ASEAN Journal of Science and Engineering

Journal homepage: http://ejournal.upi.edu/index.php/AJSE/

Spatial-Temporal and Factors Influencing the Distribution of Biodiversity: A Review

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ABSTRACT

Ecosystem health and the accomplishment of the Sustainable Development Goals require biodiversity. However, the causes of biodiversity loss remain poorly understood. We focused on the regional and temporal aspects that influence biodiversity distribution. Though transportable data is rarely convenient for providing accurate images of the proportions and distribution of all components of various ecosystems. The purpose of this term paper is to conduct systematic reviews to reflect the biodiversity distribution of different spatial and temporal dimensions in the biodiversity of plant species, animal species, microorganisms, and ecosystem diversity and the factors affecting biodiversity. Biodiversity is best defined by the patterns of the world. The distribution of biodiversity is uniform and inconsistent around the world. Therefore, the shift from the equator to the poles reduced biodiversity. These show that, unlike temperate regions, the tropics have more solar energy, water availability, and a relatively constant and predictable environment. The distribution of biodiversity is affected by a variety of environmental factors, including regional geological history, environmental stability, ecosystem productivity, habitat heterogeneity and suitability, competition, and predation. Therefore, understanding the spatial and temporal distribution of biodiversity is urgently needed to develop short-term and long-term resource management strategies, and biodiversity education and training activities are innovative.

ARTICLE INFO

Article History:
Submitted/Received 30 Sep 2021
First revised 07 Nov 2021
Accepted 09 Jan 2022
First Available online 11 Jan 2022
Publication date 01 Dec 2022

Keyword:
Biodiversity,
Distribution,
Spatial,
Temporal.

1. INTRODUCTION

Biodiversity is consistently changing at various levels. The impact of regional, biogeographic, historical, and evolutionary processes on large spatial and temporal scales determines the dynamics of biodiversity in a very big selection of your time and space (Griffiths *et al*., 2019) Biodiversity is best defined by the patterns of the globe around us, and these patterns are the source of our understanding of biodiversity (Harrison *et al*., 2014). Biogeographers and ecologists have been around for a long time inquisitive about biodiversity patterns, but the reason for these patterns remains an open scientific question (Brown, 2014). Today, scientific interest in biodiversity patterns can be directly linked to three goals common to all disciplines of science that are interested in deepening our understanding of the planet. These goals are to better understand how the Earth functions as a planetary system. Predict global changes through the use of the environment by humans and derive practical benefits from scientific knowledge (Stoms & Estes, 1993).

From a scientific vision, biodiversity is determined by the interaction of many different geographical and temporal elements. Biodiversity is determined, for example, (i) by climate change and moderate temperatures; (ii) Availability of local service and total production; (iii) Disruptive conditions and disturbances of cosmic, climatic, biological or anthropic origins; (iv) Natural resources for biodiversity and their strengths or barriers to growth; (v) Diversity of habitat; (vi) The strengths and dependencies of biological interactions such as competition, rape, commensalism, and symbiosis; and (vii) Power and reproductive mode and genes. Biodiversity does not stand in all aspects, as the evolution of natural processes and evolution accelerates the rate of evolution (Harrison *et al*., 2014; Sonter *et al*., 2016). Therefore, the drivers of biodiversity may vary geographically and management on a regional and local scale requires the use of methods that can differentiate biodiversity and change both temporarily and geographically (Renwick *et al*., 2012b).

Interspecific interactions like interspecific competition and cooperation play a crucial role in the formation and evolution of biodiversity. In time-based ecosystems, interspecific competition can limit the number of species that exist, but at the identical time ends up in species diversity. Rapeseed encompasses a direct impact on prey, but can significantly increase the number of animal species. This interaction and multifunctional relationship are widespread in many natural environments and is important for biodiversity diversity (Yang *et al*., 2019). Because these ties bind species together, the extinction of one can easily result in the extinction of others, as well as changes in the ecosystem. Interspecific interactions are responsible for the emergence of biodiversity on an evolutionary time scale; new biological features emerge continuously during the coevolution of species (White *et al*., 2010).

Biodiversity research has thus far mostly concentrated on assessing and describing existing biodiversity patterns, as well as the rapidly progressing biodiversity loss owing to anthropogenic impact. Biogeography, geobotany, population biology, evolutionary biology, and genetics have all contributed to our understanding of biodiversity dynamics, often before biodiversity studies was founded as a science (Brown, 2014; Varga *et al*., 2019). To establish short-term resource management strategies, develop and verify scientific hypotheses, and serve as baseline data in monitoring, spatial and temporal patterns of species diversity are critically needed (Stoms & Estes, 1993). Because the interrelationships of biodiversity dynamics and ecosystem functions are related to temporal and spatial scales, the focus of this paper is to demonstrate biodiversity distribution at different spatial and temporal scales on species components of biological diversity of better-known plant, animal, microorganism, and ecosystem diversity, as well as factors affecting biodiversity distribution.

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2776-6098 e- ISSN 2776-5938

2. METHODS

This research design is based on a thorough review of published and unpublished research publications on biodiversity's regional and temporal distribution. Secondary data sources were used to collect, analyze, and evaluate the information. Various authors and scholars have written about biodiversity dynamics, and both government and non-government organizations have issued reports on biodiversity distribution around the world. Finally, the most relevant research publications and postgraduate thesis works were reviewed, and the most significant findings were extracted and presented in the paper.

3. RESULTS AND DISCUSSION

3.1. Definitions and Concepts of Spatial and Temporal

In nature, organisms are not scattered evenly or at random, but rather in a pattern. This is due to a range of energy inputs, disturbances, and species interactions, which all result in spatially patchy structures or gradients. This diversity in organism communities, in addition to the diverse variety of biological and ecological activities observed, is a result of environmental variation. The type of spatial organization present may indicate certain intra- and inter-species interactions, such as competition, predation, and reproduction (Perry *et al*., 2002). In fact, the framework of communities and ecosystems (e.g., the number of individuals and species present) can vary greatly between locations. Similarly, the function of these communities and ecosystems (i.e. the interactions among the organisms that live there) differs from one area to the next. Different ecological assemblages can be found across vast swaths of land. Climate, geology, and physiography all have an impact on biodiversity patterns.

Temporal changes in the environment, on the other hand, boost as in gap-forming processes, the possibility for species cohabitation, which provides new viable habitats for species that demand open space. A dynamic mosaic of patches at varying stages of succession develops from the interaction of periodic disturbance and (re)colonization. Many systems tend to show the maximum species variation at moderate disturbance severity and frequency (Griffiths *et al*., 2019). The analysis of biodiversity includes a temporal component since the structural, functional, and geographical characteristics of biodiversity can change over time. The species and the total number of organisms in an environment, as well as how they interact, might change on a daily, seasonal, or annual basis. Over time, the size and structure of some ecosystems may change (e.g. forest ecosystems may change in size and structure because of the effects of natural res, wetlands gradually silt up and decrease in size). As a result of this, biodiversity evolves throughout time. Changes in the structural and geographical aspects of global biodiversity are caused by geological processes (e.g., plate tectonics and erosion), changes in sea level (marine transgressions and regressions), and climate changes. Natural selection and species evolution, both of which are often linked to geological processes, result in changes to local and global flora and fauna (Griffiths *et al*., 2019).

A sequence is an indirect, systematic process of social change in which communities gradually alternate until they reach a stable (productive) state. It is linked to major changes in biodiversity, making it a major natural source of biodiversity at local and regional levels (Chang & Turner, 2019). Although scientists' ideas about why sequences are directed and how they have evolved over the past century, many believe that animals adapt to different stages and, in some way, make the environment unattractive to them while making it more suitable for class animals. Despite this, the environmental theory is based on sequence, few reports

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

have attempted to integrate a range of sequential regions. Such comparisons are important because they highlight the relative importance of social cohesion processes (e.g., environmental filtering, biotic interactions, critical outcomes, and dispersion limits) in different sequence categories (Chang & HilleRisLambers, 2016), sequential species (e.g., second sequence), and on all local and temporary scales (Walker, 2011; Walker & Wardle, 2014). Comprehensive comparative studies also allow researchers to better understand sequential mechanisms, such as whether communities return to the original state or deviate into the new state (Prach, & Walker, 2019), which can assist with planning for recovery (Suding & Hobbs, 2009). The four pieces in this special edition examine mainly the concept of generalization in sequence. Understanding how sequential patterns vary across the complexity of a set of distortions (e.g., primarily in comparison to consecutive sequence areas) helps to set distances and their magnitude in context. By explicitly comparing the primary and secondary sequences of the entire ecosystem in the published literature (Prach & Walker, 2019). they report that consecutive sites tend to increase the richness of species, have very different traits, and suffer less impact from other species. On second consecutive sites on the other hand, during the second sequence, the rate of biological variation is generally higher, compared to the base sequence. Soil formation has already taken place and a soil seed bank with a large number of growing plants accelerates the re-establishment of the second crop. In contrast to the basic sequence, the level of biodiversity is usually greater during the second sequence. Soil formation has begun, and a soil seed bank with a large number of growing plants is accelerating the establishment of a second crop. Temporary strengths are influenced by sequence, the quality of the corresponding areas, and the magnitude of the sequence in both species: proximity to the seed source, sequence, and rapid variability. Their meta-analysis also found that recovery rates vary between ecosystem species, such as cold and warm ecosystems, meaning that global climate change will affect recovery rates and outcomes (Chang & Turner, 2019).

3.2. Patterns of Biodiversity at The Species Level

3.2.1. Latitudinal gradients:

Animals and fauna are not distributed evenly throughout the world, but they are spread evenly. The gradient of latitudinal variation, which exists in many groups of animals and plants, is the most well-known of these patterns. The gradient of diversity along the length of a latitudinal axis is a 200-year-old pattern for increasing biological variability from high altitude to equator (Sarukhán & Dirzo, 2013). This pattern has been seen in many animal articles and empirical research in various circumstances. Although several ideas have been provided to define Latitudinal diversity gradients (LDG) (Brown, 2014), each definition is confused by one or more of the other. Those that raise spatial and simple causes, climate/energy factors, historical and evolutionary mechanisms, and biotic methods (Freestone *et al*., 2011; Jansson *et al*., 2013; Sibly *et al*., 2009). Apart from the extensive history of the LDG and the identification of possible alternatives, no major consensus on its causes has emerged.

The accumulation of biodiversity that is spatially explicit data has sparked a flurry of efforts to better describe LDG trends and evaluate theories in general or for specific groups of organisms (Ding *et al*., 2018), noted that, a meta-analysis supported the generality of a global LDG by combining the results of gradients from many different locations of the planet and many different species. There was, however, a great deal of variety in LDG patterns, which was related to individual organisms, habitats, and ecosystems (Ding *et al*., 2018). Various explanations have been proposed since then to explain why species variety decreases as we

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2776-6098 e- ISSN 2776-5938

move from the equator to the valleys. With rare exceptions, tropical environments (latitudinal range 23.5 ° N to 23.5 ° S) are more diversified than colder or cooler locations. At its most basic level, this means that the tropics contain a greater diversity of species in total, which each unit has colder parts, and that tropical areas have more species than polar areas. Colombia, for example, has some 1,400 species of birds close to the equator, compared with 105 species in New York at 41 degrees north and 56 species in Greenland at 71 degrees north. There are around 1,200 bird species in India and the area as it has a large percentage of its land in the tropics. Tropical rainforests, such as those found in Ecuador, maybe ten times more expensive than in the case of tropical plants, such as those found in the Midwest of the United States. The Amazon rain forest in South America is home to the world's most diversified biodiversity, with about 40,000 plant species, 3,000 fish species, 427 mammals, 1,300 birds, 427 aquatic animals, 378 reptiles, and over 1,250 invertebrates (Sarukhán & Dirzo, 2013).

Forests that are damp in the tropics, in general, are the planet's most species-rich ecosystems. If new estimates of the number of unknown species, mostly insects, in tropical forests are correct, these places, which cover around 7% of the planet's surface, could host up to 90% of the world's species. If small insects from forsythia tropicalis are excluded, coral reefs and, especially for flowering plants, Mediterranean climate zones in South Africa and southwest Australia, may have a similar diversity of species. Similarly, Africa in both eastern and southern regions is home to an amazing variety of wildlife. The diversity of species is not evenly distributed in the vicinity. For example, the highest number of terrestrial mammals and the largest number of marine mammals can be discovered in eastern Africa and along the east coast from Kenya to Mozambique, in addition to the west Indian Ocean Regions. A large number of plant species are found in Madagascar and the Western Cape. Tanzania (1,050 species), Kenya (1,019 species), Uganda (988 species), and Angola (894 species) have the most bird species and are among the top 20 bird-rich countries in the world. Southern Africa, on the other hand, has a diverse insect and arachnid fauna, with at least 580 families and over 100,000 species reported. Namibia is regarded to be one of the world's richest spider hotspots the Central Zambezian Miombo forests have a great diversity of butterflies, and they are also among the top 20 countries for amphibian species richness, with 242 and 178 species in Madagascar and Tanzania, respectively.

As a result, biologists and evolutionists have proposed various theories as to why the tropics are so diverse; some of the most important are (a) Clarification is usually a work of time; unlike tropical regions that have experienced severe glaciers in tropical places have previously stayed untouched for millions of years., providing long periods of evolution for species diversity, and (b) Tropical areas, unlike the tropical climate, do not change at specific times. Such stable conditions encourage niche specialization and increase species diversity and (c) In the tropics, there is more solar energy and water availability, which contributes to better productivity, which in turn may contribute to increased diversity indirectly. These characteristics may cause photosynthetic organisms to produce more net primary production (NPP), and this expanded resource base may allow more species to coexist.

3.2.2. Species-Area relationships:

Spatial relationships are one of the oldest and most well-documented natural relationships. It shows the normal process of growth of animal species as the viewing area grows, but can take several forms and be described for a variety of causes. In addition, various studies have observed that the relative affinity for species is often measured differently depending on the objectives of the study. For example, investigated how isolation and island

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

area influence species-area relationships using Arrhenius's power-law. Because they are less accessible to transient species than non-isolated places, isolated areas feature steeper slopes. Smaller areas have smaller populations, which means a greater chance of extinction. Similarly, (Rosenzweig, 2010) examined data containing local species interactions and ecological reasons, but focused on statistical calculations of unsuccessful efforts to find the natural cause by examining the dimensions and shape of local species curves. While, Scheiner (2003) uses a meta-analysis of animals to demonstrate that relationships that exist are affected by habitat, species, system the sample, and local scale construction.

According to Dengler (2009), six distinct animal animal curve systems differ based on the local arrangement of samples, or large samples made transparently in smaller samples nearby, and whether single methods or values are used. According to the local scale given the true relationship of the habitat of species, on the other hand, is very little explained, who believes that the area is biologically important only if it suggests that samples are geographically continuous. As a result, ecological research is moving away from its previous species-centric focus and toward a much greater emphasis on organism traits and their phylogenetic relationships, leading to an examination of how these factors vary with geographic location (Andersen, 1992).

3.3. Biodiversity Dynamics at The Microorganisms' Level: Microalgae Diversity

Microbial diversity's importance in ecosystem functioning is becoming more widely understood. From an evolutionary and ecological standpoint, microalgae are a big collection of creatures that are exceedingly diverse and heterogeneous. Estimates of their diversity, on the other hand, are hazy and rely heavily on systematics, dispersal analysis, and biogeography (Sharma *et al*., 2006). Regardless of whether microalgae are important players in global ecosystems, estimates of their global species richness are still sketchy. The overall number of algal species is believed to be between 1 and 10 million, with the majority being tiny microalgae (Sharma *et al*., 2006). Algae, on the other hand, vary widely in form and size, level of organization, health history, and digestion. From unicellular planktonic forms (0.2 mm wide) to macroscopic gigantic kelps (leaves up to 60 m long), thallus organization varies (Sharma *et al*., 2006). The cell group of the group ranges from prokaryotic (cyanobacteria) to mesokaryotic (dinophyceae) to eukaryotic (eukaryotes) (whole group). "Mesokaryotes" are intermediate species that arose because eukaryotes lose histone, although they are still classified as eukaryotes. Algae are mostly aquatic and can be found in practically every habitat on Earth, including deep oceans, hot and frigid deserts, highly acidic post-mining sites, Antarctic soils, air, and man-made subaerial surfaces (Liu *et al*., 2021).

The variety of species that can be found, their natural features, and the genetic potential of the organisms that make up a community can be used to demonstrate the formation of small cell society. Understanding the chemical and physical mechanisms underlying human phytoplankton evolution is important in understanding how human activities affect the water quality of the clean water ecosystem (Adon *et al*., 2011). Differential responses of different species to changing levels of light, temperature, nutrients, grazing pressure, the onset of parasitic infection, extracellular metabolites of plants and animals with a change in season during the course of the year cause Phytoplankton numbers and species composition to fluctuate seasonally in any body of water (Padisák *et al*., 1988). Transitions between genuine succession and intermediate disturbances are the best way to characterize seasonal changes in a natural phytoplankton population. According to Reynolds (1988), such as floods, episodes of increased wind mixing or they are biotic, including factors like grazing.

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2776-6098 e- ISSN 2776-5938

As a result, structurally stable lakes are likely to follow seasonal changes more gradually. In lakes with intermediate disturbances, however, such seasonal fluctuations may be overridden. Temporally varied disruptions boost diversification. As a result, water chemical and physical parameters such as temperature, salinity, pH, nitrate, nitrite, ammonia, and silicate have a significant impact on microalgae distribution both spatially and temporally (Madhu *et al*., 2007). The impact of these factors on the microalgae community alters the species composition and diversity of the ecosystem in freshwater (Nelson, 2012).

3.4. Biodiversity Dynamics at The Ecosystems Level

3.4.1. Forest Ecosystems

The forest biome in the eastern and southern African region (ESA) is extremely diverse, ranging from tropical moist forests with heavy rainfall to dry savannah woods. High-altitude, high-rainfall areas of Ethiopia, Kenya, Malawi, Mozambique, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe have montane forests, while lowland tropical moist forests are predominantly found in Angola and Uganda. Furthermore, the semi-arid savanna ecosystems of Africa are characterized by substantial geographical and temporal volatility in fodder availability, which affects both animal and livestock population mobility (Ally *et al*., 2018). Spatially, vegetation variability occurs ranging from very fine-scale (plant level) to regional scale (landscape level), resulting in pronounced patches of quality and availability of forage. Vegetation variability occurs on a spatial scale ranging from extremely fine (plant level) to regional (landscape level), resulting in notable fodder quality and availability patches. On the contrary, temporal vegetation varies in length from a few seconds to several years. Although, due to seasonal alterations in quality and availability of forage and water resources, wild animals are hampered by nutritional stress, particularly in protected regions (Range *et al*., 2002). Although a variety of factors (such as geography, weather, and climate) influence animal distribution patterns, vegetation features (quality, quantity, species composition, plant shape, and physiology) are the most important determinants of ungulate migration.

As a result, it is critical to comprehend ecological knowledge and nutritional requirements as vegetation change both spatially and temporally. It is also vital to understand the current potentials and drivers for animal migration outside of protected areas, as well as the interactions between native species and human influences. Similarly, the eastern and southern African region's (ESA) dry and semiarid, freshwater, coastal, and marine ecosystems are highly diversified, with significant spatial and temporal variation within the country. Wetland biodiversity is particularly rich in Eastern Africa. Ten of the 22 ESA countries in mainland Africa have coasts, whereas four are islands, according to Ceballos *et al*. (2010). Long sandy beaches are interlaced with rocky outcrops along the Atlantic Ocean shoreline, while coral reefs and mangroves abound near the Indian Ocean coastline. These habitats protect a diverse range of animals and fisheries. As a result, Sea of the Red coral reefs along the shores of Djibouti, Eritrea, and Somalia are in the best shape in the Indian Ocean, with live coral covering 30-50 % of the surface and the widest variety of corals and a different species (Ceballos *et al*., 2010).

3.4.2. Habitat Preferences

Habitat preference refers to the habitat that a species is most likely to choose if given the chance, or the habitat that the species is best suited for. The global patterns of amphibian diversity habitat choices are not uniform, according to this description (**Figure 1**). The great majority of amphibians, nearly 5,000, rely on forests for survival. Other terrestrial ecosystems, particularly drier habitats like savannas and deserts, are significantly less preferred by

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

amphibians. Amphibians are renowned for preferring damp environments; thus, these findings are not surprising. A more startling finding is that just 4,224 amphibians rely on freshwater at some point in their lives. Furthermore, amphibians are known for their dual lifestyle, beginning as juveniles in aquatic environments and subsequently metamorphosing into terrestrial adults. Although this is the most common amphibian life history strategy, many species develop without a larval stage (and a few live-bearing species). Freshwater habitats preferred by amphibians, on the other hand, have been divided into two categories: still and flowing water, and swamp/marsh water. Streams are common amphibian habitats that flow with freshwater. Temporary rain pools or other tiny pools of freshwater are frequently used as still freshwater habitats. The difference between freshwater and saltwater habitats has a significant impact on the chance of a species becoming endangered. Flowing-water species are more endangered than still-water species (indeed, stream-associated species are particularly susceptible to chytridiomycosis for reasons that are still not understood).

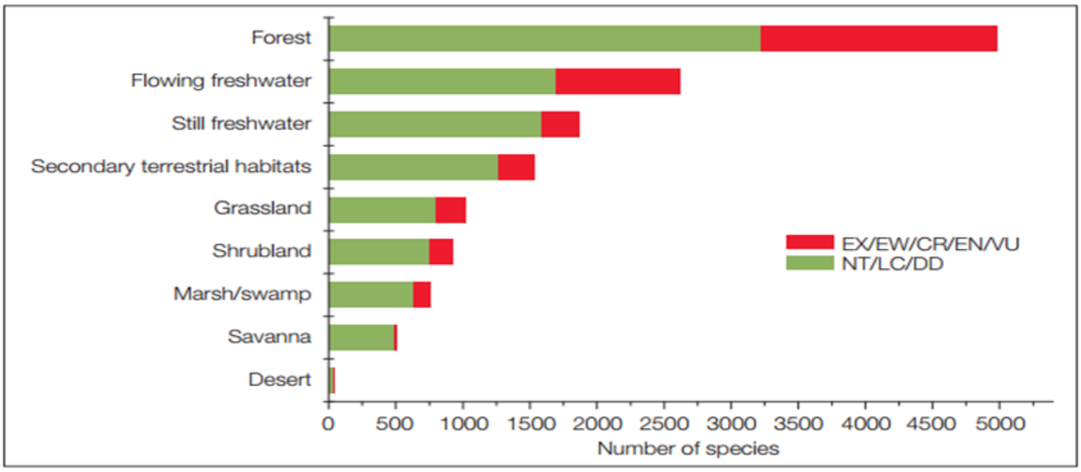

Figure 1. Habitat Preferences of Amphibians (Source: adapted from IUCN, 2008).

3.4. Factors Influencing the Distribution of Biodiversity

The geological history of the area, environmental stability, ecosystem productivity (Inoue & Nunokawa, 2002), habitat variety and suitability (Santoul *et al*., 2005), and competition and predation are all factors that influence the presence of different species. On the other hand, these forces work on multiple spatial and temporal scales. Geologic history, for example, has a regional impact on species biogeography and studies historical events in Earth's geological past to explain patterns in organisms' geographical and temporal distributions. Research into historical variables that influence species diversity and distribution is generally divided into two categories: vicariance and distribution. Species may be present in the area because their ancestors lived in a vicarian environment. Otherwise, some species or their predecessors could have reached the site by relocation (disintegration). Changes in the environment disrupt the biogeographic range of living organisms, known as vicariance. Vicariant occurrences can occur when landmasses separate due to tectonic action or when mountains rise to separate species' geographic ranges. Vicariance usually results in the development of new species through allopatric speciation, which occurs when one ancestral species produces two new species that evolve independently in geographic isolation, often due to genetic drift rather than natural selection. Dispersal biogeography is the study of species movement from one place to the next. Knowing the order of living things (i.e., evolutionary relationships between species) is a crucial component of this biogeographic history analysis and affects

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2776-6098 e- ISSN 2776-5938

biodiversity distribution, whereas physical factors of small places can influence spatial distribution and/or density. In recent decades, several attempts have been made to predict the distribution of biodiversity patterns to understand the consequences of biotic and abiotic species, as well as how they may operate in various spatial measurements.

3.5. The Way Forward

Climate change and land use are rapidly changing global climate and ecosystems, necessitating the creation of balanced and comparable data for biodiversity. Conservation of biodiversity has emerged as a global issue to be addressed by various measures, including measures such as the construction of protected areas and other effective site-based conservation programs, to help eliminate these threats. Actions or actions that form part of internationally recognized environmental agreements (e.g., Convention on Biological Diversity 1992, Convention on the Conservation of Migratory Species of Wild Animals 1973, Convention on International Trade in Endangered Species of Fauna and Flora 1973, etc.) It is necessary to adhere to the principles of biodiversity protection. Conservation strategies are thus required to not only safeguard biodiversity hotspots but also to remove barriers to social inequality and inequality, both of which lead to human migration. To maintain human survival, developing-country citizens must be educated on the importance of biodiversity conservation. Regardless, the ecological and nutritional needs of pets should be considered while establishing wildlife sanctuaries. Migratory corridors (wildlife tunnels), breeding sites, and scattering regions should all be well-built and protected. Most importantly, proper range management practices for improving bio diversities such as forest management, dry fire, veld rehabilitation, and water distribution. To maintain sustainable wildlife conservation in both protected and protected areas and to reduce human-wildlife conflicts, we recommend the development of a flexible and flexible community conservation program that includes a diverse range of stakeholders from the community to the regional level. I suggest the creation of a flexible and adaptive community-based conservation system encompassing a wide set of stakeholders ranging from community to region levels for long-term wildlife conservation both within and outside protected areas, as well as the elimination of human-wildlife conflicts.

4. CONCLUSION

The turnover of biological units at all geographical and temporal scales is referred to as biodiversity dynamics. Ecologists and palaeontologists have both emphasized the importance of taking a wide picture of biodiversity dynamics. Ecologists tend to ignore the historical context in favour of general principles of present biotic interactions at the small-time and spatial scales. Palaeontologists (and evolutionary biologists in general) have gravitated to the opposite extreme, taking a historical approach to biotic interactions at the very narrow time and space scales. Furthermore, ecologists have highlighted generality dynamics, whereas evolutionists have emphasized the lack of generality inherent in contingent "random" events. Biodiversity distribution is not consistent over the world, but rather uneven. As a result, as we move closer to the poles and further from the equator, species diversity declines. These findings suggest that, in comparison to temperate regions, tropical regions have higher solar energy, water availability, and a more consistent and predictable environment. Environmental factors like geographical history, environmental sustainability, ecosystem productivity, habitat diversity and suitability, competition, and rape, on the other hand, all have a consequence on biodiversity variety. On the contrary, these forces work on a diversity of local and temporary levels. As a result, knowing the distribution of biodiversity and

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-6793 e- ISSN 2775-6815

ecosystems is essential to building short-term and long-term resource management systems, as well as producing, testing, and applying scientific concepts and providing basic monitoring data.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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