

احجز مكانك واستعد للامتحان بثقة كاملة

$$F = \frac{Gm_1m_2}{r^2}$$

ملزمة العلوم الفصل الثاني

2026 Inspire 5 عام لعام

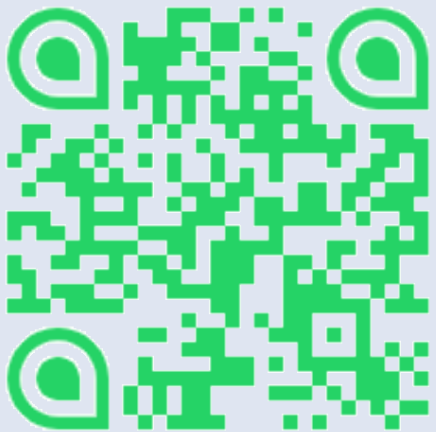
$$EF = ma$$

EF

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تنويه:
تم إنشاء هذه الملزمة لمساعدتك، ولكن المرجع الرئيسي هو الكتاب،
وسيكون هناك ملف إضافي للأمثلة.

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للتواصل والحجز



انضم للقناة

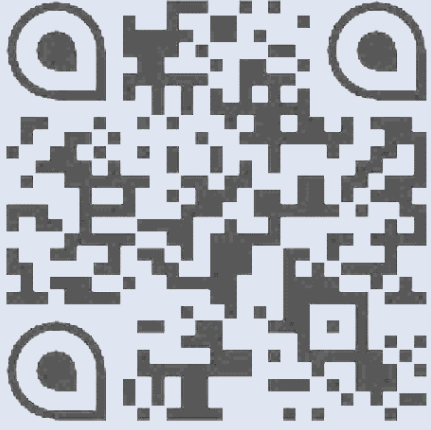


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Module (1): Earth's Water System

	Lesson Title	Page
1-1+2	Water Distribution on Earth + Human Impact on Water Resources	4
1-3	Effects of the Hydrosphere	20

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Module (1): Earth's Water System

01
/
02

First & Second Lessons:
Water Distribution on Earth
& Human Impact on Water
Resources

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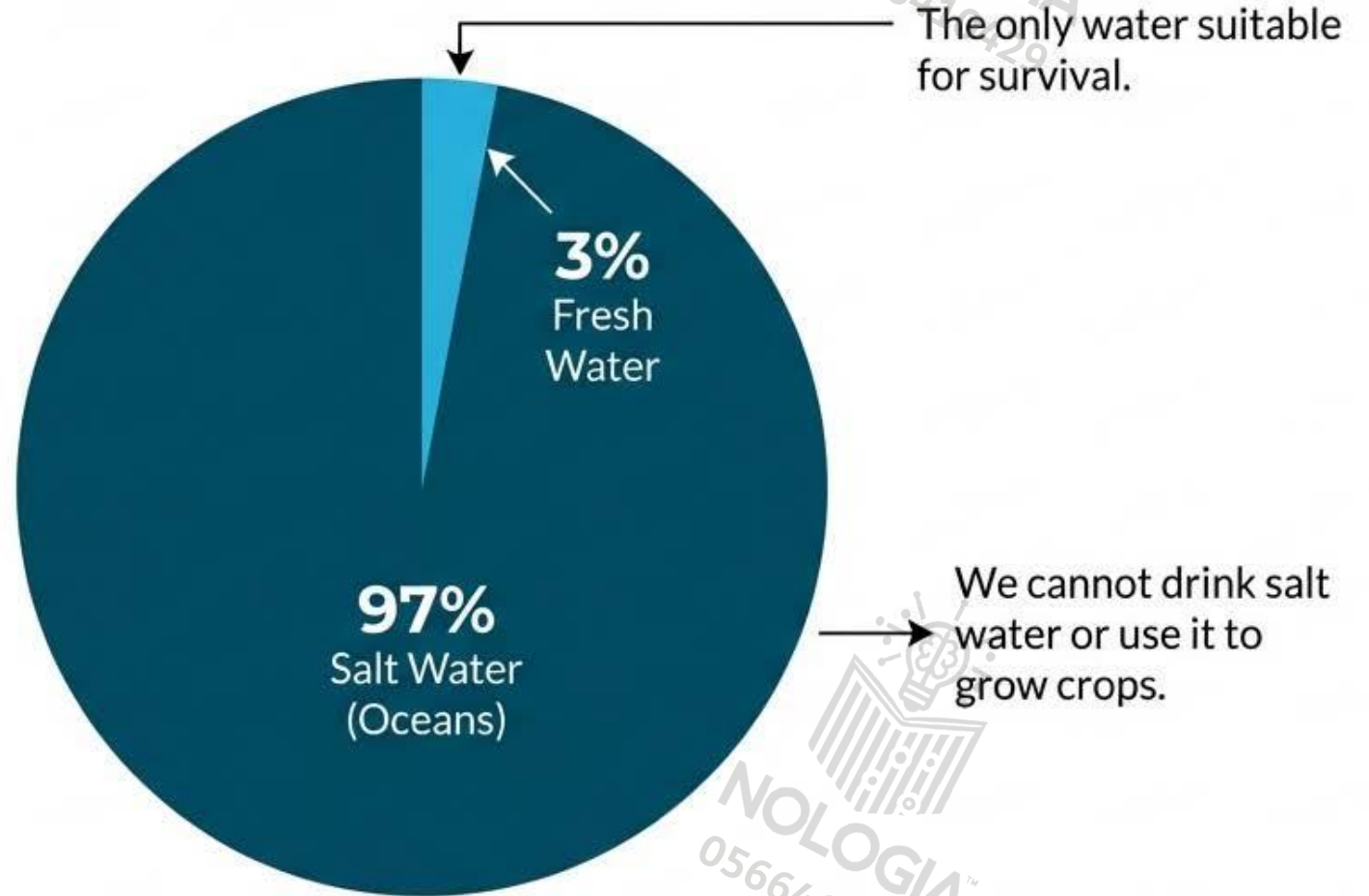
Earth's Water System: Distribution & Human Impact

A Comprehensive Guide to the Hydrosphere

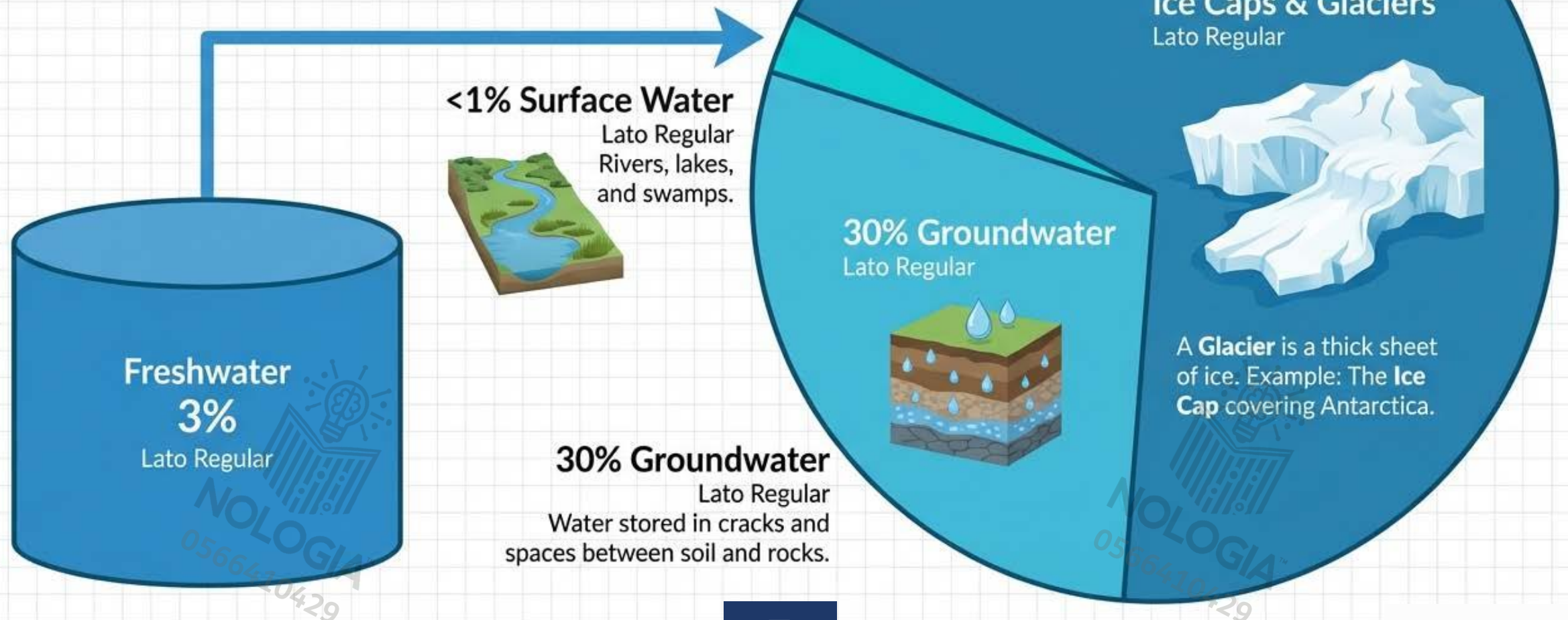


The Hydrosphere: Water on Earth

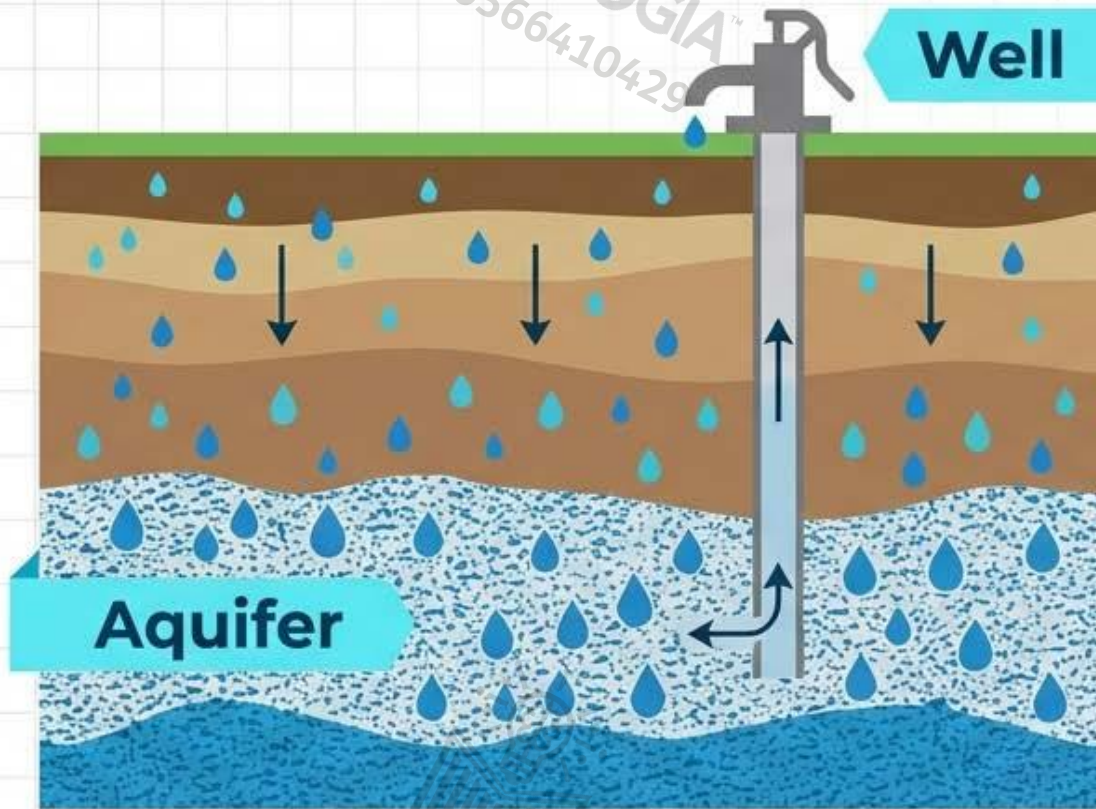
The **Hydrosphere** consists of all water found on Earth. While our planet looks blue from space, the water available for life is scarce.



Breaking Down the 3%: Where is the Freshwater?



Accessing Freshwater Sources



Groundwater seeps into soil and is stored in Aquifers. We access it by drilling wells.



Standing Water is often held in artificial lakes called Reservoirs for **Storage**.

Human Impact: The Fragile Balance



Pollution: Any harmful substance that affects Earth's resources. From farming to industry, human actions can degrade the quality of the limited 3% of freshwater available.

Agricultural Pollution: Algal Blooms

Farmers use **Fertilizers** on crops.

Heavy Rain

Nutrients wash into lakes and rivers.

Toxic algae grows rapidly (**Algal Bloom**).

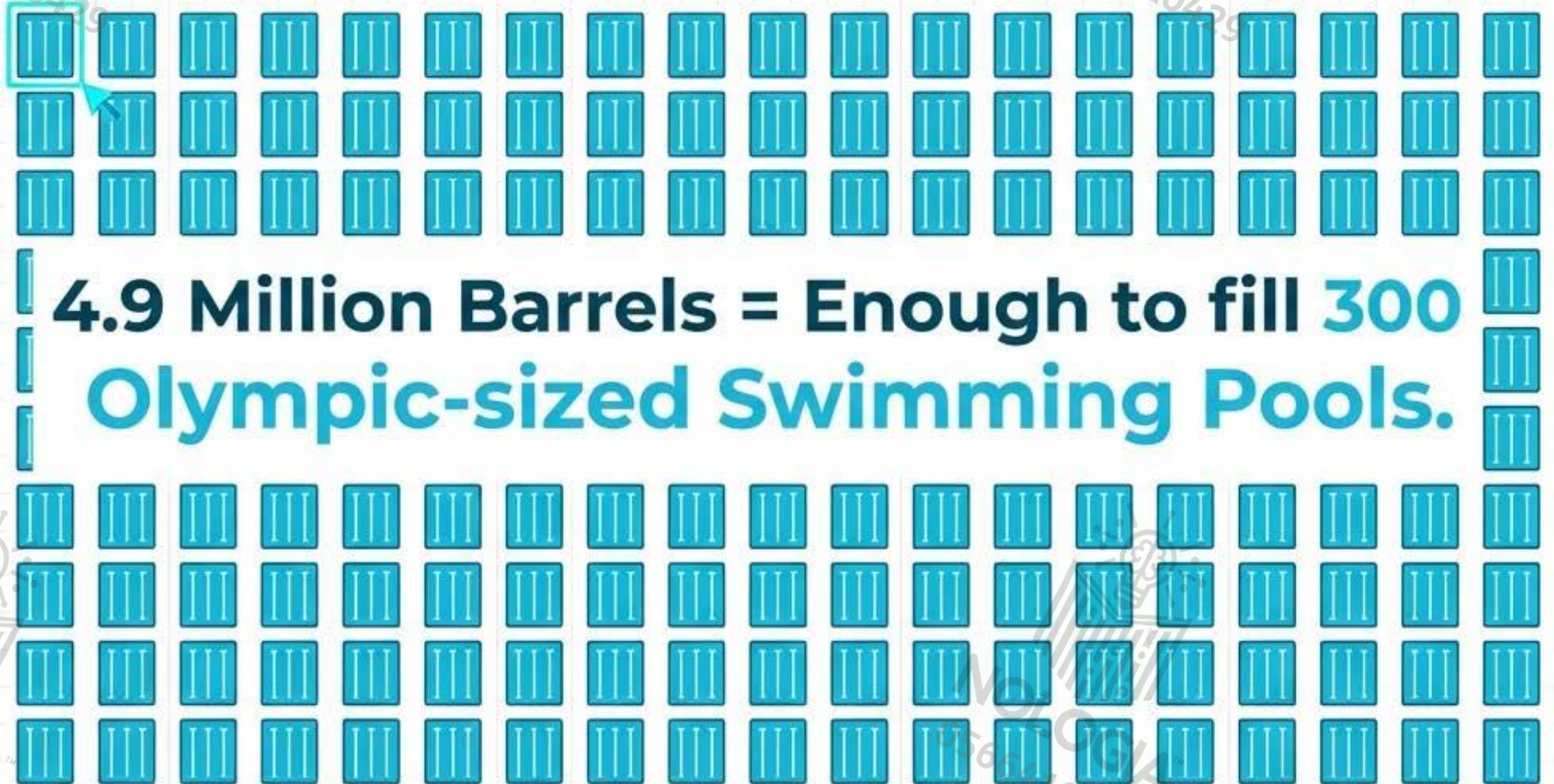
Consequence: Lowers water quality, kills fish, and disrupts the ecosystem.



Industrial Pollution: Oil Spills

Case Study: The 2010 Gulf of Mexico Explosion

In 2010, an oil rig exploded releasing **4.9 million barrels** of oil. This caused immediate harm to wildlife and long-term damage to the ecosystem.



The Chemistry of Acid Rain

Acid Rain forms when pollutants mix with water vapor in the air.



While volcanoes are a natural source, human activity is the main cause.

Effects of Acid Rain



Biological Impact: Acidic lakes and soil kill plants and fish, disrupting the entire food web.



Physical Impact: Acid reacts with **Limestone** and **Chalk**, damaging buildings and statues.

Inquiry: Testing Water Safety (pH)

We cannot judge safety by appearance.

Clear water can be acidic.

In the lab, we test this by observing reactions, such as vinegar (acid) fizzes when dropped on chalk (limestone).



Conservation: Protecting Our Resources

The Safe Drinking Water Act (1974) protects our supply, but we must do our part.



Conservation at Home: Bathroom & Kitchen



Take shorter showers & use water-conserving heads.



Turn off the faucet while brushing teeth.



Fix leaking pipes or faucets immediately.



Run dishwashers & washing machines only with **full loads**.

Conservation Outdoors

Outdoor water use can be significantly reduced through smart practices and mindful choices, especially in gardening and landscaping.



Water at Night: Watering when it is dark prevents evaporation.



Plant Choice: Grow plants that require less water.



Collect Rainwater: Reuse rain to water your garden.



NOLOGIA Study Guide: Key Vocabulary

The System



Hydrosphere: All water on Earth.



Glacier: Thick sheet of ice (69% of freshwater).



Aquifer: Underground rock layer storing groundwater.



Reservoir: Artificial lake for storage.

The Impact & Solution



Algal Bloom: Rapid algae growth from fertilizer runoff.



Acid Rain: Rain polluted by sulfur & nitrogen gases.



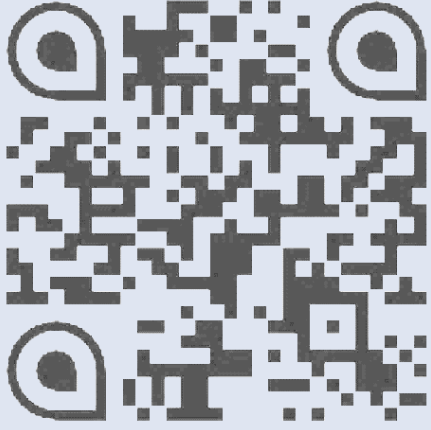
Conservation: The wise use of resources (Reduce, Reuse, Recycle).

Be a Water Steward



Earth does not have an unlimited supply. We are using resources faster than nature can replace them. It is up to us to protect what we have.

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Module (1): Earth's Water System

03

Third Lesson: Effects of the Hydrosphere



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EFFECTS OF THE HYDROSPHERE: HOW WATER SHAPES OUR EARTH

A Comprehensive Guide to Erosion,
Deposition, and Hydrology.

Earth Science Study File // Complete Reference



THE MYSTERY OF THE SHRINKING DUNES

Scenario: Three friends visit the same beach every summer. Over time, they notice the walk to the water is shorter and the dunes are smaller. What is happening?

Hypothesis 1:

Cecelia: The beach looks smaller only because they have grown older.

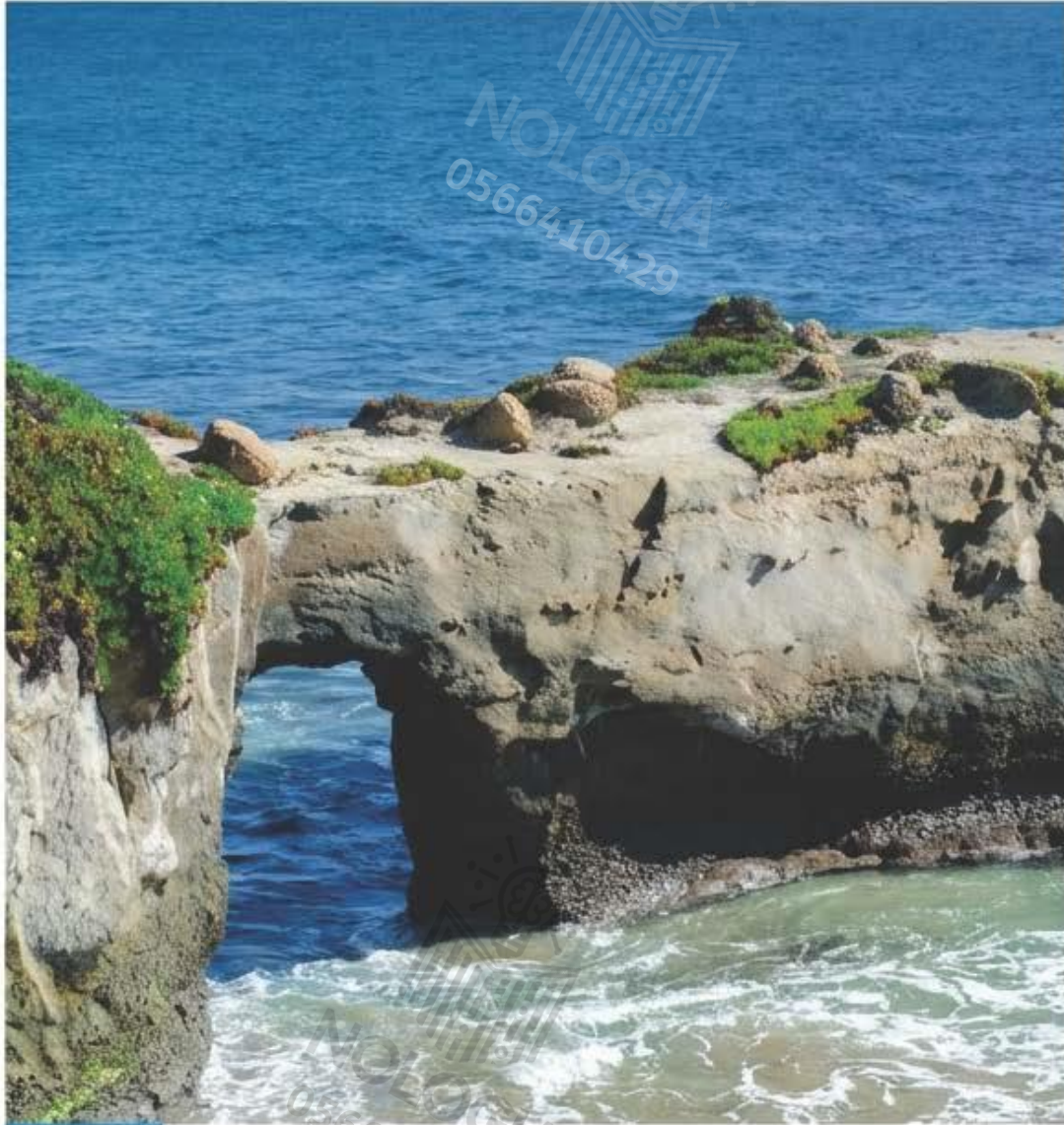
Hypothesis 2:

Omar: The dunes are smaller because people are walking on them.

Hypothesis 3:

Nari: The dunes and beach have been worn away by wind and water.

OBJECTIVE: Keep these theories in mind. By the end of this file, you will identify the correct scientific explanation.



LESSON 3

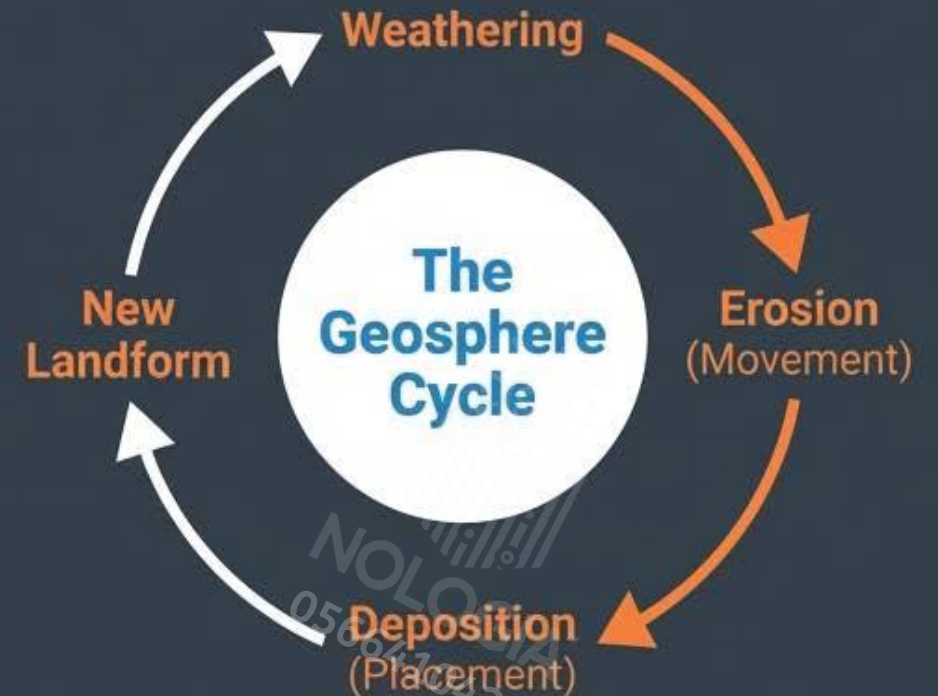
CORE PRINCIPLES: THE CYCLE OF SHAPE-SHIFTING

EROSION (Taking Away):

The process of weathered rock moving from one place to another. Think of this as Nature's Excavation.

DEPOSITION (Building Up):

The process of eroded materials being dropped off in another place. Think of this as Nature's Construction.

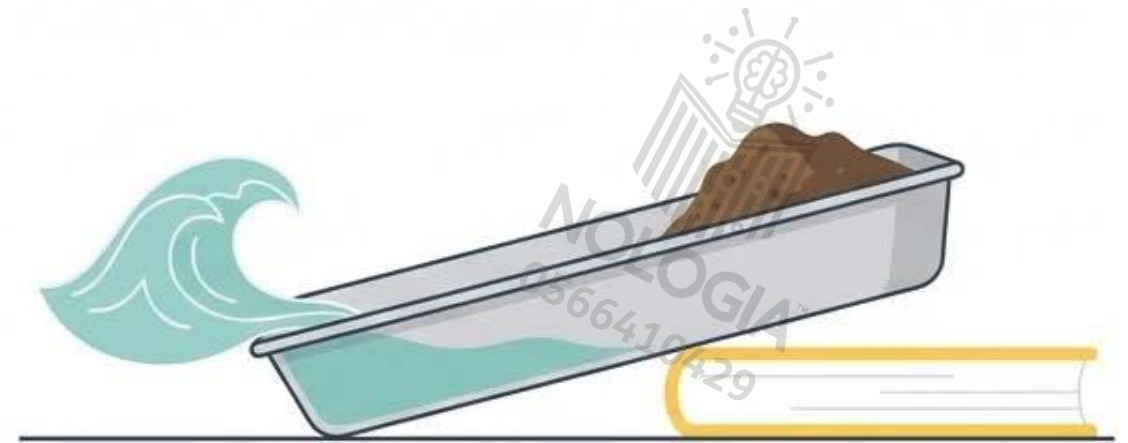


INVESTIGATION: WAVE ENERGY vs. MATERIAL

THE SETUP

Equipment: 4 aluminum pans, 250-mL water, textbook.

Method: Lift pan to textbook height and drop to simulate wave energy.



VARIABLES TESTED

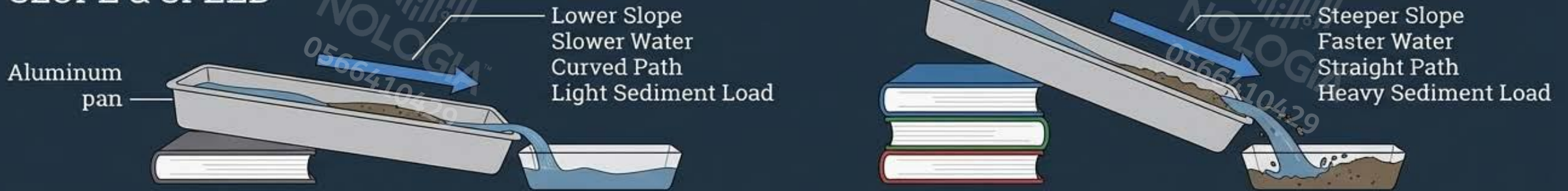
SOIL 	SAND 
GRAVEL 	SMALL ROCKS 

KEY INSIGHT

CAUSE & EFFECT: High-energy waves move small particles (soil/sand) easily. Heavier materials (gravel/rocks) require significantly more energy to displace. This models how ocean energy reshapes coastlines based on material density.

RUNNING WATER: RIVER MECHANICS

SLOPE & SPEED



Rivers are dynamic. They change course through a constant push-and-pull of erosion and deposition

DEPOSITION LANDFORMS: WHERE DOES THE SEDIMENT GO?



THE DELTA

- **Context:** River flows into standing water (ocean/lake).
- **Process:** Flow stops.
- **Result:** Land builds up **IN the water**.



THE ALLUVIAL FAN

- **Context:** Stream leaves narrow canyon onto flat land.
- **Process:** **Water spreads and slows.**
- **Result:** Fan-shape builds up on **DRY LAND**.

SYNTHESIS: Both are created by water slowing down. The destination determines the form.

EXTREME EVENTS: FLOODS AND STORMS



The Dual Nature of Floods

1. **DESTRUCTIVE:** Water overflows banks, damaging infrastructure, homes, and streets.
2. **CONSTRUCTIVE:** Floodwaters carry nutrient-rich sediment. When water recedes, it leaves soil on the **FLOODPLAIN**, aiding plant growth.

STORM MECHANICS

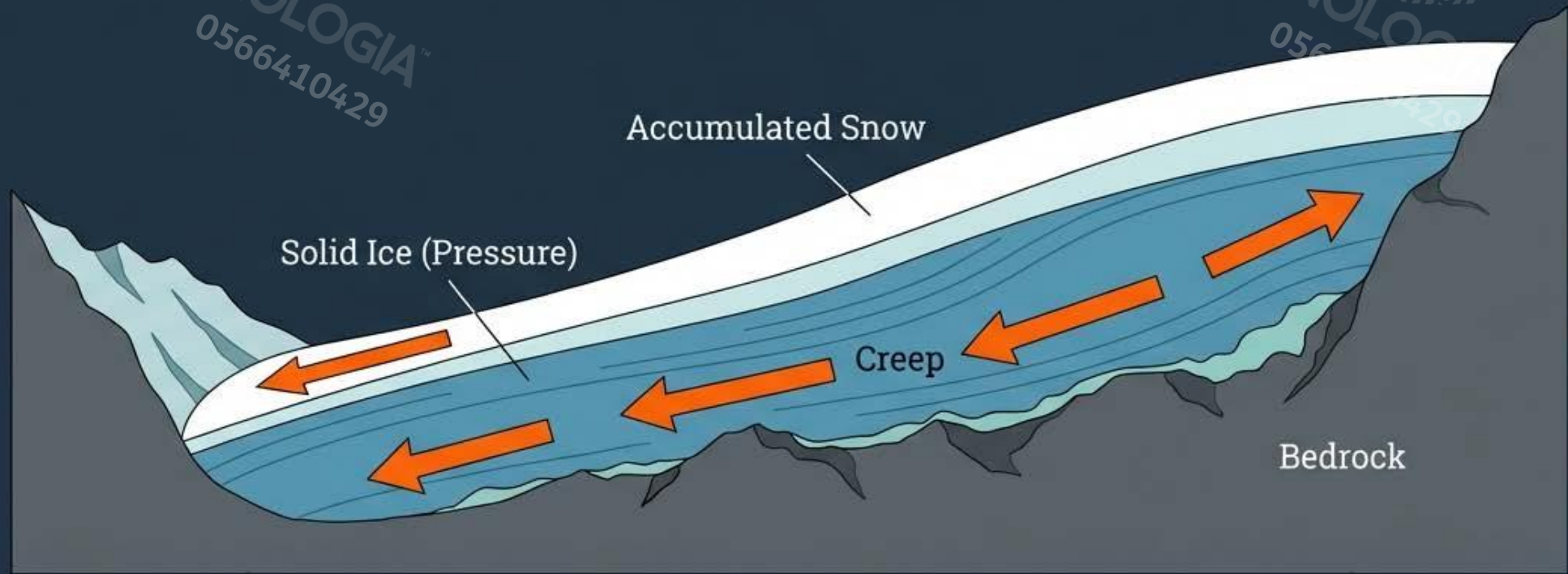


HURRICANES:
Large swirling storms over tropical oceans.



STORM SURGE:
Winds force massive water onshore, accelerating erosion in hours rather than years.

THE ICE BULLDOZERS: EROSION BY GLACIERS



DEFINITION:

Thick sheets of ice in cold regions where snow collects quickly and melts slowly.

THE PROCESS:

As the glacier moves, the bottom freezes onto rocks. It doesn't wash dirt away—it **TEARS** rock from the ground.

ACTION VERBS:

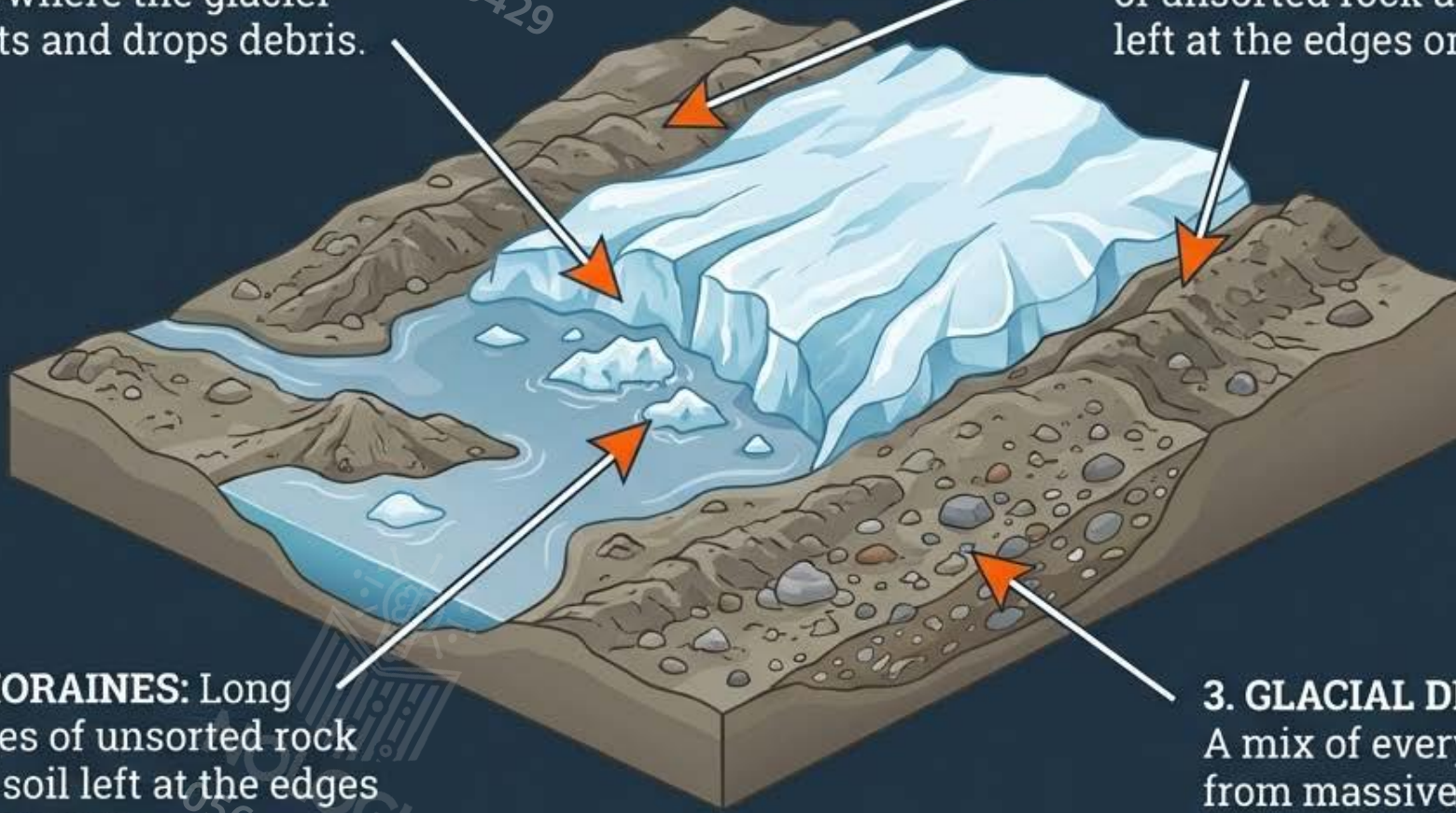
Scratch, Flatten, Break.

Result: Glaciers carve valleys wider and deeper than any river.

GLACIAL DEPOSITION: LEAVING A TRAIL

1. **TERMINUS:** The downhill end where the glacier melts and drops debris.

2. **MORAINES:** Long ridges of unsorted rock and soil left at the edges or terminus.



2. **MORAINES:** Long ridges of unsorted rock and soil left at the edges or terminus.

3. **GLACIAL DEBRIS:** A mix of everything from massive boulders to fine clay (unsorted).



FORENSIC GEOLOGY:

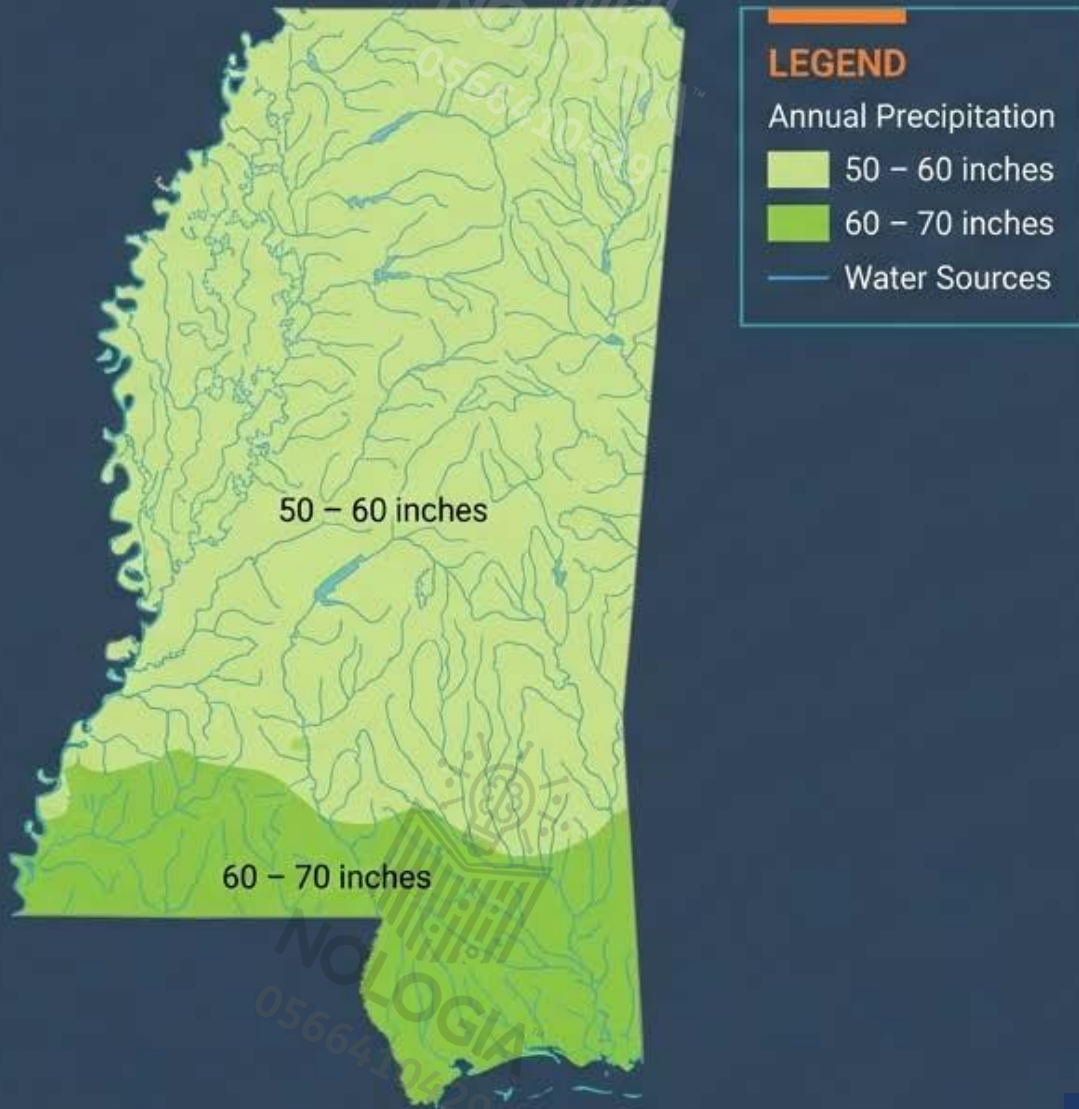
Scientists can identify where a glacier once stood by finding "Moraines"—piles of mixed rocks—even if the ice is long gone.

SUMMARY MATRIX: THE AGENTS OF CHANGE

A concise overview comparing the erosional forces of water and ice, detailing their unique actions, methods, and resulting geological formations.

AGENT	ACTION	EROSION METHOD	LANDFORMS CREATED
 WAVES	Crashing Energy	Breaks coastlines based on material size	Sea Arches, Beaches
 RIVERS	Flowing Downhill	Carves valleys, cuts banks (outside curves)	Meanders, Deltas, Alluvial Fans
 GLACIERS	Creeping Ice Flow	Scratches, flattens, tears rock (Plucking)	Wide Valleys, Moraines

REAL-WORLD CONTEXT: MISSISSIPPI WATER SOURCES



DATA OBSERVATION: Compare the water sources (blue lines) with the Annual Precipitation (green zones).

There is a direct pattern: Areas with higher precipitation (Dark Green) feed the complex network of river tributaries.

The Hydrosphere is a connected system. Precipitation feeds the surface water that powers erosion.



ENGINEERING CHALLENGE: RAINWATER COLLECTION

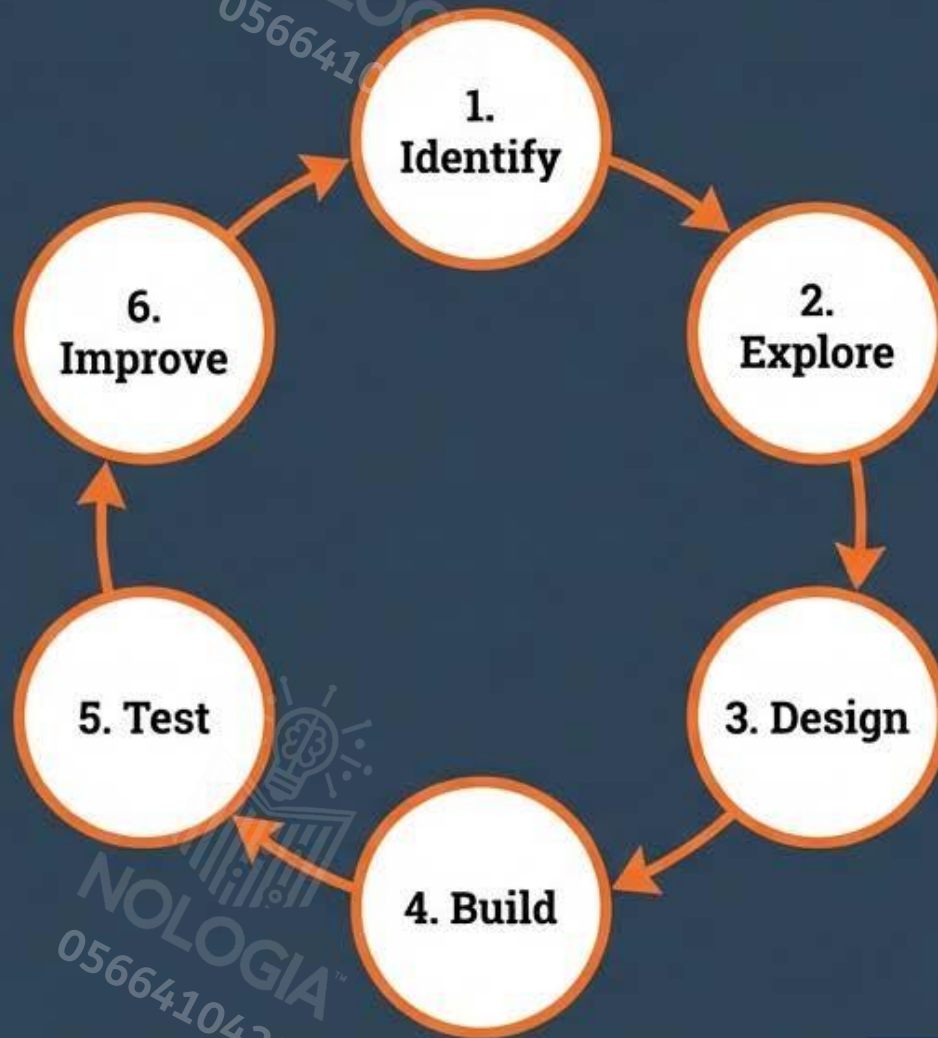
THE MISSION: You have been hired as a hydraulic engineer. How can rainwater be collected to be reused?

RESEARCH PHASE

1. **Analyze Local Rainfall:** What is the average annual precipitation in your area?
2. **Analyze Reservoirs:** What natural or man-made storage exists nearby?

GOAL: Design a system to capture water efficiently while considering the local environment.

THE ENGINEERING DESIGN PROCESS



MATERIALS CHECKLIST

- Model Requirements:
- Funnels
- Tubing
- Storage Tanks (Cups)
- Filtration Media (Gravel/Sand).

KEY ACTION: ITERATE.

If the "Test" phase reveals leaks, move to "Improve" and redesign.



CRITICAL THINKING: An engineer cannot just build; they must consider the consequences.

SYSTEM IMPACT & RESPONSIBLE ENGINEERING

BIOSPHERE IMPACT

Will diverting water harm local plants or animals that rely on runoff?

GEOSPHERE IMPACT

Will the collection system cause unwanted erosion or soil instability?

CONSTRAINT: The system must be placed where it minimizes negative impacts on Earth's natural cycles.

MISSION REPORT: THE EARTH SCULPTOR

THE MYSTERY SOLVED

Referring to the beach mystery: NARI WAS CORRECT. The dunes did not shrink because of age or walking. They were worn away by the mechanical forces of wind and water (Erosion).



KEY ACTION: ITERATE.

If the "Test" phase reveals leaks, move to "Improve" and redesign.

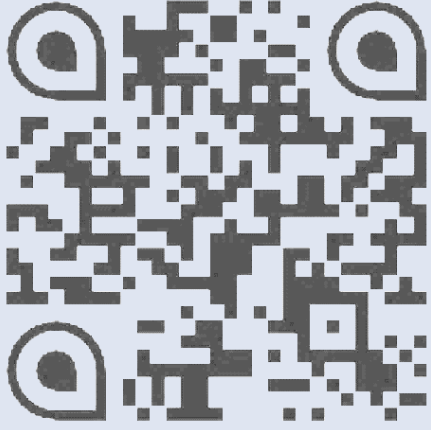
FINAL SUMMARY CHECKLIST

- ✓ Water is Earth's primary sculptor (Waves, Rivers, Ice).
- ✓ Erosion moves material; Deposition builds new land.
- ✓ Key Landforms: Deltas, Alluvial Fans, Moraines, Meanders.
- ✓ Engineering: Humans can harness water but must respect system balance.

Module (2): Earth's Other Systems

	Lesson Title	Page
2-1	Effects of the Geosphere	37
2-2+3	Effects of the Atmosphere + Effects of the Biosphere	52

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Module (2): Earth's Other Systems

01

First Lesson:
Effects of the Geosphere



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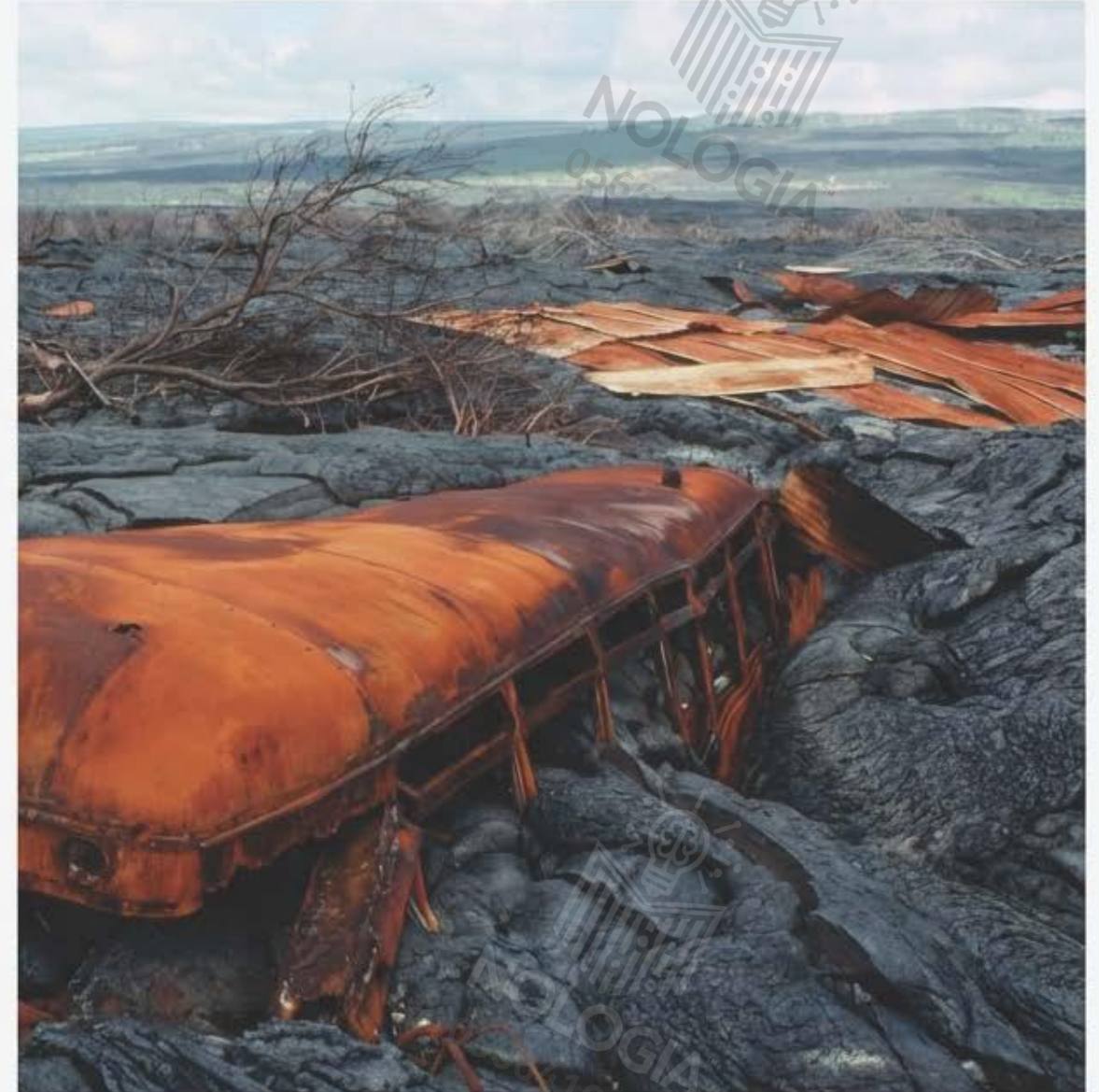
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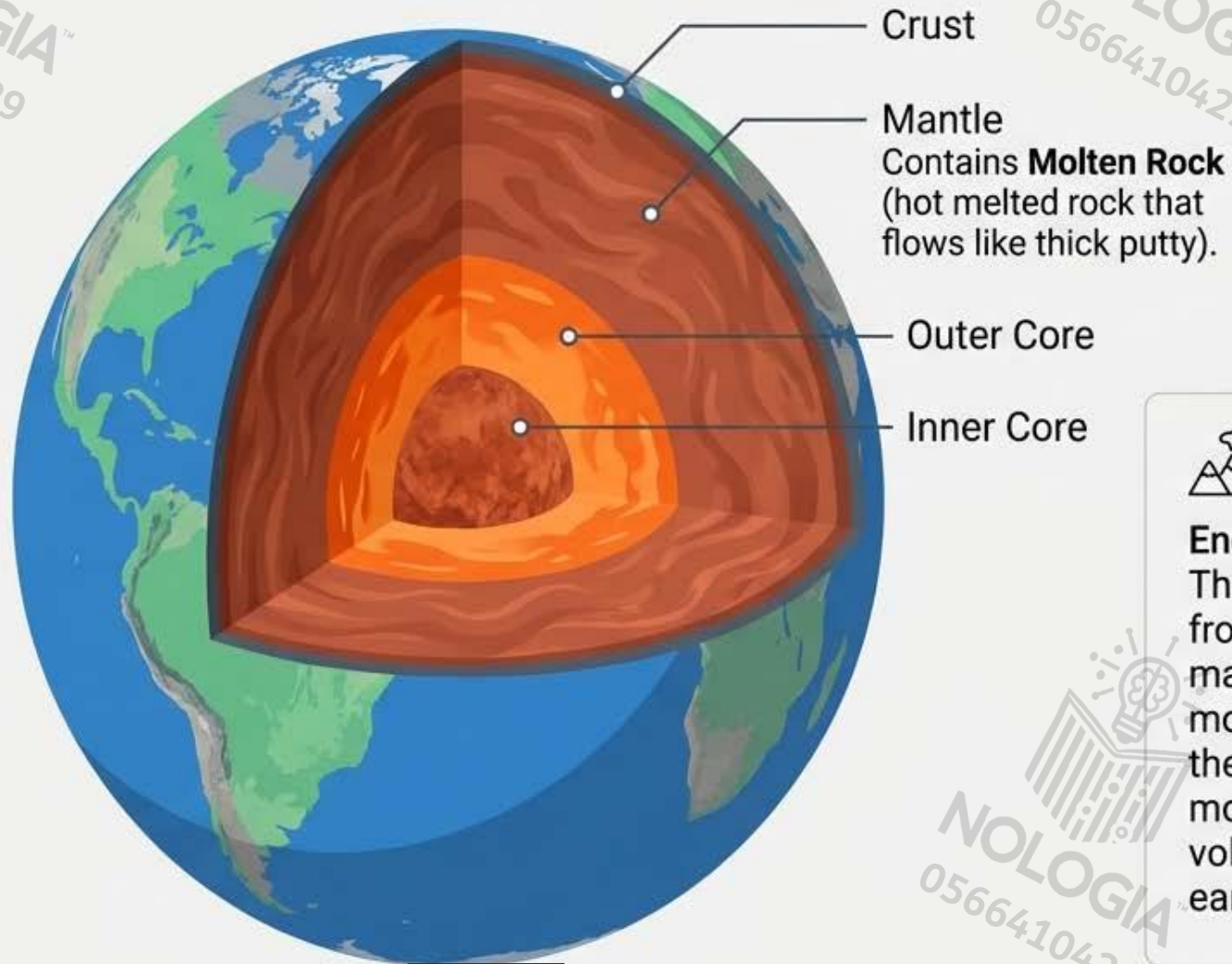
EFFECTS OF THE GEOSPHERE

Earth's Layers, Landforms, and Soil Systems | A Comprehensive Guide

The ground beneath our feet is a dynamic system. From the molten core to the soil on the surface, the Geosphere constantly changes and interacts with water, air, and life.



BENEATH THE SURFACE: EARTH'S COMPOSITION



Geosphere: The solid and melted rock inside Earth. It includes the soil, rock pieces, and landforms on Earth's surface.



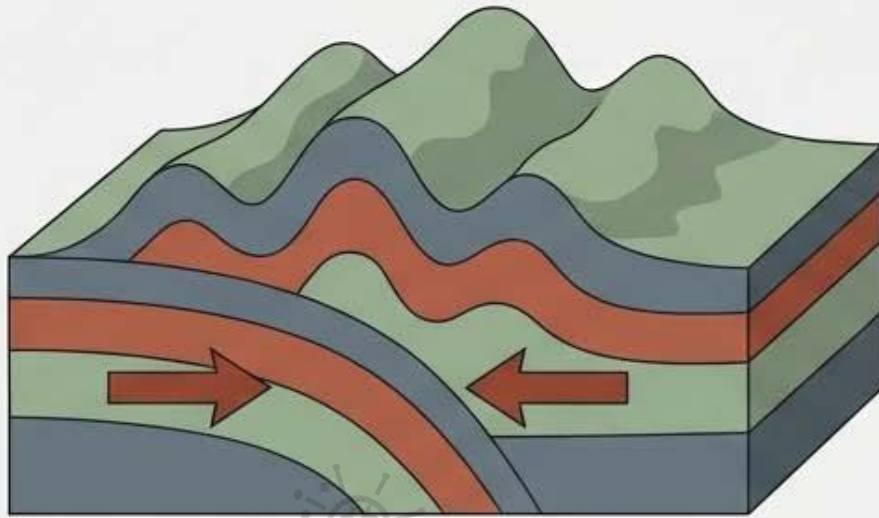
Key Insight

Engine of Change:
The intense heat from the core and mantle drives the movement of the the crust, creating mountains, volcanoes, and earthquakes.

MOUNTAIN FORMATION: HOW THE CRUST MOVES

Tension: A force that pulls things apart.

FOLDED MOUNTAINS



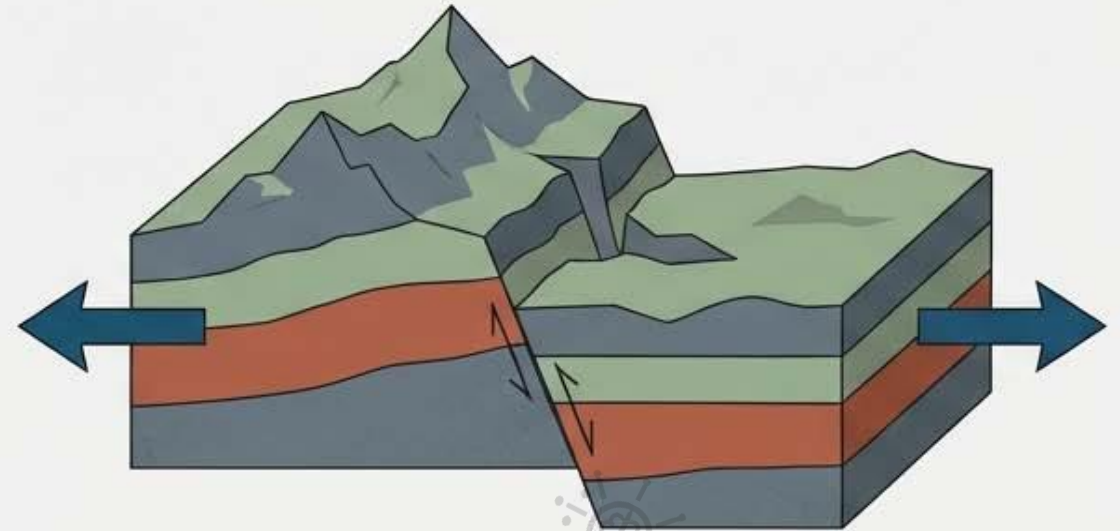
Cause: Plates push together, forcing crust upward.

Example: The Himalayas (formed by India & Asia collision).



Growing ~5mm taller per year.

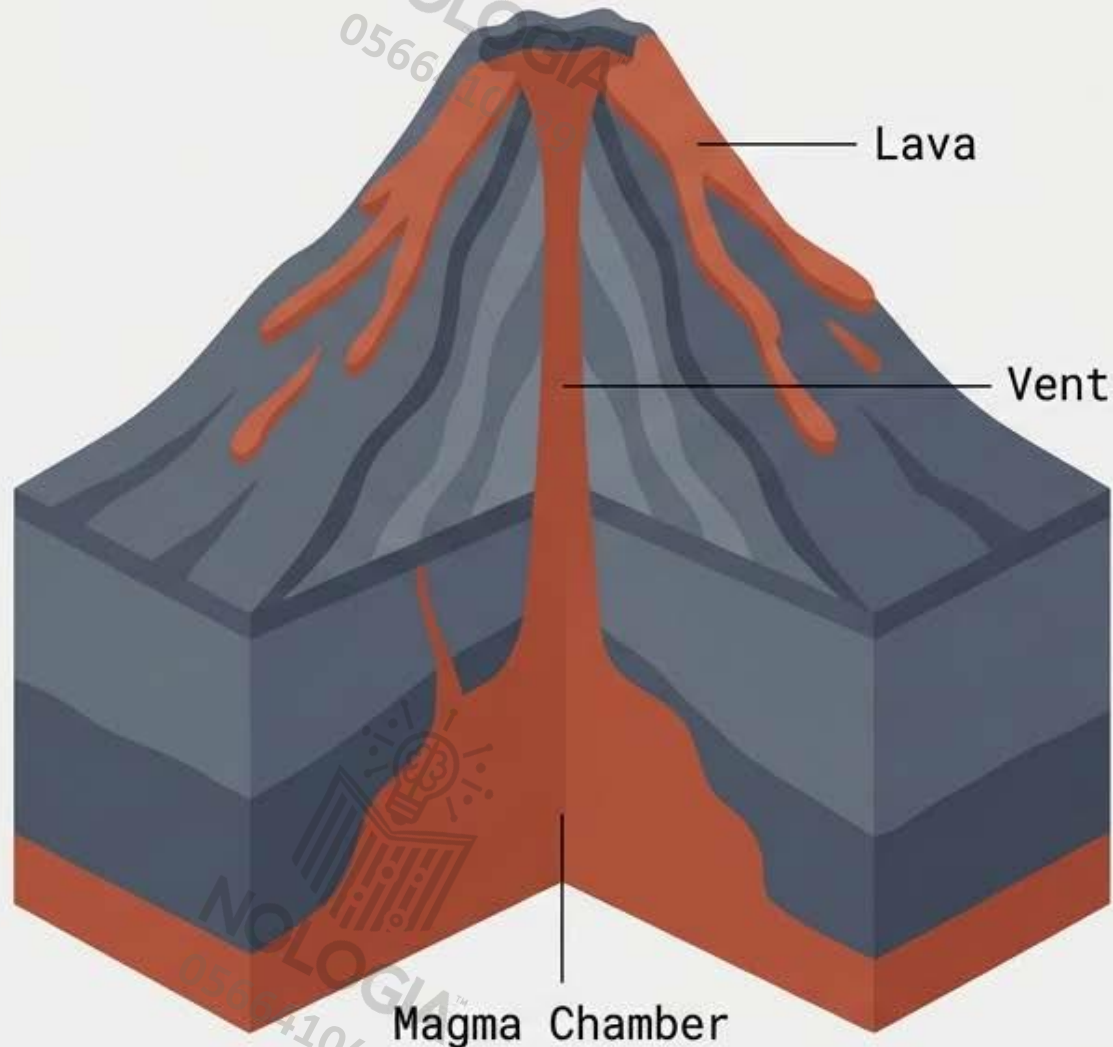
FAULT-BLOCK MOUNTAINS



Cause: Tension (pulling apart) or sliding twists and tears the crust.

Example: The Sierra Nevada Range.

VOLCANOES: WINDOWS TO THE MANTLE



An opening in Earth's crust where **Magma** (molten rock underground) erupts as **Lava**.

Formation: Commonly formed where one plate is pushed under another, melting rock into magma due to heat and pressure.

Lifecycle Status



Active: Currently erupting or recently erupted.



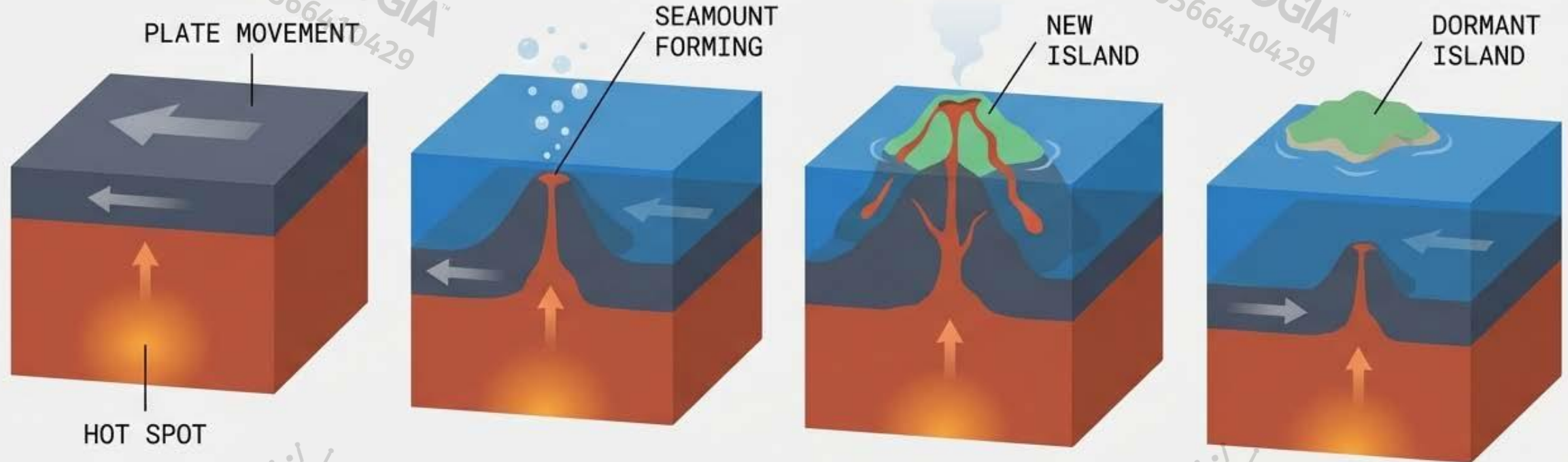
Dormant: Not erupting now, but may erupt in the future.



Extinct: Scientists believe it will not erupt again.

The Cascade Range is a line of volcanic mountains.

ISLAND BUILDING: THE 'HOT SPOT' PHENOMENON



Hot Spot

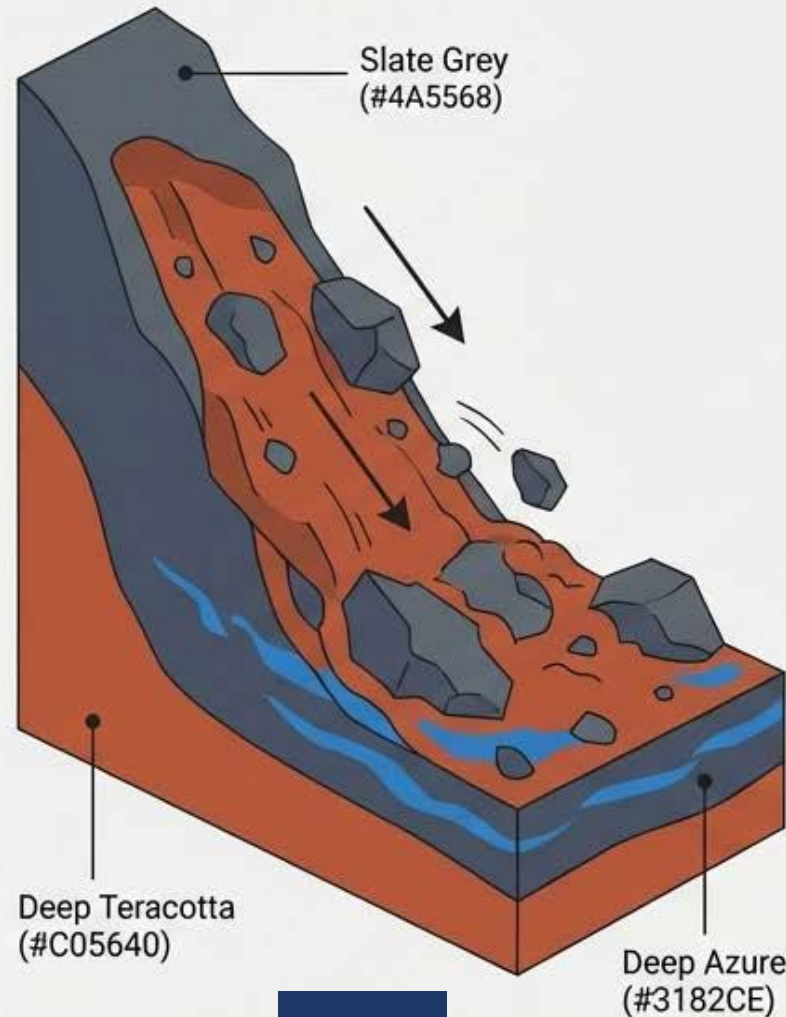
An area where molten rock from deep within the mantle breaks through the crust, often far from plate boundaries.

Real World Example

The Hawaiian Islands (Kauai, Oahu, Maui, Hawaii) formed one by one as the Pacific Plate moved over a stationary hot spot.



GRAVITY'S FORCE: LANDSLIDES & EROSION



Landslide: The sudden movement of a large amount of rock and soil down a slope, driven by gravity.

****Common Triggers*:**



Earthquakes
(Vibration)



Volcanic
Eruptions



Heavy Rains



Human Activity
(Deforestation)

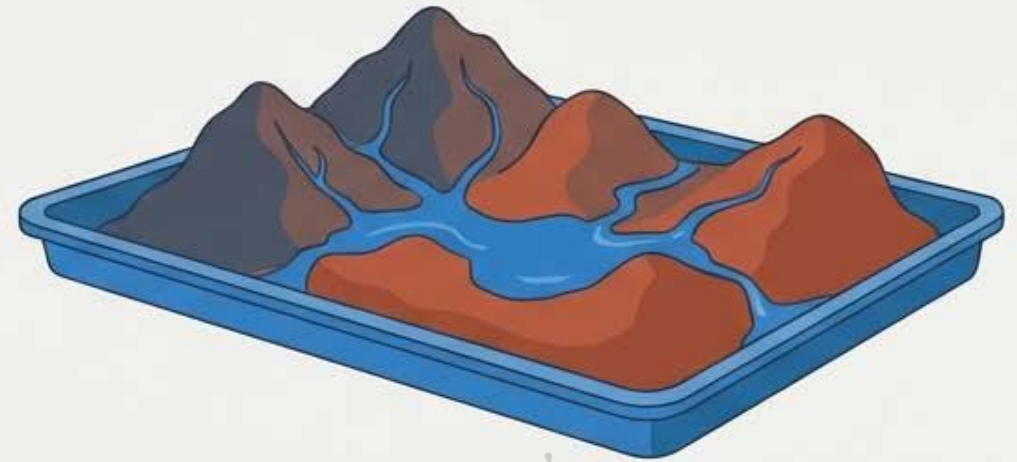
Mudslide: A specific type of landslide where water-saturated ground flows like a liquid. Mudslides can be devastating, knocking down trees and destroying paths.

SYSTEM INTERACTION: HOW LAND SHAPES WATER

INQUIRY ACTIVITY: MODELING LANDFORMS



RESULT: WATER COLLECTS IN LOW SPOTS



****Investigation****: Modeling landforms with clay and simulating rain.

****Observation****: Water flows downhill and collects in low spots determined by the shape of the land.

****Conclusion****: The Geosphere (landforms) dictates the flow and storage of the Hydrosphere (water). This is how lakes and rivers are formed.

EARTH'S SKIN: THE COMPONENTS OF SOIL

Fluids:
Water and air
pockets.

Sediment:
Sand, silt, and clay
(weathered rock).

Minerals:
Solid, nonliving
substances found in
nature.

Living Organisms:
Bacteria, fungi,
and roots.

Organic Matter:
Nonliving plant and
animal material.



Function: Soil provides the physical structure, water, and nutrients necessary for the biosphere (plants) to thrive.

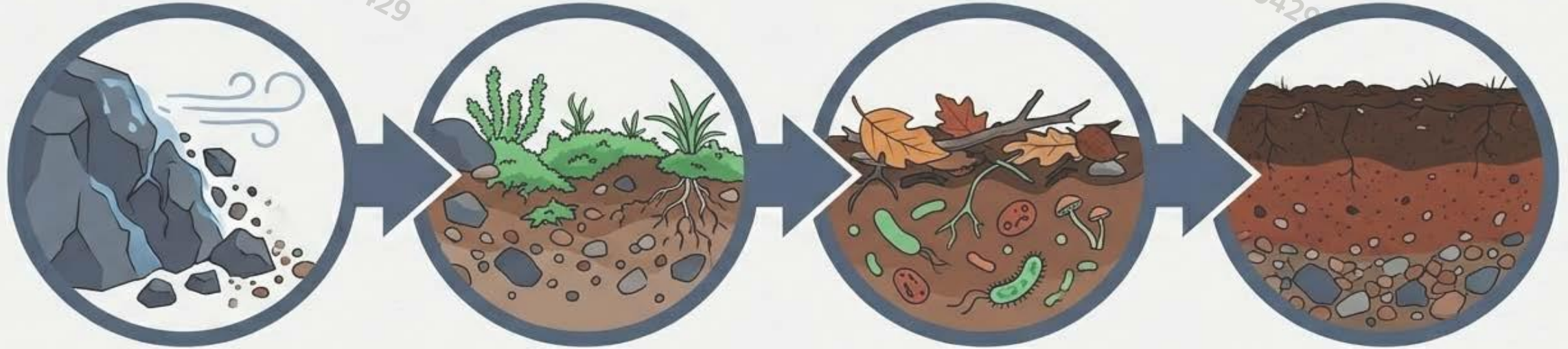
THE TIMELINE: HOW SOIL FORMS

1. Weathering

2. Colonization

3. Decomposition

4. Humus Formation



Rocks break down into sediment over time.

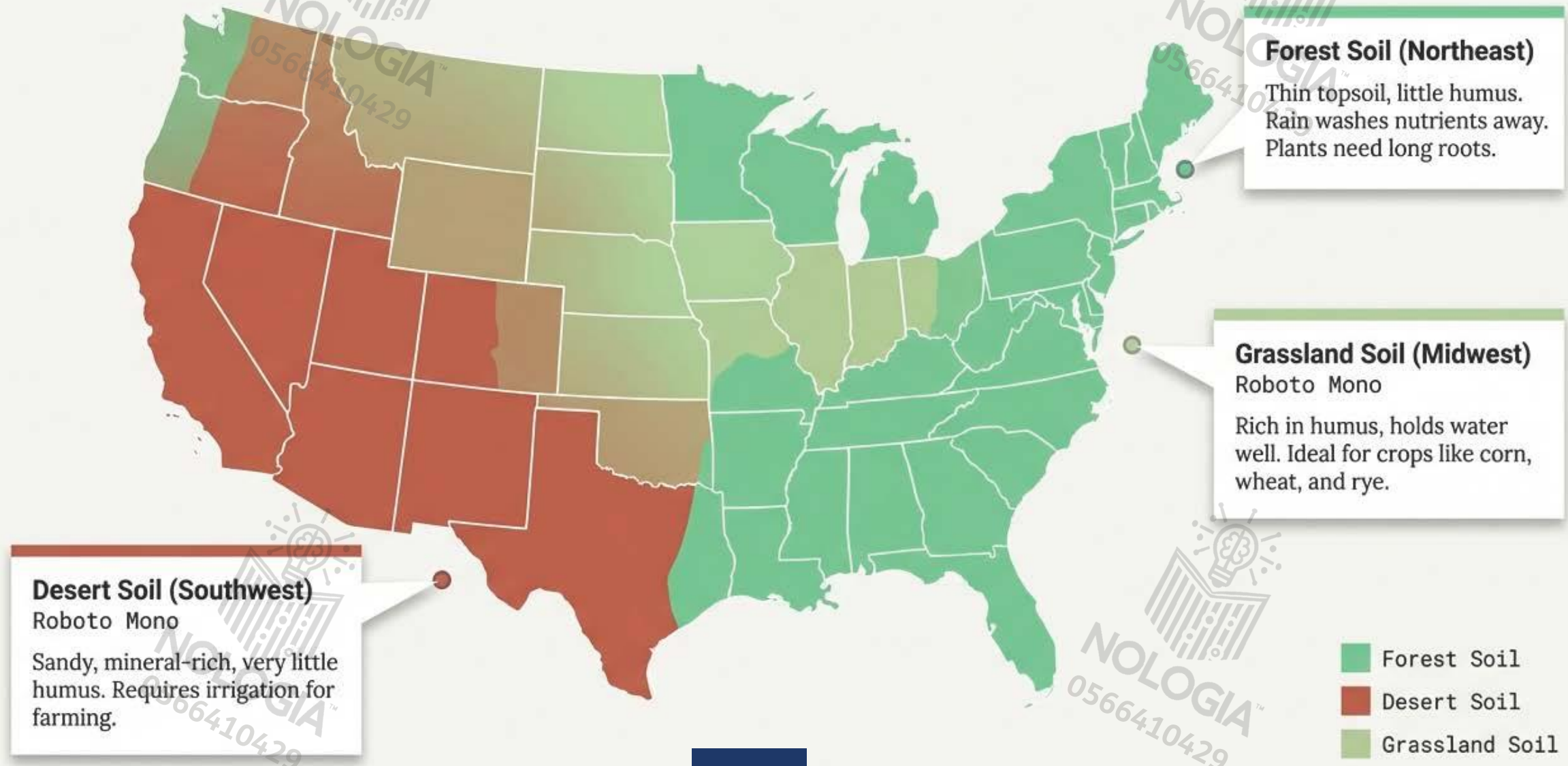
Plants and animals move into the sediment.

Bacteria and fungi break down dead matter.

Formation of **Humus** (nutrient-rich organic matter).

Key Takeaway: Living things allow the soil to renew year after year.

GEOGRAPHY MATTERS: SOIL TYPES ACROSS THE USA



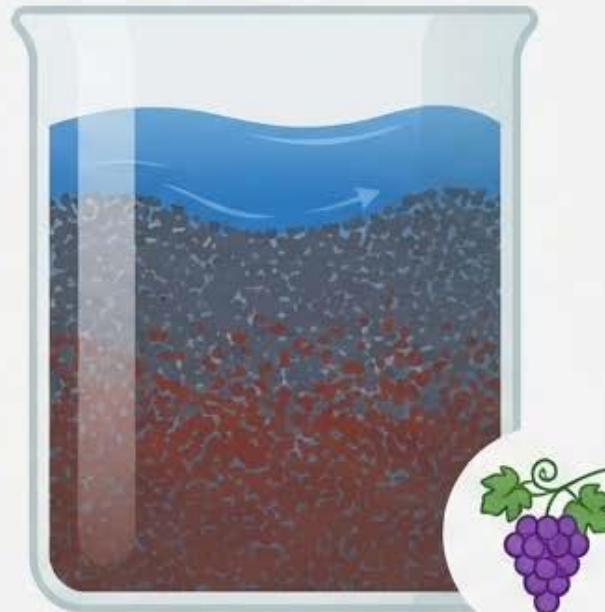
SOIL PROPERTIES: TEXTURE & WATER RETENTION

SANDY SOIL



Large particles.
Drains fast.
Holds little water.

CLAY SOIL



Small particles.
Holds water tightly.
Can drown roots.

MEDIUM-TEXTURED SOIL



The ideal balance.
Holds water and air.
Perfect for crops.

SYSTEM INTERACTION: SOIL & WATER CHEMISTRY (pH)



Experiment: Water is poured through different soil filters and tested with pH paper.

Goal: To see how soil type affects the acidity (pH) of the water.

Conclusion: Soil is part of the Geosphere, but it chemically alters the Hydrosphere. The type of soil determines the chemical makeup of local groundwater.

STEM CAREER: CAVE TOUR GUIDE

JOB ROLE

Presents natural history and geology of caves to guests.

KNOWLEDGE REQUIRED

- **Geology**: How caves form over thousands of years. (#C05640)
- **Hydrology**: Understanding underground river systems. (#3182CE)
- **Safety**: Navigation and risk management. (#4A5568)

SKILLS

Public speaking, research, and sometimes boat operation.

EDUCATION

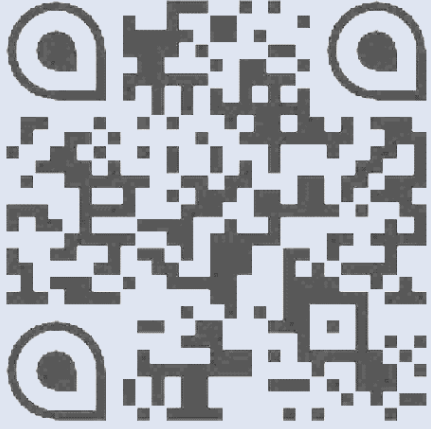
High school diploma usually required; park experience is a plus.



STUDENT REVIEW: THE DYNAMIC EARTH

****Check Your Understanding**:**

- [✓] **Layers:** Earth is composed of the Crust, Mantle (molten rock), and Core.
- [✓] **Movement:** Tectonic plates drive the formation of Mountains and Volcanoes.
- [✓] **Forces:** Gravity causes landslides; Tension creates fault-block mountains.
- [✓] **Soil:** A mix of weathered rock and humus. Types (Forest, Desert, Grassland) vary by region.
- [✓] **Systems:** The Geosphere continuously interacts with Water (Hydrosphere) and Life (Biosphere).



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Module (2): Earth's Other Systems

02

03

Second & Third Lessons:
Effects of the Atmosphere
& Effects of the Biosphere



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Earth's Dynamic Systems

A Comprehensive Guide to the
Atmosphere and Biosphere

Investigating the interactions between the air we breathe and
the life it sustains. Based on Grade 5 Earth Systems Science.

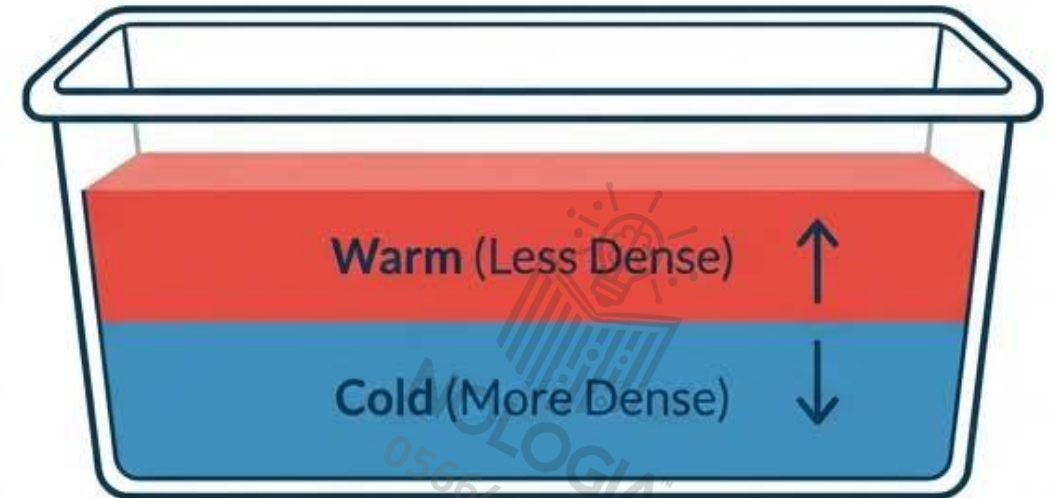
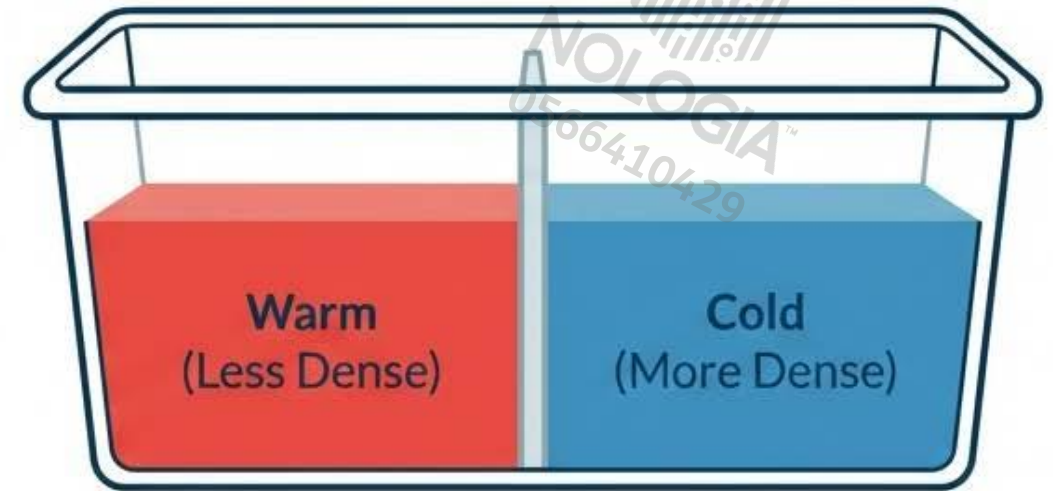
The Properties of Air Masses

Air is a fluid. Although the atmosphere looks empty, it contains matter with mass and weight.

Understanding that air behaves like water helps us predict weather patterns.

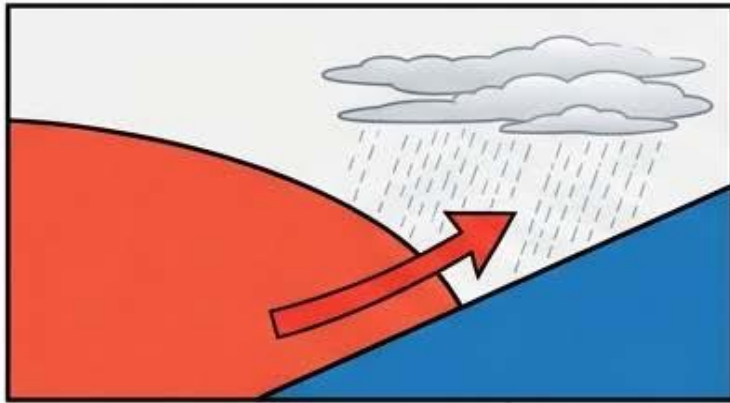
Air Mass:

A large region of air that has a similar temperature and humidity.



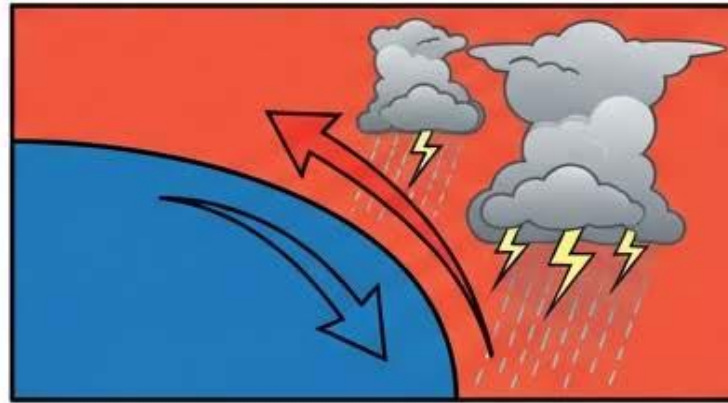
Fronts: The Engine of Weather Changes

A **Front** is the boundary where two air masses of different temperatures meet.



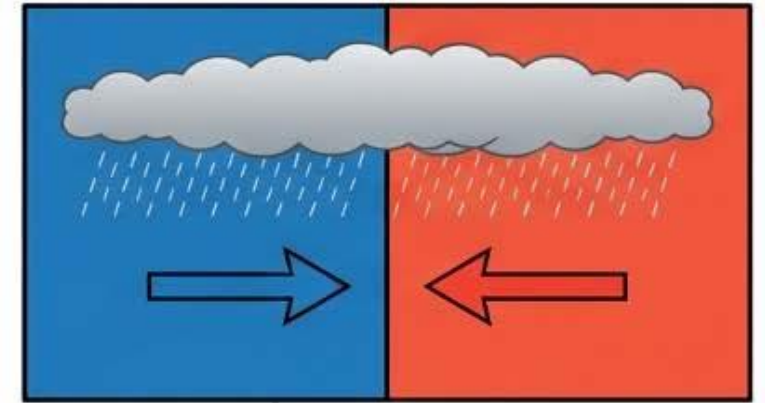
Warm Front

Warm air slides over cold.
Brings light, steady rain.



Cold Front

Cold air pushes under warm.
Forces air up quickly, causing
storms.



Stationary Front

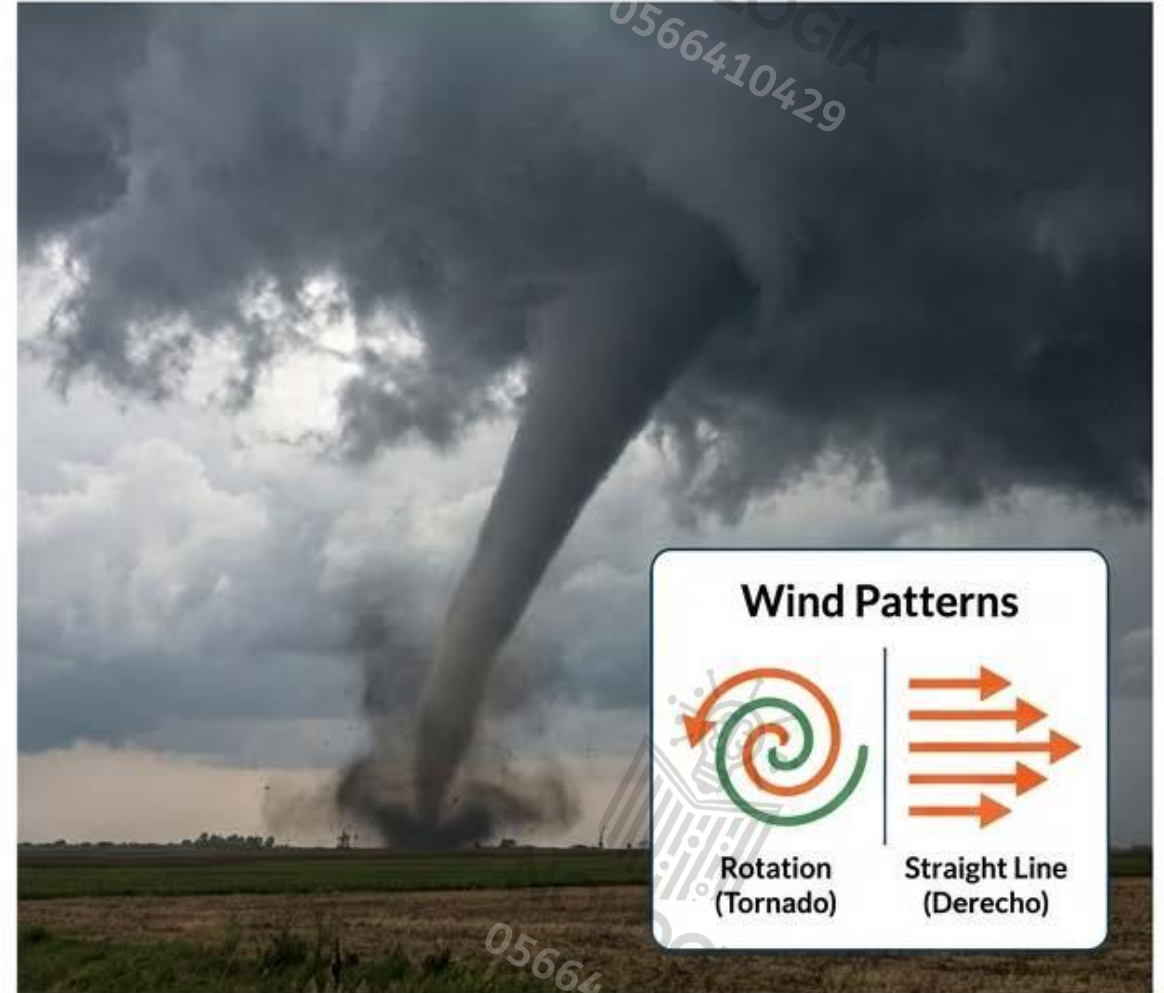
Boundary does not move.
Rainy weather lasts for days.

Severe Weather: Wind and Rotation

- **Thunderstorms:** Rainstorms with lightning, thunder, and flash floods. Caused by rapid air movement.

Comparison: Tornado vs. Derecho

- **Tornado:** A rotating, funnel-shaped cloud. Winds up to **512 km/h (318 mph)**. Moves erratically in changing directions.
- **Derecho:** A widespread windstorm. Causes tornado-like damage but moves in a **straight path** with no rotation.



Severe Weather: Tropical and Winter Systems

Tropical Storms / Hurricanes

Tropical Storms / Hurricanes occur near the equator. A storm becomes a **Hurricane** when winds exceed 119 km/h (74 mph). Characterized by a spiral of clouds with a central "eye".



Winter Storms

Winter Storms occur when cold, dry air meets warm, humid air. Forms include **Blizzards** (heavy snow/winds) and **Ice Storms** (rain freezes on contact).



Weather vs. Climate

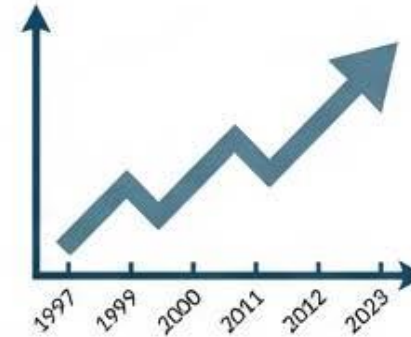
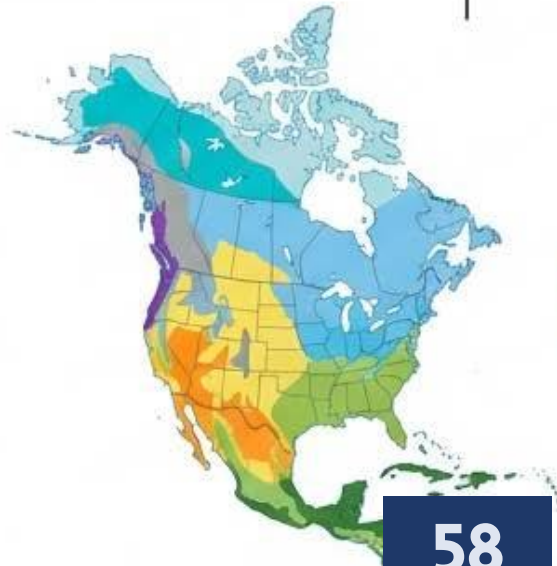


WEATHER

The condition of the atmosphere at a **given place and time**.

The condition of the atmosphere at a **given place and time**. Varies by hour or day.

- Rain
- Hail
- Sleet
- Snow
- Sunny



CLIMATE

The **average** weather pattern of a region over a long period of time.

Kind variables: Average Temperature + Average Rainfall

tropical wet
tropical wet and dry
arid

semiarid
Mediterranean
humid subtropical
marine west coast
humid continental

humid continental cool
humid continental warm
subarctic
tundra
highland

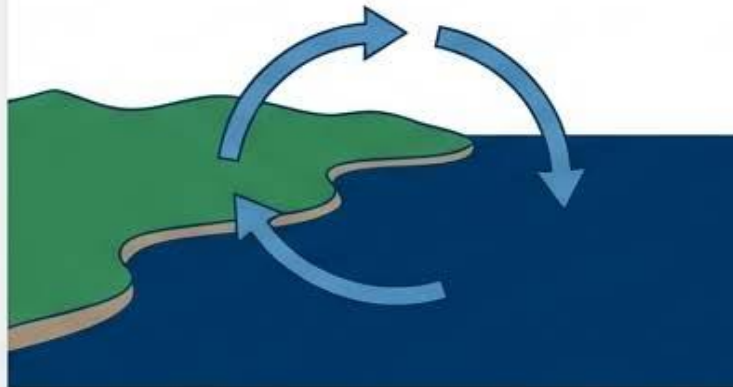
Factors That Determine Climate

1. Latitude



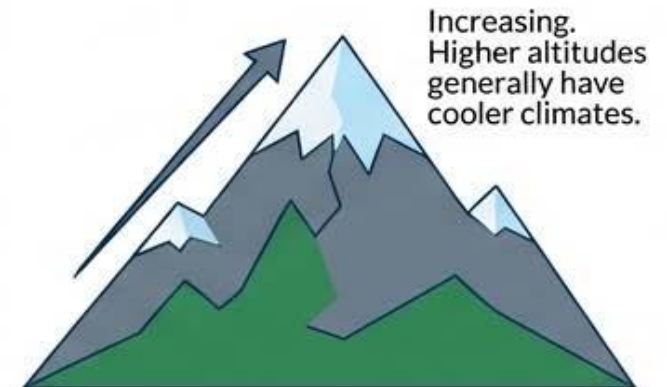
Distance from the equator
Areas closer to the equator receive more intense solar energy.

2. Hydrosphere Interaction



Distance from water
Large bodies of water moderate the temperature and rainfall of nearby land.

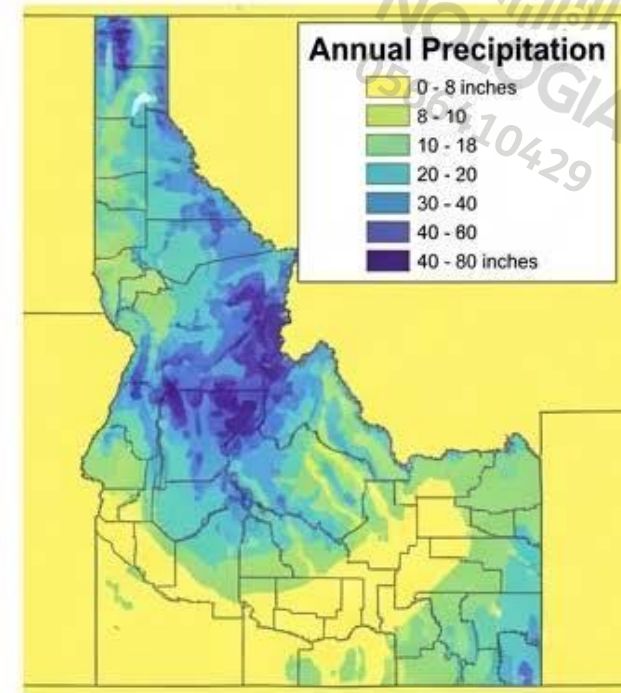
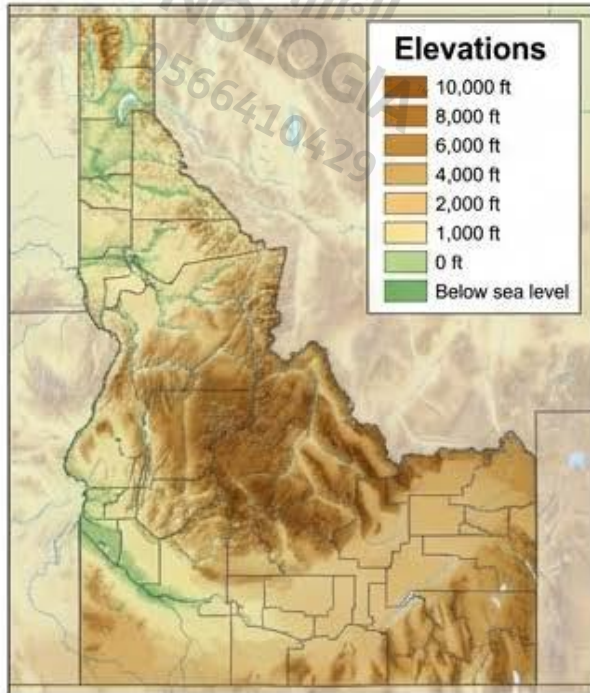
3. Altitude (Geosphere)



Elevation
Higher altitudes generally have cooler climates.

Plants can describe a climate. Example: Temperate trees lose leaves in winter; tropical plants do not.

Case Study: Idaho Elevations & Precipitation



Analysis

****Observation****: Areas with the highest elevation (mountains) correlate with the highest precipitation.

****Mechanism****: Mountains force air upwards. As air rises, it cools, and moisture condenses into rain or snow.

****Conclusion****: The Geosphere directly affects the Atmosphere.

The Biosphere and Natural Resources

The **Biosphere** consists of all living things on Earth. It interacts with the air (Atmosphere), water (Hydrosphere), and land (Geosphere).

Natural Resource: Material found in nature used by living things.

1. Renewable Resources

Can be replaced in nature or will not run out.

Water, Wind, Sunlight

2. Nonrenewable Resources

Found in limited amounts and will eventually run out.



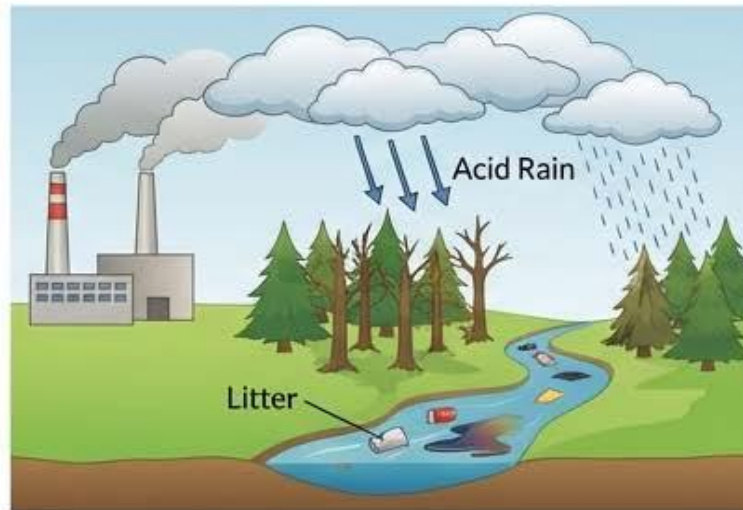
Threats to the Biosphere

Deforestation



Removal of large areas of trees for goods or building. Animals lose habitat, and trees take a long time to regrow.

Pollution



Litter physically harms wildlife. Acid rain (pollution mixed with rain) damages plants and ecosystems.

Invasive Species



Non-native plants or animals introduced by humans. They upset the balance of the ecosystem and threaten native species.

Endangered: At risk of dying out.

Extinct: No longer existing on Earth.

Data Analysis: Endangered and Extinct Species

Type of Animal	1970 Population	1990 Population	Present Status
Mountain Gorilla 	250	600	880 (Recovering)
Leatherback Sea Turtle 	90,000	70,000	55,000 (Declining)
Golden Toad	Unknown	1	0 (Extinct)
Whitefin Dolphin	400	100	0 (Extinct)

All populations are estimates.

Conservation: Protecting Our Resources

Conservation is the practice of protecting natural resources.



Waste Management

Pick up trash and dispose of recyclables properly.



Restoration

Plant new trees, bushes, and flowers that are *native* to the area.



Composting

Compost garbage and leaves to create natural fertilizer instead of using chemicals.



Transport

Ride a bike, walk, or use public transportation to reduce emissions.

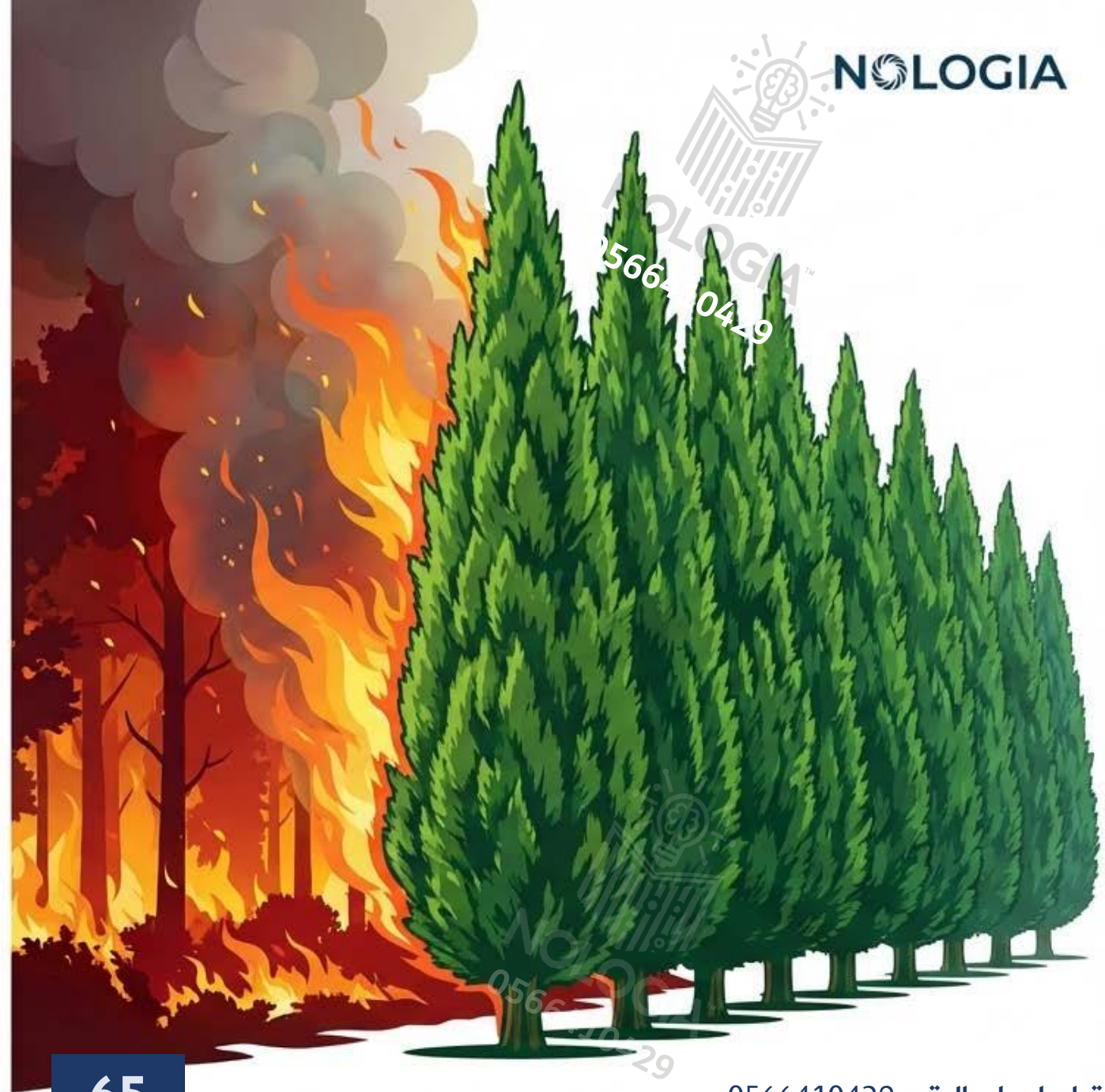
Research Spotlight: Protecting Against Forest Fires

The Challenge: Limiting damage to ecosystems from fire.

The Solution: Biosphere Engineering.

Scientists have studied **Mediterranean Cypress Trees**. These trees are naturally fire-resistant. By planting them as barriers, we can slow the spread of forest fires.

Modeling: Developing models helps humans make better decisions about their effect on the environment.



STEM Challenge: Designing a Desert Oasis

Prompt: You are a landscape architect designing a garden in a desert climate.

Geosphere

Rocks & Sand.
How does the land shape affect the oasis?



Atmosphere

High heat & dry air.
How do we minimize evaporation?

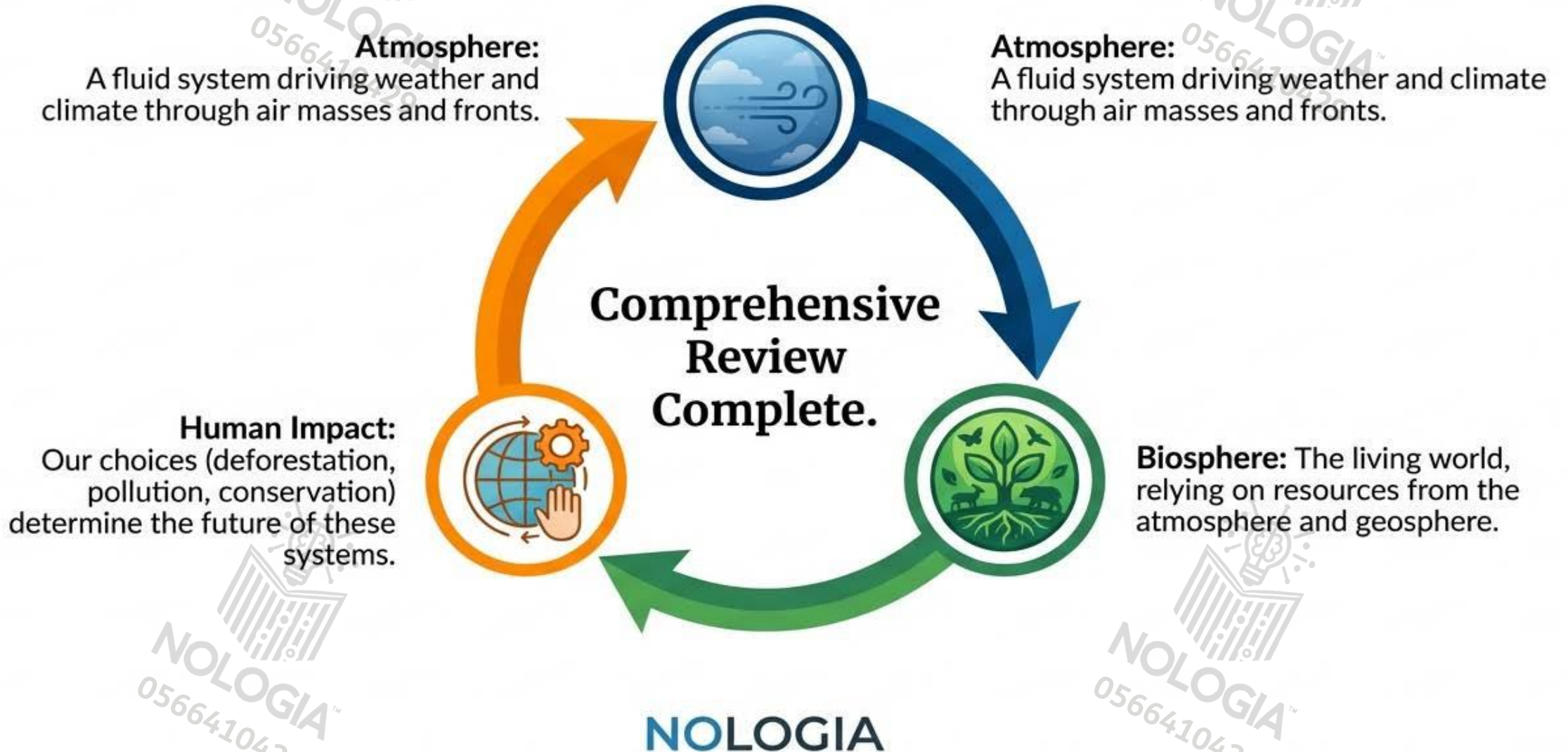
Biosphere

Plant Selection.
Choosing species that survive with limited water.

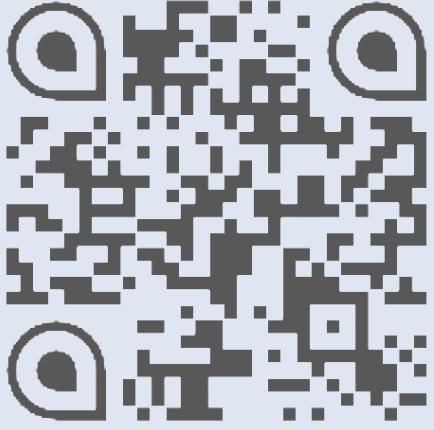


Design Constraint: The solution cannot be too expensive for the city.

Summary: Earth's Interconnected Systems



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