



Lesson 2:

Environmental Restoration

Importance and Benefits

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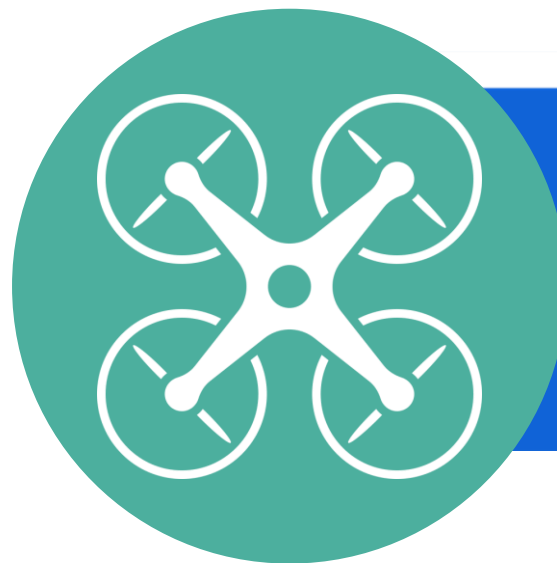


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Lesson Objectives

Understand basic concepts of
environmental restoration



Understand how drone technology relates
to Environmental restoration

Learn about skills and career paths relevant
to Environmental restoration



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2.1 Environmental Restoration & sustainability

What is Environmental restoration?

Environmental Restoration (ER): The process of aiding the recovery of ecosystems that have been degraded, damaged, or destroyed

Environmental Sustainability: The ability to maintain ecological balance and preserve natural resources for future generations.



2.1 Environmental Restoration & sustainability



Roles

Ecosystem Health: Enhances biodiversity and habitat resilience.

Climate Mitigation: Reduces carbon footprint and increases carbon sequestration.

Community Well-being: Provides clean air, water, and recreational spaces.

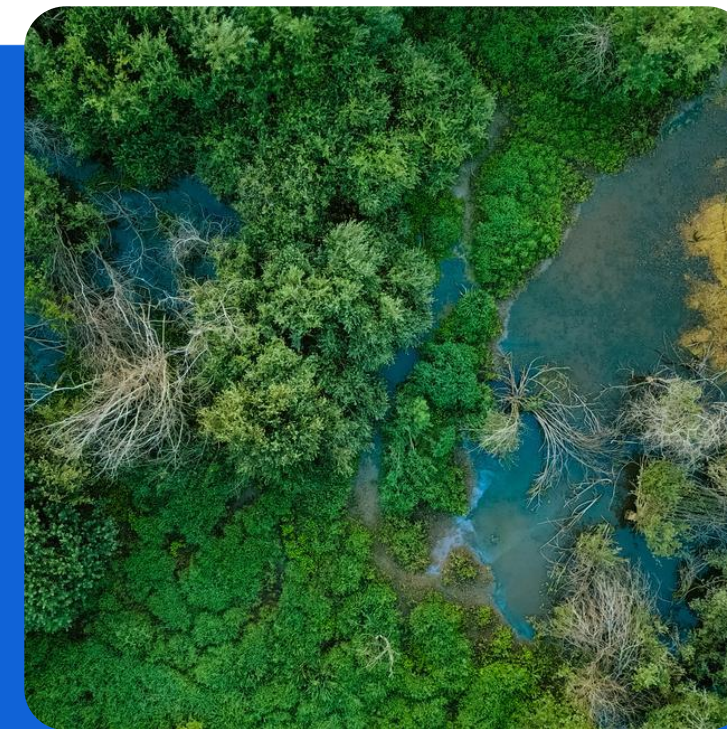
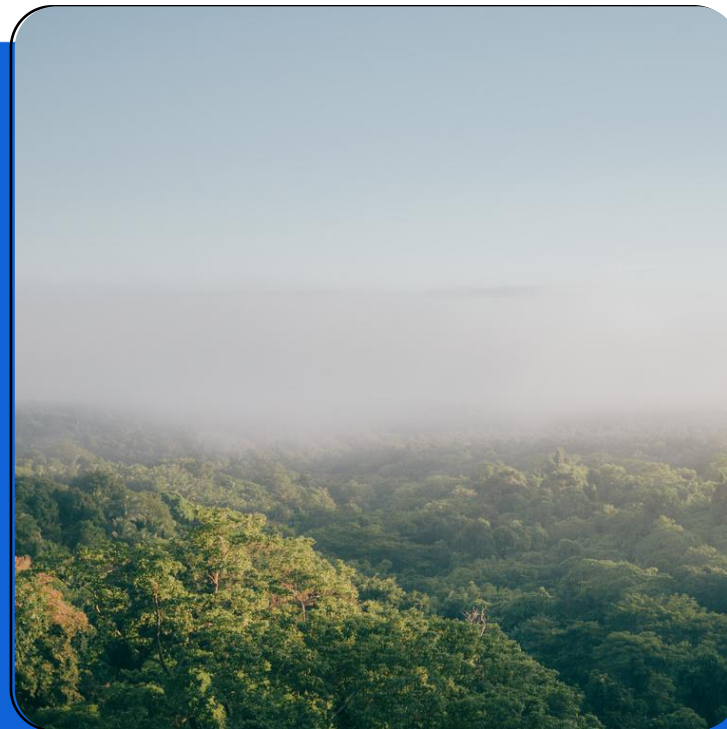
2.2.Environmental Restoration: Benefits

1.Ecosystem Recovery:

To restore degraded habitats and promote the recovery of native flora and fauna.

2. Biodiversity Enhancement:

To increase species diversity and restore ecological balance, allowing ecosystems to function effectively.



2.2.Environmental Restoration: Benefits

3. Climate Change Mitigation:

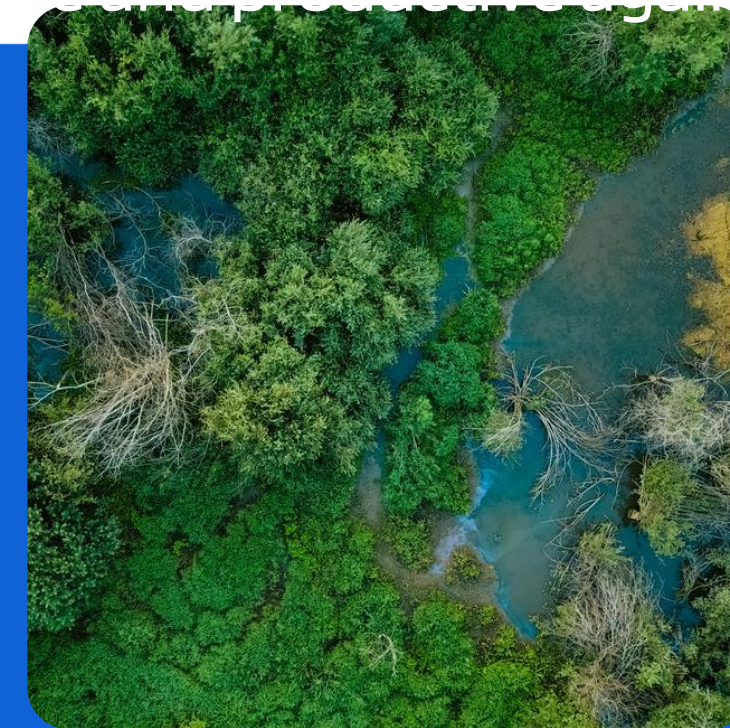
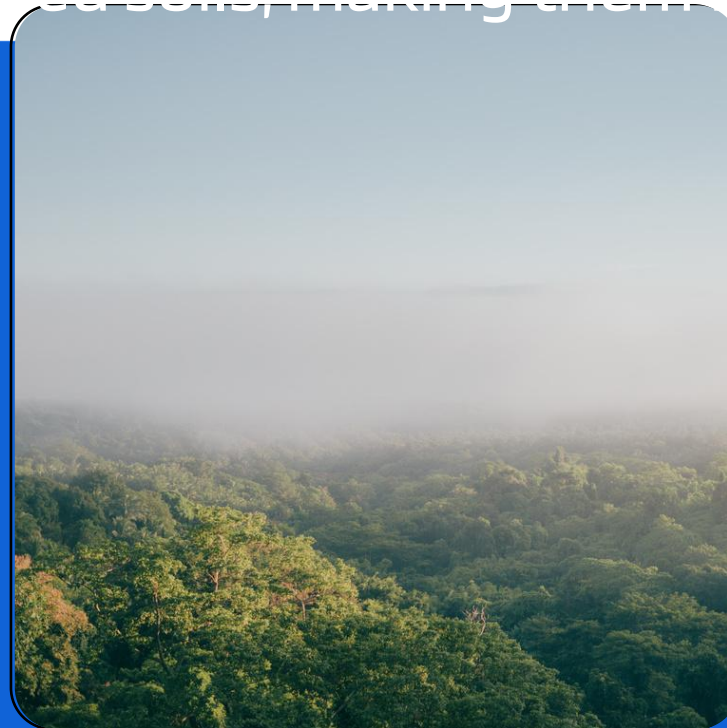
To enhance carbon sequestration and reduce greenhouse gas emissions through healthier ecosystems.

4. Water Quality Improvement:

To restore wetlands and riparian zones that filter pollutants and improve water quality in nearby bodies of water.

5. Soil Rehabilitation:

To remediate contaminated or degraded soils, making them fertile and productive again.



2.2.Environmental Restoration: Benefits

6. Cultural and Historical Restoration:

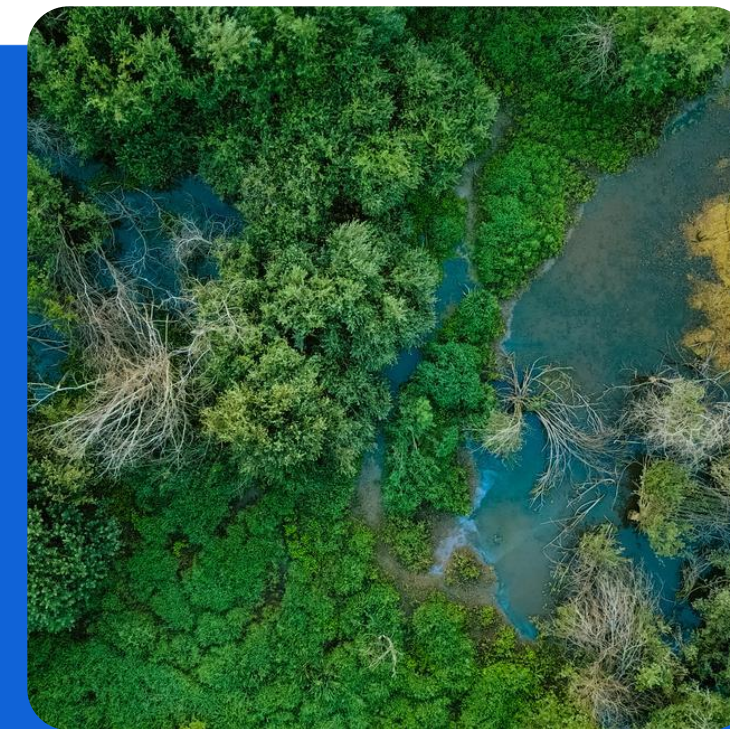
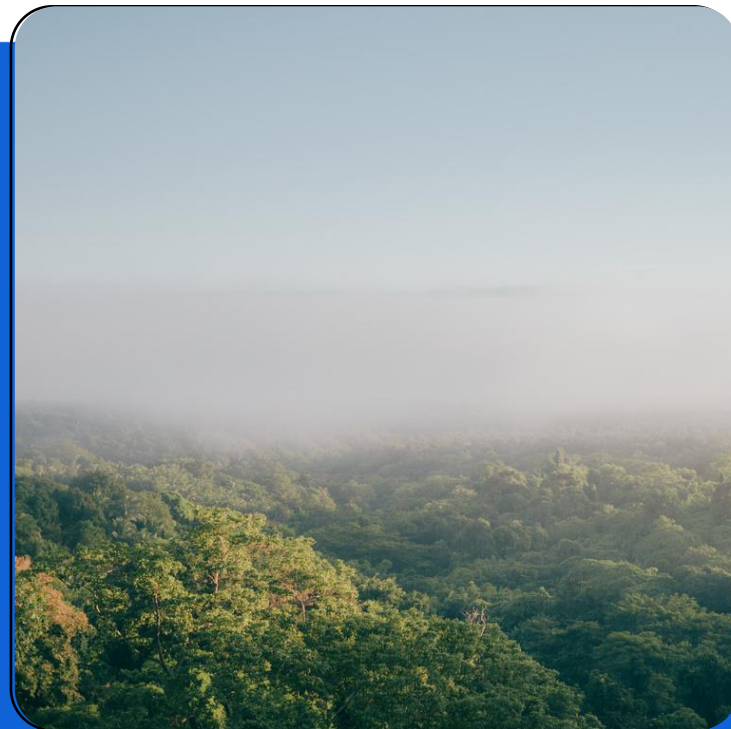
To preserve and restore landscapes of cultural significance, maintaining heritage and traditional practices.

7. Community Resilience:

To strengthen the resilience of communities against natural disasters through restored ecosystems.

8. Sustainable Resource Management:

To promote the sustainable use of natural resources, ensuring long-term availability and health of ecosystems.



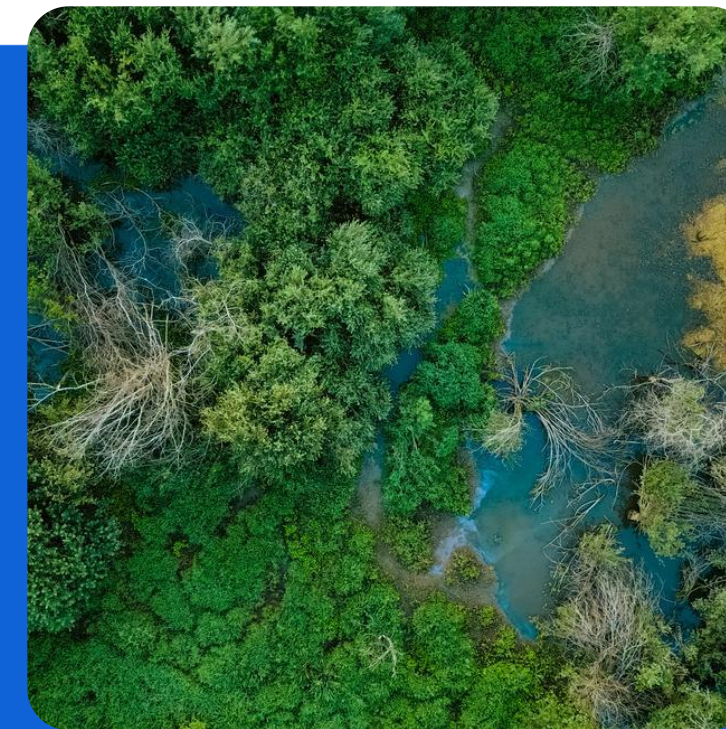
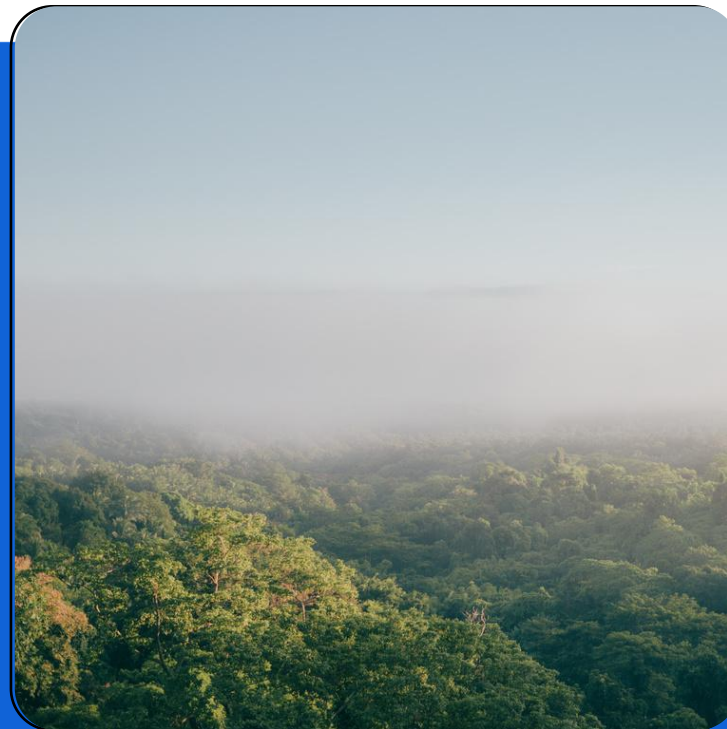
2.2.Environmental Restoration: Benefits

9. Educational Opportunities:

To provide platforms for education and research about ecology, conservation, and sustainability practices.

10. Economic Benefits:

To support local economies through eco-tourism, recreation, and sustainable resource-based industries.



2.3 Elements of Environment Restoration



Categories and examples

Ecological Restoration

- Definition: Focuses on restoring ecosystems to their natural state, including plant and animal communities.
- Examples: Reforestation, wetland restoration, and native species reintroduction.

Remediation

- Definition: Involves cleaning up contaminated sites to remove pollutants and restore environmental quality.
- Examples: Soil decontamination, groundwater treatment,

2.3 Elements of Environment Restoration



Categories and examples

Rehabilitation

- Definition: Aims to improve the health of degraded ecosystems without necessarily returning them to their original state.
- Examples: Erosion control, invasive species management, and habitat enhancement.

Reclamation

- Definition: The process of restoring land that has been disturbed or degraded, often for productive use.
- Examples: Mining site rehabilitation, landfill capping, and agricultural land restoration.

2.3 Elements of Environment Restoration



Categories and examples

Natural Recovery

- Definition: Allowing ecosystems to recover naturally over time without human intervention.
- Examples: Monitoring natural succession in abandoned agricultural fields or disturbed lands.

Community-Based Restoration

- Definition: Involves local communities in restoration efforts, ensuring cultural relevance and sustainability.
- Examples: Community-led treeplanting, wetland enhancement projects.

Green Infrastructure

- Definition: Incorporates natural processes in urban planning to manage stormwater, reduce heat, and enhance biodiversity.
- Examples: Green roofs, permeable pavements, and urban parks.

2.3 Elements of Environment Restoration:

Technologies for monitoring

1 Biological Indicators

- Uses the presence or health of certain species (bioindicators) to assess ecosystem health.

2 Data Management and Analysis Software

- Tools for collecting, storing, and analyzing data from various sources to assess restoration success.

3 Mobile Applications

- User-friendly apps that enable field data collection and reporting by volunteers and community members.

4 Machine Learning and AI

- Advanced algorithms that analyze large datasets for patterns and predictions related to ecosystem changes.

2.3 Elements of Environment Restoration:

Technologies for monitoring

5 Remote Sensing

- Monitoring deforestation, wetland health, and habitat recovery.

6 Geographic Information Systems (GIS)

- Mapping restoration sites, tracking changes over time, and planning restoration efforts.

7 Drones and UAVs (Unmanned Aerial Vehicles)

- Monitoring vegetation growth, surveying wildlife, and assessing soil erosion.

8 Environmental Sensors

- Real-time monitoring of soil health, water quality, and atmospheric conditions.

2.3 Elements of Environment Restoration:

Technologies for monitoring

9 Biological Indicators

- Monitoring changes in water quality through indicator species like macroinvertebrates.

10 Data Management and Analysis Software

- Statistical analysis of ecological data, tracking progress over time, and reporting outcomes.

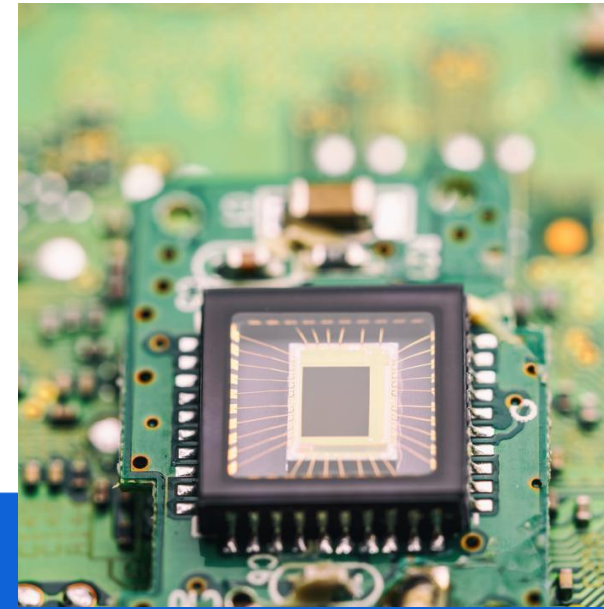


2.4 Skills and Careers for Environmental Restoration



Environmental Interpretation

To understand the state of the environment and the meaning of the gathered values, knowledge in environmental interpretation is very useful in environmental restoration projects.



Programming

Operating drones and planning drone missions are heavily reliant on programming skills. Programming knowledge can also be of assistance in the data analysis phase.



Data Analysis

Data analysis skills are needed to organize, analyze and fully utilize the information gathered through all the specialized environmental restoration equipment.

2.4 Skills and Careers for Environmental Restoration

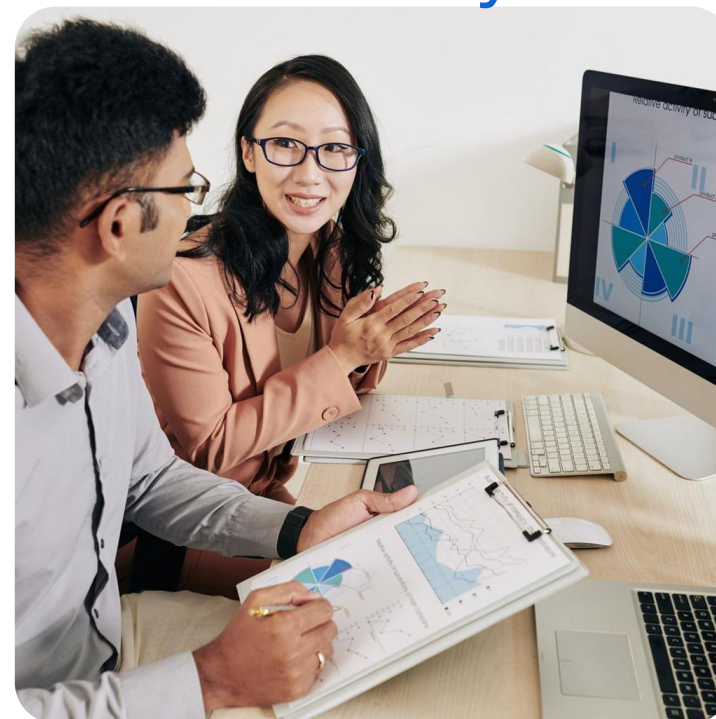
A variety of careers are relevant to environmental restoration. Environmental Scientists, Data Analysts, Field Technicians, Programmers, Foresters, Environmental Engineers are only some examples.

Working on environmental monitoring is possible through a governmental organisation, an NGO or non-profit, a corporation or a small business.

Environmental Scientist



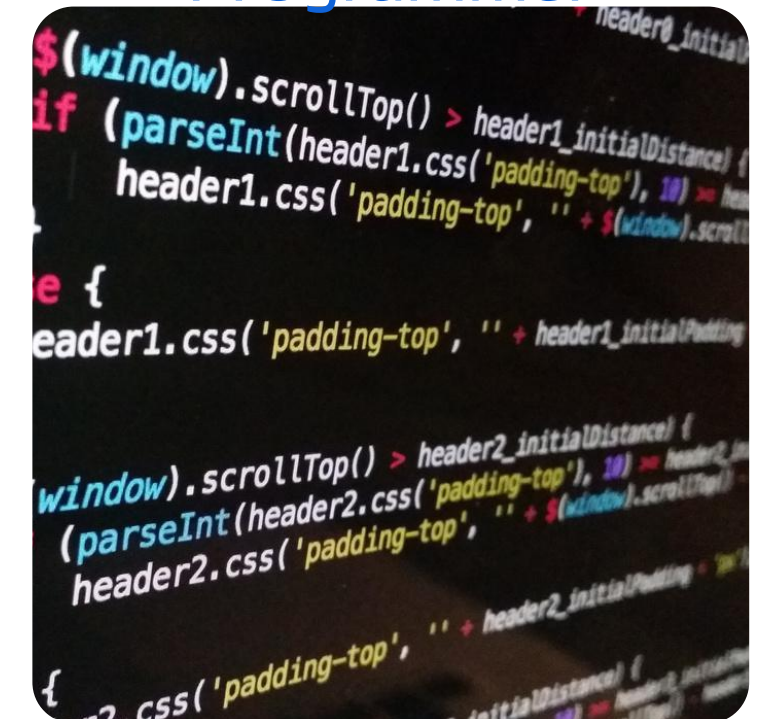
Data Analyst



Field Technician



Programmer



2.5 Discussion

Questions for the students

- How do you think environmental restoration helps fight climate change?
- How does technology improve environmental monitoring?
- What challenges do you think environmental monitoring is facing?

Open floor to discussion



2.6 Additional Resources

WEBSITES

<https://www.ser.org/>

<https://www.wri.org/initiatives/global-restoration-initiative>

<https://www.nature.org/en-us/>

<https://www.decadeonrestoration.org/what-ecosystem-restoration-law>
[Nature Restoration Law](#)

Articles

https://scholar.google.it/scholar?q=environment+restoration&hl=it&as_sdt=0&as_vis=1&oi=scholar

BOOKS

<https://www.decadeonrestoration.org/publications/ecosystem-restoration-playbook-practical-guide-healing-planet>
<https://www.ser.org/page/IPBookTitles/The-Science-and-Practice-of-Ecological-Restoration.htm>



Thank you for your
attention !



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