United Nations Environmental Assembly (UNEA)

Effectively cataloguing biodiversity worldwide

Research Report

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"Out of this world"

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Introduction

Biological diversity, or biodiversity, is the various forms of life found in one area including animals, plants, fungi, and even microorganisms like bacteria that comprise the natural world.[1] The biodiversity observed today is the effect of 4.5 billion years of evolution and, lately increasingly, human influence.[2] All the species and organisms interact to maintain balance resulting in everything that is required for survival such as food, clean water, medicine, stable climate, and economic growth. Over half of the world's total Gross Domestic Product (GDP) is dependent on nature which further contributes to social and medicinal growth.[3] More than one billion people rely heavily on forests for their daily lives. Land and ocean, lastly, absorb more than half of all carbon emissions.

However, as humans are putting additional pressure on the planet by consuming more resources and polluting the natural habitats the balance of ecosystems is being disturbed. Species are now disappearing faster than the natural rate of extinction . According to the United Nations, human activity is leading one million species of plants and animals towards extinction.[4] This is the biggest loss of life since the dinosaurs. This loss in biodiversity threatens each life on earth, not just the species directly related to getting extinct.[5]

Therefore, it is essential to aim towards effectively cataloguing biodiversity worldwide since it can foster international conservation, scientific research, policy-making, and addressing the global biodiversity crisis. It provides the foundation for informed decision-making and collaborative efforts to protect the planet's biological heritage.[6] Effectively cataloguing biodiversity worldwide can be defined as identification, recording, and organisation data on the various life forms on Earth while maintaining current, accessibility, and utility to researchers, policymakers, and conservationists. It is a systematic, coordinated, and comprehensive process. It is necessary that information is gathered faithfully, updated often, and extensively shared in order to reinforce discussion initiatives, guide sustainable development initiatives, and advance scientific comprehension.

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[4] Biodiversity - Ecosystems — European Environment Agency. (n.d.). European Environment Agency. Retrieved August 19,
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[6] Blair, J. (2020, March 27). Towards a catalogue of biodiversity databases: An ontological case study. NCBI. Retrieved August 19, 2024, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7125240/

Definition of Key Terms

Biodiversity:
"the variety of life found in a place on Earth [...] A common measure of this variety [...] is the count of species in an area."[7]

Species:
"classification comprising related organisms that share common characteristics and are capable of interbreeding "[8]

Ecosystem:
"the complex of living organisms, their physical environment, and all their interrelationships in a particular unit of space "[9]

Biodiversity hotspots:
"a region with significant levels of biodiversity that is threatened with destruction "[10]

Endemic species:
"any species whose geographic range or distribution is confined to a single given area "[11]

Biodiversity database:
"information systems that store and organise data related to the variety of life on Earth, including species, genes, and ecosystems "[12]

Extinction:
"the dying out or extermination of a species "[13]

Biodiversity loss:
"a decrease in biodiversity within a species, an ecosystem, a given geographic area, or Earth as a whole "[14]

Taxonomy:
"the science of classification, but more strictly the classification of living and

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[8] 8 Gittleman, J. L. (2024, August 10). Species | Definition, Types, & Examples. Britannica. Retrieved August 20, 2024, from https://www.britannica.com/science/species-taxon

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[12] 12 Shanmughavel, P. (n.d.). An overview on biodiversity information in databases. NCBI. Retrieved August 20, 2024, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1891718/

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[14] Rafferty, J. P. (2024, August 15). Biodiversity loss | Causes, Effects, & Facts. Britannica. Retrieved August 20, 2024, from https://www.britannica.com/science/biodiversity-loss

extinct organisms ”[15]

General Overview

Based on the 2019 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report, which was the first global biodiversity assessment since 2005, “nature across most of the globe has now been significantly altered by multiple human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline.”[16] Seventy-five per cent of the land surface is heavily altered and 66 percent of the ocean area is facing growing effects. Approximately half the coral covers on coral reefs have been lost since the 1870s. Population sizes of wild vertebrate species have been declining the past 50 years on land, in freshwater and in the sea. An average of around 25 percent of species in assessed animal and plant groups are threatened, showing that around 1 million species already face extinction. Unless measures are taken to minimise the intensity of biodiversity loss that will lead to increased acceleration which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years. [17]

Key drivers

Invasive alien species (IAS) are “animals, plants, fungi and microorganisms that have entered and established themselves in the environment outside their natural habitat”. IAS contribute to the decline or even extinction of native species and impair ecosystems. More specifically, they are responsible for nearly 40 per cent of all animal extinctions since the 17th century. The international economy due to the intensified transportation and tourism has fostered the introduction of alien species. In fact, environmental losses from introduced pests in Australia, Brazil, India, South Africa, the United Kingdom and the United States are estimated to reach over US$100 billion per year.

The biggest driver of biodiversity loss is changes in the use of land and sea. This includes the land covers more extensively such as forests, wetlands and other natural habitats for agricultural and urban utilisation. Agricultural expansion, unfortunately, remains the main cause of deforestation, forest degradation and forest biodiversity loss. Reviewing how food is produced and consumed is an effective approach to easing the strain on ecosystems. Restoring degraded or abandoned farmland can play a key role in conserving and revitalising vital ecosystems.

Since 1980, greenhouse gas emissions have doubled, resulting in a rise of the average global temperatures by at least 0.7 degrees Celsius. Global warming alone is already having impacts on species and ecosystems worldwide, specifically on the most vulnerable ecosystems such as coral reefs, mountains and polar ecosystems. It is proven that climate change-induced temperature increases can possibly threaten as many as one in six species at the global level.

Pollution, even from chemicals and waste, is a main factor of biodiversity and ecosystem alteration with direct effects on freshwater and marine habitats. Plant and insect populations are diminishing because of the persistent usage of highly dangerous, non-selective insecticides. Marine plastic pollution has intensified, air, and soil pollution are also on the

[15] Cain, A. (2024, July 30). Taxonomy | Definition, Examples, Levels, & Classification. Britannica. Retrieved August 21, 2024, from https://www.britannica.com/science/taxonomy

[16] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). (2019). Global assessment report on biodiversity and ecosystem services. Retrieved August 20, 2024. from https://www.ipbes.net/global-assessment

[17] World is 'on notice' as a major UN report shows one million species face extinction. (2019, May 6). UN News. Retrieved August 20, 2024, from https://news.un.org/en/story/2019/05/1037941

rise.

For certain ecosystems the direct exploitation, especially overexploitation, of animals, plants and other organisms, mainly via harvesting, logging, hunting and fishing has had the most detrimental effects.[18]

Importance of cataloguing

Cataloguing biodiversity is the procedure of methodically identifying, recording, and organising data about biological diversity worldwide. Effective cataloguing is essential for tracking shifts in species populations due to the severity of the increasing global biodiversity crisis. It additionally renders it possible to spot patterns and evaluate how habitat loss, other human-caused issues, and climate change are influencing biodiversity. Ensuring widespread timely availability of this data is crucial for the implementation of successful mitigation strategies for biodiversity loss.[19]

To begin with, the sustainable management of habitats depends on the qualitative cataloguing of biodiversity. It enhances targeted conservation measurements and assists in the identification of species at risk of extinction. Naturalists can more effectively preserve ecosystems balance and resistance to environmental cues by understanding and breaking down species distributions and their ecological roles.[20]

Taking into consideration that biodiversity cataloguing provides trustworthy information about species, habitats, and how they interact, it serves as the main source for scientific inquiry and advanced research. For studies in ecology, evolution, and environmental science, this data is essential by allowing researchers to evaluate modifications in biodiversity, identify patterns, and compose new conservation strategies. Scientists can utilise and access data with greater ease and efficiency thanks to biodiversity databases, which gather and arrange this information.[21]

Main challenges

Cataloguing biodiversity currently undergoes multiple significant challenges and setbacks that minimise the efficiency of data management and accessibility. Biodiversity data are usually distributed among various databases, organisations, and publications, which hinders accessibility and management. The majority of databases worldwide are not coordinated, which limits the ability for comprehensive and analytical systems.

Standardised protocols, guidelines, and formats for biodiversity data are limited. Due to this fact data integration and interconnection are tangled within different sources. The lack of joined standards hinders the effective analysis and comparison of multiple information.

The majority of biodiversity data are currently in non-digital formats, such as in-print records or physical paper in museums since they have been monitored by local experts. The digitalization of this information requires oftentimes a big amount of time and resources which causes a lot of the information to remain inaccessible.

Biodiversity informatics projects face restricted fundings and resources. Therefore the

[18] 5 key drivers of the nature crisis. (2023, September 5). UNEP. Retrieved August 21, 2024, from https://www.unep.org/news-and-stories/story/five-drivers-nature-crisis

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[20] Shanmughavel, P. (n.d.). An overview on biodiversity information in databases. NCBI. Retrieved August 21, 2024, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1891718/

[21] Blair, J. (2020, March 27). Towards a catalogue of biodiversity databases: An ontological case study. NCBI. Retrieved August 19, 2024, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7125240/

process of creating and developing resources and databases is worsened. This lack of support from organisations and governments can minimise efforts to enhance data quality, accessibility, and usability.

Lastly, the complexity of taxonomic classification and biological systems inducing various practical problems of synonymy and the discovery of new species threaten the creation of interconnected systems. Inconsistently naming conventions and classifications can cause inaccuracies in biodiversity records and databases.

Major Parties Involved

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES):

"The IPBES is an independent intergovernmental body established by states to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development." It was first established in Panama City, in 2012 by 94 national governments; it is not a United Nations body. However, since 2013 the United Nations Environment Programme (UNEP) has provided secretariat services to IPBES. The IPBES' work includes composing assessments on particular topics and environmental issues at both regional and international scopes. Secondly, it is responsible for developing policy-relevant mechanisms and structures, enhancing the reach of data for its member-states, and ensuring the sharing of knowledge.[22]

Global Biodiversity Information Facility (GBIF)

GBIF is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth." It is mainly governed by its Secretariat in Copenhagen and it aims at providing data-holding institutions worldwide with centralised standards, protocols and open-source tools that enable the knowledge sharing about species' records.[23]

Brazil

Brazil is the most biologically diverse country throughout the entire world and it is recorded at the top among the world's 17 megadiverse countries. It hosts two biodiversity hotspots and three large marine ecosystems. The main threats to biodiversity in the area include: loss of habitats, incorporation of alien species, overexploitation of plants and animals, pollution and climate change. Brazil was, in fact, one of the first South American countries to completely adopt a National Biodiversity Strategy. The national targets for 2020 targets were adopted in September 2013.[24]

Timeline of Events

1961	World Wildlife Fund (WWF) is created by the IUCN to encourage conservation of nature
1980	World Conservation Strategy developed, aiming at the sustainable development for biodiversity conservation

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[24] Main Details. (n.d.). Main Details. Retrieved August 22, 2024, from https://www.cbd.int/countries/profile?country=br

1993	Convention on Biological Diversity (CBD) becomes enforced, its main objectives include conserving biodiversity, utilising its components sustainably, and sharing knowledge
2002	World Summit on Sustainable Development in Johannesburg reaffirmed commitment to the CBD and targets to significantly reduce the rate of biodiversity loss by 2010
2010	CBD Strategic Plan for Biodiversity 2011-2020 adopted, in coordination with the Aichi Biodiversity Targets
2020	CBD COP15 planned to adopt a post-2020 global biodiversity framework to guide measures for future years

Possible Solutions

Establishing a global biodiversity database could tackle core issues by providing a centralised, UN-managed worldwide database responsible for standardising biodiversity data across multiple sources. Data would be gathered by currently existing platforms such as the Global Biodiversity Information Facility (GBIF) and the contribution of countries would be highly encouraged. That could foster data accuracy, reduce duplication, and increase accessibility for scientists, policymakers, and the public.

Enhancing current awareness of biodiversity worldwide could be accomplished through cataloguing initiatives that integrate the expertise of Indigenous and local groups. These individuals frequently have important knowledge about the regional ecosystems, which may improve conservation tactics and advance sustainable lifestyles.[25]

Lastly, developing regional hubs for biodiversity data gathering, analysis, and sharing could enhance collaboration with local stakeholders, improve data capacity coverage, and ensure that ecological concerns are met. These hubs could facilitate cross-border cooperation and centralise data collection processes.

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