Burned soils

GLOBE		*Related SDGs:*	*Type of activity*
Sphere	**Protocols**		
Pedosphere	pH Texture Composition	3 (Good Health and well-Being) 4 (Quality education) 8 (Decent work and economic growth) 11 (Sustainable cities and communities) 13 (Climate Action) 15 (Life on land)	Research. Data management using descriptive statistics.

Overview

On several occasions, the soil is subjected to high temperatures, causing significant adverse changes, such as burning, whether for cleaning residues or other purposes, which is a common practice for agricultural soils. However, one of the phenomena with the most significant impact is forest fires, which tend to seriously affect the quality of soils and ecosystems in general, leading to the loss of soil nutrients, a decrease in biodiversity, and soil erosion, among other effects.

In the current planetary climate emergency, it is necessary to know these phenomena and raise awareness about their control and prevention, assuming this process from a "**global**" perspective (global and local at the same time). Ergo, knowing and analyzing data and reflecting on the scope of these phenomena will help to establish that the prevention and combat of forest fires are an essential part of the welfare and survival of the planet and can contribute to protecting it and contribute to a sustainable life for us and future generations.

Time:
Two classes

School Level:
High School (K-10 - K-12)***.***

Purpose:
Reflect based on an analysis of data on burned soils in Latin American countries.

Student Outcomes

- Estimate the extent and impact of soil burning in the Latin American region.
- Infer the implications of soil burning on society and its basic structures, such as education and environmental preservation.
- Elaborate remedial and improvement proposals based on their analysis of the negative impact of soil burning on nature and society.

Introduction:

The consequences of burning and forest fires on the structure of forest soils can affect water retention, porosity, and soil permeability. Forest fires can also affect soil quality and chemical composition by altering key biogeochemical processes such as mineralization and nitrification. Additionally, edaphic biota are compromised, specifically organisms such as bacteria, fungi, and nematodes, which play an essential role in soil formation and nutrient availability. The study found that forest fires can alter the community of these organisms and suggest that the recovery of edaphic biota is fundamental in rehabilitating the ecosystem. Additionally, mycorrhizae (symbiosis between plant roots and certain fungi) can also be affected by forest fires, which decreases the ability of plants to take up nutrients and absorb water.

The production of this phenomenon of soil burning is primarily anthropogenic. It is, therefore, related to inappropriate practices for preserving soils in a fertile state for producing useful plants for living beings.

Guiding Research Questions

- What comparison(s) can be made between fires occurring in the Brazilian rainforest and the forested areas of Chile, Argentina, and Paraguay?
- How has the quantity of burned hectares varied over the last five years?
- How important is it to develop an international fire-fighting strategy?
- Is it relevant to develop a global attitude in people about caring for environmental assets?

Materials and Tools:

- General and statistical burned soil data in the Americas.
- Spreadsheet software (e.g., Excel, Google Sheets).

Scientific Concepts

- Edaphic biota
- Nematodes
- Bacteria and fungi
- Nitrification.

What and how to do it

- ***Beginning:***

  Considering the application of a Flipped Learning class, collect data on soils burned by different forms and causes in South American countries. This can be obtained from scientific journals, government reports, or online databases.

  Develop a spreadsheet layout in an orderly spreadsheet for the data collected. Be sure to consider relevant information such as location, extent of the burn, nature, remedial actions, and stated prevention strategies.

- ***Development:***

  With the support of descriptive statistics resources, analyze the data to identify any significant findings or patterns in the development of these events, such as the existence of a seasonal seasonality in the occurrence of fire-type phenomena, the causes, and incident factors.

  With the data collected, calculate statistics such as the mean, median, standard deviation, and range of the data to support the results and inferences you draw from your analysis. Use tables, bar charts, pie charts, and scatter plots to visually represent the data and identify trends or patterns of interest.

  Ideally, articulate the present activity with soil analyses on related topics, using GLOBE protocols, performed in parallel or before the current action.

- ***Closing:***

  Prepare a report of the results of your analysis highlighting the relevant points of the expressions reflected in the statisticians in a region that is particularly affected by soil burning. Background reports on the preferred location of burning phenomena state your inferences regarding their causes and contributing factors.

  Based on the analysis, develop informed recommendations for preventing soil burning and mitigating its impacts.

Frequently Asked Questions:

- What is the most salient effect in a ground fire?
- What temperatures is the ground subjected to in a fire?
- How do wildfires influence global climate change?

Resources:

GLOBE program soil investigation and work materials (www.globe.gov).

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