



## Exploring The Relationship Between Biodiversity And Pollution In Natural History Studies

Vishesh Kumar<sup>1\*</sup>, Pratyaya Jagannath<sup>2</sup>, Dr Sushil B Kapoor<sup>3</sup>, Merugu Srilatha<sup>4</sup>, Jeeya Shah<sup>5</sup>, Dr Tamanna Bhuyan<sup>6</sup>

<sup>1\*</sup>Senior Officer, Ministry of Environment, Forest and Climate Change, Email ID: vish5kmr@gmail.com

<sup>2</sup>PhD scholar, TERI School of Advanced Studies, Email ID: pratyayj@gmail.com

<sup>3</sup>Assistant Professor, Chemistry, Dr Khatri Mahavidyalaya Tukum Chandrapur M.S., India, Email ID: kapoor.sushil2012@gmail.com

<sup>4</sup>Degree Lecturer, MJPTBCWRDC Wargal Siddipet District Osmania University, Hyderabad Email ID: merugusrilatha47@gmail.com

<sup>5</sup>Email ID: Jeeya2611@gmail.com

<sup>6</sup>Assistant Professor, Applied Biology, School of Biological Sciences, University of Science and Technology Meghalaya, India, Email ID: tamanna.bhuyan4@gmail.com

**\*Corresponding Author:** Vishesh Kumar

**\*Senior Officer, Ministry of Environment, Forest and Climate Change, Email ID: vish5kmr@gmail.com**

Article History	Abstract
Received: Revised: Accepted:	Natural history museums & libraries provide exceptional resources for both traditional & non-traditional education settings. Because they are snapshots in time & space, collections provide information that can never be duplicated. Learning about & interacting deeply with the living world is facilitated by exposure to collections. Specimens in collections allow for direct tracking of global biological diversity & also changes in that diversity, whether those changes are ancient or recent. This paper investigates the significance of biodiversity & pollution in the field of natural history studies, as well as the connection between the two concepts. It is emphasised here how the current rise in specimen-based digitization programmes has provided access to an unprecedented biodiversity data wealth, vastly expanding the scope of natural history collections. The methodology was used as a secondary source of data, which was gathered using online sources. By providing access to specimens & data housed in natural history collections, online databases have allowed scientists along with the general public to address worldwide, regional, & also local concerns concerning biodiversity in a manner that was not conceivable a decade ago.
CC License CC-BY-NC-SA 4.0	<b>Keywords:</b> Biodiversity, Pollution, Digitization, Natural History, Education

## Introduction

The vast variety of life on Earth is the aspect that most stands out. There are many fundamental scientific concerns raised by the sheer existence of this biodiversity. For example, how many different species are there in the world? Why & how do we see such a drastic shift in biodiversity around the globe? How do species within an ecosystem adapt to one another & the abiotic conditions in which they live? What effects does this shift in cohabitation have on the ability of species to adapt over time? Despite recent progress in this area of study [1, 2], these questions continue to be difficult to answer. However, sustainable development & human well-being rely on the functions & services provided by biodiversity. Crop pollination, the provision of food & genetic resources, the prevention of disease, & the enrichment of human life in many other ways are just a few examples of the many services ecosystems provide [3]. Alarming, biodiversity across the globe, from the poles to the tropics, on land & in the ocean, is increasingly threatened by global changes in climate & land use [4].

Biodiversity has been steadily declining for decades. Because it destroys natural habitats, disrupts the remaining ecosystems, & creates various forms of pollutants such as runoff, garbage, & artificial light, urbanization is one of the major causes of biodiversity loss [5]. Sounds created by humans are also pervasive in urban areas [6] & can travel to uninhabited areas [7] due to traffic & other activity (industrial, commercial, etc.). Tourism inside a national park, along with military sonar in the water, & civilian aircraft flying in the sky are all examples of anthropogenic noise that occur far from urban centres. Numerous types of research suggest that animals may react strongly to such noises. But noise itself is not an issue. Most animals have auditory & vocal systems. The point at which sounds cross over into "noise" is species-specific (sensitivity threshold) & is tied to the nature of the impact (disturbances, avoidance, injury, etc.). The term "noise pollution" could be used here. For instance, studies have demonstrated that noise pollution has negative effects on animal communication, space utilization, & reproduction. Many different kinds of animals, like birds, along with amphibians, as well as reptiles, & also fish, along with mammals, & also invertebrates, are influenced by this concern. It includes both marine & terrestrial environments, as well as those near the coast. Noise from traffic, ships, aeroplanes, & factories are all examples of human-made noises that can be harmful to wildlife. Other forms of pollution, such as light pollution, might compound the effects of noise pollution [8].

The study of natural history includes investigating the distribution & behaviour of organisms, as well as their interactions with one another & their surroundings. Descriptive ecology & ethology, which provide in-depth explanations of organismal biology in natural settings, provide the foundation of natural history. These are then supplemented by experimental studies of the factors that influence distribution, abundance, & interactions.

Taking care of the environment & loving it along with systematics & natural history shed light on the fundamental sorts of creatures (species & higher taxa) & their interactions with each other & their environments, thereby defining the bounds & contours of biodiversity. The results of scientific studies on nature are disseminated to the public via films & literature; conservation zones are chosen in part by the diversity & abundance of the creatures they host; learning about the ecology & also the behaviour of a species is crucial for successfully rearing them in captivity & reintroducing them to the wild. Since ethnobiology is founded on the findings of systematics & natural history, these fields of study also facilitate the exchange & evaluation of information about nature among human communities [9].

## Methodology

The secondary sources of data were gathered from a wide variety of online resources, including Google Scholar, websites, PubMed, & a great number of published articles, journals, & so on. Natural history, biodiversity, pollution & relationship etc. were the used keywords for the study.

## Result & Discussion

### Emerging Prospects for Studying Historical Collections

Natural history museums & collections support modern scientific inquiry while carrying on a long & illustrious history of discovery. NHs are fundamental to the study of organisms & to our knowledge of evolution & ecology. Many of our most distinguished scientists made crucial early career discoveries in NHs that expanded our knowledge of biodiversity's genesis, development, & preservation. Natural history collections (NHCs) were the starting point for the research & inspiration for many famous scientists, including Charles Darwin, along with Jane Goodall, as well as Stephen J. Gould, & also Louis Leakey, along with Peter Raven, as well as Alfred Russel Wallace, & also E.O. Wilson [10]. Today's scientists continue to draw inspiration from NHCs as they

work to solve pressing societal problems including managing resources, changes in the climate, declining biodiversity, invasive species, human disturbance, & also national security [11].

Scientific researchers have recently come to recognize the importance of NHC specimens [11]. The NIBA strategic plan was created by the community to digitize the nearly 1 billion specimens held in US natural history collections [12]. This plan grew out of a grassroots movement among collection professionals to enhance, validate, & also preserve our natural heritage. These efforts also led to the formation of a new National Science Foundation (NSF) initiative called "Advancing Digitization of Biological Collections" (ADBC) & a national Home Uniting Biocollections (HUB) called "Integrated Digitized Biocollections" (iDigBio) with the goals of consolidating resources & standardizing best practices across the NSF's 15 funded multi-institutional thematic collection networks centred on research themes of national importance.

The foundation for our knowledge of biodiversity & its historical & ongoing changes throughout time & location is the data collected from NHC specimens, & digitization efforts are making unprecedented volumes of verifiable, specimen-based data available. Information about specimens found in NHCs, along with their metadata & digital photographs, is increasingly being made available online. Searching & viewing primary data in conjunction with additional environmental data sources (e.g., WorldClim - Global Climate Data) is now much simpler than it was previously. In the past, researchers needed to either visit the collections in person or scour through voluminous published accounts along with checklists, & also monographs. By digitizing NHC specimens around the world, their availability is increased from a local to a global scale. Students now have a novel digital chance to engage with nature, thanks to the data & photos associated with each biological specimen. Students have access to a wealth of information about the living world through specimen data [13].

## **Biodiversity data collection & dissemination in the twenty-first century**

### **Classification of life forms**

In light of recent catastrophic decreases in biodiversity, it is more important than ever to take measures to protect our planet's remaining ecosystems & wildlife. To characterize global diversity & address concerns connected to biodiversity conservation, active NHCs are essential [14].

The biota of Earth, both past & present, & its evolution throughout different geologic epochs can be traced back to the specimens housed in NHs. The study of living, once-living, or fossilized biological elements forms the basis of taxonomists' work, which involves the description & classification of biodiversity.

Collectively, museum specimens shed light on questions like the distribution of species, the dynamics of biodiversity over time, & the causes of diversification & extinction. Many individuals are surprised to learn that the majority of Earth's species are tiny, obscure, & poorly understood [15]. Everything we know about many of these species comes from a handful of museum specimens & the labels or field notes that accompany them [16]. Museum specimens can be an affordable means to collect data from a broad geographic region for species that are widely distributed. The ongoing anxiety about the degradation of habitat, changes in the climate, non-native invasive species, & imported illnesses has increased the importance of researching common species using museum specimens to unearth clues for comprehending species extinction. Institutions that provide care for NHCs & specimens are ensuring that researchers will have study material even if the worst-case scenario of species extinction occurs, as well as providing the primary method to study & reverse biodiversity loss.

### **Opportunities for Formal & Informal Education in the Twenty-First Century**

When natural history collections (NHCs) are used in conjunction with outdoor education, everyone benefits. Students in outdoor classrooms get to make use of a variety of advantages not available in traditional lecture halls. The cognitive advantages of being in nature have been demonstrated by numerous studies [17]. These advantages might pique students' curiosity & encourage them to actively participate in their education. Questions addressed or developed in the outdoor classroom can be further investigated using NHC specimens & associated data, leading to the clarification or generation of new questions. Therefore, NHCs can aid users in maximizing the advantages of being in the natural world.

#### **College-Level Researchers**

There is a growing consensus that today's youth suffer from a "nature deficit" [18], & NHCs can help address this by introducing pupils to ecological systems & pressing global challenges. Insightful, hypothesis-driven thoughts on biodiversity & environmental challenges, as well as the accompanying developing socioeconomic & public health challenges of the 21st century, are greatly aided by access to collections. Such motivation has the potential to greatly increase youth interest in the outdoors.

When schools have their own NHC specimens on hand, they may provide students with a wider variety of learning opportunities. Learning the traits that define Earth's biodiversity & support centuries of taxonomic organization is best accomplished through direct examination of actual specimens. By adding a data context, digitization projects have increased the value of the specimens. Biological snapshots in space & time are reflected in the vast, ever-growing dataset connected to NHC specimens. Massive specimen-based datasets can be mined readily for lessons that encourage the growth of transferable skills, like the capacity to gain, assess, & analyse knowledge from multiple sources; synthesise ideas throughout disciplines; choose & apply suitable techniques of quantification; utilise or create novel technologies associated with data storage & management. Students who participate actively in their education, whether in class or as part of an individual study project, are more invested in what they learn.

## Future Scope

A new conservation problem will emerge in the next decades: the unknown but possibly severe implications of fast climate change. Ideally, management techniques will take into account the projected influence of temperature & moisture changes (through organ- ismal physiology) on population viability [19]. Indirect approaches may be effective since such in-depth information needs years of study & is only accessible to a small number of species. Future extinctions were predicted by comparing the obtained refuge area thresholds with projections of habitat decline due to climate change. Particularly vulnerable to shifts in temperature & precipitation patterns are terrestrial species whose ranges are already fragmented & whose elevational tolerances are already low.

## Conclusion

Access to collections allows researchers to witness firsthand the evolution of species over time & geography. Understanding & meaningful engagement with the living world improves as a result of field & collection-based experiences. By fusing specimen-based information gathered from archived NHC databases with hands-on inventory as well as investigation in the field, the science of taxonomy can be made more readily available to new groups of learners & the general public, inspiring them to become stewards, along with natural historians, & also scientists. Studying historical collections is a great way to learn more about the world's biodiversity & develop a deeper respect for its wonders.

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