


# CYSF LOGBOOK 2023-24

*Navnir Gill & Tanveer Brar*

7<sup>TH</sup> GRADE SCIENCE

Wed, Oct, 4/2023

Idea that we chose: 

## Project Topic Planning ~

### Main Ideas:

- ***Human influences on ecosystems, and the environment***  
Explain Ecosystems                      Climate change/global warming  
Animals/ plants/ Food Chain              Wildfires/Acid Rain/Deforestation/Habitat Loss/Increase  
in Extreme Temperature ~ A solution to all these problems
- ***What is the Best Natural Cleaning Agent?***  
Testing different soaps and seeing if they are healthy for the human body and the environment.
- ***Vermicompost***  
The benefits of Vermicompost              Different types of compost  
Research biodegradable stuff, and the process of Vermicompost.

Today we started thinking about how we are going to do things. First we started off by thinking of our research, how we are going to do it, and what we are going to be researching. We came up with multiple ideas, and some of them are shown in the "Main Ideas." We also started to think about our experiment and how we are going to execute it. Our main idea that we are 100% sure of, is that we want to make our project based on our last year's project which was "Acid Rain ~ Impacts & A Solution".

Thur, Oct,5/202

## -Project Proposal-

**Project Title:** Ecosystems - Striving for Survival

### **Testable Question (s):**

What are the human influences on ecosystems, and the environment?

What are the effects of global warming on ecosystems and the environment?

~ What is an ecosystem, and what is in it?

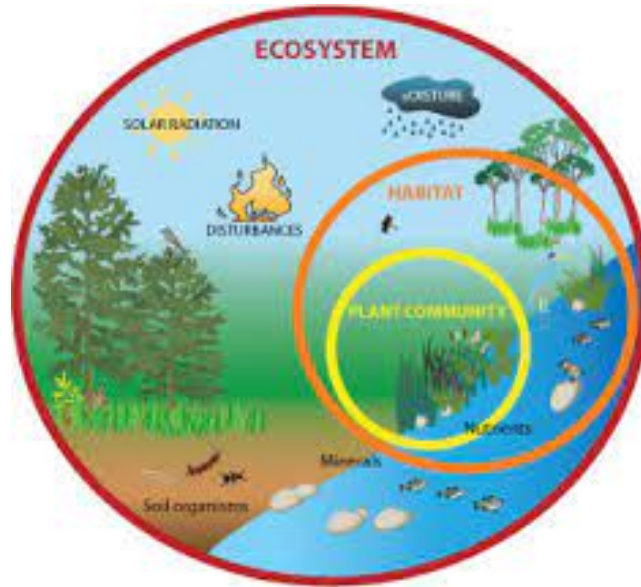
Fri, Oct,6/2023

### **Brief Research-**

#### **What is an ecosystem?**

Rutledge. K, Mcdaniel. M, Teng. M, Hall. Hall. H, Ramroop. T, Sprout. E, Hunt. J, Boudaru. D and Cost. He says (October 14)

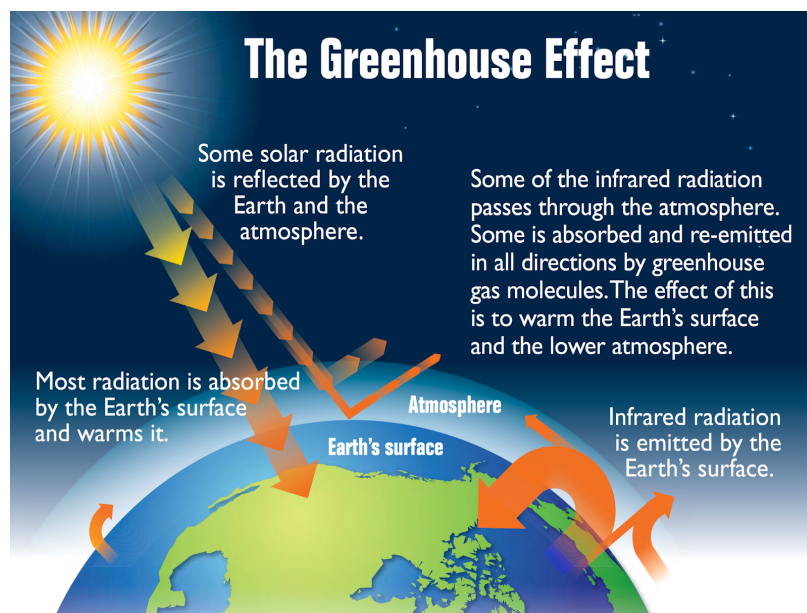
An ecosystem is basically an area where flora and fauna, and other organisms, weather and landscapes work together to form a circle of life. There can be many examples of ecosystems, and some can include Grasslands, Forests, Coral Reefs, the desert, wetlands, and many more.



### What is global warming?

(Houghton, J in (2004))

Global warming is the warming of the planet through a greenhouse effect. On average one third of solar radiation that hits the surface of the Earth is reflected back up, the remainder of it is absorbed by the land and oceans. The greenhouse gases in the ozone layer are able to trap some of this solar radiation, then warming the planet. Some greenhouse gases include; water vapour, carbon dioxide, ozone, methane and nitrous oxide. This warms the planet by 63°F (35°C).



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## NOT IN USE!!!

### **Planning For Experiment:**

For our experiment today we planned and finally came up with all of our manipulated variables. So for the first test we are going to be fully taking care of the plants, like it has been untouched. For the other two tests we are going to be showing the effects of global warming. The main topics that we are going to be focusing on are extreme weather and pollution.

## NOT IN USE!!

### **Hypothesis:**

1. Navnir's hypothesis for the influences on ecosystems is that Test 2 (Jar with human influences) will half die. This is because human influences are not always that bad, and we also do good things for the environment as well. Test 3 (Jar with climate change effects) will die. This is because as we can see in the real world, climate change has a huge effect on ecosystems and the environment. In the winters it is freezing cold, and in the summers it is burning hot. The plants might end up freezing, and then go through a drought.
2. Tanveer's hypothesis for human impacts on the environment and ecosystems is that Test 2 and 3 (the ecosystem with effects of global warming) will drop down. As we know all plants need a specific amount of water, sunlight, space and basic needs. If the amount is changed for example if a plant gets too much water it will soon enough start to give up and die. Test 2 will

probably drop and the garbage will most likely be on the ground floor, still being visible. It might be weak with the leaves and body of the plant might break off easily due to less nutrients. With our manipulated variables I think when test 3 (ecosystem with extreme weathers) will suffer from both freezing and the plant will probably be weak and cold, but when it slowly gets the time it will switch to drought. Most likely the stem and leaves might fall off leaving nothing of the plant. The roots will probably be small and thin, the reason being of the few nutrients in the plant.

Sat, Oct, 7/2023

### **Brief Planning For Experiment:**

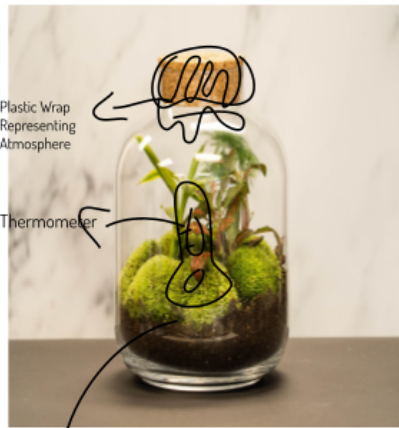
We are going to create three tests. Test 1 is going to be a jar with an ecosystem. This ecosystem is going to be untouched. In other words, we are going to take care of it, and it is going to be our control.

Test 2 is going to be the jar with an ecosystem which will represent the effects that humans have on ecosystems. In this experiment, we are going to add pieces of garbage to the ecosystem to represent littering and landfills. Over the course of a few weeks, we will probably start seeing the effects.

Test 3 is going to be a jar with an ecosystem showing the effects of climate change on the ecosystem. What we are going to do, is that we are going to add tin foil to the top of the jar instead of plastic wrap that is going to represent greenhouse gases. As a result, Test 3 will be warmer than the other two tests.

We are also going to add a thermometer to measure all of the test temperatures throughout the experiment.

### Test 1

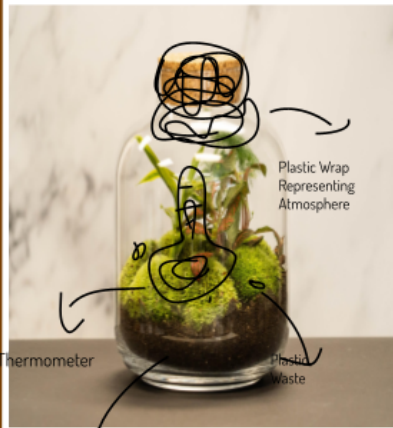


Plastic Wrap  
Representing  
Atmosphere

Thermometer

Ecosystem

### Test 2



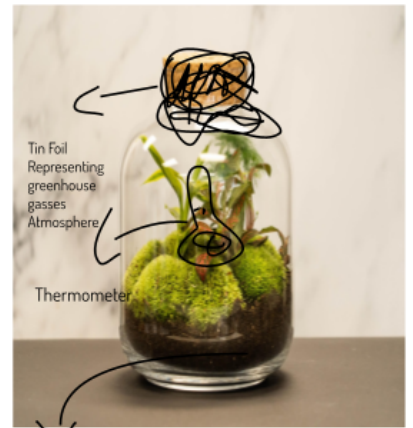
Plastic Wrap  
Representing  
Atmosphere

Thermometer

Plastic  
Waste

Ecosystem

### Test 3



Tin Foil  
Representing  
greenhouse  
gasses  
Atmosphere

Thermometer

Ecosystem

This is a visual representation of what we are thinking

## Hypothesis:

1. Navnir's hypothesis for the experiment is that if test 2 is testing the effects that humans have on ecosystems and the environment, then the ecosystem in test 2 might become weak, but not completely die. This is because human influence on ecosystems stems are not always that bad. Sometimes we balance out the negative things with the positive, for test 3, the ecosystem will most likely die because it will go through extreme heat and will probably suffer from a drought. The plants might end up drying up and dying.

Tue, Oct, 10/2023

2. Tanveer's hypothesis for the experiment is that since we are going to be showing the effects of humans including littering, pollution and increase of greenhouse gases. Then this means that both these tests are going to grow weak and I believe that the stem, leaves and roots of the plant will probably break off easily. This is because of the shift of the extreme temperatures (cold-hot) immensely fast, but on the other hand the test will grow weak due to the plastic trying to decompose.

## Research:

### What is an ecosystem?

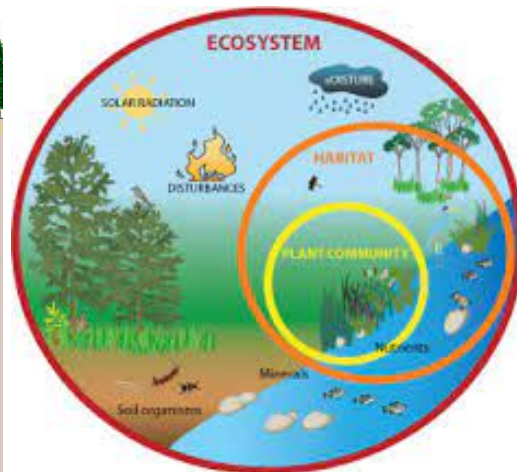
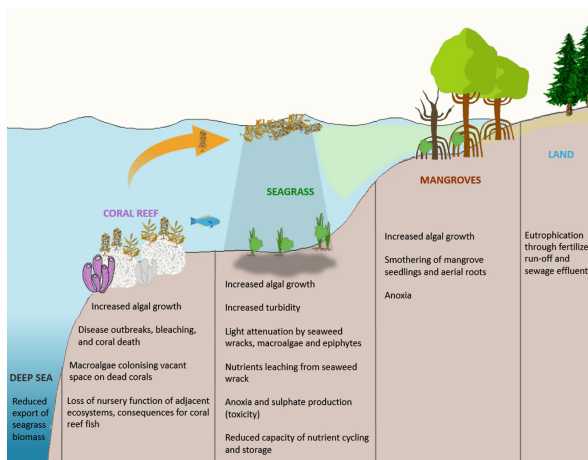
Rutledge. K, Mcdaniel. M, Teng. M, Hall. H, Ramroop. T, Sprout. E, Hunt. J, Boudereu. D and Cost. (October 14)

An ecosystem is basically an area where flora and fauna, and other organisms, weather and landscapes work together to form a circle of life. There can be many examples of ecosystems, and some can include Grasslands, Forests, Coral Reefs, the desert, wetlands, and many more.

Every part of an ecosystem depends on another part of the ecosystem. This can be either directly or indirectly. For example, if the temperature/climate changes in an ecosystem, the organisms that live there have to adapt to their environment, or migrate to another ecosystem that has what it needs.

Ecosystems can come in all different shapes and sizes. An example of this could be Tidepools (ponds left over the ocean). They are very biodiverse, and have a very strong ecosystem.

The whole surface of the earth is connected by ecosystems, and ecosystems can be connected by larger biomes ( Biomes are large sections of land. Such as oceans, forests, prairies, etc)





## What is in an ecosystem?

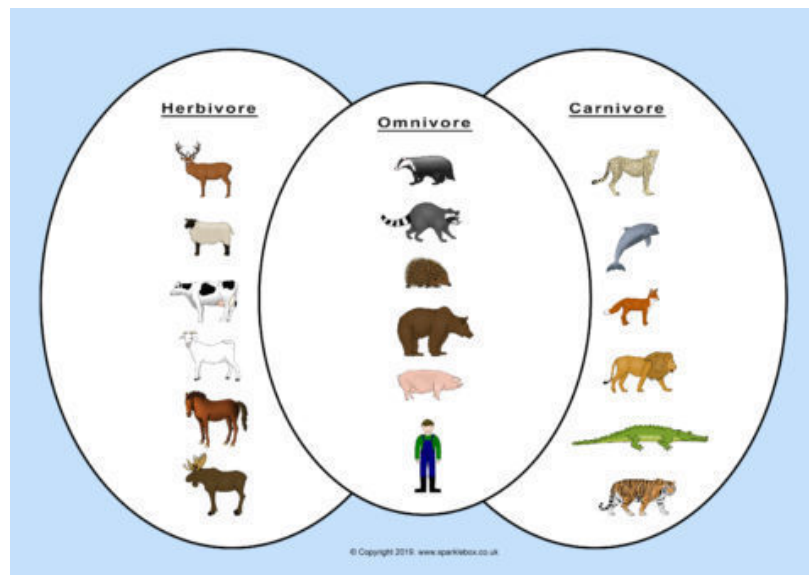
An ecosystem is a very biodiverse place. They consist of many organisms, some big and some small. All animals in an ecosystem fall into one of these three categories: carnivores, herbivores, and omnivores.

Carnivores are animals that eat meat/other animals. Examples of this could be Lions, Tigers, Wolves, and Cheetahs.

Herbivores are animals that eat plants. Examples of this could be Zebras, Elephants, and Giraffes.

Omnivores are animals that can eat both plants and animals. Examples of this can include us Humans, Bears, and more!

There are also 5 different types of plants. These include Herbs, Shrubs, Trees, and Creepers. Herbs and shrubs grow closer to the ground, and their stems are much skinner when compared to Trees. Trees on the other hand grow further up.



## What is global warming?

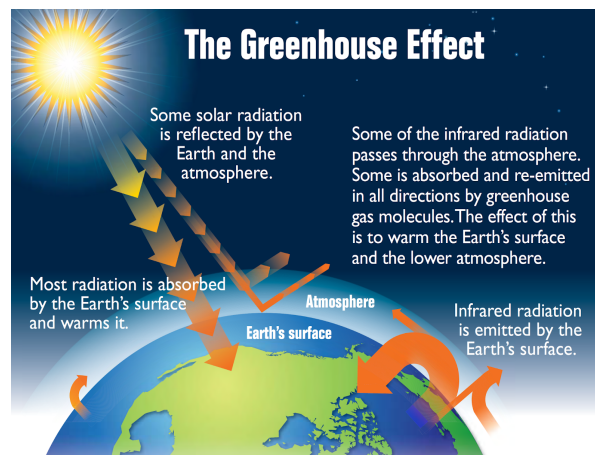
(Houghton.J(2004)

(What is climate change?/NASA)

Global warming is the warming of the planet through a greenhouse effect. On average one third of solar radiation that hits the surface of the Earth is reflected back up, the remainder of it is absorbed by the land and oceans. The greenhouse gases in the ozone layer are able to trap some of this solar radiation, then warming the planet. Some greenhouse gases include; water vapour, carbon dioxide, ozone, methane and nitrous oxide. This warms the planet by 63°F (35°C).

One of the biggest factors of global warming is cars. This is because of the high amount of methane, Co2 and overall greenhouse gases. Another factor that increases climate change is burning fossil fuels, fossil fuels generate electricity and heat but also many strong greenhouse gases like methane, nitrous oxide and much more.

Some effects of global warming include unpredicted rainfall, extreme weather events, rising sea levels. The reason this happens is because these greenhouse gases warm the Earth's surface, this warmed the Earth and caused drought melting of glaciers and much more. These changes also have many consequences for agriculture, biodiversity and even human health.



Wed, Oct, 11/2023

## What does an ecosystem need to survive?


(National Geographic Society (October 23, 2023))

Ecosystems need basic things, like water, sunlight, space, and energy to grow and live. Although they also need specific things to survive. All ecosystems must have producers, consumers, decomposers, and dead inorganic matter.

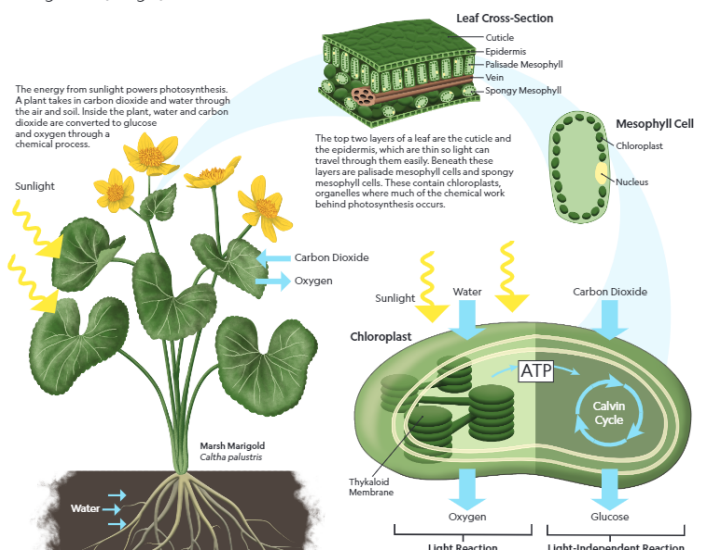
Most of the energy that an ecosystem needs comes from the sun. Sunlight allows plants/organisms to use a process called photosynthesis to convert carbon dioxide and water into carbohydrates (carbs)

Photosynthesis is the process in which plants convert carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O) into carbohydrates/sugar/glucose. Oxygen (O<sub>2</sub>) is released as a byproduct of photosynthesis.

### PHOTOSYNTHESIS



Nearly all life on Earth depends on photosynthesis. Plants, algae, and some types of bacteria use photosynthesis to make their own food and release oxygen. The biochemical process involves using energy from sunlight to convert water (H<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>) into oxygen (O<sub>2</sub>) and glucose (a sugar).



The energy from sunlight powers photosynthesis. A plant takes in carbon dioxide and water through the air and soil. Inside the plant, water and carbon dioxide are converted to glucose and oxygen through a chemical process.

The top two layers of a leaf are the cuticle and the epidermis, which are thin so light can travel through them easily. Beneath these layers are palisade mesophyll cells and spongy mesophyll cells. These contain chloroplasts, organelles where much of the chemical work behind photosynthesis occurs.

Inside the chloroplast, the cascade of chemical reactions that convert water and carbon dioxide into cellular energy involves two parts: the light-dependent and light-independent reactions. During the light-dependent reaction, the energy of the light waves is absorbed and stored in ATP molecules. During the light-independent reaction, also known as the Calvin Cycle, ATP is used to make glucose, which the plant cell relies on as a source of energy. During these reactions, water is oxidized, meaning it loses electrons, while the carbon dioxide is reduced, meaning it gains electrons. The plant then releases the oxygen into the atmosphere and stores the energy within the glucose molecules.

**Leaf Cross-Section**

- Cuticle
- Epidermis
- Palisade Mesophyll
- Vein
- Spongy Mesophyll

**Mesophyll Cell**

- Chloroplast
- Nucleus

**Chloroplast**

- Thylakoid Membrane
- ATP
- Calvin Cycle
- Light Reaction
- Light-Independent Reaction

**Light Reaction**

**Light-Independent Reaction**

**Chemical Equation:**

$$6 \text{H}_2\text{O} + 6 \text{CO}_2 \xrightarrow{\text{Sunlight Energy}} \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$$

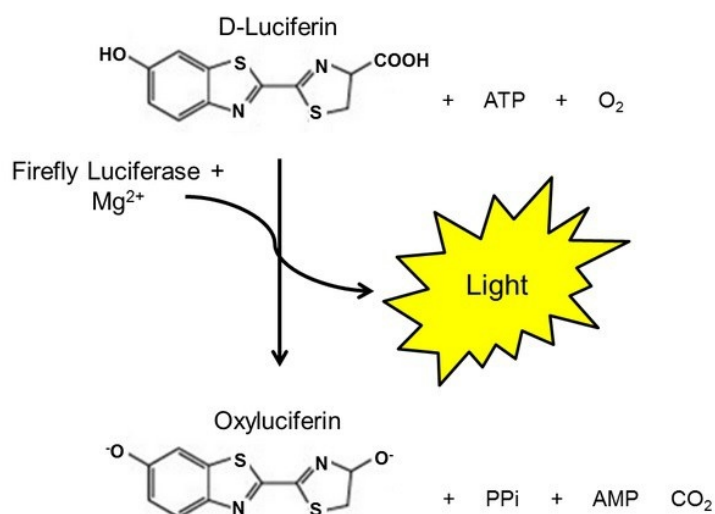
Water + Carbon Dioxide → Glucose + Oxygen



## PHOTOSYNTHESIS

Sunlight as energy

October 16, 2023



As you can see on this image, photosynthesis can reverse. What this means is that since photosynthesis is taking energy from the sun and water that creates sugar. The opposite of this is taking energy from the sugar and metabolising it through glycolysis and then the Krebs cycle to generate ATP. We can use this to produce light. An example of this are fireflies

## Definition of...

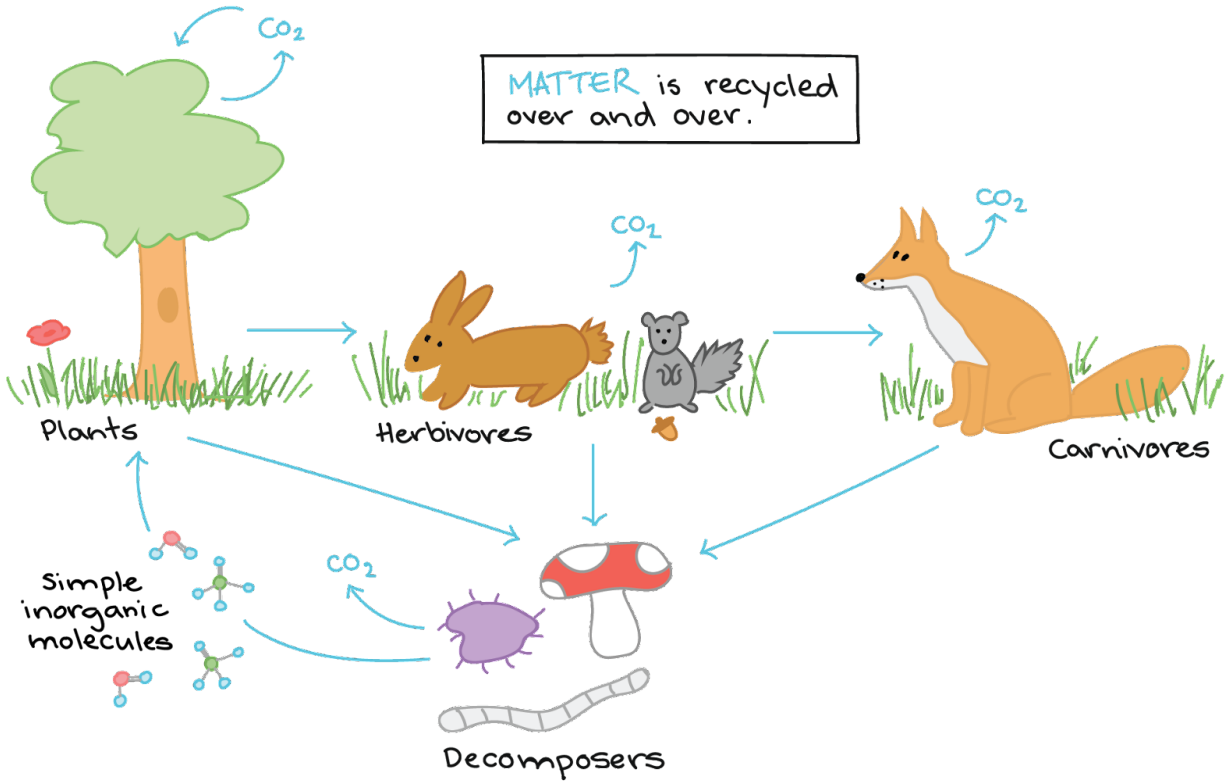
(Heather Motley(2009))

1. Producers- Producers are organisms that can produce their own food. These organisms usually include green plants because they produce sugar through the process of photosynthesis.
2. Consumers- Consumers are living things that have to hunt, gather and eat their food. There are 4 different types of consumers: omnivore, carnivore, herbivores and decomposers.
3. Inorganic matter- Inorganic matter which is not derived from living organisms and contains no organically produced carbon, some examples include ammonia, hydrogen sulphide, all metals and much more.

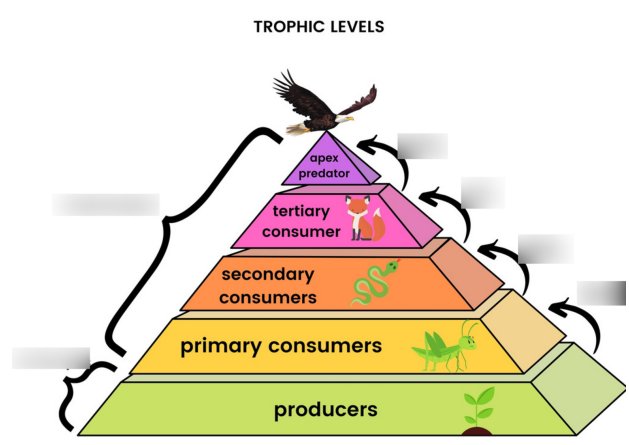
Thur, Oct,12/2023

4. Bacteria - Bacteria are small single-celled organisms. Bacteria are found almost everywhere on Earth and are vital to the planet's ecosystems.
5. Plant Diseases - plant diseases harm the plant, some include fungi, aster yellows, bacterial wilt and much more.

Mon, Oct 16, 2023



This is how a food chain works



This is a trophic scale

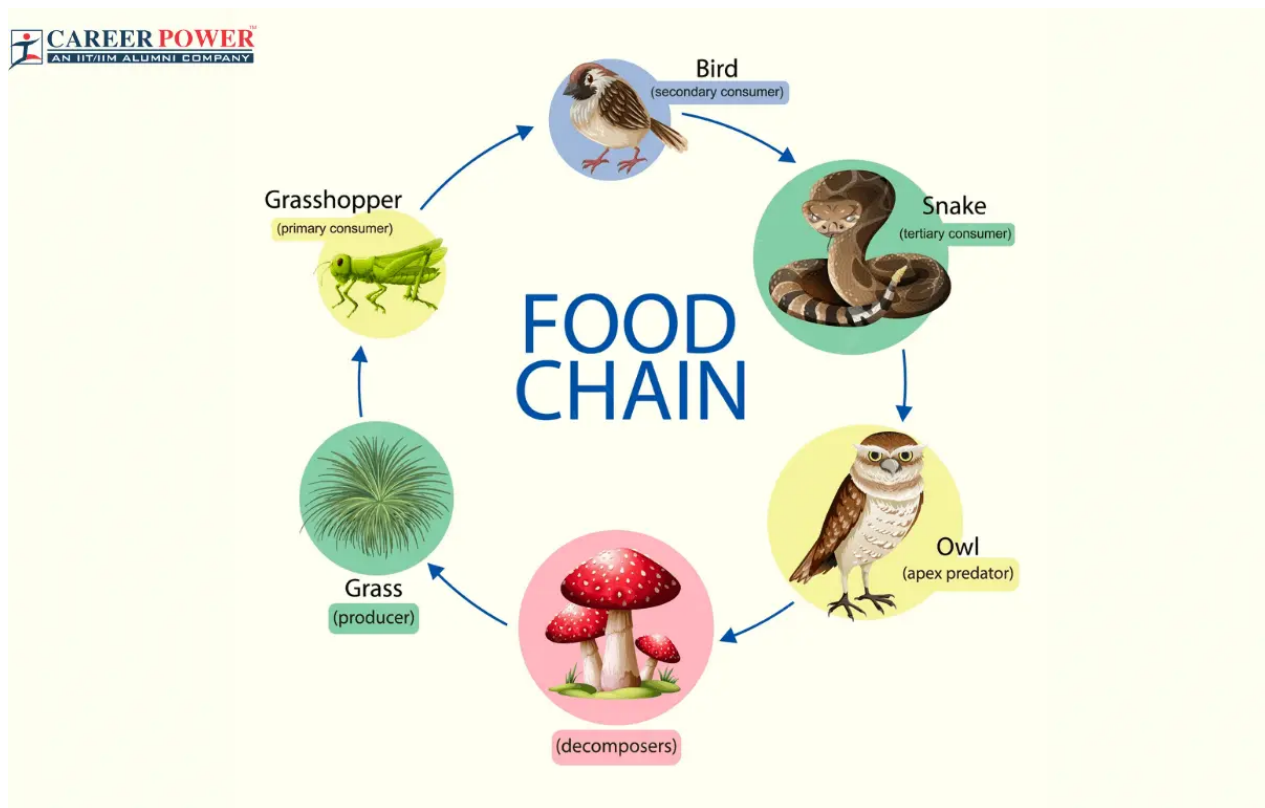
## Food Chains/Webs:

(Laura Bullar & Steve Pollock (1993))

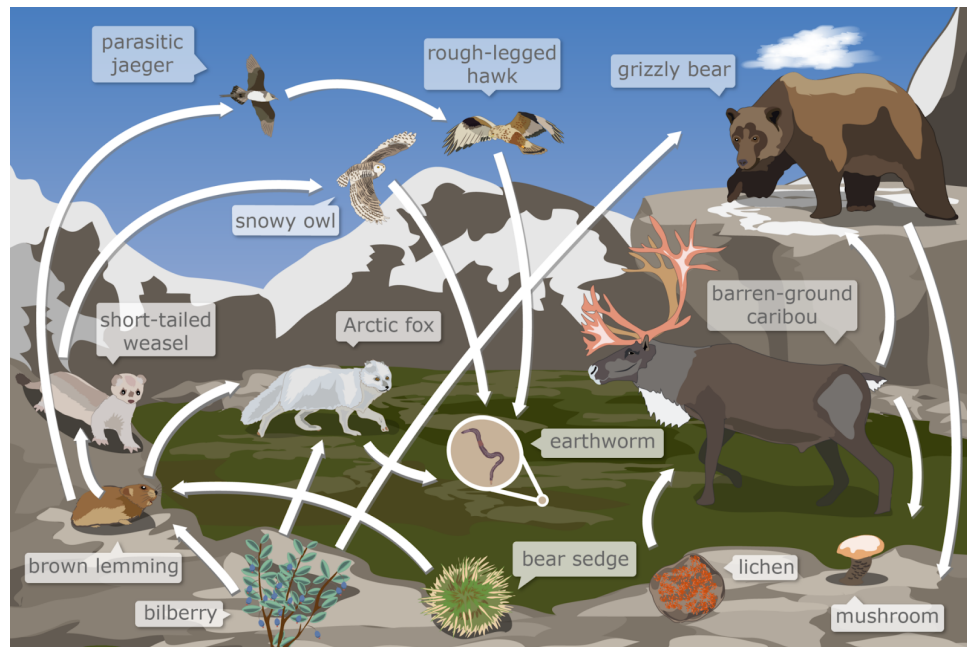
For scientists to understand how energy enters and passes through an ecosystem they must understand the relationship between organisms in that ecosystem. The transfer from food and energy from plants and organisms through repeated stages of eating and being eaten, is known as a food chain. In a food chain a plant is eaten by a herbivore, which in turn is eaten by a carnivore.

There are many food chains but because nature is highly complex and interconnected, food webs have been created. Food webs are basically the complex versions of food chains

### Food chains:



## Food Webs:



Mon, Oct,16/2023

## Soil:

(Sanjai J. Parikh (2014))

Soil is the biological active medium that has devolved the upper most layer of the crust. Soil is one of the principles of life on Earth and stores life organisms, animals and much more.

The soils of which plants depend on are created by interactions of biotic and abiotic parts of the environment. Their composition is influenced by 5 main things: Climate and weathering, geology, topography, and the actions of living things including humans. Soil has 6 main components: mineral particles (including silt, clay, and sand) and mainly organic material that forms a thin layer around each crumb of soil. These factors influence how fertile/rich the soil is.



### Layers of soil:

(Angela Naik (November 17,2023))

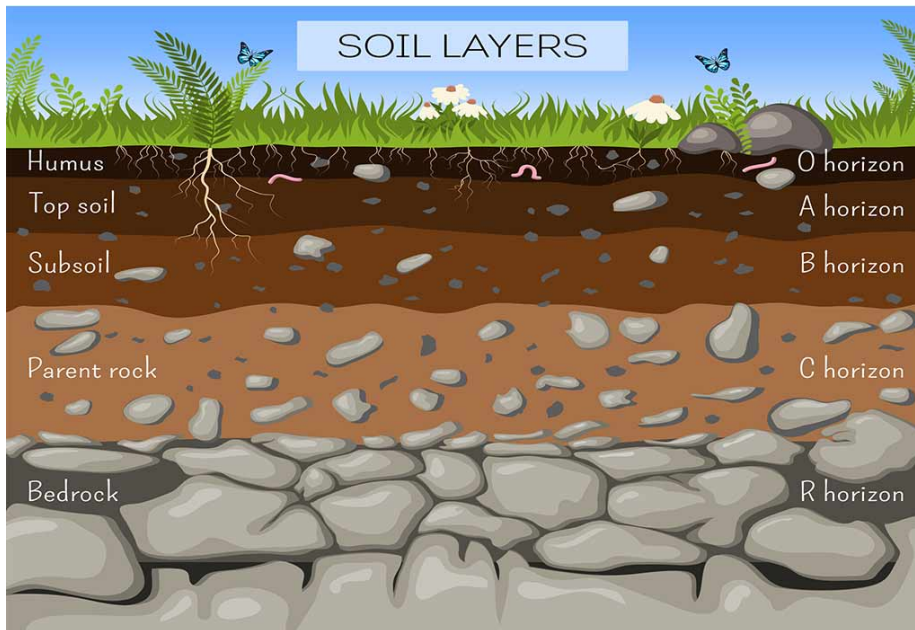
There are four main layers of soil, called O horizon, A horizon, B horizon and C horizon.

O Horizon- This layer of soil has freshly decomposing organic matter also called humus at the surface, with decomposed vegetation at its base. Hummus enriches the soil with nutrients and enhances soil moisture.

A horizon- This consists of a mixture of organic material with inorganic products of weathering. In this area rainwater percolates through the soil and carries materials through the surface.

B horizon- This is a layer that is an accumulation of mostly fine material that has moved downwards, resulting in a dense layer in the soil.

C horizon- this is the layer that includes a parent material, plus organic and inorganic material, which is broken down to form soil. The parent material here is either created in its natural place or transported from somewhere else.



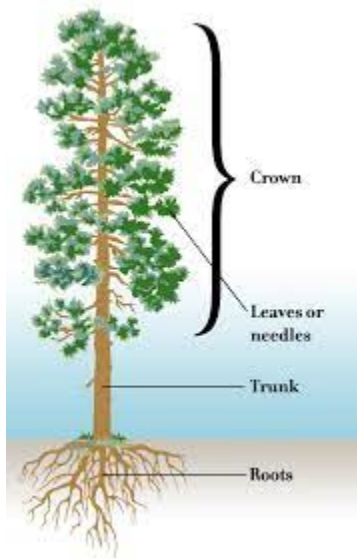
Tue, Oct,17/2023

## Trees and Forests

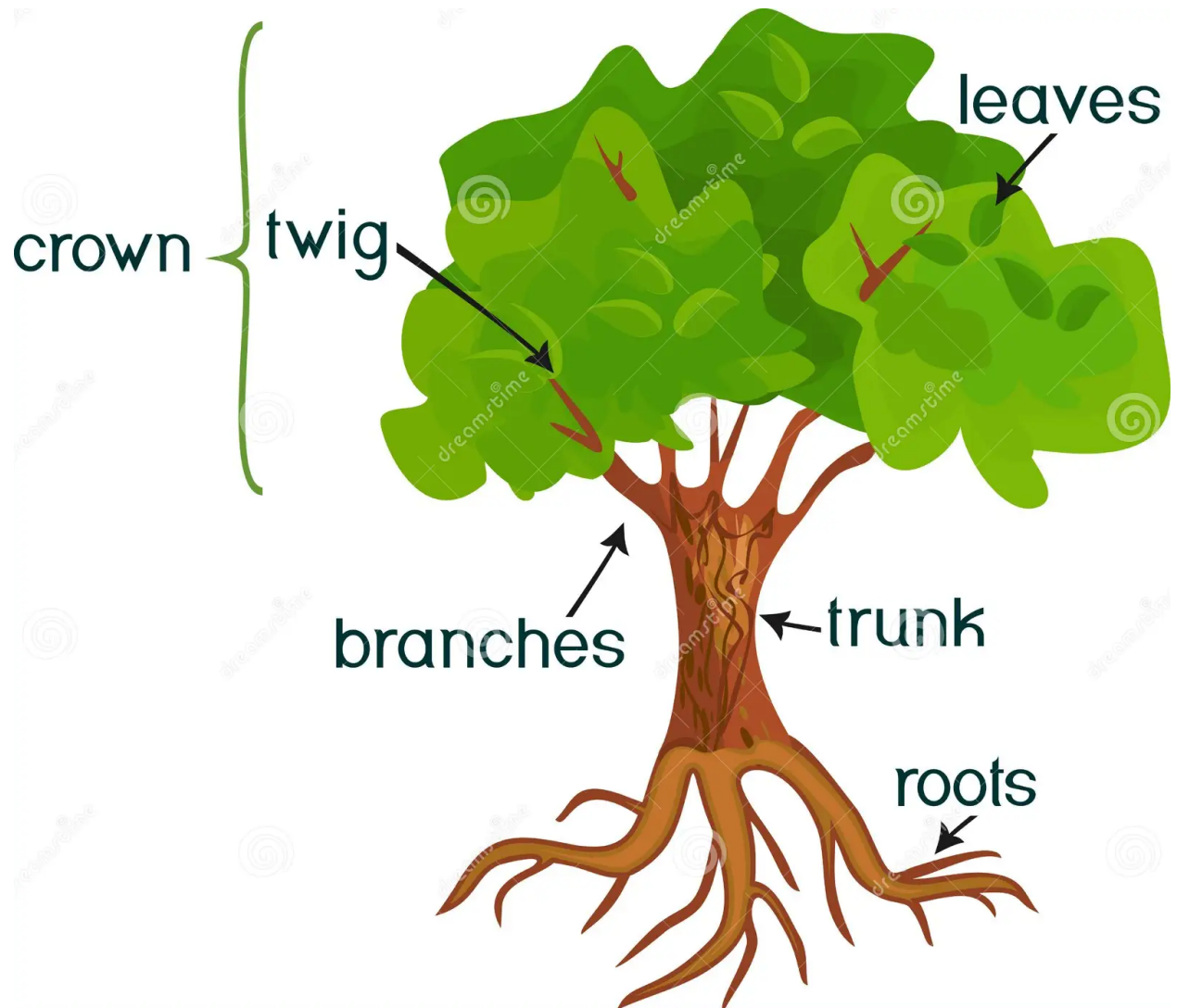
### Types of Trees

There are two different types of trees. They are called coniferous and deciduous.

**Coniferous trees-** These are evergreen cone shaped trees. Conifers have needle-like leaves, which have a waxed coating which prevents them from losing water. These trees don't grow flowers but reproduce with cones. These trees can survive harsh climates like snow and storms, this is because of their strong trunk and leaves. Conifers have woody trunks and stems. They can be low shrubs or tall trees. They have a lifespan between 1200-200 years. Some examples can include spruce, pine, fir, and larch.

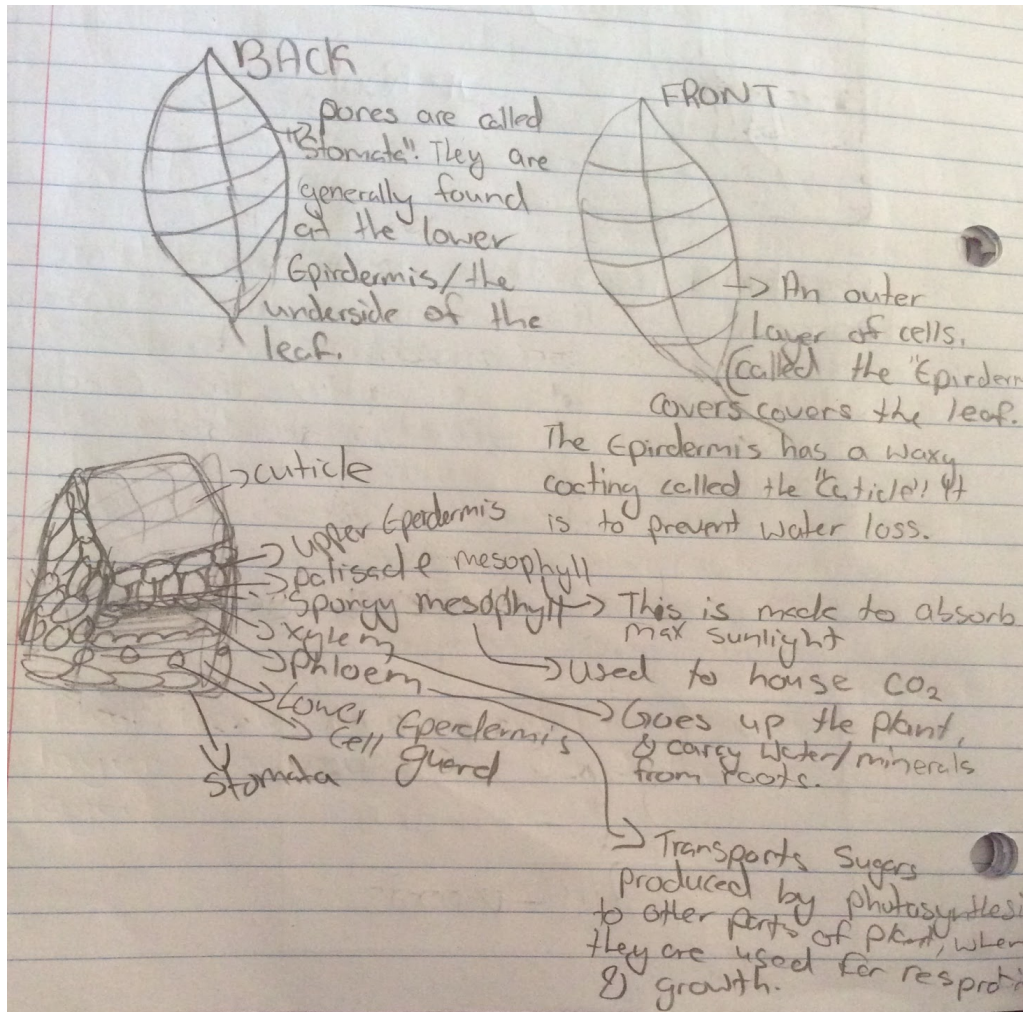


**Deciduous trees-** These broad-leaved trees have wide flat leaves, which fall off yearly in the season of Autumn. These trees grow in places where there are wet and dry conditions. These leaves are highly efficient in photosynthesis. They reproduce with flowers, fruits, seeds, and more. They restore nitrogen in forests, and make healthy soil for ecosystems. They live for about 100-500 years. Some examples can include oak, willow, birch, beech, and maple.



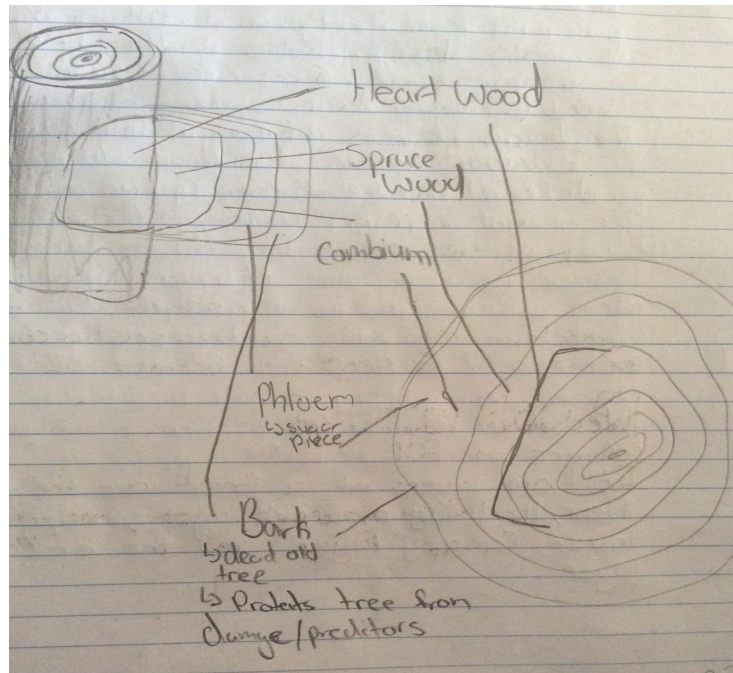
### What is a leaf?

A leaf is like sugar making (photosynthesis) factories of a tree that supply it with energy. There are so many little factors to a leaf that give it that special ability and the folding and diagrams is a visual representation of that



## Layers of wood

Trees typically have a primary woody stem/trunk. This is also the reason why they have a woody tissue, which contains lignin. This is a component of most plant cells which provide rigidity and shape. Lignin is also hydrophobic which helps xylem.



Wed, Oct 18, 2023

### Roots:

Trees have roots, which absorb water and minerals and then transport them to the trunk. They are also used to store food. Roots can be used to communicate with other trees of the same type. This helps them because when one of the trees has a disease, then the other trees can be warned.

### Forests:

The largest coniferous forests exist in a ring in the northern hemisphere (Alaska, Canada, Northern Europe and northern Asia). Most of the world's commercial softwood timber used for paper comes from here.

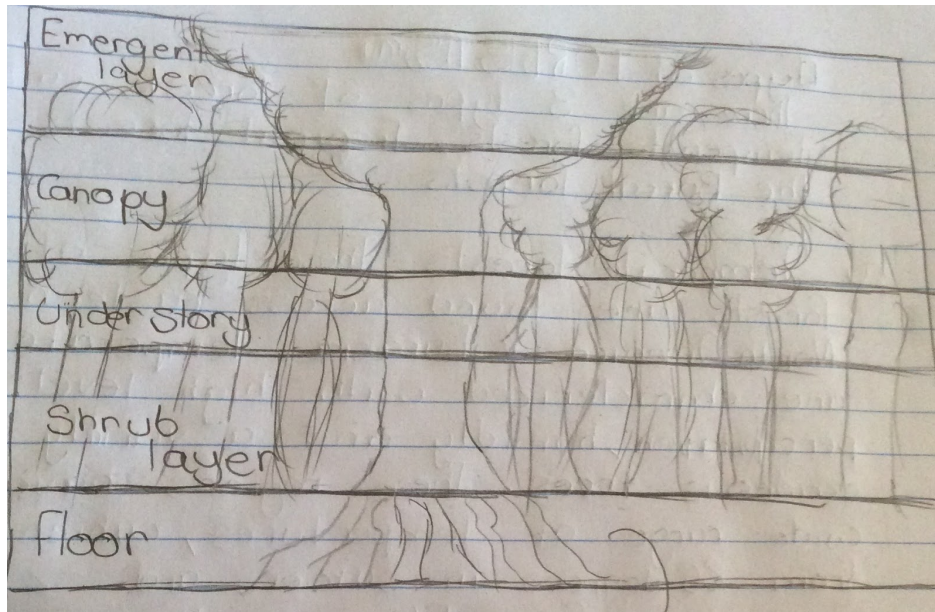
Coniferous forests are the largest land biomes in the world. The 'Taiga' is the largest coniferous forest in the world. The Taiga is also the least biodiversity biome, it is  $\frac{1}{3}$  of the world's forests,  $\frac{2}{3}$  of the world's coniferous forests and  $\frac{1}{5}$  of the world's biomass. Biomass is the mass/volume of organic matter. The toga 's floor is commonly called the tinder box, because it is known to spark forest fires, about every century or so. The amount of resin content in these trees is one of the reasons why they are so flammable. Because the Taiga has a high sunlight absorption rate, but also gets very cold. As a result, most of the animals there are pretty big because they contain a lot of fur.

Wed, Oct 18, 2023

**Layer of forests:**

(Borneo Rainforest Information.weekly.com)

The main layers of a forest are the forest floor , herb layer, shrub layer, canopy layer and emergent layer.



### **Types of forests:**

(National Geographic Society (October 10, 2023))

There are three types of forests called Temperate, tropical forests and the boreal.

**Temperate Forests** These types of forests are found across eastern North America and Eurasia. Temperate forests are characterised with high levels of precipitation, humidity and variety of deciduous trees. These regions have a wide range of temperatures, which range from 86 degrees in summers and -22 degrees in winters.

**Tropical forests** These forests are common to areas near the equator like Southeast Asia, sub-saharan Africa and Central America. Temperatures in tropical forests can be 20 and 30 degrees. These regions have 4 main characteristics; nutrient-poor soil and high-levels of biodiversity.

Types of flora in these forests include:



Fri, Oct 20/2023

Tropical forests:

- Forest floor- ferns, orchids, arums
- Understory - young trees & short pieces of tr
- Canopy- mosses, liverworts, and hornworts
- Emergent layer- Kapok trees, Brazil nut trees

Temperate forests:

- Forest floor- lichen, moss, fern, wild floors, and other small plants
- Understory- hornbeam (carpinus), dogwood, service tree (sorbus), and the shrubs Acanthopanax, and Arali.
- Canopy- maple trees, walnut trees, birch
- Emergent Layer- the tallest trees

The Taiga:

- Forest Floor- mosses, lichens, and mushrooms
- Understory- short and young trees, shrubs
- Canopy- pine, spruce, larch, fir, and less degre some deciduous trees such as birch poplar.
- Emergent Layer- very much like the cano

Some of the fauna in these forests include:

Tropical Forests:

- Jaguar
- Lemurs
- Mockeys
- Poison dart Frog
- Sloths
- Tapir
- Toucans
- Rhinoceroses
- Gorilla
- Anteaters

- Capybaras

#### Temperate Forests:

- Spiders
- Salamanders
- Hawks
- Crows
- Sluges
- Black Bears
- Snakes
- Robins
- Turtles
- Eagle
- Beetle

#### The Taiga:

- Burial Owls
- Bears
- Bray Wolves
- Lynx
- Boreal Woodland Caribou
- Beavers
- Crossbills
- Great Grey Owls
- Ravens

Sat, Oct 20/2023

## **Symbiotic Relationships:**

(National Geographic Society (October 19, 2023))

Symbiotic relationships are associations between 2 different organisms. This relationship can be mutualistic, commensalistic, and parasitic.

### 1. Mutualistic:

This relationship is between 2 different organisms, when both partners benefit from the relationship. An example of this are Birds, and Rhinos. This is because rhinos have ticks on their bodies, and the birds' favourite diet is ticks.

### 2. Commensalism:

This is a relationship when one organism benefits, and the other neither benefits, or loses. An example of this is a bird making a nest. Here, the bird is benefiting because it is getting a home, and somewhere to lay its eggs. On the other hand, the tree is neither benefiting, or losing.

### 3. Parasitism:

This is a relationship when one organism benefits the other doesn't. An example of this is a Human and a Mosquito. Here, the mosquito is benefiting because it is getting blood to reproduce, and for nutrients. The human is getting at risk for diseases like Malaria, Yellow Fever, Dengue, and much more

Sun, Oct, 22/2023

## **Adaptations:**

(National Geographic Society (October 19, 2023))

There are 2 types of adaptations which animals have which are called behavioural, and physical. These changes normally take generations to develop.

### 1. Behavioural

This is something an animal does usually in response to some type of "problem" for them. Some

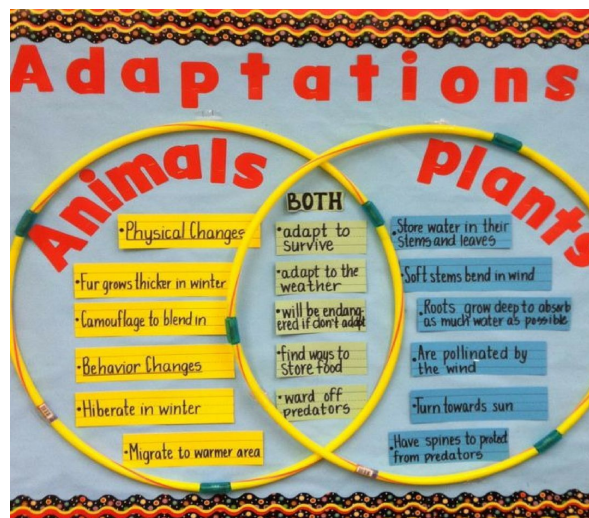
examples can include:

- Penguins huddle together for warmth and protection in Antarctica.
- Canada Geese migrate south in winter and north in the summer.

## 2. Physical

This is a physical part of an organism that helps it survive. Some examples include:

- Camouflage
- Sharp claws
- Sharp teeth
- Excellent eyesight.



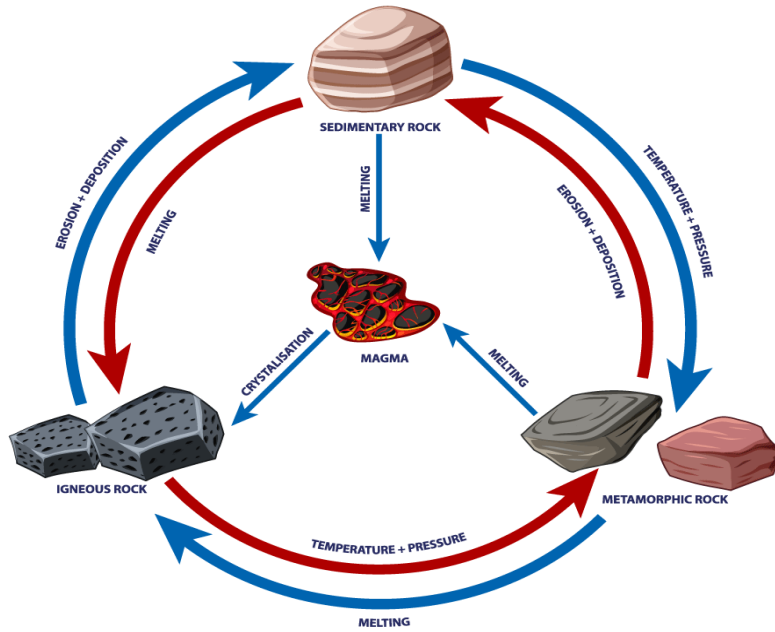
Adaptations of plants and animals.

## The Rock Cycle:

(National Geographic Society (October 19, 2023))

The rock cycle describes the process through which the 3 main rock types (igneous, metamorphic, and sedimentary) transform from one form to another.

# THE ROCK CYCLE



## 1. Ingenious Rocks:

These rocks are formed when hot magma cools very swiftly either by hitting underground air pockets,(intrusive igneous rocks) or by flowing from the mount of a volcano that has lava on

top of the ground (extrusive igneous rocks). Some igneous rocks include granite, obsidian, basalt and pumice.

## 2. Sedimentary rocks

These rocks are formed by layers of sediment (dirt and rock particles with much more) being mixed and compressed together for an extended amount of time. Some sedimentary rocks include; limestone, sandstone and shale. Metamorphic Rock

These rocks are formed when a combination of rock types, compressed together by high pressure and temperatures. Some metamorphic rocks include; Schist, slate and gneiss.

### The steps of the rock cycle are:

1. Weathering and erosion- All the types of rocks on the surface of the Earth and they are constantly being broken down by wind and water.
2. Transportation- Eroded rock particles are carried away by wind on by rain, streams, rivers and oceans.
3. Deposition- As rivers get deeper or flow into the ocean, their current slows down, and the rock particles become a layer of sediment. The sediment builds up very fast and it can't be washed away forcing a delta.
4. Compaction and Cementation- As the layers of sediment stack up (above water or below) the weight and pressure compacts the bottom layers. Then dissolved minerals fill in the small gaps between particles and then it solidifies acting as cement. After years of this then the sediment turns into sedimentary rocks.
5. Metamorphism- Over very long periods of geologic time, sedimentary or igneous rocks end up buried deep underground, These rocks are exposed to high, heat pressure, making them into metamorphic rocks.
6. Rock melting- When a volcano erupts, magma flows out of it. As the lava cools and hardens it becomes igneous rocks.

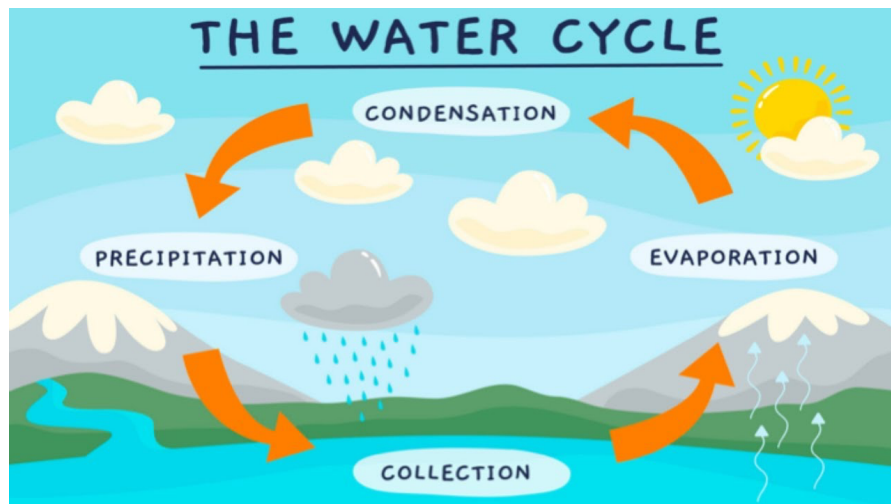
Mon, Oct 23, 2023

## **The Water Cycle**

(Laura Buller & Steve Pollock (1993))

In the biosphere energy flows in and out. Although the chemicals essential for life are limited. So they have to be constantly recycled. Water is the most common compound on Earth and all life on this planet depends on it to a greater or lesser extent. Water plays a vital role in the structure of having things. But its most important factor is that multiple chemicals will dissolve in it. Plants need water to dissolve nutrients and minerals through their roots. Animals rely on water in their lungs tissues to absorb oxygen from the atmosphere and air. The downside to this is extremely vulnerable to pollution.

The water cycle/hydrological cycle, is the process in which water is circulated through Earth/environments. The whole water cycle is operated by the sun. Its heat evaporates water from main water sources (oceans, rivers, lakes). Clouds form from the water vapour and are condensed. When the cloud is satiated enough, it falls as precipitation. Then the cycle repeats itself.



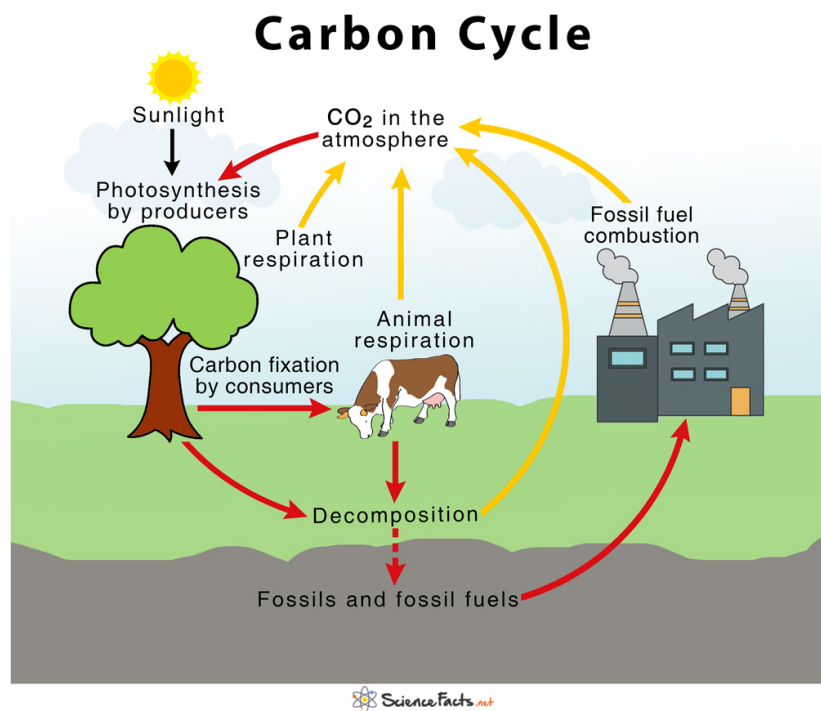
Tue, Oct 24/2023

## The Carbon cycle

(National Geographic Society (October 19, 2023))

Carbon is a very important element for all life on Earth. Organisms use it in multiple different ways, whether that be to create food, release carbon as a part of respiration (breathing), or use it for energy, carbon is a component of all life on Earth.

The carbon cycle is the way that nature is reusing carbon atom, which travel from the atmosphere into organisms and back into the atmosphere over and over again.



### Impacts of humans on the different cycles in the ecosystem:

Some ways that human activities impact the water cycle are mining, this is because this affects soil erosion and weathering.

The water cycle can also be affected by human activities just like the rock cycle. Some ways that the water cycle is affected are;



- the increase of greenhouse gases and the greenhouse effect and because global warming changes climate. Sometimes it causes more rainfall/precipitation or evaporation
- Damming rivers for hydroelectric power, using water for farming, deforestation and the burning of fossil fuels

Us humans also affect the carbon cycle by burning fossil fuels, changing land use and using limestone to make concrete.

Wed, Oct 25/2023

## Impacts of humans on the environment

After reading all of this, you might have fallen in love with ecosystems, and how much natural beauty they hold. Although that will not last unless we take care of it. Us humans do good and bad things, and in this portion of our research, we will be talking about it.

### Positive impacts of humans on the environment:

Some positive impacts and things that us humans are doing to/with our environment are; the most common things are reducing, reusing and recycling. Many of us donate to eco-friendly organisations that are helping make our world a better place, some of these organisations include; land trust alliance of British Columbia, WWF-Canada and Canadian wildlife federation.

### Reduce, Reuse and Recycle

(bouldercountry.gov)

Reduce- The meaning of reducing is to make something smaller in amount. In this case reducing would be reducing our waste, water use, plastic use and much more. This helps the environment because it is reducing greenhouse gas emissions that contribute to climate change.

Reuse- The meaning of reusing is to use again. For us it is to reuse a ziploc bag, plastic bag/reusable bag, containers and much more. This helps the environment because it prevents pollution caused by

reducing the need to harvest new raw materials.

Recycle- the meaning of exhale is the process of reprocessing materials that would be thrown away as trash. This helps the environment because it prevents emissions of many greenhouse gases and saves energy. Recycling is not as good as reducing or reusing because plastic is only recyclable 2 time at max and then it gets sent to landfills.

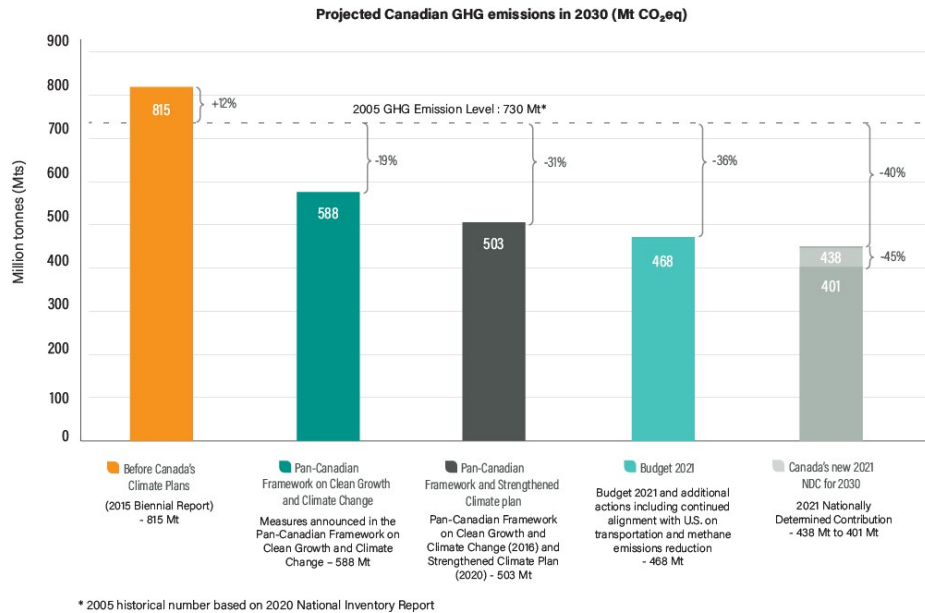


Wed, Oct 26/2023

### **What are we doing?**

[canada.ca (september 7,2022)]

As a whole, Canada is moving step by step to make this country more sustainable. Over the past 5 or so years, Canada has taken many actions to help reduce the climate change crisis. The country is shutting down traditional coal-fired power plants, and is embracing renewable energy. Canada is also improving building standards, so they can use less energy. These actions have been helpful because as you can see in the following graph, Greenhouse gas (GHG) emissions have decreased.



## What can we do in our day to day lives?

(NOAA (August 11, 2021))

There are many things that we can do as individuals to stop the increase of climate change. One of the simplest things that we can do is save energy in our homes. We could do so by switching to LED light bulbs and energy-efficient electric appliances, washing our laundry with cold water, hanging things to dry instead of using a dryer and much more.

All of the world's roads are full of vehicles, most of them burn diesel or petrol. So walking or biking instead of driving will reduce greenhouse gas emissions. For longer distances we could consider taking a train or bus or carpool.

We could reduce our travel time. This is because auto planes burn a livable amount of fossil fuels and produce greenhouse gases. This makes taking fewer flights the fastest way to reduce your impact on the environment.

**PROTECTING OUR PLANET STARTS WITH YOU** 

<p><b>BIKE MORE DRIVE LESS</b></p> 	<p><b>reduce REUSE recycle</b></p>  <p>Cut down on what you throw away. Follow the three "R's" to conserve natural resources and landfill space.</p>	<p><b>choose sustainable</b></p>  <p><b>seafood</b></p> <p>Learn how to make smart seafood choices at <a href="http://www.FishWatch.gov">www.FishWatch.gov</a>.</p>	<p>Trees provide food and oxygen. They help save energy, clean the air, and help combat climate change.</p>  <p><b>PLANT A TREE</b></p>
<p><b>EDUCATE</b></p>  <p>When you further your own education, you can help others understand the importance and value of our natural resources.</p>	<p><b>CONSERVE WATER</b></p>  <p>The less water you use, the less runoff and wastewater that eventually end up in the ocean.</p>	<p><b>-SHOP- WISELY</b></p>  <p>Buy less plastic and bring a reusable shopping bag.</p>	<p><b>Don't send chemicals into our waterways.</b></p>  <p>Choose nontoxic chemicals in the home and office.</p>
<p><b>Volunteer!</b></p>  <p>Volunteer for cleanups in your community. You can get involved in protecting your watershed too!</p>		<p><b>Long-lasting light bulbs - ARE A - BRIGHT IDEA</b></p>  <p>Energy efficient light bulbs reduce greenhouse gas emissions. Also flip the light switch off when you leave the room!</p>	

oceanservice.noaa.gov

**Negative impacts of humans on the environment:**

After reading all that you might be thinking that the environment and ecosystems must be in good conditions. Well no, us humans do, do good things for the environment, although, we also do terrible things for it as well. Now the next following paragraphs, this is what we will be talking about.

**Physical impacts:**

(National Geographic Society (October 19, 2023))

Humans have many physical impacts on the environment. Many of these include over population, pollution, burning fossil fuels and deforestation. Changes like these have triggered climate change, soil erosion, poor air quality and I drink label water.

**Pollution:**

(Boudreau D., Mcdaniel M., Sprout E., Turgeon A. (Oct,19 2023))

Pollution is basically the introduction of harmful materials to the environment. These materials are called 'pollutants'. Pollutants can be natural (such as volcanic ash) or can be created by human activity

such as trash, runoff produced by factories. Pollutants damage the quality of air, water and land. There are 3 main types of pollution: Air pollution, Water pollution, and Land pollution.

***Air pollution:***

Air pollution is pollution that is in the air/atmosphere. It is caused by activities like the emissions of harmful gases/greenhouse gases (CO<sub>2</sub>, H<sub>2</sub>S, SO<sub>2</sub> and CH<sub>4</sub>). This can be dangerous to human health as it can cause lung cancer and eye irritation. Not only that, but air pollution is the reason for acid rain.

***Water pollution:***

Water pollution is polluted water which looks much, smells bad or has garbage floating on top. Some polluted water can look clean but contain harmful chemicals that can't be seen or smelt by human senses. This water is unsafe to drink/swim in. If polluted water is consumed, it contains hazardous chemicals, or bacteria/other tiny organisms that can cause disease. Water pollution is caused by oil and gas which leak on the oceans and chemicals that go and get dumped into the oceans.

***Land pollution:***

Land pollution is the destruction/decline in the quality of Earth's surface/land due to human activities. This could include sources from mining, agriculture, and building. Land pollution could also be a cause of littering. If these pollutants are leaked from places such as landfills ecosystems and the organisms in it could suffer from bioaccumulation of toxic chemicals.

**Acid Rain:**

(united states environmental protection agency (.gov) (june 1, 2023))

Acid rain is a form of precipitation with acidic components which includes sulfuric and nitric acid. Acid rain precipitation can fall in both dry, and liquid forms. This includes rain, snow, fog, hail, and even dust that can be acidic. In comparison to normal rain, acid rain has a pH level of between 4.2 and 4.4. While normal rain has a pH of 5.6. Acid rain can reduce the pH of waters (lakes, rivers, and wetlands), and

decreases biodiversity. Acid rain weakens all plants, and weakens its ability to fight with other potential harm such as droughts, landslides, extreme cold, and pests

### **Soil Erosion:**

{canada.ca{august 21, 2023}}

Soil erosion is the displacement of the upper layer of soil. It happens when agricultural plants are removed and there is nothing to hold the soil. Heavy rains, and thunderstorms are also one of the biggest reasons why soil erosion happens. The raindrops loosen the bond that soil holds together. If it is heavy rain, the water pools on the ground start to flow carrying the lossend soil with it. This can clog waterways, which can cause a decrease in fish, and other aquatic species. The dust from this can contribute to air pollution, making atmospheric qualities worse.

Fri, Oct, 27/2023

### **Wildfires:**

{National Geographic Society {october 19, 2023}}

A wildfire is an uncontrollable fire that burns in wildland and often rural areas (forests, grasslands, savannahs, and other ecosystems). Wildfires are not limited to a particular continent, or environment. Wildfires burn vegetation located both in and above soil. The amount of smoke from this can contribute to air pollution. Some particle pollution triggers asthma attacks, heart attacks, and even strokes that can kill you. Wildfires can cause wildlife to move and search for a new habitat. These animals can enter new ecosystems, where they are not welcome, causing chaos and the animals to become invasive species.

Thurs, Nov 2/2023

## **Procedure:**

### **Materials:**

- Three medium sized jars (around 44 cm squared)
- Plastic wrap
- Aluminium foil
- Rocks
- Sand
- Subsoil
- Topsoil
- Grass seed/any other plants/pre grown plant
- Source of light (Sun)
- Clean Water
- Contaminated water (contaminated with
- Detergent/cleaning material)
- Microwave/high temperatures
- Three Thermometers
- Pieces of organic matter (orange peels, carrot peels, banana peels).
- Paper waste

## Setting up the experimental setup:

1. Grab the 3 glass jars that we collected earlier
2. At the bottom put 36-37 rocks in each jar
3. Then over top of that add around 3 teaspoons of normal beach sand
4. Over top of that, add 5 teaspoons of subsoil
5. Lastly add 7-8 teaspoons of topsoil
6. MAKE SURE YOU REPEAT THIS FOR ALL THREE EXPERIMENTS
7. Add all of your seeds/pre grown plants to the three jars. (Try to make it as same as possible)(If you are using seeds, wait for them to grow at least into sprouts)
8. Label the Jars Test 1, Test 2, and lastly Test 3
9. Instead of putting on the lid, for Test 1 and 2, add plastic wrap for it to act like an atmosphere.
10. For Test 3 add aluminium foil to the top.
11. Take really good care of Test 1, as it is your control for your experiment, which means watering it every day
12. Then take out your garbage material and gently place it into the ecosystem of test 2.
13. Then you are going to want to make some contaminated water, you can add a few ml of chemicals which could be some detergent. This is going to be used for test 2.
14. For Test 2, make sure instead of adding clean water, you add contaminated water. You are going to use this water to water test 2 everyday.
15. In Test 3, all you need to do is put it under direct light. For test 3 water the plant with clean water everyday.
16. Then take test 3 and put it in a high temperature environment, which in our case is a microwave. ALTHOUGH DO NOT TURN ON THE MICROWAVE! JUST LEAVE IT IN THERE AS IT IS A WARM SPACE!
17. For the next 2-3 weeks, record your observations every 15-20 hours or so.
18. You are done!



**Pictures While Doing the Experiment:**

Plastic Wrap



Aluminum Foil



Contaminated Water



Over all Image



Organic Matter



Mon, Nov, 6/2023

- **Variables:**

**Controlled:**

- The jars
- The soil
- The plants
- The source of light (Sun)
- Thermometer
- Rocks
- Sand

**Manipulated:**

- Contaminated water
- Aluminium foil
- Organic material (orange peels, carrot peels, banana peels)
- Paper waste (paper bag,
- Place with high temperatures

**Responding:**

- What influence affects ecosystems the most? (Human, or Global Warming)
- The height and width of plants/tests before and after the experiment
- The colour of plants/test before and after the experiment
- What did the soil look like before and after the experiment?
- The Temperature of the environment

Mon, Nov, 19/2023

## Observations

(Started experiment on Wednesday, November 8, 2023)

(Did the experiment 3 times to ensure accuracy)

### Raw data:

#### Before the experiment

Tests	Height & Width of plants	The colour of plants	temperature	Soil
Test 1	Height- 7cm (at average) Width- 1mm (at average)	The bottom of the plant is a yellowish colour and as you move up it gradually gets a rich green colour.	22°C	The top soil looks very fertilised and the subsoil is a lighter colour. The bottom is a much lighter colour.
Test 2	Height- 6.5cm (at average) Width- 0.7 mm (at average)	The colour of Test 2 looks the same as Test 1 and looks very healthy and green.	22°C	The soil is also a lot or the same as Test 1 and the bottom looks very 'sandy'.
Test 3	Height- 7cm (at average) Width- 1.05mm (at average)	Test 3 looks very green than the other tests (especially at ground level)	22°C	The soil looks very much blacker than the other tests, overall.

We also noticed white fungi at the bottom  
Test 3

**During experiment**

**Day 1**



**Day 2**



**Day 3**



**Day 4**



**Day 5**



**Day 6**





**Day 7**



**Day 8**



**Day 9**



**Day 10**



**Day 11**



**Day 12**



**Day 13**



**Day 14**



Day 15



Day 16



Day 17



Before

After



VS.



1. The plants in all three tests looked very healthy. All of the plants were tall, and nutrient rich.
2. The plants in Test 1 were the same, and in fact, they looked even better. In Test 2, the plants visually also looked the same, although when you looked closely, you could see that the top part of the plants started to very slightly droop. The Test 3 plants looked fairly the same, and started to grow taller.
3. The observations for day three looked extremely similar to those of day 2.
4. The plants in Test 1 started to grow, and looked very healthy. In Test 2 started to turn brown, and drooped down and looked dead. There still were some green blades of grass left. In Test three, the plants looked very healthy, and looked as if they were thriving.
5. While the plants in Test 1 and Test 3 were thriving, the plants in Test 2 started to die.

**6-10.** The plants in Tests 1 and 3 grew progressively, while the plants in Test 2 started to grow shorter, and die.

**11 -15.** The plants in Test 1 and 3 started to droop. This is probably because the blades of grass started to grow too tall. The plants in Test 2 looked dead.

**16.** Noticed fungi on the floor of all of the three tests. The plant healthy of the Tests remained the same when compared to the past

**17.** Test 1 and 3 looked the healthiest, and were tall. Although the plants in Test 2 were completely dead, and leached from nutrients.

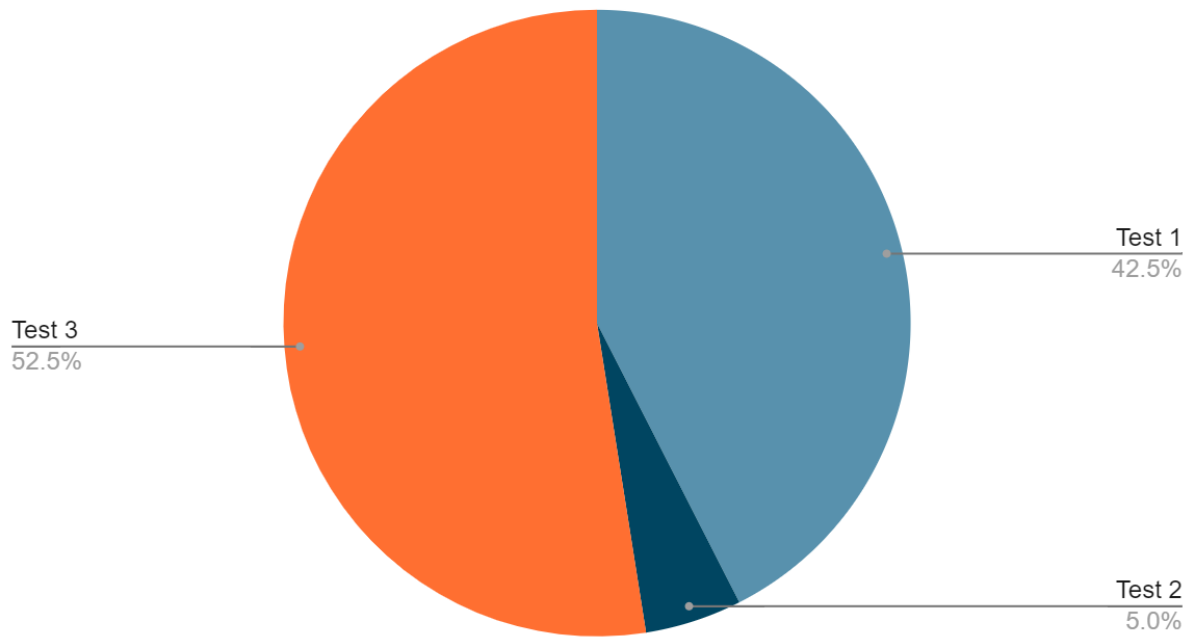
Sat, Dec, /2023

**After experiment:**

<b>Questions</b>	<b>Height/width of plant (cm)</b>	<b>Colour of plants</b>	<b>Soil</b>	<b>Temp</b>
<b>Test 1</b>	Height: 17cm (average) Width: 3 mm(average)	The shorter plants are yellow, and look dead. The taller plants are very healthy and green.	Most of the topsoil layer is covered in fungi. The rest of the soil looks very moist.	24°c (average)
<b>Test 2</b>	Height: 2cm (average) Width: 1 mm (average)	All of the plants have turned yellow, and brown. They look as if they have been leached from all of their nutrients. They are also dead.	All of the topsoil layer is covered in fungi. The rest of the soil looks dry, and leached from all of its nutrients.	20°c (average)
<b>Test 3</b>	Height: 21 cm (average) Width: 4 mm (average)	Most of the plants look very healthy, although there are some plants that are yellowish and brown. Some blades of grass have grown fungi on them.	Some patches of the topsoil layer are covered in fungi. The plant's roots are visible, and the soil seems very nutrient rich.	32°c (average)



## Over All Health



This graph shows the overall health of the plants in the Tests based on height. Test 3 was the most healthiest, and Test 2 was the least healthiest.

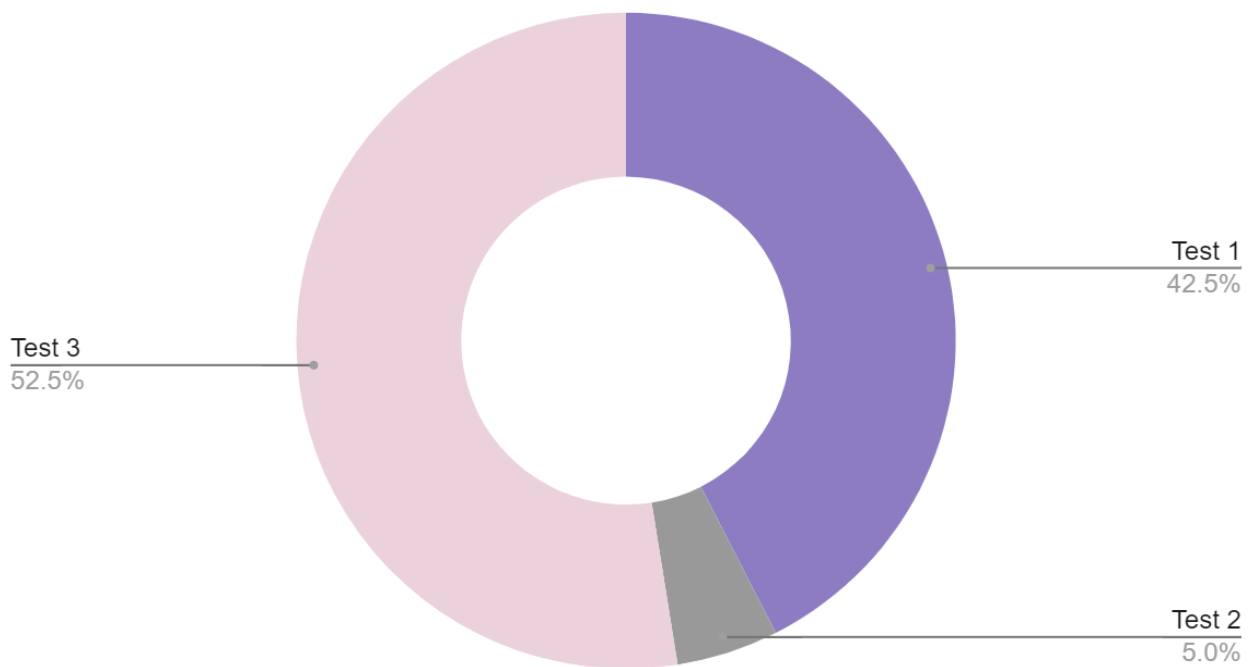
Sun, Dec 3/2023

## Analysis

The experiment that we did was primarily based on the question how human impacts affect ecosystems, and how global warming affects ecosystems. One test was the control, the second test was all about human impacts on the environment, and the third one was all about global warming. The following graph that we are about to show you, showcases the information that was obtained from the experiment.

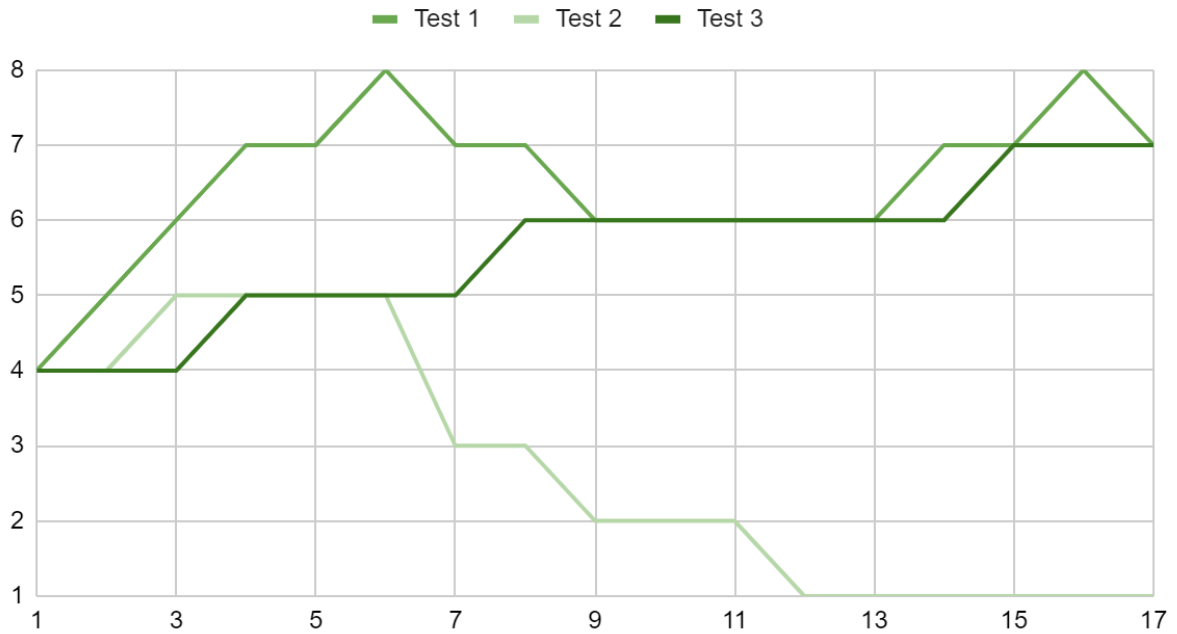
Mon, Dec, 5/2023

Over all health of plants



The graph shown above is a visual representation of the estimated percentage of the plant health all throughout the three experiments. These percentages were based on the plant's average height .

## The Colour Change of all the Tests



### Legend:

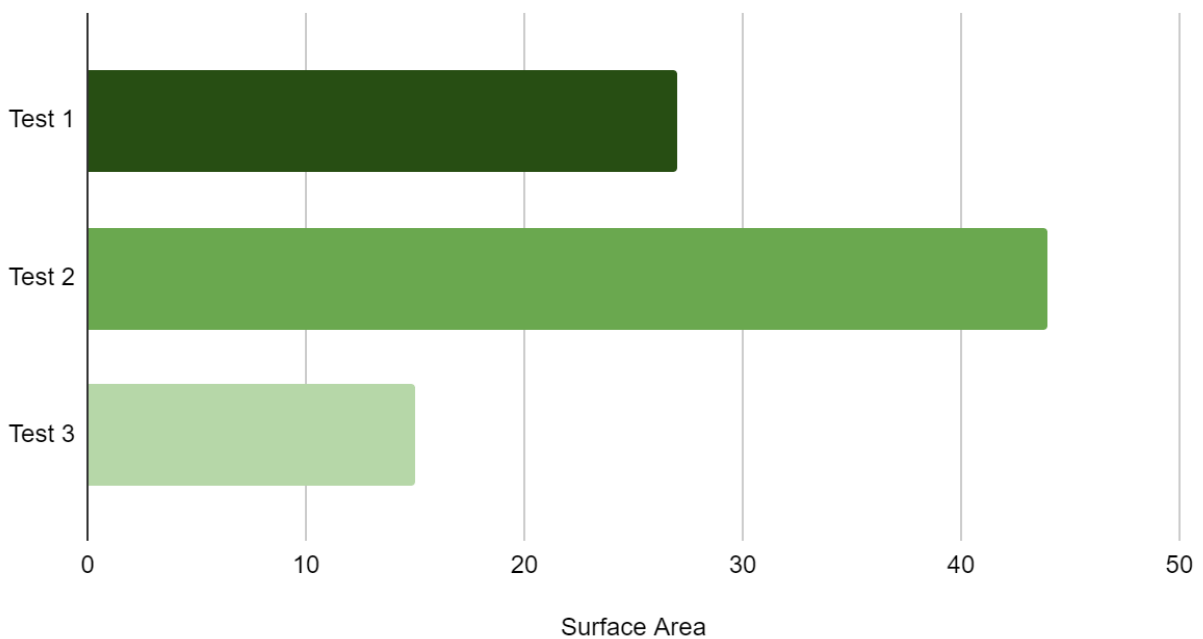
Colour	Number
Brown	1
Yellow Brown	2
Yellow	3
Yellow Green	4
Light Green	5
Green	6
Dark Green	7
Swamp Green	8

The graph showing above is a visual representation of the colour changes throughout the time period in which the test was recorded. The y-axis shows the colours, and the x-axis shows the days. The legend States that the numbers shown in the y-axis correspond to a colour. Each colour is the colour of the plants throughout the experiment.

Tue, Dec, 5/2023

Soil is a very important component to a plant's growth as it contains nutrients and minerals for the plant. Although, in many places fungi can grow on plants and right on top of the soil this is very good for the ecosystem as fungi are important decomposers. We can see that in Test 2 it had the most fungi growth which in turn helped it start decomposing the organic matter. In the following graph we will show you the fungi growth / amount in all of the three tests.

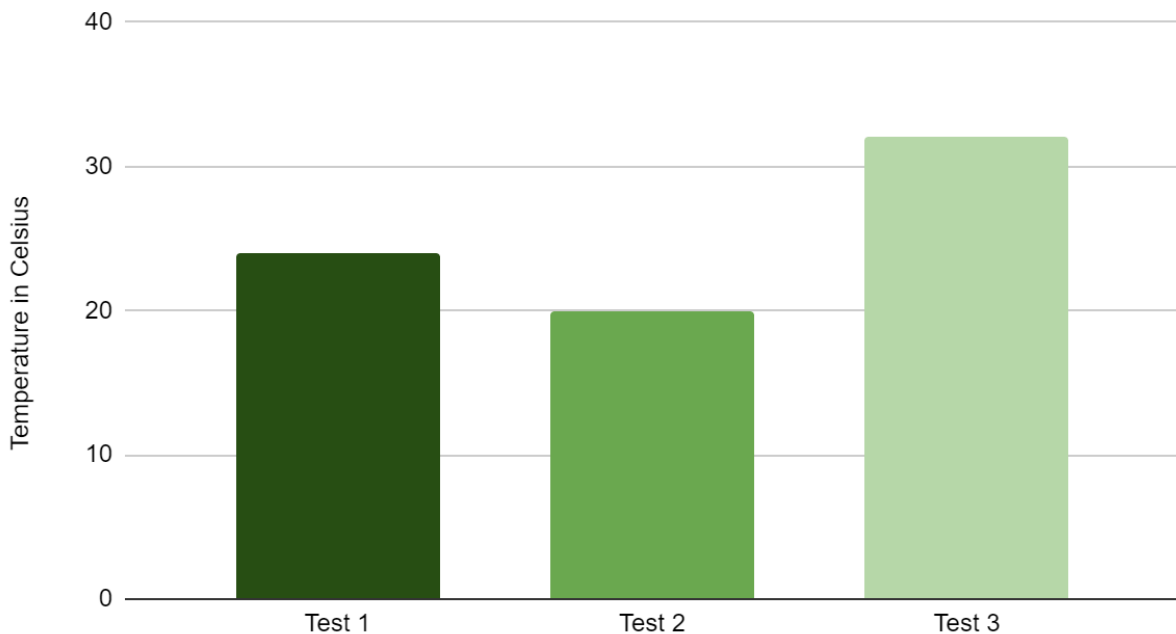
### Fungi Growth after Experiment



The y-axis on the graph above shows the three tests. The x axis shows the surface area in which the fungi grew after the experiment. The total surface area of the jars was 44 centimetres squared and the measurements on the x-axis are the fractions out of that total.

Fri, Dec, 8/2023

The Average Temperature of the Tests after the Experiment



The graph shown above is a visual representation of the temperatures in the test environments. The y-axis represents the temperature in celsius.

Out of curiosity, we started to experiment with pH levels. (Keep in mind that this was not part of the experiment, this was only done out of curiosity.)

We used Litmus Paper to briefly answer our questions. "Is a healthy ecosystem's soil acidic or alkaline?", and "Is a polluted ecosystem's soil acidic, or alkaline?". (This was done after the experiment.)

The following table showcases the information that we got from the Litmus Paper.

Test 1	Test 2	Test 3
○	●	○

● =Acidic

○ =Neutral

While Test one and three were neutral, Test 2 was acidic. This backed up our experiment as it proved that Test 2 was polluted as it was acidic.

Sun, Dec, 10/2023

Just to verify our findings we did some research.

(Gibson, M. (June 28, 2023)

A healthier soil which is suitable for sustaining life has a pH of about 6.2 and 6.8 these levels are considered neutral on the pH scale

If the soil is more to the acidic side it means that it has a lack of nutrients. This can result in the growth of the plant being very bad and can cause the plant to die entirely.

Thur, Dec, 28/2023

In conclusion, humans, and climate have a huge impact on how plants, and ecosystems thrive. This can be seen all throughout the world, and in our experiment. Test 1 was the control, which demonstrated a healthy ecosystem. Test 2 was Human influences on ecosystems, and Test 3 was Climate Change impacts on ecosystems. All of these manipulations had a completely different effect on the ecosystems. For example, the effects of Human, and Global Warming, the height and width of plants/tests before and after the experiment, the colour of plants/test before and after the experiment, what the soil look like before and after the experiment, and the temperature of the environment, were all different throughout all of the experiments.

Sun, 12,31,23

## Conclusion

The phenomenon of global warming has been a topic of scientific inquiry for many decades, with numerous studies conducted to investigate its causes, effects, and potential solutions. However, there is still much that we do not know about this complex phenomenon. One area of inquiry that has received relatively little attention is the impact of different effects of global warming on ecosystems. So this is why we try to make this problem known and in some ways we can reduce or even stop this phenomenon, also created by us humans.

The purpose of this project was to study the impact of humans and global warming through an experimental setup. After looking through different perspectives, we conclude that humans have a greater impact on ecosystems. Since humans have more chemical-based products, those products are most likely non-biodegradable.

. This means if we expose these chemicals to the environment it is very likely that they will have a detrimental effect on that ecosystem. This is supported in our experiment through different perspectives, as we concluded that the most damaged data was always in Test 2. To further explain, the contaminated water represents the chemicals that we throw into the environment. Soon after, chemicals in the contaminated water started to kill the ecosystem's plants. Hence, test 2 was considered to be the least healthy.

As we looked deeper into the data that we collected, we came to discover that test two could not be completely dead. This is because fungi were more prominent in that test. This means that the deeper parts of the soil could still be healthy and alive, which is the only explanation for why the fungi could have formed to decompose the organic matter that we planted in it. It also means that the carbon cycle was, in effect, and it was interlinking the vegetation with carbon.

We concluded that test 3 was the healthiest. Since the ideal environment for a thriving ecosystem is warm and moist, that environment was given to that test. Its colour and height are very rich, compared to the other two tests, and way better. Even though test three had the least fungi growth of all the tests, it was still said that the ecosystem was driving and was healthy. Hence, test 3 was the healthiest.

After we asked our question, we formed our hypotheses, and ever since we have been wondering if our hypothesis was correct or not. Navnir hypothesised that the ecosystem has two that will die, but not completely, as with the bag we also do good things. The ecosystem in test 3 will die completely because of the extreme heat, and it might also suffer from gel and drying out. This was proven incorrect. And test two, even though we tried to give the plants sunlight and good care, they still ended up dying completely because of the chemicals in the water that was given to them. In test 3, instead of dying, it was the healthiest, which was the complete opposite of Navnir's hypothesis. Tanveer hypothesised that for both tests, they would grow to be weak, and the stems would break off easily. In the case of Test 2, this hypothesis was correct, as the plants in it were brutal and dead. In the case of test three, this is completely incorrect as test 3 was the healthiest in the end, same as Navnir's hypothesis.

At the beginning of this project, we had minimal knowledge about ecosystems and how they thrive in two different situations. Towards the end, we gained immense knowledge about this topic.

Both of us had basic information about greenhouse gases, some of the effects of climate change on the environment and ecosystems, and some of the ways we humans are the biggest reasons why climate change happens. As we dug deeper and deeper, we answered more and more questions that sparked in our minds. One of the most fascinating things that we learned is how many different natural cycles there are, such as the water cycle, the rock cycle and the carbon cycle. And not only that but how those cycles help the ecosystem thrive. We also deepen our knowledge of how synthesis breaks and if there is a possible weight to make the photosynthesis equation go backwards. All those things are tied into all the amazing things that make an ecosystem so rich and beautiful.

Throughout this project, we have gained knowledge and insights about various aspects of global warming, including different ecosystems, animals, and plants. Our understanding of the relationships between all forms of life has also been enhanced through this learning experience. In both of our hypotheses we both were incorrect and also correct in different ways, the only reason to figure this out was with the help of our observations on the experiment. When we looked at our observations and made graphs, we started to do research on this topic giving us more to work with. These are only some of the areas that we researched and learnt about in our project.

Wed, Jan, 3/2024

## **Future Scope**

Real life situations that happened in past years inspired us to use this project for our science fair idea. As we did more research about this topic of ecosystems, we came to realise that doing research on this topic is important. This is because the study of ecosystems helps us to better understand the importance of Environmental Conservation, especially in future years when the greenhouse gas emissions get higher, and higher. Studying ecosystems can also help us with long term goals, such as decreasing the destruction of the ozone layer, and maybe even stopping climate change. It provides information about the benefits of the environment and judicious use of Earth's resources in ways that make the environment healthy for future generations. This is why scientists do research on ecosystems.

There are many things that we do not know about our environment, and earth itself. We are trying to put an end to climate change, and global warming, but we have probably never considered what would happen to the diverse life in ecosystems, if we do that. Since organisms would be adapted to these hot/warm temperatures, and we expose them to colder temperatures faster than they could adapt. This could end in the organism suffering from hypothermia, and more. This is why we need to find a way to reduce climate change slowly, so organisms do not have to go through that.

Areas of future research related to ecosystems, and the effects of humans, and climate change:

- Impacts of human influences on Marine Life



- This study may include the industrial pollutants added into the marine environment, such as mercury. Marine life is a part of our food chain, which means in turn the mercury that marine life is exposed to will end up coming back to us. This leads to mercury poisoning.
- Impacts of growth of modern cities on ecosystems
  - This study may include the sustainable housing, garbage and recycling options of cities, sustainable transportation systems, etc.
- Impacts of agricultural processes on ecosystems
  - This study must include the use of pesticides, insecticides, fertilisers, and irrigation systems. As well as disposal of crop waste/residues.

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Today we started thinking about what questions we can ask other students in our school for an overall analysis of what other students know about climate change, and human effects on global warming.

**Questions for interview with students:**

1. What is an ecosystem and what is in an ecosystem?
  2. What is global warming?
  3. How can we reduce global warming?
- 

## Application

Our project was all about a worldwide issue that causes problems and overall effect on the health of organisms. Our project can be used worldwide to help spread awareness/educate other students about the impacts of humans on ecosystems and the impacts of global warming on ecosystems. It can also help educate others about what ecosystems are, and what organisms live in them. Ecosystems are all around us and without them, we would not have reliable food sources, fibres, resources, and even medicine. Hence, it is important to take care of ecosystems, and the environment, because if we don't, we would not be able to obtain these important resources that we require.

During this project, we obtained information that taught us new things about the world around us. Out of curiosity, we also decided to test our classmates, and other students in other grades, knowledge about ecosystems, and how humans/global warming affect them. The reason why we did this is not only because we were curious, but also because we wanted to spread awareness about how little things we do can help add to the huge issue of global warming, as well as harming the

environment, and ecosystems.

Interview with Annie Gale school

Wed, Jan, 10/2024

**Grade 9's**

Student 1- "An ecosystem is an environment and organisms like animals living in it"(question 1).  
"Global warming is when the greenhouse gases in the ozone layer warm up the planet"(question 2).  
"Recycling things that mostly end up in landfills"(question 3).

Student 2- "Animals and plants living together in an environment"(question 1). "Global warming is when human effects, which sometimes can raise sea levels"(question 2). "Some ways we can reduce global warming is by using renewable resources"(question 3).

Student 3- "An ecosystem where all living animals live, abiotic and biotic things"(question 1). "Global warming is a crisis the Earth is going through (over heating)"(question 2). "Some effects on sea levels rising, stopping pollution, reducing the use of greenhouses and glasses"(question 3).

Student 4- "An ecosystem where animals and other organisms live"(question 1). "Global warming's effects are sea levels rising and glaciers melting"(question 2). "Using less gases and picking up trash"(question 3).

Student 5- "An ecosystem is an area with living things"(question 1). "Global warming is when heat is released causing many effects"(question 2). "Some ways we can stop global warming are car pooling and recycling"(question 3).

Student 6- "An ecosystem is a big area where many species live"(question 1). "Global warming is when greenhouse gases go up to the atmosphere creating a blanket effect causing many effects"(question 2). "Some ways we could stop global warming is renewable energy"(question 3).

Student 7- "An ecosystem is home to animals and how they live (a cycle of life)" (question 1). "Fossil fuels and greenhouse gases going up the atmosphere heating the planet"(question 2). "Ways we can do this is by using renewable resources"(question 3)

Student 8- "A system that includes plant and animal life"(question 1). "When greenhouse gases warm up the planet in the atmosphere"(question 2). "Using renewable resources, limiting things that release greenhouse gases"(question 3)

Thur, Jan 18/2024

**Grade 8**

Student 1- " An ecosystem is a mix of animals and plants and is a livable habitat." (question 1) " global

warming is when humans create pollutants which harm the environment. “ (question 2) “ we can fix this by using electric stuff and reducing gas emissions and more. “ (question 3)

Student 2- “An ecosystem is basically a collection of animals interacting with each other. “ (question 1) “ global warming is actions that harm and warm up the planet which is called the greenhouse effect. “ (question 2) “ to reduce this we need to focus more on renewable energy sources such as windmills and solar panels.” (question 3)

Student 3- “ an ecosystem is plants and animals and where they live. It is a habitat where food and water are. “ (question 1) “ global warming is warming of the planet and overheating temperatures. “ (question 2) “ to stop this we need to stop wasting and not polluting, cleaning up composting and recycling plastic. “ (question 3)

Student 4- “ An ecosystem is basically when we try to help animals out.” (question 1) “ global warming is when the earth is getting heated up. “ (question 2) “ to reduce this we need to start recycling composting. “ (question 3)

Student 5- “ an ecosystem is anything to do with wildlife and habitats.” (question 1) “ global warming is icebergs melting and disruption of the solar system due to not recycling.” (question 2) “ we can reduce this by recycling, caring and spreading awareness.” (question 3)

Student 6- “ and ecosystem is when all animals work together so their habitat doesn't go bad. “ (question 1) “ funny is when it doesn't snow and the Earth is heating up because of pollution. “ (question 2) “ we can reduce this by maybe using electric cars and walking more.” (question 3)

Student 7- “ An ecosystem is books, hair, economy, and moving bins.” (question 1) “ global warming is snowing and the Earth getting more cold“ (question 2) “ to fix this we can get more polar bears, kill the Sun and stop polluting, bullying and start recycling. “ (question 3)

Student 8- “ An Ecosystem is recycling paper. “ (question 1) “ global warming is cold weather ,driving cars ,pollution and no recycling “ (question 2) “ To prevent this we need to have more polar bears and walk and have more snow gear to be prepared for the cold weather.” (question 3)

Friday, Jan 12/2024

### Grade 7

Student 1- "An ecosystem is where organisms live and interact with other animals"(question 1). "Global warming is when the air is filled with pollution"(question 2). "Stop transportation (vehicles with gas)" (question 3).

Student 2- "An ecosystem is when multiple organisms live in a space together" (question 1). "Global warming,when greenhouse gases get trapped in the atmosphere" (question 2). "We can try using electric transportation and renewable energy"(question 3).

Student 3- "Is a living habitat of animals" (question 1). "Global warming is when the Earth heats up because of greenhouse gases" (question 2). "You can reduce global warming by planting more trees to take in Co2" (question 3).

Student 4- "It has insects and animals, trees and nature, provides oxygen for us and has frostery/greenery as well" (question 1). "Global warming is when there is destruction in weather changes" (question 2). "Stop monitoring the weather and people should actually care about this problem" (question 3).

Student 5- "An ecosystem is basically a place where abiotic and biotic things live with each other" (question 1). "Global warming is maybe when the Earth is under pressure" (question 2). "Using less energy and less factories" (question 3).

Student 6- "An ecosystem is when living things come together to basically survive. " (question 1) " global warming is when the Earth he took because of fossil fuels. " (question 2) " to reduce global warming we can plant more trees stop littering and use electric cars " (question 3)

Student 7- " an ecosystem is a system of nature." (question 1) " global warming is the earth warming up. " (question 2) " to reduce global warming we can start to reduce reuse and recycle. " (question 3)

Student 8- " ecosystem is when animals, plants, weather and other factors work together to form a system of. " (question 1) " Global warming is basically when the planet is going through the greenhouse effect. " (question 2) "How to reduce global warming is by limiting our use of fossil fuels such as carbon dioxide entrily. " (question 3)

Thur, Jan 11/2024

### Grade 6

Student 1- "Ecosystems are where organisms, animals and plants reside" (question 1). "Global warming when gases go into the air" (question 2). "It will take a lot of years to fix this problem, maybe using renewable energy" (question 3).

Student 2- "I don't know what an ecosystem is" (question 1). "Something going up in the sky" (question 2). "Using masks and washing our hands" (question 3).

Student 3- "It is Earth, and all the natural resources and things before humans". (Question 1) "Global warming is Earth warming because of pollution and factories". (question 2) "We can reduce this by stopping waste and having no landfills and stopping fossil fuels. as well as stock cutting trees and conserve the environment" (Question 3)

Student 4- " an ecosystem is a place where animals live with trees and plants. " (question 1) "Global warming is carbon dioxide emissions, fossil fuels and cars. " (question 2) " to reduce global warming we can start to use trees, stop landfills, we can have better cars and stop burning fossil fuels. " (question 3)

Student 5- " An ecosystem is an environment which mostly involves nature and can be different." (question 1) "I do not know what global warming is " (question 2) " don't know how to reduce global warming" (question 3)

Student 6- " don't know what an ecosystem is. " (question 1) " global warming is when we don't take care of Earth." (question 2) " we can reduce this by less littering and less gases" (question 3)

Student 7- "Ecosystems are outside. " (question 1) " global warming is factories, and gases. " (question 2) " we can reduce global warming by walking more than taking cars " (question 3)

Student 8- " an ecosystem is when plants and animals live and thrive together." (question 1) " global warming is formed because of pollution and greenhouse gases." (question 2) " we can stop or reduce global warming by reducing our use of fossil fuels and using electric cars. " (question 3)

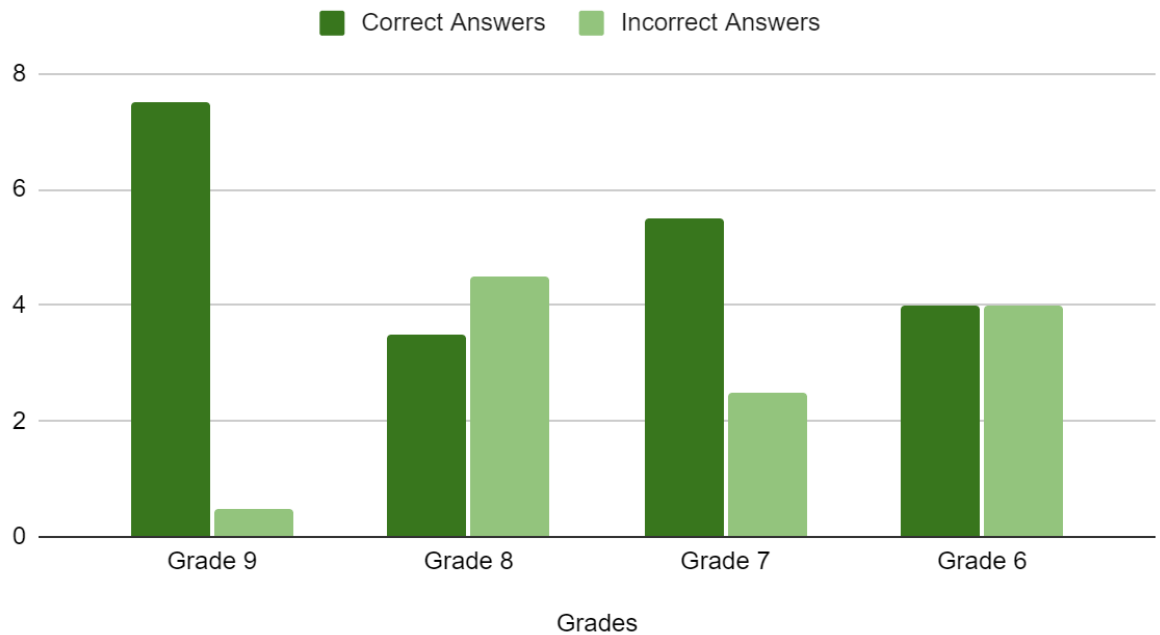
Thur, Jan 18/2024

What we considered as the correct answer is the following:

- 1) An ecosystem is an area where plants and animals live, and where they interact with weather, climate, other organisms, and other factors to form a circle of life.
- 2) Global warming is the warming of the planet through the greenhouse effect.
- 3) Using renewable energy, as well as more carpooling, and walking.

Based on the information and the data that we collected, we formed a graph showing the number of people who got the questions incorrect or correct. In other words, which grade has the most knowledge of the environment around us.

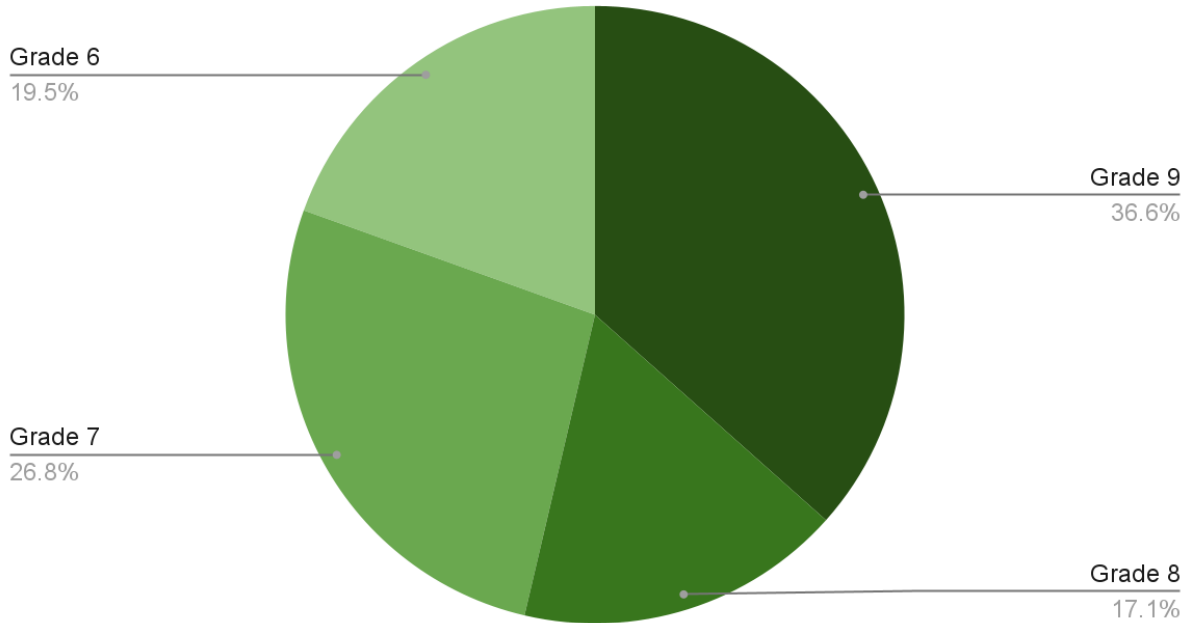
### Correct Answers and Incorrect Answers



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Tue, Jan 23/2024

## Correct Answers



The graph shown above shows the same data, as the graph before, but in percentage form. This graph is a more visual representation of the number of people who got the most correct answers in all of the grades. It also compares the four grades that we interviewed, and concludes that the grade 9 students are the most educated about this topic: ecosystems, their health, and global warming.

Tue, Jan 16/2023

## Sources of Error

- The size of the ecosystem.
  - Since ecosystems form at a much larger scale than what was represented in the experiment, that could have had a very large impact on the data collected.
- Not could have been exactly replicated
  - Since ecosystems are a complicated chain of intertwining relations, there is no way that we could have directly replicated an ecosystem. As ecosystems also consist of animals, and other organisms, those interactions were not present during this experiment, this could result in the data not being that valid.

- The exact temperature.
  - Since most of the tests were put in an environment where external conditions can interfere, the data collected for the temperatures could not be that valid. For example, where we put the tests were in a room temperature place, and when people pass by that area, and stay in that room, body heat from those people can change the climate in the ecosystem.
- The plant health.
  - The seeds/pre grown plants that we planted, we did not know if they were in a healthy condition to start with. For example, if we planted a pre grown plant that was not as healthy as the pre grown plant for another test, that could influence how we interpret the data.
- Human error
  - There could have also been a mistake in us measuring and interpreting the data collected. Resulting the data being less valid.

## Citations:

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2. [Human Impacts on the Environment](#)
3. [What Is Climate Change? | Facts.](#)
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10. [3. Energy in Biological Processes](#)
11. [Photosynthesis](#)
12. [Is photosynthesis reaction reversible? - Quora](#)
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14. [Symbiosis: The Art of Living Together](#)
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37. [Canada's Climate Actions for a Healthy Environment and a ...](#)
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45. [Soil erosion](#)
46. [4. How can human actions seriously affect water resources?.](#)
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48. [Humans and the water cycle](#)
49. [The Water Cycle | U.S. Geological Survey. .](#)
50. [How do humans affect the rock cycle?.](#)
51. <https://www.qld.gov.au/environment>

## **Books:**

- Eye Witness: Ecology by: Laura Bullar and Steve Pollock (1993)
- Global Warming by: John Houghton (2004)

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