

An International Edition

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VANISHING DIVERSITY

Global threats to flora and fauna

Contents

Preface

Editors' Profile

Introduction to global biodiversity	DOI: https://doi.org/10.5281/zenodo.17798078 Preeti Kumari, Jaya Jayantika, Aakanksha Singh and Padikara K. Satheeshkumar	1-21
Habitat destruction and deforestation	DOI: https://doi.org/10.5281/zenodo.17818050 Ravikant Singh, Praveen Kumar Singh and Ramesh Chandra Vishwakarma	23-58
When forests fall silent: Deforestation's impact on Songbird survival	DOI: https://doi.org/10.5281/zenodo.17818424 Shaafay Khalid, Monowar Alam Khalid and Kaleem Ahmed	59-70
Deforestation and ecological tipping points: Global consequences in the Amazon and Southeast Asian forests	DOI: https://doi.org/10.5281/zenodo.17818600 Sarabjan Deori, Meghna Mech and Mayur Mausoom Phukan	71-83
Forest fragments and vanishing canopies – Threats and conservation pathways for hornbills in the Terai Arc of Uttar Pradesh	DOI: https://doi.org/10.5281/zenodo.17818791 Ruchira Nigam, Asif Ahmad Siddiqui, Monowar Alam Khalid and Chitra Singh	85-96
Understanding of illegal wildlife trade	DOI: https://doi.org/10.5281/zenodo.17818932 Esha Yadav	97-103
Poaching and illegal wildlife trade	DOI: https://doi.org/10.5281/zenodo.17829173 Rupam Sinha, Amit Kumar and Deepak Nehara	105-121
The dark side of green energy – Hidden costs for wildlife and the environment	DOI: https://doi.org/10.5281/zenodo.17829397 Deepak Nehara, Rupam Sinha, Aditya Kumar, R. A. Siddique, Meenakshi Singh and Daina Talukdar	123-134
Climate change and its impact on wild life	DOI: https://doi.org/10.5281/zenodo.17829631 Priyanka Shah, Priya Patel and Sanjay Kumar	135-146
Climate change-A driver in reshaping Avian ecology and their migration	DOI: https://doi.org/10.5281/zenodo.17829782 Mohsina Khan and Monowar Alam Khalid	147-163
Climate change and global warming: Challenge for future generations	DOI: https://doi.org/10.5281/zenodo.17829921 Amina Jafri, Nida Fatma and Pranjali Tripathi	165-172
Loss of habitat and ecosystem distrupction due to pollution	DOI: https://doi.org/10.5281/zenodo.17830096 Shivendra Pratap Chauhan and Amita Sarkar	173-179

Environmental pollution and its effects on biodiversity

DOI: <https://doi.org/10.5281/zenodo.17830326>

Shailza Mishra, Gereraj Sen Gupta, Ashish Kumar Mishra, Shivani Gupta, Parvati Madheshiya and Supriya Tiwari

Pollution and its effects on biodiversity DOI: <https://doi.org/10.5281/zenodo.17830531> 181-207

Yashwant Singh, Ranjana, Devendra Kumar Chauhan and Shailendra Kumar Chaudhary

Effects of the oil spill on the marine environment DOI: <https://doi.org/10.5281/zenodo.17830682> 209-221

Shubham Singh, Sahabiya Fatima Rahman and Javad Ahmad Siddiqui
Disease dynamics and their influence on species survival DOI: <https://doi.org/10.5281/zenodo.17830913> 223-230

Amita Sarkar, Anurag Mishra and Anamika Singh
The role of infectious diseases in accelerating species decline DOI: <https://doi.org/10.5281/zenodo.17830989> 231-237

Meenakshi Singh, Rupam Sinha, Deepak Chand Meena, D.V.V.N. Durga Prasad, Diana Talukdar and Shailja Kumari
The role of disease in species decline DOI: <https://doi.org/10.5281/zenodo.17831135> 239-243

Ritu Kumari, Mrityunjay Sharma, Anita and Padikara K. Satheeshkumar
Insect pollinators crisis: Ecological challenges and strategic responses DOI: <https://doi.org/10.5281/zenodo.17835441> 245-262

P. K. Somjith, A. Hima, Omprakash Navik and Santosh C. Kedar
Pharmaceutical bioaccumulation in aquatic ecosystems: Environmental and human health implications and effects on flora and fauna DOI: <https://doi.org/10.5281/zenodo.17837011> 263-279

Arbind Kumar Choudhary and S. S. Avinash
Toxicological effects of malachite green DOI: <https://doi.org/10.5281/zenodo.17837119> 281-307

Abhinav
Ocean acidification and coral bleaching, causes and impact on ecological and socioeconomic consequences DOI: <https://doi.org/10.5281/zenodo.17837192> 309-315

Phool Gend Kumar
Imperiled chelonians: Issues and conservation challenges DOI: <https://doi.org/10.5281/zenodo.17840959> 317-323

Monowar Alam Khalid, Sreeparna Dutta, Pawan Shantiprakash Pareek and Shailendra Singh
Overfishing and marine biodiversity loss DOI: <https://doi.org/10.5281/zenodo.17841089> 325-336

Panchakarla Sedyaw, D. I. Pathan, Darwin Ratnaghosh Bhaladhare, Pranali Arun Kamble, Sanket Sunil Kawade and Aniruddha S. Sharangdhar
DOI: <https://doi.org/10.5281/zenodo.17841089> 337-352

- Poaching and illegal wildlife trade DOI: <https://doi.org/10.5281/zenodo.17841224>
Priya Patel, Priyanka Shah and Sanjay Kumar 353-370
- Agricultural practices and biodiversity decline
 DOI: <https://doi.org/10.5281/zenodo.17841457>
Avanish Prajapati, Akanksha Dwivedi, Priyanka Singh, Saumya Mishra, Nisha Singh, Khushboo Pal and Rajesh Kumar Sharma 371-400
- Agriculture as a driver of biodiversity loss DOI: <https://doi.org/10.5281/zenodo.17841581>
Rakesh Kumar Chaurasia 401-420
- Effects of invasive species in an ecosystems: A case studies from Nagaland
 DOI: <https://doi.org/10.5281/zenodo.17841760>
Wati Temjen, Khikeya Semy, Aosenla Jamir, Ngampo S. Salim and Maibam Romeo Singh 421-437
- Wetlands: The essential component of ecosystems
 DOI: <https://doi.org/10.5281/zenodo.17842048>
Susmita Srivastav and Jaya Chaudhary 439-447
- Climate change and its impact on wildlife
 DOI: <https://doi.org/10.5281/zenodo.17842158>
Deepak Nehara, Rupam Sinha, Aditya Kumar, RA Siddique, Daina Talukdar and Dhram Prakash Srivastava 449-455
- Biodiversity conservation network of India: National parks
 DOI: <https://doi.org/10.5281/zenodo.17842277>
Sanjeev Kumar Srivas, Reena Rastogi, Jyoti Devi, Satendra Sahu, Sahil Soni, Muskan and Nainasi Rajak 457-464
- Case studies on environmental stressors in India: Microplastics in marine life and pesticides affecting bees
 DOI: <https://doi.org/10.5281/zenodo.17842499>
Sanjeev Arora 465-474
- Entomophagy practices of the Phom tribe of Longleng district, Nagaland, India
 DOI: <https://doi.org/10.5281/zenodo.17844810>
N. Namsong, Rita Khatri Chhetri and Lobeno Mozhui 475-486
- Indigenous knowledge on edible insect consumption of the Chang Tribe, Tuensang, Nagaland
 DOI: <https://doi.org/10.5281/zenodo.17844861>
Yemkongbhakmei B. Chang, Rita Khatri Chhetri and Lobeno Mozhui 487-501
- Honey as a bioindicator of environmental stability: Melissopalynological perspective
 DOI: <https://doi.org/10.5281/zenodo.17844987>
Sneh Trivedi and Alka Srivastava 503-511
- Conservation measures and strategies for declining biodiversity-National and global perspective
 DOI: <https://doi.org/10.5281/zenodo.17845028>
Monowar Alam Khalid and Shaafay Khalid 513-527
- Harnessing the genetic diversity of cereal crops is a key approach for global food security under changing climate in 21st century-An update
 DOI: <https://doi.org/10.5281/zenodo.17845061>
Ravindra Prasad and Pragati Minz 529-549

- Conservation efforts and solutions DOI: <https://doi.org/10.5281/zenodo.17845104>
Asikho Kiso and Sanjay Kumar 551-574
- The role of technology in conservation DOI: <https://doi.org/10.5281/zenodo.17845159>
Divyanshi Singh, Rupam Sinha, Aditya Kumar and Rohini Gupta 575-590
- From enclosure to ecosystem: How zoos are safeguarding biodiversity
DOI: <https://doi.org/10.5281/zenodo.17845203>
Azra Ikram, Monowar Alam Khalid and Sanjay Kumar Shukla 591-606
- Hidden havens in Peril: The critical role of microrefugia in conserving biodiversity
under accelerating global change DOI: <https://doi.org/10.5281/zenodo.17845247>
Bhavna Sharma and Amita Sarkar 607-610
- Species identification and biodiversity assessment through DNA barcoding: A case
study of butterfly DOI: <https://doi.org/10.5281/zenodo.17845385>
Rushda Faisal and Monowar Alam Khalid 611-617
- National conservation initiatives: Preserving resources for future generations
DOI: <https://doi.org/10.5281/zenodo.17845443>
Susmita Srivastav and Kavita Chaudhary 619-626
- Mainstreaming environmental education through National curriculum framework and
NEP 2020: Opportunities and challenges in 21st century classroom
DOI: <https://doi.org/10.5281/zenodo.17845545>
Rashmi 627-640

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FROM ENCLOSURE TO ECOSYSTEM: HOW ZOOS ARE SAFEGUARDING BIODIVERSITY

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ABSTRACT : This book chapter offers a comprehensive analysis of the role of modern zoos in *ex situ* conservation, with a specific emphasis on the scientific, legal, and ethical frameworks that govern their operations. It explores the historical evolution of zoological institutions from simple menageries to their current status as critical hubs for wildlife conservation, research and public education. The importance of *ex-situ* conservation is underscored by its function as a vital complement to *in-situ* efforts, providing a last chance for the survival of species threatened by habitat loss and other human-driven factors. The chapter highlights the implementation of meticulously coordinated captive breeding programs and the use of studbooks to ensure genetic diversity and demographic stability in captive populations. This conservation work is conducted within a strict regulatory environment, shaped by international agreements like CITES, which governs the legal and sustainable trade of species, and national legislation such as India's Wild Life (Protection) Act, 1972, which established the Central Zoo Authority (CZA) to enforce standards and coordinate national breeding efforts. The chapter concludes by addressing the significant challenges and ethical debates surrounding zoos, particularly the conflict between the welfare of individual animals and the imperative of species preservation. To move forward, it is suggested that the future of zoo-based conservation must focus on a more profound integration of *ex-situ* and *in-situ* efforts, embracing technological innovations like genetic profiling and "rewilding" strategies to prepare animals for release. By transforming into collaborative centers for species restoration, zoos can strengthen their indispensable role in a world facing a mounting biodiversity crisis.

Key words : *Ex-situ*, modern zoos, conservation, rules & regulations.

The Modern Zoological Institution: From Menagerie to Conservation Hub

The conservation of global biodiversity is a multifaceted endeavor that requires a combination of strategies to protect threatened species and their habitats. At the forefront of this effort is *ex-situ* conservation, a process defined as the protection of an endangered species, variety, or breed of plant or animal outside of its natural habitat. The primary objective of such a strategy is to ensure the survival of threatened species and to maintain their associated genetic diversity, serving as a critical complement to *in-situ* conservation efforts, which focus on preserving species within their native ecosystems. The techniques employed in *ex-situ* conservation are diverse, ranging from the establishment of gene banks—such as seed, sperm,