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## **Background Guide**

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Topic: Using Artificial Intelligence to Protect Nature and Support Green Change

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# Using Artificial Intelligence to Protect Nature and Support Green Change

## 1. Background

Today, the world is facing serious environmental problems. Forests are getting smaller, animals and plants are disappearing much faster than before, and ecosystems are becoming weaker. Losing biodiversity (the variety of life on Earth) is not just bad for nature — it also threatens human life by affecting food supplies, weather stability, and the spread of diseases. Because of this, protecting nature while continuing to grow the economy has become an important goal in the United Nations Sustainable Development Goals (SDGs).

At the same time, a new wave of science and technology — especially Artificial Intelligence (AI) — is changing how countries work together. AI is very good at finding patterns and analyzing big amounts of data. It is now being used in nature protection, such as identifying wild animals, reading satellite images, tracking where animals move, and helping scientists monitor the environment more easily. The United Nations' “AI

for Good” Global Summit has said for years that AI has great power to help protect biodiversity and fix damaged ecosystems.

With the help of AI, we now have new ways to turn “clear waters and green mountains” into real value. For example, AI can help us find and measure the value of natural resources. It can also help build systems for eco-compensation (paying people or places that protect nature) and carbon tracking. This helps share the benefits of protecting nature more fairly between cities and villages, rich and poor areas, and different countries. By combining large AI models with satellite technology, we can build global systems to watch over national parks and protected areas more carefully.

However, there are still many problems. First, building and using AI requires powerful computers, large amounts of data, and skilled experts. Many developing countries do not have enough of these, which means they may be left out of global environmental decisions. Second, collecting ecological data often touches on sensitive issues like privacy, national control, and local community rights — especially in areas with Indigenous peoples or rich natural resources. Third, training

large AI models uses a lot of energy, which could hurt efforts to fight climate change and reduce pollution.

## 2. Key Term

- Biodiversity

Biodiversity means the variety of life on Earth. It includes different ecosystems, species, and genes. From tiny microbes to large animals, from rainforests to the North and South Poles, all are part of biodiversity. Protecting biodiversity helps nature stay strong, supports farming, and helps control the climate.

- Biodiversity Loss

Biodiversity loss means the number and types of living things are decreasing. This is mostly caused by human actions like cutting down forests, pollution, climate change, and bringing new harmful species into ecosystems. When biodiversity is lost, nature cannot clean water, grow food, or control diseases as well.

- Genetic Resources

Genetic resources are parts of living things that contain genetic information, like DNA. These are important for science, farming, and making new medicines. Sharing and using genetic resources fairly is important to make sure all countries benefit.

- Ecosystem Biodiversity

This is the variety of different ecosystems, such as forests, grasslands, wetlands, and deserts. It shows how different parts of nature work and connect. Having many types of ecosystems helps keep the planet healthy.

- Ecosystem Services

Ecosystem services are the things nature gives us. These include food, clean water, storing carbon, preventing floods, and even providing places to learn and enjoy. Knowing how much these services are worth helps us understand how important nature is to our lives and economy.

- Green AI

Green AI means using AI in a way that is better for the environment. It tries to use less energy, water, and materials. Scientists use smart ways to build AI systems that work well but

don't harm nature, like using cleaner electricity and better computer parts.

- Biodiversity Informatics

This means using computers and data to study biodiversity. It helps scientists understand where species live, how they are changing, and how to protect them. It supports the use of AI in solving problems about animals, plants, and the environment.

- Invasive Species

An invasive species is a plant or animal that comes from another place and harms the local environment, economy, or people's health. AI can help find and watch these species and stop them from spreading too far.

- Ecological Footprint

The ecological footprint shows how much nature we use in our daily lives. It tells us how much land and water are needed to support our lifestyle. AI can help measure this and give ideas on how to use fewer natural resources.

- Digital Sequence Information (DSI)

DSI is the digital form of genetic information, like DNA data from animals, plants, or microbes. It is useful for research, medicine, and farming. Countries and communities want to make sure this information is shared fairly.

### 3. International Actions

Based on the United Nations “AI for Good” platform—launched by the International Telecommunication Union (ITU) together with over 40 UN agencies—it is recommended to establish the Ecosystem AI Governance Alliance (EAI Alliance). This alliance would focus on using AI to protect biodiversity. The goal is to share AI models, remote sensing and eDNA data, successful project examples, and management experience. This would help more countries join in ecosystem AI projects, gain access to technology, and support innovation through cooperation. The United Nations Development Programme (UNDP) has already helped over 50 countries use AI to support their biodiversity policies, showing that this kind of alliance is possible and useful.

In addition, the Kunming–Montreal Global Biodiversity Framework and the Cali Fund, launched in early 2025, have created a system called Digital Sequence Information (DSI) Benefit-Sharing Mechanism. This system helps make sure that countries with rich biological resources, Indigenous peoples, and local communities can share the benefits of using their genetic data. The EAI Alliance is encouraged to follow this framework, support data sovereignty, and make sure that data collection and use are approved by countries and local communities. It also encourages AI companies and research groups to offer technical help, training, and fair rewards—such as funding or licenses. The alliance can also create a "Green Contribution Credit System" to track and recognize countries' efforts in protecting ecosystems.

To make sure AI is used in a way that helps the environment, the alliance should also help build green AI standards and evaluation systems. These standards should explain how much carbon, water, and electricity an AI system can use when being trained and used. Studies show that changing the way AI models are trained (for example, using better settings) can cut energy use by more than 50%. The alliance can work with groups like GPAI (Global Partnership on AI), WMO (World Meteorological

Organization), and UNEP (United Nations Environment Programme) to set up green certifications. These can help developers choose low-carbon systems and clean energy, and offer eco-friendly AI projects low-cost loans or support.

To help developing countries use AI in ecosystem projects, the alliance should focus on building skills and sharing knowledge. In 2024, China launched the AI Capacity-Building Action Plan, which supports South–South and three-way (triangular) cooperation to give more people access to AI education. The alliance could work with UNDP, UNESCO, the World Bank, and others to run AI training and pilot projects in tropical forests, wetlands, and other protected areas. Local universities and NGOs can also be part of creating models that suit their own environment.

The alliance could also create a network of regional pilot projects, such as in tropical rainforests, national parks, or desert restoration areas. In these places, AI tools can monitor forest health, track species, and watch for illegal logging. China’s Three-North Shelterbelt Program and desert control projects already have strong experience in restoring ecosystems. These can be added to the alliance’s knowledge base, and shared

online or through country-to-country visits so others can learn from them.

In China, regions like Beijing–Tianjin–Hebei and the Yellow River Basin have already started using AI for environmental monitoring. These include AI systems that detect forest fires, recognize biodiversity from satellite images, and help manage restoration work. These projects also include green evaluation systems to measure energy use and carbon emissions. This puts into action the idea of “Lucid waters and lush mountains are invaluable assets,” which means that protecting nature also creates value for people.

#### 4.Link with Sustainable Development Goals (SDGs)

##### SDG 15: Life on Land

Protecting biodiversity is at the center of this topic, and it directly supports the goal of SDG 15, which is to “protect, restore, and promote the sustainable use of land ecosystems.” AI can be used in many ways to help reach this goal. For example, with image recognition and satellite technology, AI can automatically identify endangered species, watch changes in

forest coverage, and give early warnings for illegal logging or poaching. In some national parks in China, AI-powered drones are already used to check ecosystem conditions regularly. These tools make environmental monitoring more accurate and faster, which helps protect nature and endangered animals.

### SDG 13: Climate Action

Fighting climate change needs both technology and good policy. AI can help by modeling climate risks, checking carbon emissions, and improving how carbon trading systems work. It also helps countries plan their Nationally Determined Contributions (NDCs). In China's effort to reach "carbon peak and carbon neutrality," AI is being used to help set carbon budgets and track carbon footprints in different regions. AI also helps manage clean energy systems like offshore wind and solar power. By using AI in climate work, countries can build low-carbon and smart environmental systems, which supports SDG 13.

### SDG 9: Industry, Innovation and Infrastructure

AI is a key part of the new "smart productivity" and is changing the way green industries work. Combining AI with environmental protection is a kind of green innovation, which

matches the goals of SDG 9 to build sustainable industries and improve research capacity. With AI tools like large-scale demo platforms, green algorithm design, and low-energy devices, new kinds of digital infrastructure are growing—such as “Eco-AI Data Centers” and “Green Algorithm Labs.” China is also developing eco-friendly industrial zones and services, helping to upgrade green infrastructure and support SDG 9.

#### SDG 17: Partnerships for the Goals

AI and biodiversity protection both need strong international cooperation. To share environmental data, spread green technology, and build fair AI rules, we need global teamwork. This topic proposes an “Eco-AI Governance Alliance,” which fits well with SDG 17’s call to “strengthen partnerships and share knowledge, technology, and resources.” China supports this through the “Digital Silk Road,” South-South cooperation projects, and work with the UN on AI development. These actions help make green technologies global public goods.

#### SDG 12: Responsible Consumption and Production

Building a system to show the value of nature is key to turning “green waters and lush mountains” into real wealth. AI can help measure and report on ecosystem services—like carbon storage,

water supply, and habitat quality—and include these in economic systems. This helps turn natural resources into visible assets and encourages people to protect nature. It also reduces waste and promotes green consumption and sustainable production, supporting the goal of SDG 12 for better resource use.

#### SDG 4: Quality Education

To make AI work for biodiversity around the world, we must also improve education and skills. SDG 4 asks us to make sure everyone has access to quality education. In AI for nature protection, fairness depends on whether all countries—especially developing ones—can get training and basic tools. This topic supports building “Global Eco-AI Curriculum Modules” and technical aid programs for smaller or lower-income countries. These efforts help people learn how to use AI for ecology and spread environmental education globally.

#### 5. National Positions

## China

China is a policy-driven country in both ecological protection and artificial intelligence. It promotes the development idea that “Lucid waters and lush mountains are invaluable assets,” and has already carried out many pilot projects combining “AI + green governance.” China supports strengthening the role of the United Nations in digital ecological governance and calls for building an inclusive international cooperation framework for Eco-AI.

## G77 + China (Group of Developing Countries)

This group emphasizes that Eco-AI governance must reflect technological fairness and shared capacity. Most member states have rich ecological resources but weak AI technology and computing power. They strongly support setting up technical assistance, green financing, and a fair data benefit-sharing system in global Eco-AI cooperation.

## Russia

Russia has fast development in AI and values national

sovereignty in ecological governance. It is cautious about sharing ecological data internationally and tends to see Eco-AI as part of national strategic security.

### European Union (EU)

The EU is a global leader in promoting responsible AI and green digital transformation. It is actively pushing forward the EU AI Act and the European Green Deal. The EU believes AI in environmental protection must follow the principles of ethics, fairness, transparency, and sustainability. Eco-AI should serve the larger goal of the European Green Deal.

### United States

The U.S. pays close attention to the use of AI in both environmental and national security fields. It supports AI development led by the private sector. In ecological governance, the U.S. stresses innovation freedom and private sector-driven solutions, but is cautious about sharing ecological data across borders.

## ASEAN Countries

ASEAN countries care deeply about forest protection, marine biodiversity, and climate disaster early warning. Technology development levels vary across the region. Some countries, like Singapore, have strong Eco-AI potential, while most others look forward to more international cooperation to close the technology gap.

## Brazil and Latin American Countries

Latin America is one of the most biodiverse regions in the world, making Eco-AI highly important for the region. Brazil, as a leading country in ecological issues, believes AI governance must protect both natural resources and Indigenous cultures.

## Current Challenges and Possible Solutions for Eco-AI

Today, Artificial Intelligence (AI) shows great potential in helping protect biodiversity and promote green transformation. However, the development of Eco-AI also faces many complex challenges. First, the energy use and carbon footprint of AI is growing rapidly. According to a report by the ITU, between 2020 and 2023, the indirect carbon emissions from major tech

companies like Amazon, Microsoft, Google (Alphabet), and Meta increased by an average of 150%, equal to about 102.6 million tons of CO<sub>2</sub> per year. Training large AI models requires huge amounts of electricity and water. For example, training GPT-3 used up to 700,000 liters of clean water. This high energy use goes against the goals of green development and climate action.

Second, AI hardware also causes pollution and waste. Making, using, and throwing away large numbers of servers and data centers creates more and more electronic waste. In 2022, the world produced around 62 million tons of e-waste, and this number is still rising. AI devices also need rare earth elements and important minerals. Without strong recycling systems, this may harm the environment and increase pressure on global resources.

Another challenge is about data ethics and national rights. Many biodiversity hotspots are in developing countries. These places often have rich ecosystems and Indigenous communities. But when collecting data for AI, the rights of these areas and their people are often ignored. If data use and algorithms are not transparent, it may lead to unfair results or even harm local

communities. This could reduce trust and make global ecological cooperation more difficult.

Also, there is still no complete system to measure how good or bad AI is for the environment. Although AI is already used in biodiversity monitoring, species recognition, and early warning systems, most assessments focus only on technical functions—not environmental costs. To build a truly “green AI,” we must count not only performance, but also how much energy and water it uses, and how much carbon it produces. Right now, there is no single global standard to measure these things, making it hard to compare AI projects or involve public oversight.

Another problem is that green AI laws and regulations are still lacking. Some regions like the EU and OECD have begun creating frameworks, but most of their rules focus on AI safety and privacy—not environmental impact. We still need clear and unified green AI standards to guide developers and compare results.

There is also a big gap in AI technology between developed and developing countries. Rich countries have strong computing power and AI experts. But many developing countries with rich

natural resources lack these tools. They cannot easily build or use AI for their own ecosystem projects. This “technology gap” could make global eco-governance more unfair: resource-rich countries may not get the benefits of their own ecological data.

Another challenge is the lack of local and community participation in AI projects. Most Eco-AI plans are led by governments or large companies, while local people and Indigenous communities are left out. Without their knowledge and input, projects may misunderstand nature or ignore cultural values. This can reduce both accuracy and fairness.

To face these challenges, we need a complete set of green AI standards and guiding principles. First, we must make AI models lighter and greener—use less power, produce less carbon, and waste less water. Studies suggest that using better model design, smaller parameters, and efficient training methods (like sparse networks or mixed-precision learning) can cut energy use by more than 50%, without losing performance. We also need to speed up the use of low-carbon hardware, power data centers with clean energy, and explore edge computing to reduce long-distance data transfer.

To bridge the technology gap, we should build a South–South Eco-AI capacity-building and tech-sharing system. For example, an Eco-AI fund could help local NGOs, universities, and start-ups in developing countries get access to computing power, data resources, and teacher training. The “AI for Climate and Nature Grand Challenge,” supported by Microsoft and the Bezos Earth Fund, offers small funding to spark local innovation—this can serve as a model.

We should also work with the UNDP, CBD, World Bank, and others to set up multinational pilot networks. These can be located in ecological hotspots like tropical rainforests, coral reefs, or national parks. In these places, AI can monitor ecosystems, track species, detect illegal logging, and help prevent extinction. These pilot zones can also include carbon tracking, e-waste management, and community participation. With full testing and documentation, successful examples can be copied in other areas.

On the policy side, we should promote the creation of a global green AI regulatory framework, where every country agrees to include AI’s environmental performance in their AI rules and climate reports. Also, Eco-AI projects should always start with

local knowledge and community workshops, where Indigenous people and local residents can share what they know—like animal migration routes or local plant uses—and take part in data labeling, project design, and benefit sharing.

In the end, building a green AI system is a large project that includes technology, laws, education, ethics, community input, cross-field cooperation, and green finance. Only by working together in all these areas can we truly use AI to help nature—and turn “lucid waters and lush mountains” into a shared treasure for all.

Question to consider

How can AI technology help us find and monitor different species and ecosystems more effectively?

What does it mean to have “lightweight” and “green AI,” and how can we use these ideas in real life?

How should we check and measure the environmental impact of Eco-AI projects?

How can countries in the Global South work together to build stronger Eco-AI skills and networks?

Do we need one set of global rules or standards for using AI in ecology?

What is the role of AI in helping reach the Sustainable Development Goals (SDGs) and building a shared future for all people?

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