



# STEAM Project

## Discovering UNESCO Global Geopark Sites

### Main school subjects involved

Sciences / Geography / Physics / Economics / Arts / Global Perspectives

### Aimed for

students between 14 and 18 years old

### Participant Schools

School 1 Logo	School 2 Logo	School 3 Logo	School 4 Logo	School 5 Logo
School 1 Name	School 2 Name	School 3 Name	School 4 Name	School 5 Name

### Supporting Organizations

STEAM Practices  
Advisor



Lesvos Natural  
History Museum  
(Greece)

Organizational  
Endowment



International Schools  
Association - ISA  
(Switzerland)

Academic  
Advisor



Aegean  
University  
(Greece)

### School term:

September 2024 - April 2025

## Introduction

UNESCO Global Geoparks (UGGp) are areas of international geological significance managed through protection, education, and sustainable development. Currently, there are 213 UGGps in 48 countries.

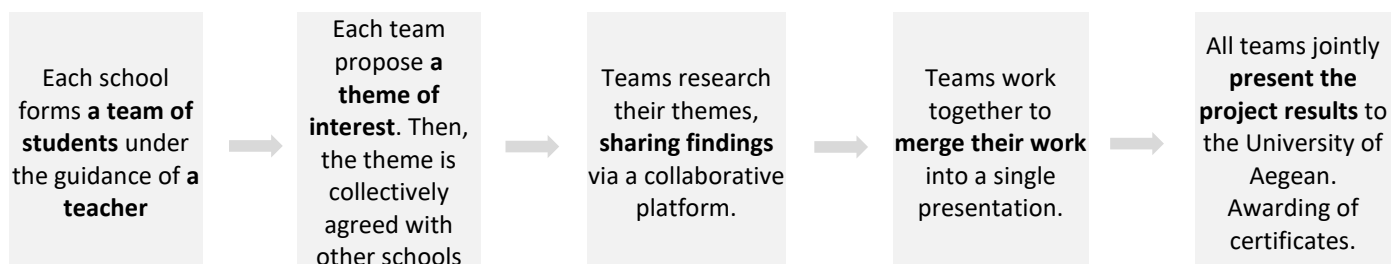
Discovering UNESCO Global Geopark Sites is a **collaborative STEAM project** involving several ISA schools. Each school will form a team of students guided by a teacher. The process begins with the school selecting a theme related to UNESCO Global Geoparks that they wish to research. As the project unfolds, students within each school team



will delve into their selected themes, conducting research and critical analysis, and using a collaborative online platform to share their findings and ideas with other schools.

Their collective efforts will culminate in the creation of an argumentative essays or other forms of presentation based on their own observations, research, and/or experiments, showcasing their expertise in their respective areas of exploration. At the end of the project, the work from each school will be unified into one, **to be presented at the University of Aegean** on Lesvos Island (Greece) by April 2025, highlighting insights gained and contributions to UNESCO Geopark heritage preservation.

Through this initiative, students embark on a collective journey of discovery, fostering understanding and appreciation for the natural and cultural wonders of UNESCO Geoparks. By leveraging digital connectivity, the project facilitates seamless collaboration, allowing students to exchange knowledge and insights regardless of geographical boundaries. As a result, participants not only deepen their understanding of cultural heritage but also cultivate a sense of global citizenship and responsibility towards environmental conservation. The presentation at the University of Aegean serves as a culmination of these efforts, showcasing the collective achievements and contributions of participating schools towards the preservation and promotion of UNESCO Geopark legacies.



*Project Implementation Steps*

## Learning Objectives



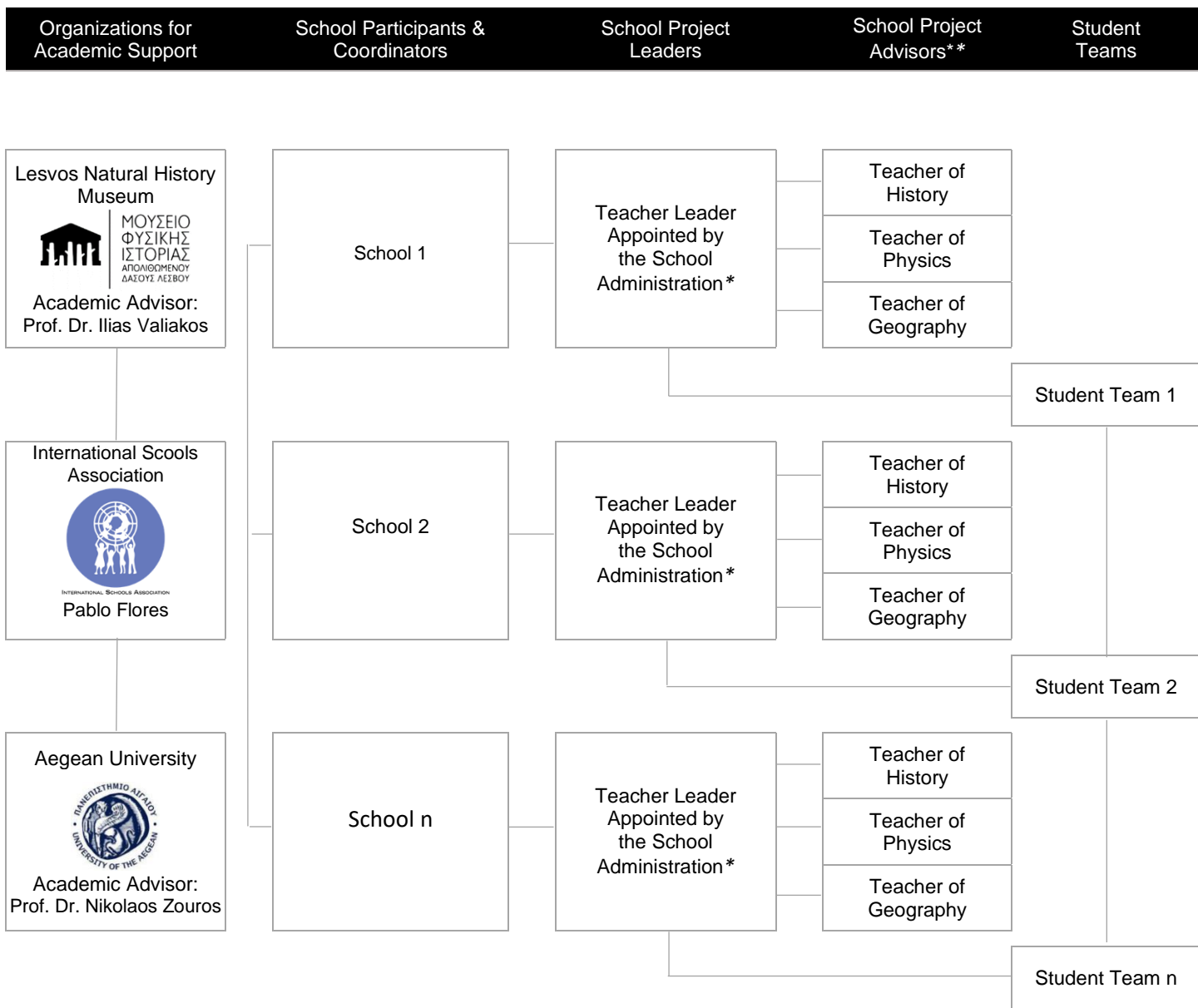
This school project aspires to nurture students to not only excel academically but also to possess the skills, knowledge, and appreciation needed to thrive in a globally interconnected world.

Therefore, the project aims to cultivate collaboration among students from diverse cultural backgrounds, fostering teamwork and the exchange of ideas.

The following are the learning objectives expected:

- Understanding UNESCO Global Geoparks (UGGp) as areas of international geological significance managed through protection, education, and sustainable development.
- Recognizing the collaborative nature of the Discovering UNESCO Global Geopark Sites project and its involvement of multiple ISA schools.
- Developing practical academic skills and knowledge through interdisciplinary exploration (STEAM) within the context of UNESCO Global Geoparks.
- Fostering cross-cultural appreciation and collaboration among students from different schools.
- Enhancing research and critical analysis skills through the investigation of selected themes related to UNESCO Global Geoparks.
- Using collaborative online platforms for sharing findings and ideas with students from other schools.
- Demonstrating expertise in selected areas of exploration through the creation of argumentative essays or other forms of presentations.
- Understanding the significance of preserving UNESCO Geopark heritage and contributing to its promotion.
- Cultivating a sense of global citizenship and responsibility towards environmental conservation.
- Showcasing collective achievements and contributions through a joint presentation at the University of Aegean, highlighting insights gained from the project.

# Organizational Workflow



\* The school administration may appoint any teacher they consider best suited to assume the role of teacher leader for the project, representing and coordinating activities for their school. Additionally, this selection process enables the school administration to choose a teacher most relevant to the subject matter. For instance, while some schools may opt for a science teacher, others may prefer an art teacher to develop a theme related to their expertise.

\*\* School Advisors can develop their own subprojects. For instance:

*History - The history teacher can delve into the historical narratives of the region, exploring how the geological history of Lesvos has impacted its human history. This subproject can involve research on the preservation of UNESCO heritage.*

*Physics - The physics teacher can focus on the scientific aspects of fossilization and geological processes. Students can study the principles of dating, sedimentary rock formation, and the physics behind fossilization, connecting the past with the present.*

*Geography - The geography teacher can analyze the terrain, climate, and topography to understand how these factors have influenced the formation and preservation of fossils in the region.*



## Suggestions of Themes for Collaborative School Research

Within the overarching project theme, *Discovering UNESCO Global Geopark Sites* participating school will develop a specific research theme over the course of the school year. These developments will be shared with the other schools through a collaborative online platform, fostering knowledge exchange and mutual learning. Among the themes that schools may choose to explore are the following, though the possibilities are not limited to these:

- **Environmental Sustainability.** Investigate sustainable practices and environmental conservation efforts within UNESCO Global Geoparks. An appropriate teacher for this theme would be a **science** or **geography teacher**, with interest in ecology and environmental science.
- **Cultural Heritage Preservation.** Explore the cultural significance and historical heritage of sites within UNESCO Global Geoparks. A **social studies** or **history teacher** would be well-suited to guide students in this theme, facilitating research into local traditions, historical landmarks, and archaeological discoveries.
- **Geotourism and Economic Impact.** Analyze the economic and social impacts of geotourism within UNESCO Global Geoparks. An **economics teacher** would be best equipped to lead students in understanding the economic implications of geotourism, including its benefits and challenges for local communities and economies.
- **Global Perspectives on Geology.** Examine the global significance of geological phenomena and their implications for society. This interdisciplinary theme could be guided by **teachers from various subjects**, including **geography**, **science**, and **global perspectives**, encouraging students to explore the interconnectedness of geological processes and human activities on a global scale.
- **Artistic Interpretations of Geoparks.** Explore the intersection of art and geology through creative expressions inspired by UNESCO Global Geoparks. An **art teacher** would be ideal for guiding students in this theme, encouraging artistic exploration and interpretation of geological landscapes and cultural heritage sites.
- **Geopark Time Capsule.** Students explore how fossils found in the Geopark serve as indicators of past climates and environmental changes. Guided by a science teacher, they analyze these fossils to understand climate history and its relevance to contemporary climate change concerns.
- **Ecological Restoration Initiatives.** Explore efforts to restore and rehabilitate ecosystems within UNESCO Global Geoparks. Led by a **biology or environmental science teacher**, students investigate restoration projects aimed at preserving biodiversity and promoting ecosystem resilience in geologically significant areas.




## Operational Characteristics & Estimated Schedule

Time Frame	Work	Operational Characteristics
October - November 2024	Project Initial Organization and Start	<ul style="list-style-type: none"> <li>- Creation of an interschool group of teacher leaders. Each school will assign one teacher leader to this group. They will meet to coordinate the activities, to establish a shared understanding of goals, roles, and expectations. They will also update the project plan timelines, milestones, and agree to distribute the part of the project to research.</li> <li>- Creation of the student team in each school. Determine the collaborative platform, the frequency and forms of communication between them, including virtual meetings using Zoom, Google meeting or other similar means.</li> <li>- First virtual meeting between the teams, in order to get to know each other.</li> </ul>
November 2024 - March 2025	Project Development	<ul style="list-style-type: none"> <li>- Students from each school begin <b>research on their assigned themes</b>.</li> <li>- Teachers guide students in locating relevant online and offline resources.</li> <li>- Regular check-ins and <b>collaborative discussions</b> on the project platform to share findings and insights.</li> <li>- Regular <b>virtual meetings</b> between the school student teams in order to share their experiences, discuss arising issues, and exchange useful information. The time and frequency must be agreed between project leaders. Recommended once per month.</li> <li>- Several <b>lectures</b> would be provided by the Lesvos Natural History Museum (Greece) in order to provide useful thematic insights on UNESCO Geoparks and cultural heritage. The theme for each lecture will be agreed between teacher leaders according to their needs, and proposed in advance to the academic advisor of the Museum.</li> <li>- Each school team will produce an Argumentative Essay and/or other forms of audiovisual presentation describing their findings or to demonstrating what they have learned.</li> <li>- Once school essays are completed, schools will work together on merging them into a cohesive synthesis to <b>produce one overarching work</b>.</li> </ul>
April 2025	Field Trip, Project Presentation, Closing Ceremony	<ul style="list-style-type: none"> <li>- <b>Field trip to Lesvos Island (one-week trip).</b> More details will be produced later, as details of activities should be agreed with teacher leaders and the Lesvos Natural History Museum considering the project developments.</li> <li>- Presentation of the Project findings at the Aegean University</li> <li>- Award of certificates to students and teachers. Awarded by the Aegean University and the International Schools Association.</li> </ul>

## Documentation of the Activities and Means of Interschool Communications

Each school team should have a “Development report diary” to register details like stages, problems found, things to improve, etc. Project leaders may appoint a student that should be responsible for keeping that diary, take pictures and make short videos on the activities of his team.

<p style="text-align: center;"><b>Team “.....” School</b> Activity Diary</p>		Teacher Supervisor _____ Team coordinator _____ Team members _____ _____ _____		
		Lesson #	Activity	

*Example of diary of activities*

Keeping a diary of activities in a school project serves several important purposes. For instance, it provides a detailed record of what has been done throughout the project. Additionally, it documents the progress, milestones, and accomplishments achieved by the project team. This documentation can be valuable as a space for reflection on the project's progress. Team members can analyze what has been accomplished, what challenges have been faced, and how those challenges were overcome. This reflection is crucial for evaluating the project's effectiveness and identifying areas for improvement. Finally, the diary serves as a means of communication within the project team. Team members can refer to the diary to stay informed about the project's status, upcoming tasks, and any changes or adjustments that have been made. This helps to maintain transparency and keeps everyone on the same page.

### Blogging

- Blogging in the classroom, especially throughout project work, is a great way for students to document their work and experiences.
- The blog serves as a platform upon which to post written editorials, videos, photos, how-to instructions, and more.
- This would be a great way for students to take initiative, get involved, and share their stories with others.
- Parts of this blog can be uploaded in a collaborative platform in order to share the activities with other schools participating in the project.



### Collaborative Platform Engagement

- Utilization of the collaborative digital platforms for cross-school interactions.
- Scheduled virtual meetings or discussion forums to facilitate knowledge sharing, address challenges, and exchange perspectives.
- Platform serves as a repository for research materials, discussions, and updates.

## Estimated Budget for the Project

Item	Provider	Aim	Total cost (euros)	Cost distribution per school / team (euros)
4 Lectures (50 minutes each)	Lesvos Natural History Museum (Greece)	To provide useful thematic insights on various aspects of UNESCO Geoparks and cultural heritage. The theme for each lecture will be agreed between teacher leaders according to their needs, and proposed in advance to the academic advisor of the Museum.	500	The costs of the lectures will be equally distributed among all school participants. For instance, if there are 5 schools, then each school should contribute with 100 euros.
Field trip to Lesvos Island (Greece)	Lesvos Natural History Museum (Greece)	It aims to immerse students and gain firsthand insights. Additionally, the opportunity to present their collaborative findings at the Aegean University adds a layer of academic rigor, allowing students to engage with a broader audience and fostering their research, communication skills, and academic accomplishment.	To determine on next November 2024* and will be calculated according to various aspects, including transportation, lodging, meals, and incidentals connected to the trip.	The cost will be calculated according to the program agreed with The Natural History Museum of the Lesvos Petrified Forest.

\* In parallel, the host organization will actively investigate potential sources of funding, such as grants, sponsorships, and fundraising initiatives. This proactive approach intends to mitigate costs and ensure that a broader spectrum of students can participate in this remarkable educational opportunity.

**Acknowledgement:** images obtained from The Natural History Museum of the Lesvos Petrified Forest. Website: <https://www.lesvosmuseum.gr>



# **APPENDIX**

## **Complementary Information and Supporting Material for the Activities**

## I. Useful resources

- List of World UNESCO Global Geoparks <https://www.unesco.org/en/igpp/geoparks>
- Lesvos Natural History Museum <https://www.lesvosmuseum.gr/en>
- Lesvos Island UNESCO Global Geopark <https://en.unesco.org/global-geoparks/lesvos-island>  
<https://whc.unesco.org/en/tentativelists/5858/>
- Research paper: 3-d fossils for k–12 education: a case example using the giant extinct shark carcharocles megalodon <https://stelar.edc.org/sites/default/files/Grant%20et%20al%20%282017%29.pdf>
- Paleontological Society <https://www.paleosoc.org/educational-resources>
- Developing a Paleontology Field Program for Middle-School Students [https://www.academia.edu/27253675/Developing\\_a\\_Paleontology\\_Field\\_Program\\_for\\_Middle\\_School\\_Students](https://www.academia.edu/27253675/Developing_a_Paleontology_Field_Program_for_Middle_School_Students)
- Khan Academy. Unit 4: The geosphere <https://www.khanacademy.org/science/middle-school-earth-and-space-science/x87d03b443efbea0a:the-geosphere>
- The Geological Society of America <https://www.geosociety.org/GSA/GSA/edu-career/k12/resources.aspx>
- American Institute of Professional Geologists <https://aipg.org/page/K-12Learning>

## II. Integrating STEAM concepts

Integrating STEAM (Science, Technology, Engineering, Arts, and Mathematics) concepts into this project can enrich students' learning experiences. Students can:

### **Mathematics and Geometry of Fossils:**

- Calculate the dimensions and volumes of various fossils.
- Analyze the geometric shapes of fossils and compare them to modern counterparts.
- Determine the age of fossils using mathematical dating techniques.

**Geometry.** The use of geometric shapes and patterns to create a sense of order and structure in a work of art.

### **Physics of Fossilization:**

- Investigate the physical processes involved in fossilization, including mineralization and petrification.
- Study the principles of sedimentation and how they relate to fossil formation.

### **Volcanology and Geology:**

- Explore the volcanic history of Lesvos and its impact on the formation of the Petrified Forest.
- Analyze volcanic rocks and minerals found in the region.
- Examine the role of tectonic processes in shaping the island's geology.

### **Fossil Reconstruction and Paleophysics:**

- Reconstruct the physical attributes of ancient organisms based on fossil evidence.
- Explore the biomechanics of prehistoric creatures by studying their fossilized remains.

### **Paleoenvironmental Analysis:**

- Use geological and paleontological data to reconstruct ancient environments and climates.
- Apply physics principles to understand past climates and their effects on fossilization.

### **Dating and Earth Sciences:**

- Learn about radiometric dating methods and their application in determining the age of fossils and rock layers.
- Explore the principles of plate tectonics and how they relate to the geological history of Lesvos.

### **Scientific Measurement and Data Analysis:**

- Conduct precise measurements of fossils, rock layers, and geological features.
- Analyze and interpret data collected during fieldwork and research.

### **Comparative Anatomy and Evolutionary Biology:**

- Study the anatomy of fossilized organisms and compare them to modern species.
- Explore evolutionary principles and how fossils provide insights into the history of life on Earth.

### **Experimental Simulations:**

- Conduct experiments to simulate fossilization processes, such as mineralization, under controlled conditions.
- Measure and record physical changes over time to understand fossilization dynamics.

## **III. Science principles and concepts**

Throughout this project, students can review various scientific principles and concepts related to:

**Fossilization.** Students can learn about the process of fossilization, including mineralization, petrification, and the conditions necessary for the preservation of organic materials.

**Geological Processes.** They can study geological concepts such as sedimentation, stratigraphy, and the role of plate tectonics in shaping the Earth's crust, especially within the context of Lesvos.

**Earth's History.** Students can explore the geological timescale and major events in Earth's history, using fossils as a means to understand the evolution of life on our planet.

**Evolutionary Biology.** They can examine how fossils provide evidence for the theory of evolution and the diversity of life forms that have existed throughout geological time.

**Environmental Science.** Students can investigate the ancient environments and climates that existed during the time when the Petrified Forest's organisms lived, considering factors such as temperature, humidity, and ecological interactions.

**Radiometric Dating.** They can learn about radiometric dating methods like carbon dating and radioactive decay, and how these techniques are used to determine the age of fossils and rock layers.

**Biodiversity.** Students can explore the concept of biodiversity, both past and present, by studying the variety of organisms preserved in the fossil record and comparing them to modern species.

**Geological Fieldwork.** They can gain practical experience in geological fieldwork, including rock and mineral identification, geological mapping, and stratigraphic analysis.

**Scientific Observation and Data Collection.** Students can develop skills in systematic observation, data collection, and documentation, which are essential in paleontological and geological research.

**Interdisciplinary Research.** They can understand the value of interdisciplinary research, where concepts from biology, chemistry, physics, and geology converge to provide a comprehensive understanding of the natural world.

**Cultural and Historical Significance.** Students can explore how geological and paleontological discoveries have shaped human understanding of the Earth's history and cultural heritage.

**Environmental Conservation.** They can examine the importance of preserving natural heritage sites like the Petrified Forest and the implications of human activities on fossil resources and geological features.

These science principles and concepts provide a broad foundation for students to engage with various aspects of the project, fostering a deeper understanding of Earth science, paleontology, and the natural world.

By integrating these concepts and encouraging collaboration across diverse cultures and educational levels, the project not only sheds light on the concept of beauty but also fosters a deeper understanding of the interconnectedness of various disciplines. The overarching results of this collaborative effort will culminate in a comprehensive essay that reflects the collective insights gained from the students' explorations, analyses, and reflections.

#### IV. Example of classroom activities

##### A) Geological Mapping and Fossil Locations:

- **Objective:** To teach students about geological mapping and how to interpret fossil distribution in the context of geological formations.
- **Materials:** Geological maps of Lesvos, fossil locality data, colored pencils, rulers.
- **Steps:**
  1. Provide students with geological maps of Lesvos that show the locations of the Petrified Forest and surrounding rock formations.
  2. Give students fossil locality data, which indicates where various fossils have been found on the island.
  3. Instruct students to use colored pencils to mark the fossil locations on the geological maps.
  4. Have students discuss patterns they notice in the distribution of fossils in relation to specific geological formations.
  5. Encourage students to hypothesize about why certain fossils are more prevalent in certain areas based on geological conditions.
  6. Discuss as a class how geological processes have influenced fossil preservation and distribution on Lesvos.

##### B) Fossilization Simulation and Experiment:

- **Objective:** To help students understand the fossilization process through a hands-on experiment.
- **Materials:** Various organic materials (e.g., leaves, twigs, shells), plaster of Paris or modeling clay, plastic containers, water.
- **Steps:**
  1. Discuss the fossilization process with students, emphasizing the steps of burial, mineralization, and hardening over time.
  2. In small groups, provide students with organic materials like leaves, twigs, or shells.
  3. In plastic containers, have students bury their organic materials in either plaster of Paris or modeling clay, mimicking the burial step.
  4. After a few days, remove the organic materials from the containers and examine them to see if they have undergone any changes. Discuss how this relates to the fossilization process.
  5. Encourage students to record their observations and reflect on the experiment, discussing how real fossils form in nature.

=====END OF THE DOCUMENT=====