E-ISSN No: 2456-6713 Print ISSN No: 3048-6459

International Educational Applied Research Journal

Peer-Reviewed Journal-Equivalent to UGC Approved Journal

A Multi-Disciplinary Research Journal

THE MAINTAINING BIODIVERSITY AND CLIMATIC CHANGES

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Paper Rcevied date

05/04/2025

Paper date Publishing Date

10/04/2025

DOI

https://doi.org/10.5281/zenodo.15319784

IMPACT FACTOR

5.924

ABSTRACT

Human beings are not only a part of our planet's ecosystems, but also, they are massively overusing them. This makes ecosystem protection, including biodiversity preservation, vital for humanity's future. The speed and scale of the threat are unprecedented in human history. The long arch of evolution has been confronted with such a high level of human impact, that we are now facing the sixth mass extinction event, 66 million years after the last one.

This threat heightens the imperative for bold human intervention. Our paper identifies three strategies for such an intervention. First, and possibly most challenging, human demand needs to be curbed so it fits within the bounds of what Earth's ecosystems can renew. Without meeting this quantitative goal, biodiversity preservation efforts will not be able to get scaled. Second, in the transition time, we must focus on those locations and areas where most biodiversity is concentrated. Such a focus on 'hotspots' will help safeguard the largest portion of biodiversity with least effort. Third, to direct biodiversity preservation strategies, we need to much better document the existence and distribution of biodiversity around the globe. New information technologies could help with this critical effort. In conclusion, biodiversity preservation is no longer just a concern for specialized biologist but is becoming a societal necessity if humanity wants to have a stable future.

Keywords : Intervention, Strategies, Humanity's , Ecosystems, Preservation

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Introduction

Human beings are a part of the global ecosystem. Our ancestors evolved within it and we continue to depend on it for our survival. We therefore must be concerned with the functioning of that ecosystem and with the future of species, its functional units. With overall human demand having become so massive compared with the ability of ecosystems to provide for it, ecosystem protection, including biodiversity preservation, has become a defining strategy for enabling a thriving future for humanity.

The biosphere and its many local ecosystems depend for their healthy functioning on interactions involving millions of species; these relationships and the sustainability of the ecosystems they make possible have evolved and changed continuously over the whole history of life on Earth. For any particular ecosystem, we do not how many species can be subtracted before the system collapses. The continued functioning of an ecosystem, however, clearly depends on maintenance of its structure.[1]

Plants play an important role in most terrestrial ecosystems, in that they maintain the composition and quality of the atmosphere and of soils. Plants also regulate the flow of water and the extent of erosion worldwide, and profoundly affect local climates. Without plants and a few other groups of photosynthetic organisms, most other life could not survive. In addition, and with very few exceptions, photosynthesis is at the bottom of every food chain. Individually also, plants are very important to human beings.

Along with all land-based animals and other organisms, we depend on them directly or indirectly for all of our food. We have many other uses for them, as medicine and for many kinds of building materials, biofuels, chemicals, and other products. Moreover, many plants are extraordinarily beautiful, inspiring us each day we live.[1]

Because we function as a part of ecosystems and therefore depend on them, we must find ways to slow the catastrophic loss of species that is causing increasing damage to all of them. Unless we do so, we are betraying the generations that will come after us and will impoverish their lives to an unimaginable degree.

Historical nature life and earth

To help understand the role of biodiversity and our place as part of it, we need to review how life evolved to where it is now. Our planet is approximately 4.5 billion years old, with various different kinds of single-celled organisms appearing within the first billion years of its history. The critically important process of photosynthesis evolved first in the ancestors of the “blue-green algae,” or cyanobacteria, about 3 billion years ago. Abundant in all of the oceans, cyanobacteria have generated oxygen for billions of years, eventually driving the proportion of oxygen in the atmosphere to about one fifth. The first terrestrial organisms appeared on land more than 430 million years ago, with vertebrate animals, plants, arthropods, and fungi making the transition separately and more than once in each group. No longer shielded by water from mutagenic solar radiation, these pioneers depended on the sun-blocking properties of oxygen to enable them to exist on land.

Once established on land, organisms began to differentiate rapidly. Because of this proliferation, a substantial majority of the existing species is terrestrial. Since early times, plants have formed the backbone of ecosystems on land, backbone within which many other forms of life evolved; these eventually included humans. Tetrapod animals had differentiated by the Carboniferous Period, some 335 million years ago, with mammals, turtles, crocodiles, and ultimately birds following; all of these evolutionary lines, along with the older amphibians, were in existence by 150 million years ago. Two of the groups of organisms most prominent in today's world, flowering plants and placental mammals, first appear in the fossil record in the early Cretaceous Period, about 130 million years ago.[2]

During the history of life on Earth, four major extinction events occurred before flowering plants and placental mammals had appeared. Each of these events caused the loss of over half the species that existed when they began. The most recent of them took place about 66 million years ago, at the Cretaceous–Paleogene boundary. All remaining dinosaurs became extinct at that time, together with more than 75% of all other existing species. In time, the disappearance of so many species led to the opening of new, diverse habitats that were key to the course of subsequent evolution within many groups. In these new habitats, terrestrial vertebrates, insects, and plants evolved, eventually building the unprecedented number of species living today.

As reviewed the Cenozoic Era has been a period of drying and, in general, cooling. Grasslands, as well as ecosystems dominated by hard-leaved, evergreen trees and shrubs, appeared and began expanding about 45–30 million years ago. The strong differentiation between frigid polar climates and warm tropical ones strengthened over the course of the past 15 million years, eventually forming the divisions that are so evident today. Communities and ecosystems assumed their characteristic appearances as vascular plants and other kinds of organisms radiated progressively into each of them.

To assess patterns of geographical distribution and overall rates of evolution and extinction properly, we must first determine with relative accuracy the numbers of species in at least a few groups of organisms. Among those that are relatively well known are terrestrial vertebrates, with at least 35,000 species; butterflies, with some 25,000; and vascular plants, with perhaps 450,000

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(about 380,000 of them named. In contrast, our knowledge of species numbers for groups such mites (45,000 named species); nematodes (15,000 named species); and fungi (120,000 named species) is clearly inadequate.

Together, these three groups may well include at least five million species! Eukaryotic organisms alone may feature at least 20 million species living today, a staggering number relative to fewer than 2 million species of eukaryotes, which have been assigned scientific names, suggesting that the great majority of those species, particularly in the tropics, will remain unknown as we drive them to extinction. For prokaryotic organisms (bacteria and Archaea), we have no realistic idea how many species may exist. In any case, we have recognized and assigned scientific names.[3]

The emergence of human beings and their impact

Since human beings, members of our species, are the overwhelming force driving biological extinction today, let us consider our evolutionary journey to where we are today. African apes and the human evolutionary line (hominids) diverged from a common ancestor some 6–8 million years ago. Within that line, our species, Homo sapiens, originated in Africa at least 200,000 years ago, reaching Eurasia at least 60,000 years ago in Africa, reaching Eurasia at least 60,000 years ago. Once there, they spread rapidly throughout Eurasia and to Australia, ultimately reaching the Americas no less than 15,000 years ago. Most of their migration took place during the recent glacial maximum, a cool period that lasted from 110,000 to 10,000 years ago. Some 11,000 years ago, humans who were living as hunter-gatherers developed crop agriculture and began domesticating grazing mammals and birds, a practice probably originating initially in Western Asia. As the process of domestication got underway, there were only about 1 million humans on Earth, though this number immediately began growing steadily, especially around the villages, towns, and cities made possible by agriculture. People living in these early settlements no longer needed to move continuously in search of food, but could stay in one location year-round.[4]

With a total of some 200 million people 2000 years ago and 500 million at the start of the European Renaissance (1500 AD), the human population first reached the level of one billion in Napoleonic times (1804). From that point onward, our numbers, spurred by the Industrial Revolution and the emerging use of fossil fuels, grew rapidly to nearly 7.8 billion today. Given current trends in fertility and longevity, the UN projects that this number will increase by an additional 2.2 billion people during the next 30 years.

Revolution and development of the Eco-system

The versatile and powerful fossil fuels, coupled with the inventiveness of the Industrial Revolution and the development of globally-traded currencies that hugely facilitated loans and new investments, massively eased the constraints imposed by our earlier direct dependence on biological resources. Fossil fuel used for fertilizers and for powering tractors and pumps allowed us to produce far more food and animal feed than agriculture was able to grow previously. As an energy source, fossil fuel also enables storing, processing, and shipping food and animal feed around the world, thus overcoming local food production limitations. It also eases the access to remote forests that we have since exploited. It makes possible the manufacture of substitutes for biological fibers of biological origin, with 70% fibers are now produced synthetically. Additionally, without burning wood, and makes possible the transport of people around the world without having to feed horses and donkeys.

This fossil fuel use has amplified people's material demand on nature to an extent where our impact on all global ecosystems has become overwhelmingly negative. Agriculture occupies at least 40% of the Earth's land surface, with humans affecting virtually every square centimeter of the planet. Global warming, driven in large part by human activities, has led to a 1 °C increase in world temperatures over the past century; they are now higher than they have been for millions of years.[5] Even if we stayed at current levels, greenhouse gas concentrations in the atmosphere, having reached 500 ppm CO_2 equivalent in 2019 , would almost certainly lead to an eventual increase of 2 °C, with an increase of 1.5 °C projected by 2030. Scientists anticipate that the effects of such an increase would be disastrous, given the threat to agricultural and marine productivity, weather calamities, sea-level rise, marine productivity, sea level rise, and freshwater availability, to name just a few. Despite the enormous threats we face, our efforts to form a global alliance to hold back climate change have not nearly been effective enough. The productivity of plants, which amount to more than four-fifths of the total living biomass on Earth and playing a huge role in absorbing carbon and thus being critical for slowing the rate of warming, could be seriously compromised by the expected climate change.

We can measure the scale of human presence in the biosphere by estimating how much people demand relative to what the planet's ecosystems can renew. Even if the ultimate goal is quality (such as preserving biodiversity), such a quantitative metric is essential as it highlights the quantitative imbalance between human demand and ecosystem regeneration. As long as the quantitative bottom-line condition of demanding less than what can be sustainably renewed is not met, quality cannot be scaled. For instance, assume that a forested area is harvested at double the rate at which it can be sustainably renewed. Of course it is possible to preserve and protect a portion of that area. But if the human demand on this area stays the same, the overuse will be concentrated on the remaining portion of that forest, threatening its integrity. In other words, forest protection can only be scaled across the entire forest area, if the basic quantitative condition of harvesting that forest below sustainable renewal rates is met.

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Ecological approaches

This quantitative argument concerning biological resource security also holds for sustaining economic success (including poverty eradication), certainly at the global level. And on average, it is also true at the local level, as for every resource import by one entity, one other entity on the planet has to provide it as export. Focusing on biological resource security builds on the recognition that the most limiting, material resources are our planet's biological assets, i.e., its biological capacity to renew living matter. Even for fossil fuel which is more limited by the biosphere's ability to absorb the excess CO_2 than by the stocks left underground.[6]

In ecological sciences, such balances are often approximated using NPP (or net primary productivity) assessments. While conceptually powerful, they are limited in producing sharp numbers contrasting human demand with biological regeneration as demonstrated. Ecological Footprint accounts use an agricultural quantification approach, where harvest of specific agricultural products (such as potatoes) is compared with the regeneration or yield of these products (potato fields). This becomes a sharper comparisons which does not depend on estimating the ancillary biomass involved in such production. This agriculturally inspired lens is the essence of Ecological Footprint accounting which contrasts biological regeneration (called "biocapacity") with human appropriation (called "ecological footprints").

Human demands on nature that compete for biocapacity include sequestration capacity for CO_2 from fossil fuel burning, demand for food and fiber, energy production (from hydropower to biomass), space for roads and shelters, use of freshwater, if it diverts water from other ecosystem uses, etc.

Both biocapacity and ecological footprint can be tracked and compared against each other, based on two simple principles: (1) one can add up all the competing demands on productive surfaces, i.e., the surfaces that contain the planet's biocapacity; (2) by scaling these areas proportional to their biological productivity, they become commensurable. The measurement unit used in this metric are "global hectares" which are biologically productive hectare with world average productivity. More details about the principles and mechanics of this accounting system are documented extensively in the literature. A simple discussion of its underlying accounting principles and guidance for basic result interpretations are provided.

Ecological and biocapacity interpretations

Ecological footprint and biocapacity estimates by Global Footprint Network, based on UN statistics and shown in, reveal that human demand in 1961 corresponded to about 73% of what Earth could renew at the time. This demand – essentially on plants' ability to renew - has risen to 175% in 2019, according to those estimates. One simple way to express this is that from January

1 to July 29, 2019, humanity had demanded as much from the Earth's ecosystems as these ecosystems could regenerate in the entire year.

Conclusion

The balance, inevitably, stemmed from resource depletion. shows the same trends on a per-person basis. People consume nature's productivity highly unequally, with national per person averages in the U.S., Gulf countries, and Western Europe being the highest. In contrast to these areas, the averages within countries that lack ecological resources and purchasing power reflect very low demands, indicating extreme deprivation and difficult material prospects for their residents.

Glossary

Biodiversity is a part of life science. It is related from different ecological part of the nature. Biodiversity is depending on the human life and environmental approaches.

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