ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 11| Issue: 5| May 2025|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2025: 8.691 || ISI Value: 1.188

A COMPREHENSIVE STUDY ON PLANT GEOGRAPHY AND ITS ECOLOGICAL APPROACH

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ABSTRACT
Geography aims to explain and characterize the globe and its inhabitants. Significant regional differences also exist in the nomenclature used to characterize Earth's surface characteristics. A plant is a living organism that can grow on other plants, in water, or in the ground. It typically has flowers, roots, leaves, and a stem. It also generates seeds. Geography is to ascertain how the physical surroundings of plants and animals relate to their growth and position on Earth. The study of plant geography examines the spatial distributions of vegetation and plants as well as the interactions between the environment and these distributions. The branch of biogeography that studies the geographic distribution of plant species and their impact on the earth's surface. Ecology is the study of living things and their interactions with their surroundings. Ecologists investigate the interactions between organisms and their environments. Present study carried out the plants geographical conditions and their ecological aspects.
KEYWORDS: *Plant Geography, Biogeography, Plant Species, Ecology, Living things.*

1. INTRODUCTION

The study of the spatial distribution of animate nature, encompassing plants and animals, as well as the mechanisms that result in variations in the patterns of distribution, is known as biogeography. The types of plant and animal life that live in the highly populated area of the earth's surface, as well as the intricate biological processes regulated by natural surroundings, are the focus of this area of geography. The study of areal distributions, geographical patterns, locational analysis, man-earth relationships, and human-environment relationships are some of the definitions of geography. In relation to humans, this area of geography examines all biotic elements that make up the earth's environment. The primary foundation of biogeography is the environment and human activity that influence the distribution of living things. The Earth's biosphere, or organic world, is the region that is home to living things and includes soil, air, and water. Studying plants and animals as the primary soil-climate-vegetation units of the earth is the core of biogeography. Many different elements constantly affect the growth of our planet's flora, either helping or impeding it.

These elements that impact the earth's vegetation were not limited to earlier geological epochs when the continents' positions and configurations changed, new mountain ranges were formed, seas moved and receded, and the climate changed. There are traits that all living creatures share. To describe the link between species and their surroundings, the term ecology was created. Ecology is the study of organisms "at home," or in their natural environments, according to its etymology. Kormondy (1969) attempted to attribute Henry David Threau's 1858 usage of the term ecology as its original usage. The Geograman biologist H. Reiter, who is credited with coining this term in 1868, is mentioned in works of literature. German scientist Enst Hackel initially defined the term in 1869 as "the body of knowledge concerning the economy of nature – the investigation of the total relations of the animals to their inorganic environment," despite the fact that it seems to have been coined in 1886. One needs to examine the environment in great detail because of advancements in environmental knowledge, the growing human population, space constraints, food issues, deteriorating hygienic conditions, the threat of natural resource depletion, and socioeconomic issues.

Grisebach coined the term "geobotany" in 1866, and Drude (1890) and Rubel (1922–1927) also used it in the same way. Theophrastus (327–288 BC) was the first to write the Natural History of Plants, separating the types of life and growth via comparative observation of many nations. He promoted the notion that the temperature, soil, and water determine a plant's range, and that the maturation period changes depending on the geographic setting.

2. HYPOTHESES

As society's demands and configurations have evolved over time, so too have the roles and functions of geographical knowledge and its structures. The need to define sovereignty and ensure transit precision made mapping and surveying fundamental instruments of the geographer's trade. Closely examining how lifestyles, economic systems, and social reproduction differ by region. The natural sciences and the human sciences are connected by geography. Establishing geography as a discipline that is necessary to comprehend problems facing humanity and parts of the contemporary globe. As its impacts become increasingly apparent, global environmental change has come to be regarded as a reality.

3. OBJECTIVES

This research study aims to achieve the following objectives-

i. To know the concept of Plant Geography
ii. To know the historical background of Biogeography
iii. To understand the biome

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iv. To understand the spatial circumstances around plant availability

4. METHODOLOGY

Data for the research paper that follows was gathered from primary and secondary sources, including books and periodicals.

5. LITERATURE REVIEW

a) The study of plant species distribution is the goal of historical plant geography, according to E.V. Wulef's 1943 book "An Introduction to Historical Plant Geography." According to him, historical plant geography research and the study of current plant distribution look into fossil plants, which are found in extremely small quantities and frequently in such poor form that identification is impossible.

b) The book "Origin and Geography of Cultivated Plants" by N.I. Vavilov (1992) offers a rare chance to retrace the evolution of Vavilov's theories on cultivated plants as well as his gradual development of a precise terminology. All individuals interested in the evolution of cultivated plant species will find the book to be very interesting, both in terms of the discipline's past and present as well as its potential future.

c) Paul A. Keddy (2017) presents a global and multidisciplinary perspective to plant ecology in this much anticipated new edition of Plants and Vegetation, which combines the most recent concepts, models, and data with classical subjects. With a wealth of real-world examples and vibrant images throughout, Keddy uses his vast teaching experience to make the subject come to life for students.

d) In 2023, Martin Kellman published his book "Plant Geography." Based mostly on plant population biology, the author develops a number of plant geographic concepts, addressing in turn processes that function at the individual and population levels, interactions between plant populations, the role of environmental factors and plant dissemination in determining the distributions of plant species, and vegetation geography. Throughout, emphasis is given on how the earth's plant cover is dynamic and how past events and current conditions interact to shape plant distributions and evolution.

Description of Study

Environment is a complex network of interconnected elements that can either alone or in combination have an impact on plant growth. The following categories can be used to group the most important environmental factors:-

- **Physiographic:** Elements such as height, land slope, and ground structure have an impact on plant life, either directly or indirectly. The region's relief is what creates specific temperature, light, moisture, and wind conditions that affect plant growth. (For example, slope, altitude, relief, and structure.)
- **Climatic:** Depending on a number of elements, including temperature, wind, and sunlight, and rainfall, vegetation may be directly impacted by climate, or it may be indirectly impacted by soil and biotic factors. (For example, temperature, light, wind, and precipitation.)
- **Edaphic-** An essential component of the biosphere, edaphic-soil networks facilitate the flow of nutrients and energy from one plant to another or from humus to plants and subsequently to animals. (For example, soil qualities and circumstances).
- **Biotic-** The impacts of one plant species on another, as well as the influences that humans and animals have on plants, are examples of biotic factors. When one plant competes with another for light, soil area, nutrients, water, and seed dispersal space, the results can take many different forms. (For example, how one organism affects another?)
- **Anthropogenic:** Human activity and the emergence of new vegetation types are two ways in which these influences affect plant ecosystems. (For example, human activities such as fire cultivation and deforestation.)

The world's floral distribution has been impacted and plant groups have been produced by the interaction of environmental factors.

➢ **Plant Association**

Plant associations are defined as plant communities that are distinguished by their floristic content in addition to their plant morphologies. The existence of a single plant species in a given location is extremely uncommon. A certain vegetation type or formation is composed of a range of species that may have some form-related traits but are differentiated by distinct species assemblages that represent varied ecological conditions.

According to Braun-Blanquet, there are four categories of plant species-

a. Strangers - Occur by erroneously in certain locations.
b. Companions- Companions are indifferent species that don't have a clear, strong attachment for any one community.
c. Selective- Selective species are those that are found in one community type but are sporadically found in others.
d. Preferents-Species that is present in several community types but predominantly in one.

➢ **Development and Succession of Plant Communities**

Plant associations and communities develop gradually and continuously. Over a period of time that might range from a few years to hundreds of years, the land surface often exhibits a succession of progressive changes in the vegetative cover due to anthropogenic influences like grazing and deforestation or shifting physical variables like soil, climate, and drainage. The many kinds of successions that occur in different terrain were outlined by Clements (1916). Primary succession and secondary succession are two categories into which they fall. The former is started on areas that were not previously inhabited by plant or animal groups, like recently cooled lava flows, dry river beds, or rock material that has recently been exposed by glaciation.

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- **Climax vegetation**

The biomass reaches its maximal maturity and the system is self-replicating in a climax community. Early in a yearly cycle, the net community production is high, but as it matures, it decreases. As the peak approaches, the food chains among many plants and species are increasingly complicated.

- **Plant dispersal barriers**

Mountain ranges and other physiographic obstacles restrict the dispersion of seeds dispersed by wind. Similarly, pits and depressions act as a barrier to the spread of seeds and spores that become lodged in them. Long-term exposure to an unfavorable climate degrades seeds and spores, which can prevent them from germinating. Because of the improper environment, seeds from temperate zones have not germinated even when transported to tropical locations by wind or flowing water. Physical characteristics, chemical makeup, moisture content, and spore and seed texture are examples of edaphic variables. Since biotic barriers come in a variety of forms, it's possible that the region where fresh plant seeds are planted may already be overrun by dominant species, leaving not much space for new ones.

- **Relic Area**

Such areas contain traces of a historic flora that were left over when the dominating species abandoned the surrounding surroundings. One dominating species used to be highly widespread, but due to their geographic isolation, these species are now extinct. The relic locations can be divided into three categories based on their casual effects.

a. Formation relics: They are found in small regions inside the borders of large plat communities that have experienced significant modifications in composition. For example, man has burned or felled some woodland, causing grasses to replace trees.
b. Geomorphological relics: These relic areas were created as a result of significant ecological changes. Due to anthropogenic or local microclimatological influences, either the soil or the climate has changed in these regions. For example, silt and trash have now accumulated on the borders of the seas and in some lakes and ponds. As a result, secondary successions have replaced the original plant cover.
c. Climatic relics: These types of relic places are created when significant changes in the climate take place. Plant community's advance and retreat as a result of these changes. For example, during dry periods, the majority of mesothermic plants moved toward the boreal areas, and during wet phases, they returned to their original locations.

- **Implication of the 'Biome'**

According to Clements and Shelford (1939) and Carpente (1939), a biome is "a plant matrix with the total number of included animals." Only terrestrial ecosystems are now referred to as biomes, however ecologists and biogeographers also use terminology such provines, brochores, regions, and formations. The word "biochore" is typically used to describe a geographic setting that has a unique plant and animal life that is especially adapted to climatic conditions; each biochore is therefore distinguished by a predominant vegetation type. A 'biome' is a significant ecological or biotic population of living plants and animals that inhabits a vast are' Biotic communities' are local groups of interdependent plants and animals living in a region which is under an equilibrium or ecosystems Often referred to as physiognomically definable symbioses, biomes are an essential component of our planet's main vegetation and climate belts.

6. CONCLUSION

Plant geography can be impacted by biotic variables, such as the species' dispersion strategies and environmental behavior, or abiotic factors, such as soil, relief, the number of nutrients present in a particular location, temperate climate, rainfall, and moisture. Because environmental changes cause human behavior to vary across regions, it is necessary to quantify the impact of antropogenic elements that contribute to the expansion or extinction of specific species in a given area. The geographer's method was more impacted by ecological ideas than by taxonomic ones. For a thorough understanding of the distribution of the relationships between a certain plant and animal species in the ecosystem, the primary focus of biogeographical studies is ecology.

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