

# Xplorlabs: Biology of Lithium Ion Batteries

Students will determine the environmental impacts created by mining for resources needed in lithium ion batteries. They will research a biome and a natural resource used in battery manufacturing. They will create a representative biome model that they will use to simulate a mining operation and the EPA requirements for land and water reclamation after mining is completed. They will present their findings to a group of their peers.

	<u><i>Ecology Intro.</i></u>	<u><i>Biome Building</i></u>	<u><i>Resource Exploration</i></u>	<u><i>Mining Operations</i></u>	<u><i>Aim to Reclaim</i></u>
<b>NGSS</b>	HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.				
<b>Time</b>	90 mins (1 block)	180 mins (2 blocks)	45 mins	180 mins (2 blocks)	90 mins (1 block)
<b>Overview</b>	Students will complete guided notes on Ecology as a unit intro. Teacher lecture and video to increase depth of understanding.	Students are assigned a biome (Tropical Rainforest, Prairie, Deciduous Forest, Savannah or Desert), each containing a resource used to manufacture LIBs. They research their biome, create a presentation, and construct a diorama to represent their biome based on soil type, flora, fauna, and climate.	Students will research the resource found in their biome that is used to construct LIBs (Lithium, Cobalt, Carbon, Copper, Aluminum, Oil, or Coal). They will research types of mining and the environmental impacts.	Students will research 7 active mine sites to determine which they will recreate in their biome. They will complete documentation and take photos throughout the mining operation. Students will determine the type of mining they will conduct (open pit or underground) and construct a mining site with all required building and vehicles. They will mine for their resource, calculate % recovery, and complete EPA style post-mining documentation.	Students will develop and implement a reclamation plan on their biome. They will follow EPA style guidelines to complete mine closure, evaluate site damage, construct a reclamation plan, and successfully reclaim their land. They will reflect on human impacts on the environment
<b>Resources/ Links</b>	<ul style="list-style-type: none"> <li><a href="#">Ecology Slides</a></li> <li><a href="#">Guided Notes</a></li> <li><a href="#">Amoeba Sisters - Ecology Review</a></li> </ul>	<ul style="list-style-type: none"> <li>Diorama building materials (metal tins, playdough, sand, soil, artificial plants and animals, rocks, etc.)</li> <li>Beads or samples for all resources in an LIB</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Mining for Metals</a> (video)</li> <li><a href="#">Resource Extraction</a> (Xplorlabs)</li> <li><a href="#">Resource Extraction</a> (worksheet)</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Mining Types and Interactive Maps</a></li> <li><a href="#">Mining Operations Lab</a> (packet)</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Aim to Reclaim Virtual pre- Lab</a></li> <li><a href="#">Aim to Reclaim Lab</a> (packet)</li> </ul>

# Xplorlabs: Biology of Lithium Ion Batteries - Visuals

## Ecology Intro.



**Unit: Ecology, Population Dynamics, Behavior, Ecosystems, Human Impact, Resource Use**

**SECTION 1**  
INTRO TO ECOLOGY

**What is Ecology?**  
Ecology is the study of the interactions between organisms and their environment.

**Levels of Organization**

**Abiotic Factors**  
Non-living factors that affect an organism's life.

**Biotic Factors**  
Living factors that affect an organism's life.

**Flowchart: Levels of Organization**

**What is Ecology?**  
Ecology is the study of the interactions between organisms and their environment.

**Unit 8: Ecology & Animal Behavior Guided Notes**

**Section 1: Intro to Ecology**

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**Levels of Organization**

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**Flowchart: Levels of Organization**

**What is Ecology?**  
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**ECOLOGY REVIEW TOUR**

- Food Chains
- Food Webs
- Flow of Energy Through Trophic Levels
- Ecological Relationships
- Carbon & Nitrogen Cycles
- Human Activity & Effect on Biodiversity

## Biome Building

**Slide Requirements:**

- Title Slide
- Biome Name
- Your Name
- Biome Pictures
- Characteristics and Location Slide
  - Soil type
  - Natural Resources found in the biome
  - Geographic Location it is found with a map picture
- 2 Pictures
  - Climate Slide
  - Temperature
  - Precipitation
  - At least 2 pictures
- Flora/Animals Slide
  - At least ten species of animals with pictures and descriptions
  - Explain adaptations that help the animals to survive in the biome.
- Flora/Plants Slide
  - All least ten species of plants with pictures and descriptions
  - Explain adaptations that help the plants to survive in the biome.
- Threats and Human Impacts Slides
  - All least three specific human impacts on the biome with descriptions and pictures
  - Conservation Efforts Slides
    - At least three specific ways that humans can protect or preserve the biome
- Research Sources Slides
  - Include links for ALL resources used to create your slides and design your biome

**Biome Model Building Requirements:**

- General Requirements
  - Must look realistic
  - Must have appropriate soil and include "buried natural resource"
  - Must have 20 parts and depth
  - Must use a variety of building materials
- Biome Landscapes Features
  - Landforms (mountains, plains, deserts, etc.)
  - Climate Indicators (snow, dryness, humidity, etc.)
  - Water sources (river, lake, ocean, etc.)
- Organisms
  - Minimum of two producers
  - Minimum of four consumers
  - Minimum of one decomposer
- Labels
  - All species (plants and animals) labelled with Common Name and Scientific Name for each organism
  - Role in the ecosystem on the label (herbivore, carnivore, decomposer, producer, omnivore)



## Resource Exploration

Name: \_\_\_\_\_

**Resource Exploration**

What is your biome? \_\_\_\_\_

What is your natural resource? \_\_\_\_\_

Locations where you can find your resource

Description	Uses

Watch this video Mining Definition:

What are some environmental challenges caused by mining?

List five different natural resources obtained through mining:

- 1.
- 2.
- 3.
- 4.
- 5.

List five everyday items that contain mined materials:

- 1.
- 2.
- 3.
- 4.
- 5.

**Types of Mining**

OR

Mining OR Mines

Mining OR Mines

Mining OR Mines

**LITHIUM**

3  
Li  
6.94

Lithium is the lightest solid element in the periodic table. It is often used to create alloys.

**ALUMINUM**

13  
Al  
26.98

Aluminum is very ductile (easily shaped into a thin foil wire or thread). It is highly conductive thermally and electrically.

**COBALT**

27  
Co  
58.93

Cobalt is a transition metal. It is solid at room temperature and pressure. It is often added to alloys to improve their strength at high temperatures.

**GRAPHITE (from Carbon)**

6  
C  
12.01

Graphite is porous. It consists of layered sheets of carbon atoms.

**COPPER**

29  
Cu  
63.55

Refined copper is very ductile (easily shaped into a thin foil wire or thread). It is highly conductive thermally and electrically.

## Mining Operations



## Aim to Reclaim

