea that a change of climate brings forth changes in the morphology and physiology of animals and plants. He also propounded animal migration.

The first systematic taxonomic classification of animals was given by German Zoogeographer Eberhard Zimmermann (1743-1815) who gave the characteristics features of individuals groups of animals. Climatic effects were described in the early 19th century by Arthur Young (1741-1820). The great German geographer Alexander Von Humboldt (1969-1859) was also a plant geographer and a great naturalist; he established the relationship between climate and vegetation and said that vegetation is the true index of climate and climatic condition in any area. Humboldt discovered many new plants and described them in his book 'Physiognomy of Plants', he propounded several concepts on plants association climatic variation, and modes of dispersal of plants. Works on biota noted by geographers like J.H Febv're (1823-1915), E. Haeckel (1866), K. Mobius (1877) bio-geographer developed as a special branch of geography. This research paper divided into two parts i.e. Part –A concentrate on Climatic classification of Plants and influenced of edaphic factors on biota.

Part-B avails impact of Interazonal Soils for discontinuous of plant communities by observing various related aspects.

II. HYPOTHESIS

Forest soils are the medium that produces nature's most magnificent crop. Nowadays forest soils have systematic research. The soil-forming influences of forest vegetation may be offset by the more powerful effects of climate, topography, or parent rock. Soil structure is defined as the arrangement of individual soil particles (Baver, 1940). The formation of structural aggregates is caused by the action of electrolytes and colloids, freezing and drying of soil, and the activity of soil organisms and roots.

III. OBJECTIVES

The present study carried out the following objectives:-

1. To the Geographical Literature on Edaphic factors affecting on vegetation.
2. To avail the edaphic factors relates to vegetation.
3. To know the climatic classification of forest
4. To find the impact of intrazonal soils on vegetation
5. To know the types and regions for discontinuous distribution of plant communities.

IV. METHODOLOGY

The study is concerned with the descriptive. The data were collected using the primary and secondary data collection methods. Data are gathered by various journals, articles, books, and articles for collected data were tabulated, edited, and analyzed.

V. LITERATURE REVIEW

a) The early literature on soils was marked by the appearance of a few works published prior to the 18th century. Soil's connection with silviculture practices was made by H. Cotta (1809), Hundeshagan (1830), Sprengel (1831), and Schantz (1832). In 1840, the principles of soil sciences and ecology were introduced to silviculture by Grebe, a German forester. With the influence of environmental forces, the surface strata of the lithosphere undergo weathering a process that tends to release the original mineral constitutes and rearrange them into new compounds (Jenny, 1940).

b) The horizons of forest soil are designated according to Glinka (1931), that parent material of soil consisting of either un-weathered or weathered mineral matter. The original version of this system of profile designation was introduced by Dokuchaev (1879) in connection with the study of Chernozem soils, i.e. Soils comprised of three (A, B, and C) horizons. According to Climatic factors, the conditions of temperature and moisture exert a particularly profound influence, upon the distribution of parts and the development of soils (Schemper, 1903).

c) The humid climates, with their excess precipitation over evaporation, are conducive to the development of forest vegetation and the formation of forest soils. Rainfall and the temperature exert compositions of forest cover according to soil development. (Ramann, 1918).

d) Soil inherits from parent material certain important properties (Tamm, 1921) determining their depth, texture, and sometimes mineralogical composition. The soil profiles which develop under unbalanced or extreme climatic conditions are influenced by the parent material only to a limited extent. The soils occurring in regions with a mild climate, weakly podozolized acquired from their parent rocks as was pointed out long ago by Fallou (1862).

e)

A. Description of Study

- **Climatic Classification of Plants**

Plants can be classified accordingly to the climatic conditions in which they grow. All plants need water to grow and perform their metabolic activities. Different areas have varying water balance to the vegetal cover and plants adapt themselves to their different environmental conditions. On the basis of varied climatic conditions and the consequent adaptability of plants, the vegetable world can be divided into the following classes-

Hydrophytes: - These plants either grow in water or groundwater bodies such as ponds, lakes, and rivers where there is permanent moisture e.g. ferns, algae, mosses, etc.

Mesophytes: - These plants are intolerant to too much or too little water or extremes temperature. Mesophytes are adapted to conditions of periodic or permanent water deficiency and extremely warm and cold temperatures.

Xerophytes: - These plants are visible in dry habitat areas. They are capable of resisting and remitting sources. Xerophytes have long tapering roots which reach greater depths of soil to absorb more water. These plants also grow in alkaline soils and boggy areas.

- **Factors of the Environment:** The most significant factors of the environment can be categorized as follows :-

1. Physiographic: Structure, relief, altitude, and slope
2. Climatic: Temperature, light, precipitation, wind
3. Edaphic: Soil conditions and soil properties
4. Biotic: The influence of one organism on other
5. Anthropogenic: Human influences i.e. deforestation, fire, cultivation, etc.

- **Influenced of Edaphic Factors**

The various combinations of soil factors that influence plant life are referred to as edaphic factors. The soil system is an integral part of the biosphere vital to the transfer of energy and nutrients from one plant to the other or from humus to the plants and then the animals. Plants derive about 16 major nutrients from soil chiefly the salts of nitrogen phosphorus, sulphur, etc. Soil texture and structure are the most significant qualities that influence vegetation by affecting drainage aeration, moisture, and nutrient availability to plants.

a) Soil Formation: Soil formation is a dynamic process resulting from the weathering of solid rocks for thousands of years. Soils develop from transported materials like river aluminum, windblown sand, and glacial debris, Peaty, and boggy soils develop from organic materials. Soil formation occurred by pedogenic factors mainly geological, climatologically, and biological. Fertile soil is packed with living organisms one gram of soil may contain as much as 1 million to 4000 bacteria, 5000 to 1 million fungi, 10,000 to 50,000 algae spores, and a large number of unicellular protozoa.

b) Soil Profile: A soil profile is the vertical section of the soil layers from the top layer up to the solid, consolidated rocks forming the bedrock. The depth of the soil cover varies from a few inches over the precipitation slopes of mountains to hundreds of feet as in the plants. A typical soil profile has three main horizons. Horizon A is the top layer of the soil consisting of fine or coarse-grained parent material, mixed with humus. Horizon B of the soil receives the suspended and dissolved nutrients from the zone of Eluviations. B-horizon has three distinct layers of soil that can be identified B1, B2, and B3. The horizon B1 is usually an iron pan formed due to the deposition of some iron salts and concentration of re-deposited clay minerals. B-2 horizon is hard and can impede the drainage of soil water and plant roots. B-3 horizon consists more of the parental material with lesser amounts of humus and chemical compounds. C-horizon is related to the geological structure of the area as the transportation of weathered material in the erosion processes.

B. Impact of Interazonal Soils

Interazonal Soils develop under special circumstances in drainage or the predominance of parental rock material. They are categorized into three main groups:-

1. Hydromorphic- Hydromorphic has an excess of soil moisture on account of waterlogging as in low-lying areas. This may impede water drainage and cause a lack of aeration which may eventually diminish the bacterial action in the soil causing accumulation of under composted organic matter to greater depths. In the lower horizons, ferrous iron may not get oxidized and these horizons may look blue-gray in color. Hydromorphic soils are commonly found in Tundra where temperatures are too low to cause any bacterial activity. Ex. Bog soils.

2. Hylomorphic- These soils have a high soil content associated with pedocals i.e. chernozems, brown soil, and desert soils. These saline soils are formed in dry continental interiors as in the Aral-Caspian depression, American cordilleras, etc. They have an abundance of salts like chloride, sulphates, and carbonates of sodium, calcium, and magnesium. These soils subdivided into three groups-

a) Solanchalks: They are formed in most areas where evaporation exceeds precipitation and so an account of the upward movement of groundwater.

b) Solonetz- They are alkaline soils. When the solanchalks get subjected to a prolonged period of moist climate in which the salts collected in the top layer are again and again washed due to increased rainfall.

c) Soloths: Also called 'solods', there are former saline soils that have undergone continued impaired drainage and leaching for long periods.

d) Calcimorphic- These soils have rich lime contents consisting of calcium carbonate and their formation is affected by the parent material instead of climatic factors in the Karst Region.

e) Redzinas- They develop on limestone rocks under moist conditions, as in southern Poland coastal parts of Yugoslavia, Greece, and Alabama (USA). They are friable and rich in organic contents.

f) Terra Rosa- They are heavy clay soils rich in lime and iron, aluminum, and silicon. They visible in drier climatic conditional areas.

- **Impact of Intrazonal Soils for Discontinuous Distribution of Plant Communities**

Plants form that exists in similar climatic and edaphic zones all over the world. Interruption in distribution patterns may be noticeable when physiographic barriers like mountains, seas, lakes, and rivers exist or when the biotic barriers have been active to the maximum limit. In this distribution, plant communities are

separated by wider groups. This may occur on account of complex topography, limited range of habitat conditions, differences in microclimates, and soil fragmented distribution.

- **Types of Discontinuous Distribution of Plant Communities:-**

i.Diffused: A 'diffused' discontinuity is visible when plant communities are broken up into small, more or less, numerous and equal parts.

ii.Altitudinal: An 'altitudinal' discontinuity may be visible when the floral structure is limited to the same altitudes and similar latitudes.

- **Region for Discontinuous distribution of Plant Communities**

Table 1: ***Discontinuous distribution is visible on the globe in the following ten regions-***

Sr. No	Region	Plant Communities and Species
1.	Arctic Region and Mountains	Arctic Alpine (Dwarf-willow, Purple Saxifrage)
2.	Coastal Parts of the Atlantic in North America and Europe	North Atlantic (Bog Club mosses and hooded trees)
3.	Coastlands of Pacific in North America, Japan and China	North Pacific (Torrey Pine, Skunk Cabbage)
4.	North and South America	North-South American (Picher Plant family)
5.	Europe and Asia	Euro Asian (Leontice)
6.	Coastal land of Europe, Asia and Africa	Mediterranean (Button woods and Plane Trees)
7.	South America	Tropical (Buddlerra)
8.	Islands of South Pacific, New Zealand, South America	South Pacific (Jovellana)
9.	South America, Africa and Madagascar	South Atlantic (Milk-weeds)
10.	Antarctic continent, South America and New Zealand	Antarctic (Beech Tree)
Ref: Library of Congress Cataloging in Publication Data, Simmons, Ian Gordon		

Plant associations are usually associated with various soils types. The environmental factors in communion with each other have formed plant communities and affected the floral distribution in the world.

VI. CONCLUSION

Biogeography is the sub-branch of geography that studies all biotic things consisting of the earth's environment with respect to man. It involves the evaluation of distribution areas of biota as per ecological potential, genetic viability, physiology of biotic communities as well as the spatially and temporally varying behavior of environmental factors. The altitude itself induces climatic changes that give rise to vertical zonation of vegetation, slope influence the drainage and soils which in turn affect plant life. Areas of undulating land where the soil has developed from a uniform parent rock may show obvious differences in soil formation and drainage. Due to variations in the soil texture, pH values, color, structure, and consistency a variety of soils occur in the world. Intrazonal Soils are half mature and have been formed under inadequate drainage which produces alkalinity and salt accumulation.

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