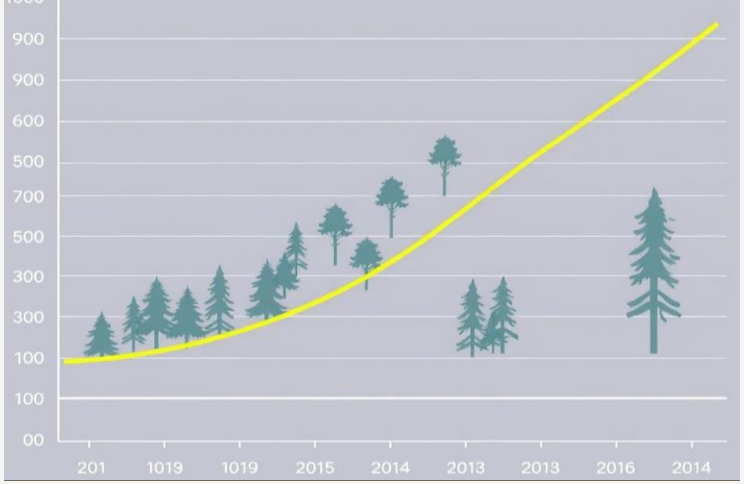

Environmental Statistics

Lecture 1

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Introduction

- **Environmental statistics** is a branch of statistics that focuses on the collection, analysis, interpretation, and presentation of data related to the environment.
- **Why Statistics in Environmental Policies?**

Informs Decisions

Quantifies Risks

Tracks Policy Success

Optimizes Resources

Protects Public Health

Drives Sustainability

Enables Global Collaboration

Ensures Transparency

Types of Data:
1. Qualitative Data

- **Definition:** Non-numerical data that describes qualities or characteristics.
- **Examples:**
  - Habitat types: Forest, wetland, desert, grassland.
  - Pollution severity: Low, moderate, high.
  - Species presence: Present or absent.
- **Uses in Environmental Science:**
  - Classifying ecosystems .
  - Assessing environmental conditions

2. Quantitative Data :

- **Definition:** Numerical data that can be measured or counted.
- **Examples:**
  - Temperature (°C or °F).
  - Tree count (number of Trees in a Forest).
  - Rainfall (mm).
  - CO_2 emission (Ton/Year).
- **Uses in Environmental Science:**
  - Measuring environmental parameters.
  - Tracking changes over time.

Subtypes of Quantitative Data:

- **Discrete Data:**
  - Data that can only take specific, separate values (whole numbers counted).
  - **e.g.** Number of trees in a forest.
  - *Cannot be subdivided (e.g., you can't have 2.5 trees).*
- **Continuous Data:**
  - Data that can take any value within a range (measured, not counted).
  - **e.g.** CO_2 levels (e.g., 415.7 ppm).
  - *Can be subdivided infinitely (e.g., 22.3°C, 22.31°C, 22.315°C, etc.).*

Scales of Measurement

1. **Nominal Scale**:
   - Categorizes data into **unordered groups** (no numerical meaning).
   - **e.g.** Blood types(O, A, B, AB).
2. **Ordinal Scale**:
   - Categories with **order/rank**, but intervals between values are not equal.
   - **e.g.** Pollution severity (low, medium, high).
3. **Interval Scale**
   - Numerical data with **equal intervals**, but **no true zero** (zero is arbitrary).
   - **e.g.** pH levels where(pH 4 vs. pH 6: difference of 2 units).
4. **Ratio Scale**
   - Numerical data with **equal intervals** and a **true zero** (zero = absence of the attribute).
   - **e.g.** Rainfall (mm), pollutant concentration (ppm), tree height (meters).

Scales of Measurement

Data Type	Structure	Level	Measure
Qualitative	Nominal	Discrete	Categories (no order/ranking)
	Ordinal	Discrete	Ordered categories (ranked)
Quantitative	Interval	Continuous	Equal intervals, no true zero
	Ratio	Continuous	Equal intervals, true zero
	Ratio	Discrete	Counts (whole numbers)