

Lesson 6:

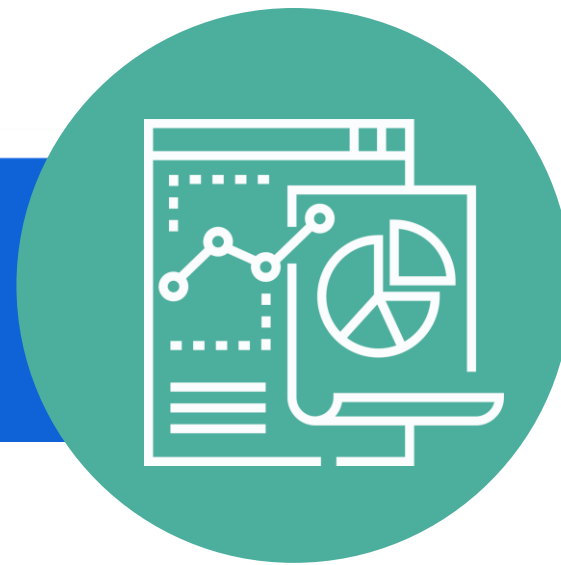
Environmental Restoration

Data Analysis



Lesson Objectives

Understand basic concepts of
data analysis



Understand how data analysis relates
to Environmental Restoration

Learn about numerical analysis, data visualisation and
result interpretation through theory and simple exercises



Data Analysis



What is Data analysis?

Defintion: Data Analysis is the process of inspecting, transforming and modeling gathered data to extract useful information.

Main Purpose: The purpose of data analysis is to utilize the information in order to reach helpful conclusions and make informed decisions.



Benefits of Data Analysis for Environmental Restoration

1 Detection

- Environmental Restoration wants to detect climate patterns, changes in biodiversity and other environmental impacts after the restoration.
- While the data collection process is imperative, detecting the parameters of such issues is only possible through data analysis and result interpretation to understand, where, how, why and when those effects appear.

2 Informed Decision Making

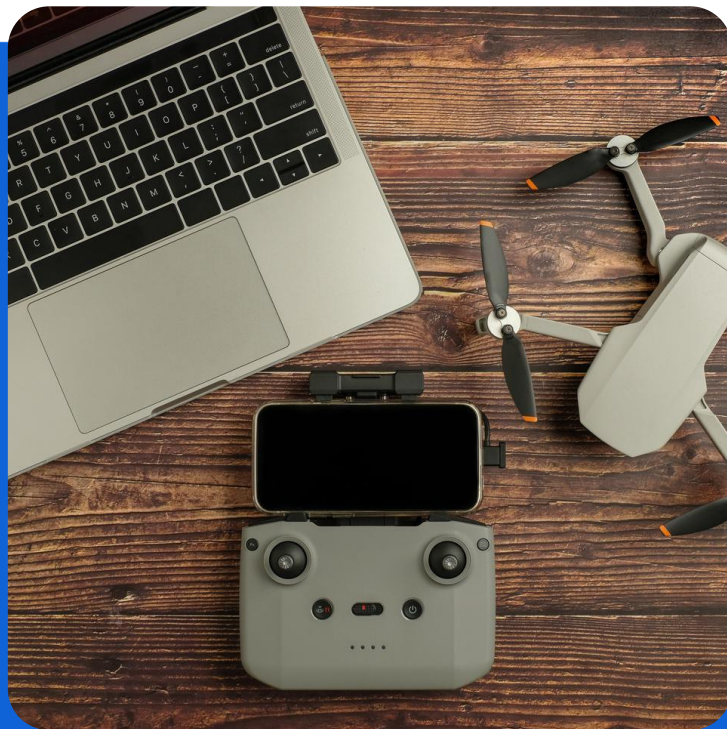
- Scientists, policy makers, government officials, are constantly making decisions that have effects on the environment.
- Through data analysis, there is ample information to direct those decisions towards a beneficial and effective course.

3 Accountability

- Entities that cause negative environmental effects must be held accountable.
- Through the data analysis process that detects issues and their parameters, accountability can be

Transferring Data: Methods

- Wireless Transmission: Using Wi-fi or bluetooth is convenient for real-time data transfer. Connecting the drone with a device such as a computer wirelessly will allow the data to slowly transfer from one to the other.
- SD Cards: SD cards are removable and make it easy to transfer large amounts of data between devices. They are also quite versatile. Using an SD card involves removing it from the drone and connecting it with a device such as a computer to transfer the data



Transferring Data: Challenges

Potential Data Loss

During data transfer, wireless or not, it is potential for data to be lost. This can occur for a variety of reasons, like:

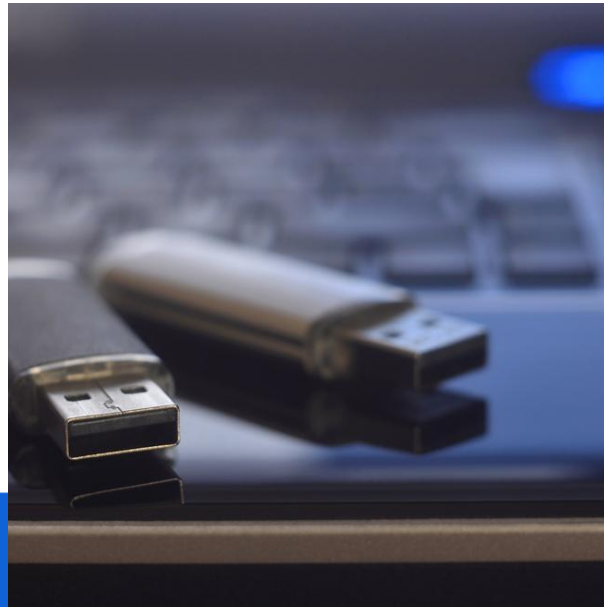
- Lost wireless connection, where the entirety of the data was unable to be transferred due to lost wifi or bluetooth signal.
- Data corruption, where during transfer parts of the data become corrupted.

Privacy and Security

During and after transferring data, it is important to keep the information private and secure. To this end, it is advised that:

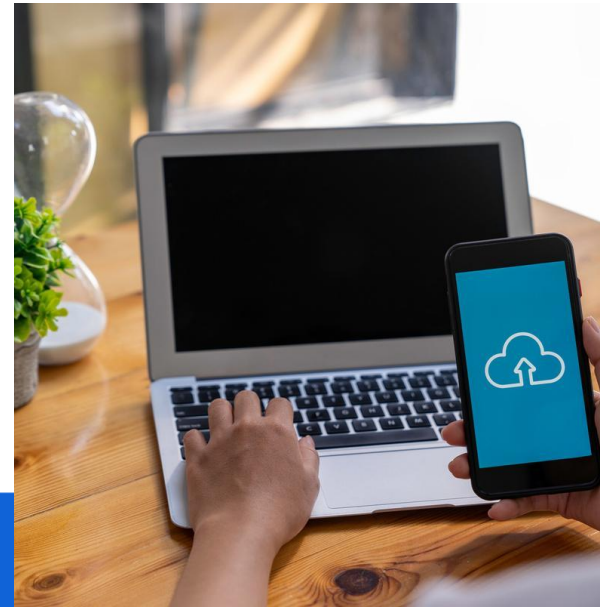
- Trusted networks are used during wireless transfer.
- Sensitive data is encrypted to remain safe in case of interference.

Storage and Organisation



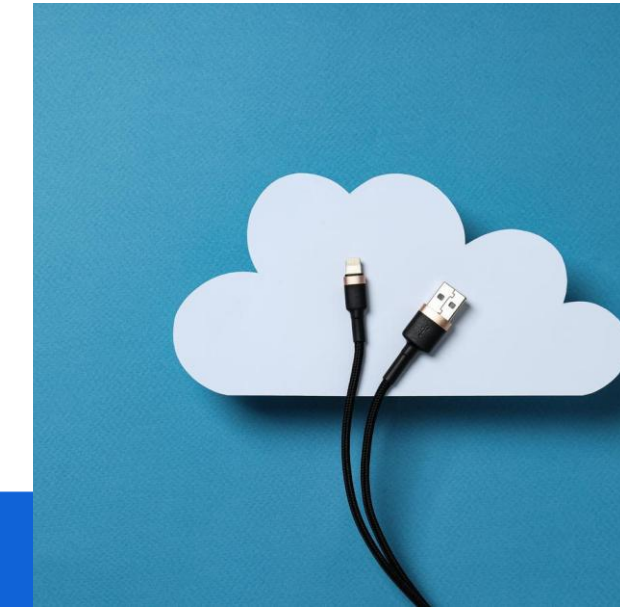
Local Storage

- Physical devices that allow full control over data and its security.
- Data is stored on site and accessible without an



Cloud Storage

- Remote servers that store data and make it accessible through the internet.
- Storage capacity can easily expand
- Convenient for sharing and



Tools and

Alternatives

- Local: Hard Drives, USB Drives, SD Cards
- Cloud: Google Drive, One Drive, Dropbox

Analysing Data: Preparation



Error Removal

Identify and correct any errors in data.

Ensure all data is expressed in the same formats and units



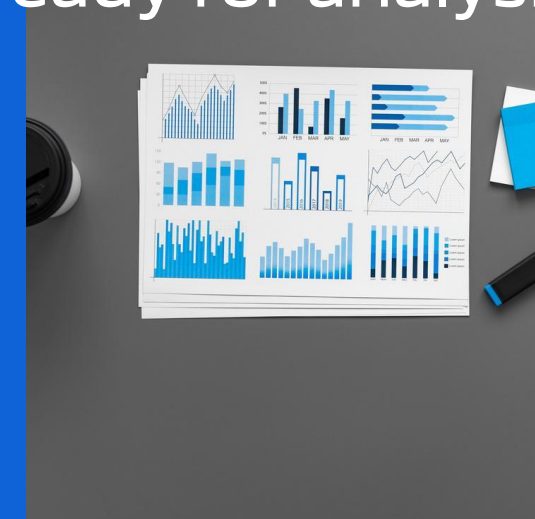
Inconsistencies



Filling Gaps

Identify and address missing data points.

Ensure data is properly formatted and ready for analysis



Formatting



Categorizing

Organise data into categories for better interpretation.

Analysing Data: Tools

Many types of data analysis tools exist. The most common ones are:

- Microsoft Excel, a widely used tool that can cover from basic to advanced data analysis
- Google Sheets: An accessible online spreadsheet tool
- GIS (Geographic Information Systems): Specialised software for spacial data analysis.

Many different tools exist that utilize GIS, like QGIS.



Analysing Data: Basic Calculations

There are some very useful basic data calculations used during data analysis.

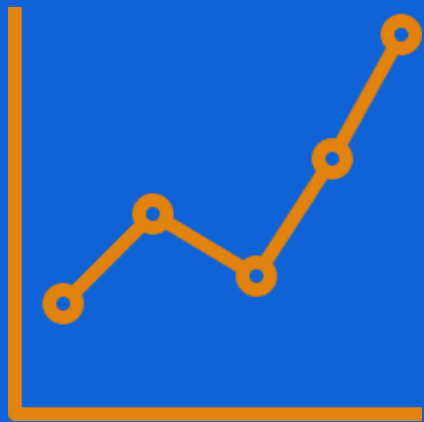
- Calculating the Mean, which is the average value of the data set.
- Finding the Median, the middle value after sorting the data.
- Finding the Mode, which is the value that repeats most in the data set.
- Calculating Standard Deviation, that measures the variation in the data.

Analysing Data: Patterns

Using the data gathered during environmental restoration, several useful trends and patterns can be identified.

- Anomalies: Detecting unusual values.
- Correlations: Exploring and identifying relationships between different parameters. For example, correlating higher pollution levels with factory activity.

Analysing Data: Visualisation



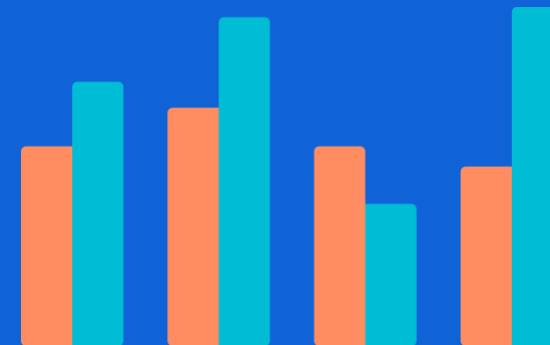
Line Plots

Show trends over time. Clear visualisation of data fluctuations

Comparing variables and showing relationships between data points.



Spider Graphs



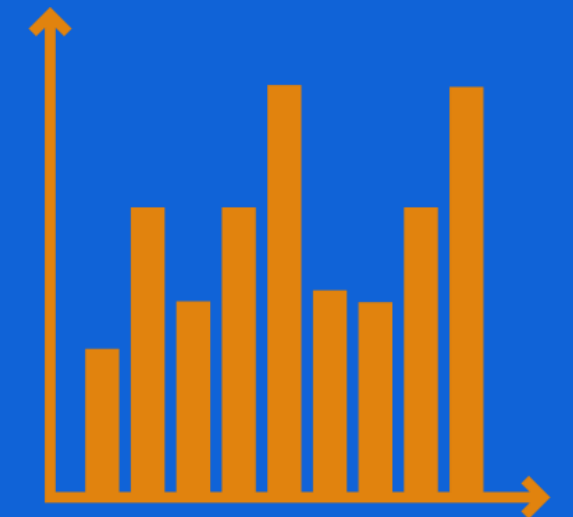
Bar Charts

Comparing quantities in different categories

Proportions and percentages within a whole. Clear distribution visualisation.



Pie Charts



Histograms

Organise data into categories for better interpretation.

Analysing Data: Graph Interpretation

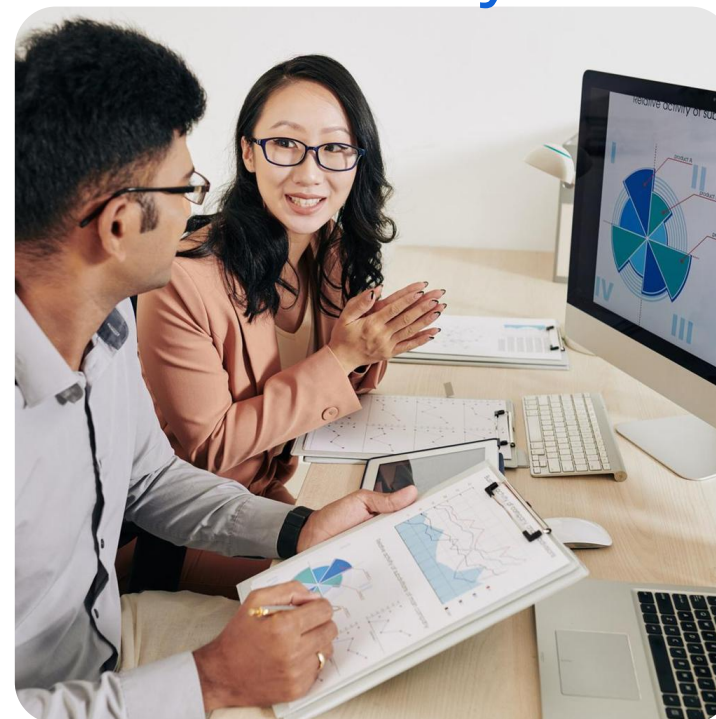
A variety of careers are relevant to environmental restoration. Environmental Scientists, Data Analysts, Field Technicians, Programmers, Foresters, Environmental Engineers are only some examples.

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



Analysing Data: Microsoft Excel

Using Microsoft Excel

Microsoft Excel is a spreadsheet tool from the Microsoft 365 suite, that can be used for free. It can be accessed at the [official website](#).

Basic Excel Operations

Operation	Excel Process, Function
Removing Duplicates	go to Data>Remove Duplicates
Sorting	go to Data>Sort
Calculating Mean	=AVERAGE(select range of cells)
Calculating Median	=MEDIAN(select range of cells)
Calculating Standard Deviation	=STDEV.S(select range of cells)

Discussion Questions for Students and Q&A

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

What are your questions?



Additional Resources

Further Reading

<https://unece.org/un-decade-ecosystem-restoration>

<https://www.eea.europa.eu/publications/importance-of-restoring-nature>

Videos

<https://www.youtube.com/watch?v=LIPMERHaLKM>

<https://www.youtube.com/watch?v=53pmijCaMIA>



Thank you for your
attention !



Co-funded by
the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.



