Meaning scope and significant studies of biogeography studies

Biogeography is defined as the study of distribution of plants and animals on the earth surface, it deals with how these plants and animals are distributed on the earth surface at a particular time and space and certain factors responsible for variation in distribution.

Biogeography is a branch of geography that studies the past and present distribution of the world's many animal and plant species and is usually considered to be a part of physical geography as it often relates to the examination of the physical environment and how it affected species and shaped their distribution .

Scope and Nature of Biogeography

Biogeography is closely related to ecology which is the study of the inter-relationships between organisms and their habitat. The organism home or habitat could vary from a small micro habitat such as under a stone or a leaf to Biomes which could be a tropical rainforest or desert. However, biogeography is a broad discipline but has two main branches

1. **Ecological Biogeography** which is the present distributions and geographic variation in diversity, how biotic and abiotic interactions influence species distributions, interactions between species (e.g., predation and competition).
2. **Historical Biogeography** which is the second deals with continental drift, glaciation, evolutionary lineages reconstructing the origin, dispersal and speciation and extinction of species.

However, the term biogeography is the study of the geographic patterns of species distribution; it is an aspect of physical geography that examines the physical environment and the way it affects the distributions of various species on the earth surface. The discipline is related to biology, ecology, evolution studies, climatology, and soil sciences as they are relate to animal populations and the factors that allow them to flourish in particular regions of the globe. In that case, we are unable to separate biogeography from its related fields, since biogeography is relying heavily on theory and data from other related subjects.

In the late nineteenth and early twentieth centuries, biogeography was a focus of analysis across disciplines such as geography, anthropology and archaeology, both for those concerned with the development of human societies and for those concerned with the distribution and viability of animal or plant populations.

Biogeography seeks to describe and analyze distributional patterns exhibited by organisms at present and in the past. To enable it to comprehend distributional patterns, biogeography needs to study physical and organic factors as they are now and how they were in time past. To acquire this knowledge, it must use information drawn largely from the natural and earth sciences. It is an interdisciplinary subject within these domains.

Importance and significant of Biogeography stidies

If we accept that the field of biogeography is the study of living things and especially the association of living things, the next question, which poses itself, is for what reason or purpose does a geographer study biogeography? One simple answer to this question of course will be that: A geographer studies biogeography in order to understand and solve biogeographic problems. Other reasons we study biogeography are:

1. Biogeography enables us to identify biodiversity patterns in the past and present, to identify the expansion of organisms while it enables us to study about the relationship between living and non-living factors influence organisms to exist.
2. It enables us to identify the environmental diversities of Biogeography and the fluctuations of diversities and the problems arising in the environment.

3. We study biogeography to find out why resources are not evenly distributed on the Earth
4. It also helps us to find out what is where and why it is there
5. Biogeography provides evidence of evolution

A biogeographer is a person who studies the **geographic distribution of plants and animals** on the earth.
The study of biogeography became popular due to the work of Alfred Russel Wallace, an England exploraer (1823-1913). Alfred Russel Wallace is regarded as the father of biogeography. Wallace was a naturalist, explorer, geographer, anthropologist, and a biologist who was recorded as the first geographer to extensively study the Amazon River and then the Malay Archipelago (the islands located between the mainland of Southeast Asia and Australia). During his time in the Malay Archipelago, Wallace studied the flora and fauna and came up with the Wallace Linea line that divides the distribution of animals in Indonesia into different regions according to the climates and conditions of those regions and their inhabitants' proximity to Asian and Australian wildlife. Those closer to Asia were said to be more related to Asian animals while those close to Australia were more related to the Australian animals. Aside Wallace, there were a number of other biogeographers who also studied the distribution of species, and most of those researchers looked at history for explanations, thus making it a descriptive field. They include

- Carl Linnaeus Georges-Louis Buffon, Johann Reinhold Forester, Alexander von Humbolt
  Agutin de Candolle, Charles Lyell, Charles Darwin, Alfred Wegnen, Ernst Mayr, G.E. Hutchison, Robert H. MacArthur, Edward O. Wilson

Biosphere Definition
The biosphere, which includes the ground and the air, is characterized as the region of the planet where organisms live. The biosphere is defined as the region on, above, and below the Earth's surface where life exists.
The biosphere is a narrow zone on the surface of the earth where soil, water, and air combine to sustain life. Life can only occur in this zone. From fungi and bacteria to large animals, there are several different types of life.
The biosphere is characterized as an area that contains all living organisms and the products of their activities. As a result, it plays a critical role in the maintenance of ecosystems, i.e., the existence of species and their reciprocal interactions. And the biosphere is critical for climate regulation.

Biosphere Resources
The biosphere provides important resources. Many people rely on the biosphere for basic necessities including food, medicine, construction materials, and fuel. Indigenous peoples, in particular. Except for salt, all food comes from the biosphere, but established societies prefer to farm rather than forage.
The biosphere is a relatively thin layer of the Earth's surface that supports life, reaching from a few kilometers into the atmosphere to deep-sea vents. The biosphere is a global ecosystem made up of living organisms (biota) and the nonliving (abiotic) factors that provide them with energy and nutrients.
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Importance of Biosphere

The biosphere provides the ecosystem that is needed for survival. Adaptation to the biosphere's climate is expected for living organisms. Biodiversity thrives within ecosystems, and the biosphere is a reliable source of food on Earth. Biodiversity is just what it sounds like biological variety.

Safe areas for the protection of plants and animals are known as biosphere reserves. It also helps to restore the tribals' traditional way of life in the region. They protect the region's biodiversity. The biosphere is the ecological organization's highest level. It covers all types of life as well as any biome on the earth.

The biosphere functions as the planet's life support system, assisting in the control of atmospheric composition, soil health, and the hydrological (water) cycle. A indicator of a biome's contribution to the earth. The biosphere is a narrow zone on the surface of the earth where soil, water, and air combine to sustain life. Life can only occur in this zone.

Biosphere Facts

- The biosphere is related to the lithosphere, hydrosphere, and atmosphere, which are all spheres of the physical world. The lithosphere is the Earth's solid outer layer, which contains rocks, sand, and soil.
- The biosphere is characterized as an environment that contains all living organisms and the products of their activities. As a result, it plays a vital role in the conservation of ecosystems, i.e., the life of species and their reciprocal interactions. And the biosphere is critical for climate regulation.
- Any of the main greenhouse gases, such as methane, carbon dioxide, and nitrous oxide, are affected by the biosphere.
- Various environmental conditions, such as favorable temperature and moisture, are needed for organisms to live on Earth. Energy and nutrients are also needed by the species. The biosphere of the Earth contains all of the mineral and animal nutrients needed for life.
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Biosphere Examples

The biosphere, which includes the ground and the air, is characterized as the region of the planet where organisms live. The biosphere is defined as the region on, above, and below the Earth's surface where life exists. The part of the world where life naturally exists, spreading from the deep crust to the lower atmosphere.

The biosphere, also known as the ecosphere, is the Earth's dynamic biological epidermis of unknown dimensions. It is the natural habitat of living organisms. It is made up of the lithosphere's surface, a lower portion of the atmosphere, and the hydrosphere.

The biosphere is the world's ecological system as a whole. It encompasses all forms of life on Earth as well as all habitats capable of sustaining life. There are many biomes that make up the biosphere. These areas have unique climates, vegetation, wildlife, and adaptations that must be met in order to live.

Photosynthesis is the main source of energy for ecosystem processes. Processes in the biosphere are intertwined with those in the atmosphere, hydrosphere, and geosphere. Via the balance of photosynthesis and respiration, biological processes play a significant role in controlling atmospheric CO_2 concentrations.

An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts.

Ecosystem Definition

An **ecosystem** is a system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living things. Thus, an ecosystem science definition entails an ecological community consisting of different populations of organisms that live together in a particular habitat. Natural sciences like ecology and geography define an ecosystem as a geographic area where organisms, weather, and landscape, work together to form a "*bubble of life*".

How about in biology, *what is an ecosystem*? In essence, the ecosystem definition in biology is that it acts as the fundamental unit of nature. Just as a living organism is made up of cells that act as the structural and functional units of life, nature also consists of fundamental units called *ecosystems*.

What is a simple definition of an ecosystem?

An ecosystem is a community *plus* the environment. Ecology, which is the scientific study of the interactions between populations or between organisms and the environment, can be viewed at the level of an individual, a population, a community, or an ecosystem.

Ecology at the level of individuals is concerned chiefly with the individual organism's physiology, reproduction, and development. At the level of population, ecology deals primarily with the attributes and the various factors affecting the population. At the level of community, ecology studies the interactions between populations and community patterns. At the level of an ecosystem, ecology puts all of them together to understand how the system operates as a unit. Thus, an ecosystem ecology would be more concerned about energy flow and nutrient cycles than about individual species.

Etymologically, the ecosystem meaning and origin can be traced back to the Ancient Greek *"οἶκος"* (*"oîkos"*) for "house" and *"σύστημα"* (*"sústēma"*) for "organized body". The term was coined in the early 1930s by the botanist, Roy Clapham, to denote the physical and biological components of an environment. However, it was the British Ecologist, Arthur Tansley, who first introduced the concept in his paper entitled "The Use and Abuse of Vegetational Concepts".

Ecosystem Structure

The structure of an ecosystem consists of two major components:

(1) **biotic components**

(2) **abiotic components**

(1) Biotic components

The biotic components include all the living things. Basically, there are two major types of living things. They are the *eukaryotes* and the *prokaryotes*. Eukaryotes are characterized by having membrane-bound organelles (such as a nucleus) inside their cells. The prokaryotes, in turn, are those lacking membrane- bound organelles. For further differences between these two groups, read this). Examples of eukaryotes are plants, animals, fungi, and protists. Bacteria and archaea represent the prokaryotes. Now, each of them has a "*job*" to do in the ecosystem.

Plants, for instance, have chloroplasts that enable them to harvest light energy. Then, they take carbon dioxide and water from their environment to convert them into sugar, a biomolecule that can be used to synthesize chemical energy (such as ATP). Because they are capable of producing their own food through photosynthesis, they are referred to as the **producers**. Next to the producers are the **primary consumers**. They feed on the producers while they serve as a food source to the higher levels of consumers (e.g. secondary and tertiary).

(2) Abiotic components

The abiotic components include all the non-living things, such as rocks, soil, minerals, water sources, and the local atmosphere. Similar to biotic components, the abiotic components also have their ecological role. For example, elements and compounds serve as sources of nutrients.

They are essential to the growth and metabolism of an organism. Apart from providing nutrients, they also provide organisms a place to live and thrive — a *habitat*.

Types of Ecosystems

What are the 4 types of ecosystems? The four types of ecosystems are *terrestrial, freshwater, marine,* and *artificial*. The first three occur naturally in various biomes. The last one is man-made. Ecosystems vary in size — from the micro-ecosystems (e.g. tree ecosystems) to the largest ecosystems such as ocean ecosystems.

(1) Terrestrial ecosystem

The **terrestrial ecosystem** is one that occurs on land. Examples of land-based ecosystems are forest ecosystems, grassland ecosystems, tundra ecosystems, and desert ecosystems.

A *forest ecosystem* is one that consists of various plants, particularly trees. Because of the abundance of plants that serve as producers, this ecosystem abounds in life. Not only plants but also animals are teeming in a forest. They are also a great source of fruits, wood, They also help maintain the earth's temperature. They are also a major carbon sink.

Grassland ecosystems are typically found in tropical or temperate regions. They are dominated by grasses. As such, the animals commonly found in this type of ecosystem are grazing animals, such as cattle, goats, and deer.

Tundra ecosystems are characterized as being treeless and snow-covered. The snow melts briefly in spring and summer, producing shallow ponds. During this time, lichens and flowering plants typically grow. Because of the ice that covers the land in the tundra, this type of ecosystem is important in regulating the earth's temperature. It also serves as a water reservoir (in the form of ice or frost).

Desert ecosystems are the ones occurring in desert habitats. Deserts are typically arid and windy. Some of them contain sand dunes, others, mostly rock. Organisms in the desert are not as diverse as those in forests but they possess adaptations that make them suited to their environment. Plants that are commonly found in the desert are CAM plants, such as cacti. Desert animals include insects, reptiles, and birds.

(2) **Freshwater ecosystems**

Freshwater ecosystems are the aquatic ecosystems that do not contain saltwater. They are home to algae, plankton, insects, amphibians, and fish. There are two major types: *lentic* and *lotic* ecosystems.

A *lentic ecosystem* refers to ecosystems in still waters. Examples include the following: ponds, puddles, and lakes. Lakes, in particular, may form zonation. That is when it becomes very well established that different zones are formed. These zones are as follows: littoral, limnetic, and profundal. The *littoral zone* is the part that is near the shore. Here, light can penetrate up to the bottom. The *limnetic zone* is the zone in which light does not completely penetrate through. The part of the limnetic zone that is penetrated by light is the *photic zone* whereas the zone in which light cannot penetrate through, and therefore is dark, is the *benthic zone*. The plants and animals vary in these zones. For instance, rooted plants are found in the littoral zone but not in the limnetic zone. Rather, freely-floating plants are the ones commonly seen on the surface of the limnetic zone.

A *lotic ecosystem* is an aquatic ecosystem characterized by a freshwater habitat that is freely flowing. That is as opposed to the lentic that is nearly stationary. Examples include rivers and streams. Many plants and animals in these ecosystems have adaptations to help them cope with the force and the different conditions that running water brings.

(3) Marine ecosystem

A **marine ecosystem** is an aquatic ecosystem that contains saltwater. Examples are the ecosystems in the seas and oceans. The *ocean ecosystems*, in particular, are an important source of atmospheric oxygen due to the vast population of autotrophic algae that release oxygen

through photosynthesis. Marine ecosystems are regarded as the most abundant type of ecosystem in the world

(4) Artificial ecosystem

An **artificial ecosystem** is a man-made system, which can be further classified as terrestrial, freshwater, or marine. An example of an artificial ecosystem is a *terrarium*. Many man-made ecosystems are built for conservation purposes, aesthetics, and studying biology and ecology.

What Is Biodiversity?

The term biodiversity (from "biological diversity") refers to the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life

Biodiversity includes not only species we consider rare, threatened, or endangered but also every living thing—from humans to organisms we know little about, such as microbes, fungi, and invertebrates.

At the Center for Biodiversity and Conservation, we include humans and human cultural diversity as a part of biodiversity. We use the term "biocultural" to describe the dynamic, continually evolving and interconnected nature of people and place, and the notion that social and biological dimensions are interrelated. This concept recognizes that human use, knowledge, and beliefs influence, and in turn are influenced, by the ecological systems of which human communities are a part. This relationship makes all of biodiversity, including the species, land and seascapes, and the cultural links to the places where we live—be right where we are or in distant lands—important to our wellbeing as they all play a role in maintaining a diverse and healthy planet

Biodiversity is all the different kinds of life you'll find in one area—the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world. Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life.

Why Is Biodiversity Important?

Biodiversity is important to most aspects of our lives. We value biodiversity for many reasons, some utilitarian, some intrinsic. This means we value biodiversity both for what it provides to humans, and for the value it has in its own right. Utilitarian values include the many basic needs humans obtain from biodiversity such as food, fuel, shelter, and medicine. Further, ecosystems provide crucial services such as pollination, seed dispersal, climate regulation, water purification, nutrient cycling, and control of agricultural pests. Biodiversity also holds value for potential benefits not yet recognized, such as new medicines and other possible unknown services. Biodiversity has cultural value to humans as well, for spiritual or religious reasons for instance. The intrinsic value of biodiversity refers to its inherent worth, which is independent of its value to anyone or anything else. This is more of a philosophical concept, which can be thought of as the inalienable right to exist. Finally, the value of biodiversity can also be understood through the lens of the relationships we form and strive for with each other and the rest of nature. We may value biodiversity because of how it shapes who we are, our relationships to each other, and social norms. These relational values are part of peoples' individual or collective sense of wellbeing, responsibility for, and connection with the environment. The different values placed on biodiversity are important because they can influence the conservation decisions people make every day.