Committee: Environmental Commission Sub-Commission 1 (EC1)

Topic: Examining AI-driven biodiversity preservation solutions

Student Officer: Nefeli Corbeel

Position: Deputy President

Personal Introduction

Dear Delegates,

My name is Nefeli Corbeel, and I am a Year 13 student from Campion School. I became interested in Model United Nations in Year 10 and I have been actively participating in Model United Nations conferences ever since, taking up various roles such as admin, delegate and judge. MUN is an experience that has changed me as a person and has taught me to exit my comfort zone and be more confident in public speaking and collaborating with others.

I am passionate about environmental policy and fascinated by the potential of new technologies in this field. Such technologies are especially relevant to the theme of this year's CSMUN conference, "Free Will in the Age of Artificial Intelligence". This study guide will help you familiarise yourself with the topic of "Examining AI-driven biodiversity preservation solutions". However, you are also encouraged to conduct your own research in order to have a comprehensive understanding of the topic and the stance of the country you are representing. You may find the links included throughout the study guide useful. If you have any questions, feel free to contact me through my email.

Looking forward to meeting you in October!

Kind regards,

Nefeli Corbeel

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Topic Introduction

Based on the International Union for Conservation of Nature, over 40,000 species are on the verge of extinction.[1] This shocking number is a result of environmental destruction, climate change, pollution caused by industrialisation, and the invasion of alien species due to increasing trade and tourism. These factors cause the collapse of ecosystems and, subsequently, the decline in biodiversity, leading to loss of habitat and food chain imbalance, impacting numerous species of plants and animals.

It is here that technologies are increasingly being utilised to help us better understand and protect the natural world. Specifically, in recent years, Artificial Intelligence (AI) has increasingly been applied to biodiversity preservation. With AI systems, tasks such as species identification, satellite image analysis, and poaching prediction can be performed with human-level expertise and decisiveness, but with speed and efficiency that exceed human capabilities. AI-powered camera traps can sort through thousands of wildlife snapshots in a matter of minutes, while machine learning models are being deployed to identify the early signs of deforestation and predict the risk of biodiversity loss in near real-time.

Nonetheless, like any AI-based solution that offers transformative potential, these are not without challenges. Their effectiveness can be undermined by bias in the training data, limited access for developing nations, and concerns over data privacy and ethical use. These problems are difficult to tackle, but they are obstacles that must be overcome in order for AI to be applied safely and efficiently across all biodiversity conservation efforts.

A collapse in biodiversity is a disaster for all, with long-lasting consequences: accelerated extinctions, destabilised ecosystems, and a decreased amount of resources that are vital to every species. Therefore, promptly addressing biodiversity needs is crucial, and is a matter that should be taken seriously by all nations. If utilised correctly, AI has the potential to be a high-impact and effective conservation solution. However, its value depends on balancing innovation with prudence and embedding it within robust social and environmental safeguards.

[1] "The IUCN Red List of Threatened Species." *IUCN Red List of Threatened Species*, www.iucnredlist.org/about/background-history. Accessed 20 Aug. 2025.

Definition of key concepts

Artificial Intelligence (AI)

"Technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy."[2] In conservation, AI detects patterns and automates monitoring tasks,[3] allowing it to play a major role in tasks such as detecting animal migration routes.

Machine Learning (ML)

A field of AI that involves algorithms that learn from data to make better predictions.[4] Machine learning algorithms are able to improve themselves as they are exposed to more data. It has become a vital component of biodiversity preservation technology, being able to support tasks such as animal movement prediction, using available data previously used for training the algorithm.

Deep Learning

A subset of ML using neural networks to detect complex patterns (e.g. identifying species in images).[5] Deep learning is valuable in tasks such as recognising animal sounds from audio recordings.

Remote Sensing

Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance, often from a satellite or aircraft.[6] Remote sensing provides large-scale data about the earth, such as forest cover and water quality.

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[2] Stryker, Cole, and Eda Kavlakoglu. "What Is Artificial Intelligence (AI)?" *IBM*, 29 July 2025, www.ibm.com/think/topics/artificial-intelligence.
[3] "Artificial Intelligence: A Modern Approach, 4th Us Ed." *Artificial Intelligence: A Modern Approach, 4th US Ed.,* aima.cs.berkeley.edu/. Accessed 20 Aug. 2025.
[4] "Deep Learning." *Deep Learning*, www.deeplearningbook.org/. Accessed 20 Aug. 2025.
[5] "Deep Learning." *Deep Learning*, www.deeplearningbook.org/. Accessed 20 Aug. 2025.
[6] "What Is Remote Sensing and What Is It Used For?" *USGS*, www.usgs.gov/faqs/what-remote-sensing-and-what-it-used. Accessed 20 Aug. 2025.

Geospatial Analysis

"The study and practice of methods used to collect, store, manage, visualise, analyse, and present geographic data."[7] It can be used to interpret spatial data to track changes like deforestation. Geospatial analysis processes data of specific geographic locations.

Acoustic Monitoring

The use of specialised recording devices which are used to capture sounds in the environment. Devices can be used to record species, and with the use of AI, identify species based on vocal patterns.[8]

Predictive Modelling

Predictive modelling uses AI, statistical techniques and machine learning to analyse past and current data in order to forecast threats (e.g., poaching and diseases) and trigger alerts for fast responses.[9]

Environmental DNA (eDNA)

"Environmental DNA (eDNA) is nuclear or mitochondrial DNA that is released from an organism into the environment."[10] It is often collected from soil or water. AI could be used to analyse eDNA in order to detect species, especially those that are rare or hard-to-find.[11]

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[7] "Department of Geography." *College of Arts and Sciences | Geospatial Analysis*, 29 Jan. 2025, cas.umw.edu/gis/.

[8] *Acoustic Monitoring for Conservation in Tropical Forests: Examples from Forest Elephants - Wrege - 2017 - Methods in Ecology and Evolution - Wiley Online Library*, besjournals.onlinelibrary.wiley.com/doi/abs/10.1111/2041-210x.12730. Accessed 20 Aug. 2025.

[9] *Importance of Health Assessments for Conservation in Noncaptive Wildlife*, conbio.onlinelibrary.wiley.com/doi/10.1111/cobi.13724. Accessed 20 Aug. 2025.

[10] "Environmental DNA (Edna)." *USGS*, www.usgs.gov/water-science-school/science/environmental-dna-edna. Accessed 20 Aug. 2025.

[11] *The Scourge of Society: Trends in Ecology & Evolution*, www.cell.com/trends/ecology-evolution/abstract/S0169-5347(99)01642-0. Accessed 20 Aug. 2025.

Geographic Information System (GIS)

A digital tool used for mapping and analysing spatial and environmental data. It can be used to track and map habitats.[12]

Biodiversity Hotspot

Areas rich in biodiversity with many different types of species, but under severe threat of habitat loss.[13] To qualify as a biodiversity hotspot, an area needs to meet certain criteria, such as harbouring at least 1500 different types of vascular plants.[14]

Background Information

Historical Overview of Conservation

Efforts to conserve ecosystems began centuries ago, yet the modern environmental effort only began in the 20th century, when the widespread establishment of national parks and wildlife reserves began to take place. The formation of the International Union for the Conservation of Nature (IUCN) in 1948 marked a critical moment in fostering global attention towards the conservation of biodiversity. In the 1970s, international initiatives, including UNESCO's "Man and the Biosphere" Program and the World Heritage Convention, began articulating the need to safeguard important ecological and cultural locations.[15] Although all these initiatives were being made, deforestation, habitat loss, and species extinction all continued to advance unchecked, demonstrating the need for new strategies and drastic change.[16]

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[12] "What Is GIS?: Geographic Information System Mapping Technology." *What Is GIS? | Geographic Information System Mapping Technology*, www.esri.com/en-us/what-is-gis/overview. Accessed 20 Aug. 2025.
[13] Myers, Norman, et al. "Biodiversity Hotspots for Conservation Priorities." *Nature News*, Nature Publishing Group, www.nature.com/articles/35002501. Accessed 20 Aug. 2025.
[14] "What Are Biodiversity Hotspots?" *Conservation International*, www.conservation.org/priorities/biodiversity-hotspots. Accessed 20 Aug. 2025.
[15] Centre, UNESCO World Heritage. "The World Heritage Convention." *UNESCO World Heritage Centre*, whc.unesco.org/en/convention/. Accessed 20 Aug. 2025.
[16] "About IUCN." *IUCN*, 11 Dec. 2024, iucn.org/about-iucn.

The Rise of AI in Biodiversity Protection

During the last few years, an increase in the use of technologies and data collection in the subject of biodiversity preservation has taken place. This is due to the growing interest and effort to move away from conventional conservation methods, and rather develop more effective technologies and tools, including AI. Wildlife Insights was launched in 2016 in collaboration with certain conservation organisations. This platform uses TensorFlow and cloud computing to process and classify camera-trap images.[17] In 2017, Microsoft introduced AI for Earth, which is used as training support for environmental research, and provides grants for environmental projects and cloud resources.[18] Machine learning started being used during early 2020, when tools such as Amazon Mining Watch (AMW) dashboard tracked deforestation linked to mining with this technology.[19] This resulted in AMW having uncovered over two million hectares of mining-related forest loss by 2024.[20]

Applications of AI in the Field

Academic institutions and NGOs have increasingly incorporated AI into field research. For example, a team from George Mason University trained AI to recognise Amazonian bird calls, successfully identifying 201 out of 250 targeted species.[21]

Below are a few examples of AI technologies currently being researched and adopted in biodiversity preservation.

Acoustic monitoring devices

[17] "Home." *Wildlife Insights*, wildlifeinsights.org/. Accessed 20 Aug. 2025.
[18] "Microsoft Planetary Computer." *Planetary Computer*, planetarycomputer.microsoft.com/. Accessed 20 Aug. 2025.
[19] Vizzuality. "Forest Monitoring, Land Use & Deforestation Trends: Global Forest Watch." *Forest Monitoring, Land Use & Deforestation Trends | Global Forest Watch*, www.globalforestwatch.org/. Accessed 20 Aug. 2025.
[20] Finer, Matt. "Maap #226: Ai to Detect Amazon Gold Mining Deforestation - 2024 Update." *MAAP*, 10 June 2025, www.maapprogram.org/amazon-mining-2024/.
[21] Gillooly, Elizabeth. "Research using AI to track Amazon rainforest species produces landmark results." *George Mason University*, 25 Nov. 2024.https://www.gmu.edu/news/2024-11/research-using-ai-track-amazon-rainforest-species-produces-landmark-results

Enhanced by AI, acoustic monitoring devices are now used to detect elusive or nocturnal animals, minimising the need for constant human presence and disturbance.[22] Such a tool has gained an increase in use due to rapid advances in this technology, as well as its cost-effectiveness. Due to it being waterproof and easily portable, this tool has quickly gained popularity.[23]

AI acoustic monitoring works by deploying microphones to record environmental soundscapes. Using advanced AI algorithms, the system can automatically distinguish and analyse animal sounds, including species calls. Such a tool is extremely beneficial, as it allows for the detection of species presence without disrupting the ecosystem, offering continuous monitoring for conservationists.

Figure 1: An acoustic monitoring system used for biodiversity preservation[24]

Further reading:
https://armstronginternational.eu/products/ad5000-series-steam-trap-monitoring/

Camera-trap software

Camera-trap software automatically filters and classifies wildlife images and videos, while predictive models help prevent poaching and illegal logging. Camera-trap software has played a massive role in the revolution of wildlife and ecosystem preservation. With the help of AI, the software can analyse and interpret a large amount of footage captured by the remote cameras, and yield useful

[22] *Acoustic Monitoring for Conservation in Tropical Forests: Examples from Forest Elephants - Wrege - 2017 - Methods in Ecology and Evolution - Wiley Online Library*, besjournals.onlinelibrary.wiley.com/doi/abs/10.1111/2041-210x.12730. Accessed 20 Aug. 2025.
[23] "Acoustic Monitoring." *WWF*, www.wwf.org.uk/project/conservationtechnology/acoustic-monitoring. Accessed 20 Aug. 2025.
[24] "Acoustic Monitoring." *WWF-UK*, World Wide Fund for Nature, www.wwf.org.uk/project/conservationtechnology/acoustic-monitoring. Accessed 27 Aug. 2025.

information such as the species identified, animal behaviour, as well as species distribution. This process has proven to be a powerful tool to assist researchers and conservationists in their work.

Further reading:
https://www.zsl.org/what-we-do/conservation/protecting-species/monitoring-and-technology/camera-trap-software

Predictive Modelling

Predictive modelling uses AI technology to analyse past historical data to make predictions of the future.[25] Predictive modelling can be used to foresee behaviours in multiple fields, including biodiversity preservation, by predicting environmental behaviours.

This technology, when used for biodiversity preservation, can help forecast species distribution, habitat suitability, and ecosystem changes. This helps with predicting possible new environmental threats and planning suitable actions in preventing habitat loss and overall preservation of endangered species.[26]

Further Readings
https://www.researchgate.net/publication/236586611_The_application_of_predictive_modeling_of_species_distribution_to_biodiversity_conservation

Impacts of AI technology on biodiversity

Response times and effectiveness in conservation have been improving in response to AI-powered tools. For example, in Kenya, the integration of AI with ranger patrols has led to over a 50% decrease in elephant poaching and a 90% decrease in rhino poaching in the past 10 years[27]. AMW, a satellite-based system, has enabled near real-time detection of land-use changes, such as

[25] "Predictive Model." *ScienceDirect Topics*, Elsevier, sciencedirect.com/topics/computer-science/predictive-model. Accessed 27 Aug. 2025.
[26] Rodríguez, J. P. "The application of predictive modelling of species … " *Diversity and Distributions*, vol. 13], 2007, Wiley. *The application of predictive modelling of species...* DOI: 10.1111/j.1472-4642.2007.00356.x. Accessed 27 Aug. 2025.
[27] MacLeod, Alastair. "Tracking and Tackling Africa's Poachers with Satellite IoT." *IOT Insider*, 16 Oct. 2024, www.iotinsider.com/iot-insights/technical-insights/tracking-and-tackling-africas-poachers-with-satellite-iot/. Accessed 27 Aug. 2025.

deforestation or mining, which in turn led to faster enforcement of environmental laws. These technologies help protect ecosystems that are critical for climate regulation, water purification, and carbon storage.[28]

While AI enhances conservation, it also raises social concerns. Camera traps and drones may inadvertently capture images of local or Indigenous communities, risking privacy violations. Furthermore, the centralised control of sensitive data such as the location of endangered species can lead to misuse if not properly protected, potentially endangering both biodiversity and local populations. Such data, if put in the wrong hands, can lead to people targeting endangered species. As a result, poaching and overhunting, which are detrimental to ecological balance, can become potential concerns and may harm the local communities.

In addition, the use of AI in conservation can bring long-term economic benefits by preserving ecosystem services such as pollination and water filtration, as well as restoring soil fertility. However, the high cost of deploying AI technologies, including equipment, cloud services, and trained personnel, could place an economic toll on Less Economically Developed Countries (LEDCs). Without global cooperation and resource-sharing, these economic disparities could widen.

Balancing Innovation, Safety and Equity

Data privacy

Ecological data collected must be protected, and measures must be put in place to prevent the misuse of such information. Improper handling of such sensitive data–such as GPS coordinates of endangered species–could have a harmful impact on wildlife by facilitating illegal logging, poaching, as well as other harmful activities.[29] Furthermore, conservation projects should maintain a balance between providing transparency to the public and keeping certain critical information, such as the aforementioned, undisclosed.[30]

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[28] "Tropical Deforestation." *NASA*, NASA, earthobservatory.nasa.gov/features/Deforestation/deforestation_update3.php. Accessed 20 Aug. 2025.
[29] "Recommendation on the Ethics of Artificial Intelligence." *UNESCO.Org*, 23 Nov. 2021, www.unesco.org/en/legal-affairs/recommendation-ethics-artificial-intelligence.
[30] "To What Extent Do Data Privacy Issues Impact AI Wildlife Monitoring? → Question." *Sustainability Directory*, 1 Jan. 1970, sustainability-directory.com/question/to-what-extent-do-data-privacy-issues-impact-ai-wildlife-monitoring.

Algorithmic bias

Algorithmic bias takes place when AI systems generate flawed responses based on biased design or incorrect data. In the context of biodiversity conservation, such biases could be displayed as AI prioritising specific species or habitats over others due to a lack of training data for certain other species. This can distort conservation priorities and decrease trust in AI tools, especially in communities which are directly affected by conservation policies.

Equitable access

Access to AI technologies is often limited in many Less Economically Developed Countries (LEDCs). In biodiversity-rich regions with insufficient resources, it is essential to invest in local capacity-building and infrastructure. Global initiatives such as those aligned with Sustainable Development Goal 15 must prioritise inclusive and responsible AI development, ensuring that the benefits of digital tools are shared fairly across nations.[31]

Further Reading:

- https://wildlifeinsights.org
- https://www.microsoft.com/en-us/ai/ai-for-earth
- https://www.globalforestwatch.org

Case Study: Camera-Trap Classification in African Reserves

Platforms such as Wildlife Insights, which was launched in December 2019, are using deep-learning models to transform biodiversity monitoring. This is because the deep-learning models can be used to identify animals using millions of camera-trap images, which reduces manual sorting time.[32] In African reserves such as the Kruger National Park in South Africa, this technology allows for near real-time monitoring of the distributions of species and population movements, which helps to address potential threats like poaching or habitat destruction. The Wildlife Insights model has been trained to be able to recognise 1,295 species from all around the world.[33] This platform has allowed

[31] Kupferschmidt, Kai. "How the Pandemic Made This Virologist an Unlikely Cult Figure." *Science*, vol. 368, no. 6489, 28 Apr. 2020, p. 1126, https://doi.org/10.1126/science.abc5095. Accessed 27 Aug. 2025.
[32] "Home." *Wildlife Insights*, wildlifeinsights.org/. Accessed 20 Aug. 2025
[33] Hehmeyer, Abby**.** "Using the Power of AI to Identify and Track Species." *World Wildlife Fund*, 3 Mar. 2025, www.worldwildlife.org/stories/using-the-power-of-ai-to-identify-and-track-species. Accessed 27 Aug. 2025.

researchers to widen their knowledge on species such as jaguars, monkeys and many more. It has also played a role in the assessment of human interactions with different species, which allows researchers to make more informed decisions on preservation methods.

Nonetheless, the precision of the application relies heavily on well-structured, high-quality datasets. Rare or obscure species are often underrepresented in datasets, resulting in inaccuracy and bias. Certain environmental factors, such as poor lighting, dense vegetation, and partial sightings, can reduce accuracy and increase the need for human verification.[34]

Certain efforts have been implemented to improve such systems, including the expansion of global image databases, data augmentation to strengthen image recognition, and citizen-science participation in species verification. This project has been considered successful, as millions of snapshots of species have been taken throughout the world, with many of these coming from the African reserves. This has allowed not only researchers to gain more knowledge on species but also to better understand how human interactions affect them.

Further reading:

- https://wildlifeinsights.org
- https://www.wwf.org.uk/updates/how-ai-helping-protect-biodiversity

Date	Description of the event
5 October, 1948	The International Union for the Conservation of Nature (IUCN) was formed
1971	UNESCO's "Man and the Biosphere" project began
November 16, 1972	The World Heritage Convention started bringing attention to the importance of conservation
2017	Wasserstein GANs (WGANs) were developed and had a significant impact on the advancement of AI, especially in the environmental field.[35]

[34] *Choosing an Appropriate Platform and Workflow For ...*, arxiv.org/pdf/2202.02283. Accessed 20 Aug. 2025.
[35] Benjaminson, Emma. "Wasserstein Gans." *Wasserstein GANs – Emma Benjaminson – Data Scientist*, sassafras13.github.io/Wasserstein/. Accessed 21 Aug. 2025.

2018	Project Guacamaya used AI to monitor deforestation and protect biodiversity in the Amazon rainforest[36]
2019	Wildlife Insights was launched as the largest camera-trap database, hosting over 4.5 million images[37]
8 July 2021	Launch of Wildlife Insights AI platform for camera-trap image classification.
15 April 2020	The planetary computer initiative was launched by Microsoft to collect a large quantity of photos in hopes of improving and addressing global sustainability issues.[38]
July 2023	The LIFE program started integrating AI to find possible solutions for environmental preservation.[39]
30 July 2025	Google Earth AI was launched. It includes a collection of geospatial AI models and datasets to address critical global challenges.[40]

Major countries, organisations and alliances

Brazil

Brazil employs AI and satellite technology to monitor deforestation in the Amazon rainforest. It has been revealed that over two million hectares of forest loss were caused by illegal mining.[41] Brazil is

[36] *Artificial Intelligence for Climate Action in Developing ...*, unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/AI4climateaction/28da5d97d7824d16b7f68a225c0e3493/a4553e8f70f74be3bc37c929b73d9974.pdf. Accessed 20 Aug. 2025.
[37] Sing, Nathan. "A Google-Backed Website Is Compiling Millions of Wildlife Images." *CNN*, Cable News Network, 13 Jan. 2020, www.cnn.com/2020/01/13/world/wildlife-insights-camera-trap-scn-intl-c2e.
[38] Nieto-Rodriguez, Antonio, and Ricardo Viana Vargas. "The Opportunities at the Intersection of AI, Sustainability, and Project Management." *Harvard Business Review*, 27 Oct. 2023, hbr.org/2023/10/the-opportunities-at-the-intersection-of-ai-sustainability-and-project-management.
[39] "EU Invests €220 Million to Test AI Solutions for Healthcare, Food, Industry, and Everyday Life." *Shaping Europe's Digital Future*, digital-strategy.ec.europa.eu/en/news/eu-invests-eu220-million-test-ai-solutions-healthcare-food-industry-and-everyday-life. Accessed 21 Aug. 2025.
[40] *Artificial Intelligence for Climate Action in Developing ...*, unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/AI4climateaction/28da5d97d7824d16b7f68a225c0e3493/a4553e8f70f74be3bc37c929b73d9974.pdf. Accessed 20 Aug. 2025.
[41] "MAAP Update: Using AI to Detect Gold Mining Deforestation in the Amazon." *Amazon Conservation Association*, 8 May 2025.

home to the largest tropical rainforest in the world, and thus, the protection of its biodiversity is crucial. Using a combination of AI-driven monitoring systems and high-resolution imagery, such technology has given the authorities the opportunity to detect illegal activity almost instantly, allowing them to take enforcement actions more swiftly. International collaborations and open-access data initiatives further strengthen Brazil's capacity to safeguard the Amazon's ecological integrity.

China

China has been investing large amounts of money into AI-driven solutions to conserve the environment. With technologies such as drones, AI-based camera traps, and eDNA analysis, China can protect its biodiversity hotspots, such as the one in Yunnan province.[42] China, being a large country with rich biodiversity, has a major impact when deciding and implementing policies to protect biodiversity and ecosystems. The continuous efforts and improvements being made by China have allowed it to detect threats such as habitat degradation in early stages. Different partnerships between government agencies and other organisations, such as IUCN, which has been a long-term partner of China, have led to the acceleration in the development of more efficient and effective tools.[43]

United States

The U.S. is home to leading AI research institutions and tech companies. Initiatives such as Microsoft's AI for Earth offer grants and cloud resources for conservation work.[44] The federal government also funds national parks and contributes to global biodiversity monitoring, making the U.S. a major driver of conservation technology. The partnership between federal agencies, NGOs, and private-sector innovators has resulted in the development of advanced tools which can be used

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https://www.amazonconservation.org/maap-update-using-ai-to-detect-gold-mining-deforestation-in-the-amazon/. Accessed 27 Aug. 2025.

[42] Yu, Tian-Tian, et al. "A Glimpse into the Biodiversity of Insects in Yunnan: An Updated and Annotated Checklist of Butterflies (Lepidoptera, Papilionoidea)." *Zoological Research*, 2022. *PMC*, https://pmc.ncbi.nlm.nih.gov/articles/PMC9700505/.

[43] F_126. "China Employs Tech to Boost Conservation of Migratory Birds." *China Employs Tech to Boost Conservation of Migratory Birds - People's Daily Online*, en.people.cn/n3/2025/0113/c90000-20265252.html. Accessed 21 Aug. 2025.

[44] "Microsoft Planetary Computer." *Microsoft*, www.microsoft.com/en-us/ai/ai-for-earth. Accessed 21 Aug. 2025.

for tasks like species tracking. The efforts the USA has made result in it being a key player in shaping global standards for the ethical and effective use of AI in conservation.

Kenya

Kenya has used AI to overcome a major issue: poaching. Through integrating smart collars, sensors and predictive models, this strategy has led to a 50% reduction in elephant poaching and a 90% drop in rhino poaching over the past decade. It demonstrates how AI can protect species in biodiversity-rich areas.[45]

UNESCO

The United Nations Educational, Scientific and Cultural Organization (UNESCO) promotes the protection of natural and cultural heritage. It has started programs such as the Man and the Biosphere Programme (MAB), and has also adopted the World Heritage Convention. UNESCO has been involved in supporting conservation for many years. For instance, in 2021, UNESCO's 193 member states adopted the Recommendation on the Ethics of Artificial Intelligence, emphasising human rights, environmental sustainability, and inclusiveness.[46]

IUCN (International Union for Conservation of Nature)

The IUCN maintains the Red List of Threatened Species, helps coordinate international conservation strategies and also supports research and dialogue on the ethical use of AI in conservation efforts. It has set certain global criteria for species risk assessments, using a scientific foundation to establish conservation priorities and policy decisions. IUCN collaborates with numerous NGOs, the government and technology partners to ensure that while AI applications align with biodiversity goals, they also respect social and environmental safeguards.[47]

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[45] *Thermal Cameras and Ai Help Wildlife*, www.worldwildlife.org/stories/how-thermal-cameras-and-ai-are-powering-rhino-conservation-success-in-kenya. Accessed 20 Aug. 2025.

[46] "Microsoft Planetary Computer." *Planetary Computer*, planetarycomputer.microsoft.com/. Accessed 21 Aug. 2025.

[47] "The IUCN Red List of Threatened Species." *IUCN Red List of Threatened Species*, www.iucnredlist.org/. Accessed 21 Aug. 2025.

Previous attempts to solve the issue

Satellite Monitoring for Illegal Deforestation (2022)

The Amazon Mining Watch (AMW) dashboard combines satellite imagery with machine learning to detect illegal, mining-driven deforestation. As of 2024, AMW has documented over two million hectares of forest loss in the Amazon.[48] While the technology is effective, limited internet infrastructure and technical capacity in rural areas often delay enforcement actions. These technologies have been seen as successful, as they have led to reduced deforestation and improved wildfire prevention. Although such technology has been helpful, it sometimes involves biased decision-making, which needs to be avoided in order to achieve more effective biodiversity preservation through this technology.[49]

Further reading:

- https://www.globalforestwatch.org
- https://earthobservatory.nasa.gov/features/Deforestation

Acoustic AI Systems to Track Species (2010)

At George Mason University, researchers developed an AI model trained to recognise the calls of 250 Amazonian bird species. In practical testing, the model successfully detected 201 species.[50] These acoustic systems are vital for tracking elusive or nocturnal animals, though they require extensive labelled datasets and are sensitive to environmental noise. Although during the practical testing this technology is successful, it has not yet been properly used to be considered a solid solution, and has not met its complete goal.

Further reading:

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[48] Vizzuality. "Forest Monitoring, Land Use & Deforestation Trends: Global Forest Watch." *Forest Monitoring, Land Use & Deforestation Trends | Global Forest Watch*, www.globalforestwatch.org/. Accessed 21 Aug. 2025.
[49] "What Is AI Bias? Understanding Its Impact, Risks, and Mitigation Strategies." *Holistic AI*, Holistic AI, 10 Sept. 2024, www.holisticai.com/blog/what-is-ai-bias-risks-mitigation-strategies. Accessed 27 Aug. 2025.
[50] "Research Using AI to Track Amazon Rainforest Species Produces Landmark Results." *George Mason University*, 19 Aug. 2025, www.gmu.edu/news/2024-11/research-using-ai-track-amazon-rainforest-species-produces-landmark-results.

- https://science.gmu.edu/news/using-ai-monitor-bird-populations-amazon
- https://www.nature.com/articles/s41598-020-65926-4

Rainforest Connection Acoustic Monitoring (2020)

Rainforest Connection (RFCx) is a non-profit organisation that has used recycled smartphones to develop AI-powered acoustic monitoring systems. These systems have been placed high in rainforest canopies to be able to constantly monitor and record sounds. The real-time audio is used by AI to analyse both threat signals and biodiversity signals to be able to act in moments where species are in danger rapidly. Considering these devices are constantly active, they can monitor both elusive and nocturnal species.[51] This system is now being used in multiple countries, including Ecuador, Peru, and Cameroon, where it's helping researchers and locals monitor ecosystems. Although such a system acquires a large amount of data effectively, it needs to maintain a good network connection and be managed properly, which, in such environments, could be a potential issue.[52]

Further reading:

- https://www.wwf.org.uk/project/conservationtechnology/acoustic-monitoring
- https://www.worldwildlife.org/stories/using-the-power-of-ai-to-identify-and-track-species

Possible solutions

Promote International Data-Sharing Agreements

The effectiveness of AI models depends heavily on access to diverse, high-quality datasets. By establishing open-access repositories and standardised formats for ecological data, international collaboration can reduce algorithmic bias and improve accuracy. Countries with a rich biodiversity (such as Brazil) should be sharing ecological data, so that they could receive aid from countries with more resources, but also so that other countries can adapt faster to the changes needed to preserve their species and ecosystems. These efforts would also safeguard the privacy of local communities and respect the rights of Indigenous peoples. This would be achieved through making legal

[51] Rainforest Connection. “AI and Acoustic Monitoring.” *Rainforest Connection*, 2020, https://rfcx.org
[52] Aide, T. Mitchell, et al. “Real-Time Bioacoustics Monitoring and Automated Species Identification.” *PeerJ*, vol. 8, 2020, e10357. https://doi.org/10.7717/peerj.10357

agreements with the Indigenous communities regarding the implementation of certain AI tools and technologies, which might include terms on respecting Indigenous territories.[53]

Establish Ethical Frameworks

To ensure that AI is used responsibly in conservation, ethical guidelines must be adopted at both national and international levels. Facilitated by the UN and international organisations such as IUCN, countries worldwide could come to an agreement with certain ethical frameworks, such as maintaining a balance between sharing information gained from AI-driven technologies and keeping certain sensitive data private to prevent misuse. This would ensure some level of data sharing to support global conservation work, while promoting accountability with such information.[54] At a national level, countries could implement ethical frameworks that might include the approved areas in a country where AI technologies can be used without disrupting the environment, as well as the specific ways they can be adopted depending on the ecological conditions of various regions. The creation of such frameworks is especially important to countries with large biodiversity hotspots and many endangered species.

Expand Public–Private Partnerships

Collaboration between governments, NGOs, and tech companies is essential to scale affordable conservation tools. Public–private partnerships can combine commercial innovation with conservation goals, resulting in more accessible and efficient technologies. These partnerships would also foster long-term investment in conservation beyond temporary donor support.[55] This could allow key technologies such as camera-traps and acoustic monitoring systems to be further advanced, and help them become more accessible to countries worldwide. All of this would lead to accelerated research and finds on the different species' lifestyles, and could help shape policies that more effectively protect them worldwide.

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