

Urbanization and how it affects us

Marine ecosystems

In 1772 mankind learned how to create nitrogen. The same thing that already cycles through our ecosystem naturally thanks to marine plants, and when there is too much of something in an ecosystem changes are made to the area. When there's a lot of Nitrogen in the water algae grow to take in all the nutrients in the water. But in doing so they block the sun from reaching the bottom of the body of water and the plants won't be able to do photosynthesis so they will die. When dead bacteria will consume the dead plants and the cycle will continue but the bacteria will grow larger and consume all the oxygen in the water creating anoxic water.

Symbiosis

Symbiosis is what we call a relationship in an ecosystem. One example of symbiosis in an ecosystem is called mutualism. Mutualism is when two organisms benefit from a shared relationship. Another type of symbiosis is called commensalism. Commensalism is when only one organism benefits from a relationship, and the last form of symbiosis is called parasitism. Parasitism is kind of like commensalism but one organism is harmed so the other one can have food and steal their nutrients.

Water cycle

The water cycle is a repeating pattern between water, the sun, and the clouds. The water cycle is the process in which water travels through out our ecosystem. The water cycle begins in the water where the sun will evaporate it turning it into a gas and when in gas form it will travel upward and into the clouds then turning into gas it reaches the air it gets cold, turns back it to a liquid and infiltrates the cloud and when to heavy, rain falls from the clouds in to streams and becomes runoff. But because of the urban sidewalks we have the water can't get clean in the dirt (explain how dirt cleans water) so along the way to rivers the water picks up toxins and brings them into the water, so the water in runoff and doesn't infiltrate into the ground.

Green roofs

Green roofs are plants that collect water so the water doesn't end up in nearby waterways and damage them. Green roofs also provide shelter from small animals and insects and if it doesn't rain for a long time a cactus would be perfect because they will use stored water to support themselves and if the water they collect can be used to support power homes so they don't use up their electricity. Green roofs also stop runoff from damaging ecosystems by collecting water.



Urbanization

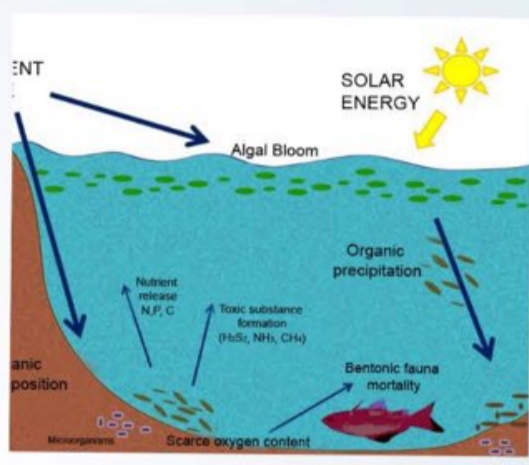


Marine Ecosystems

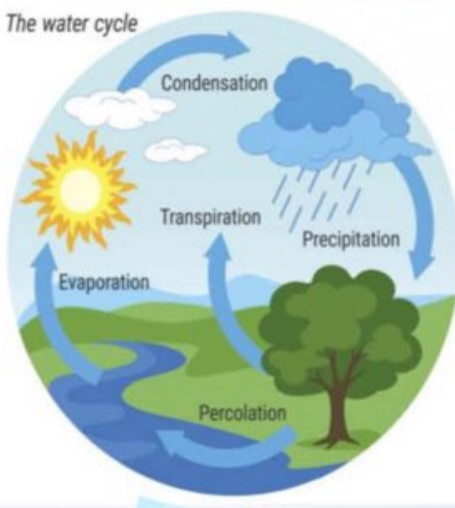
By: Anna

Marine Introduction

Eutrophication only happens in a body of water. When too much nutrients (a human-made disruption made from phosphates and nitrates) is washed into the source of water from sewage. This is called increased nutrient concentration. The nutrients from the fertilizer is for the algae, but the algae will reproduce and grow and make a thick surface over the water. That will block the sun while the algae is absorbing the sunlight. The plants in the marine ocean that do photosynthesis will die. The bacteria will decompose the plants that didn't get to photosynthesize. Creating an endless food supply for the bacteria when it releases more nutrients so it will keep on going. Continuing the algal bloom cycle. The bacteria decreases the dissolved oxygen levels.

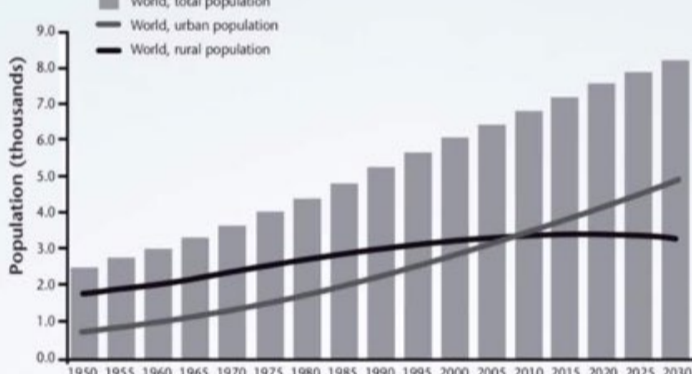


The water cycle starts with any shape or type of water. The water will evaporate turning it into water vapor. As the vapor advances in to the sky the temperature decreases. The vapor turns back into the liquid it once was before. This is called condensation. The liquid will form a cloud until it can't take anymore liquid dropping it back into the atmosphere (precipitation) because of gravity. Restarting the process all over again in a endless loop. You might be wondering "how does this relate to urbanization or pollution?" urbanization change how much water is getting filtered by the ground. Some of the water organisms have completely disappear from their original habitat to a new unfamiliar terrain.



Nitrogen goes through different kind states to be in the right form for plants. The nitrogen gas turns in to ammonia. Another different bacteria changes the ammonia to nitrites. Plants can't use this state of nitrogen yet. To be able to use the nitrogen it has to be nitrates. Then they can finally use it for a natural protein source. Herbivore animals then eats the plants then humans eat the animals. We all have nitrogen in our bodies from this cycle.

Nitrogen goes through different kind states to be in the right form for plants. The nitrogen gas turns in to ammonia. Another different bacteria changes the ammonia. The carbon cycle is way different from the nitrogen cycle. Photosynthesis consists of CO2, H2O, sun, sugar, and oxygen. The plants will use the photosynthesis and grow. Then the consumers will eat the plants. The consumers will die and go form detritus. The detritus turns into oil-coal next it will go to the factory. The burning fuel from the factory that contains the carbon will go back to the atmosphere restarting the cycle. To be able to use the nitrogen yet. Plants can't use this state of nitrogen yet. To be able to use the nitrogen it has to be nitrates. Then they can finally use it for a natural protein source. Herbivore animals then eats the plants then humans eat the animals. We all have nitrogen in our bodies from this cycle.



Urbanization Outcome

Runoff is liquid that did not get filtered by the ground or even did not turn into water vapor. This will cause erosion and will end up in the water where species live. This is all bad news except for one organism. Bacteria. The bacteria will expand more which is one of our biggest fears. Most of this runoff is because we have a huge amount of impervious areas in our state (or country). Infiltration is a huge part in this, but the infiltration is not happening because we have no pervious surfaces. The runoff will end up in other water source with their pollutants. Without infiltration our water will be polluted with new urbanization we build. Water can not infiltrate with all these impervious surfaces built here. Boston's 16.1% (that's rural) have a nice system of water getting infiltrated

Due to recent studies any urban area with a percentage of 75-100 impervious surface their runoff will be 5.5x the amount it is supposed to be. This is much more than the ideal amount runoff is supposed to be. Boston is one of the states that have 5.5x the original amount of runoff. Boston have 83.9% impervious surface. Earth has evolved more than we should've. (if we meant to or not). This is getting worse over time. This is not evolving this is called degradation.

"Some mammals would die off very quickly."

Urban to Rural



"When it rains, these poisons wash into the rivers and continue to the sea." World Without Fish

Solution

All of the other solutions (rain gardens, pet waste, and garden roofs) are not a match for permeable concrete. The problem with the other interventions is that they're all temporary. We don't need temporary for a huge problem like this. We need strong, sturdy, and something that lasts long. Permeable concrete is the one for you. Permeable concrete is made with the same mix of normal traditional concrete but it doesn't have fine particles or the sand. It is basically like gravel but it is mixed with the cement. Whenever it rains it will go straight through the cement right into the soil underneath. This cement have gaps in between it to allow the water to soak through. You may be wondering "how does this decrease water pollution?" well you should now dirt is a pervious surface. The runoff normally travels on the cement to the water with the pollutants. With this permeable concrete the runoff can't make it to the water but straight through the soil with the pollutants.



"They used to automatically put in a retention pond. Now they're automatically putting in rain gardens or other green space. I'd like to think that we're going to be able to replace that."

By: Anna

Importance of Green Roofs on the Ecosystem

Green Roofs are important!



The Background



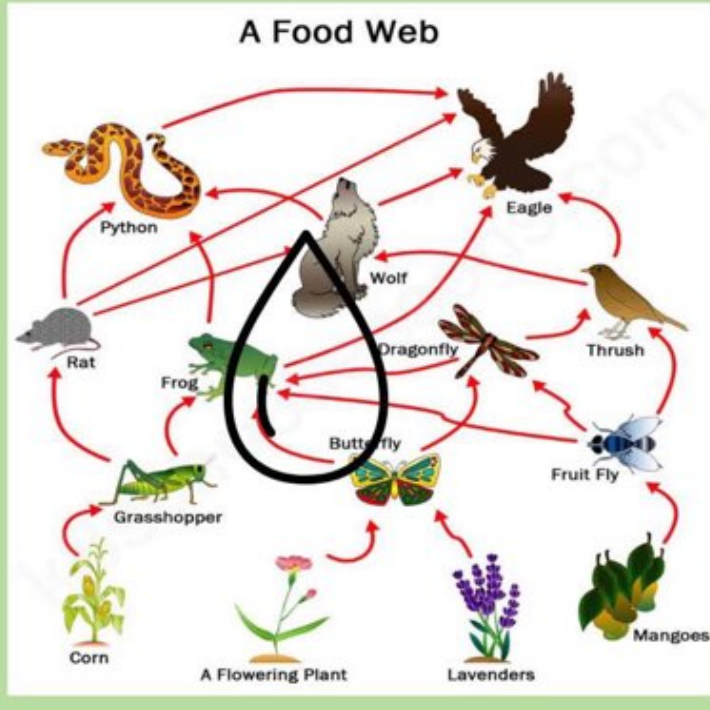
The Problem



The Solution

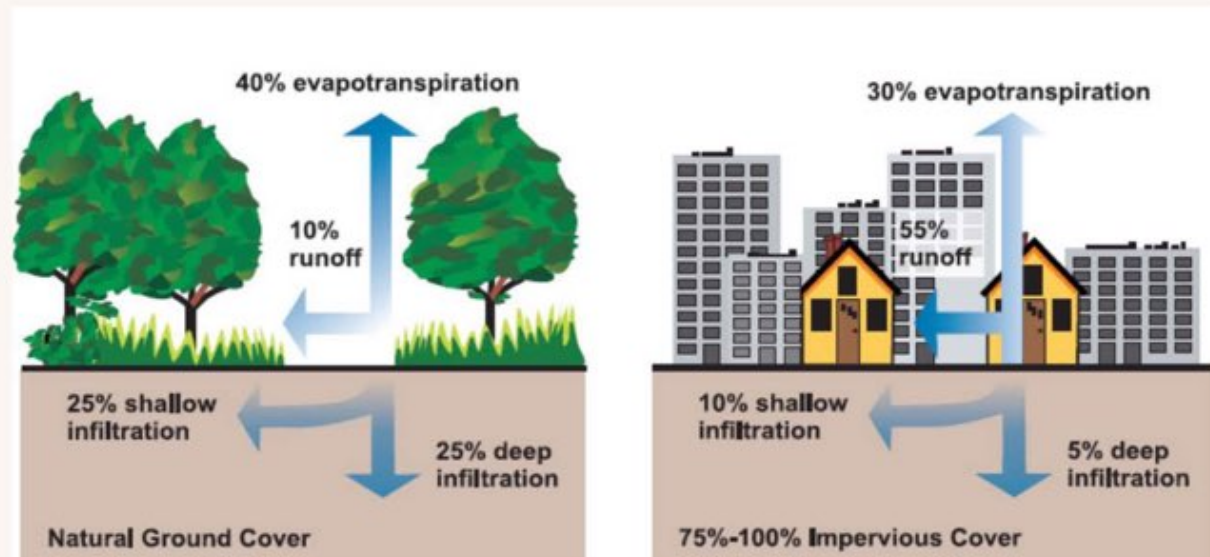
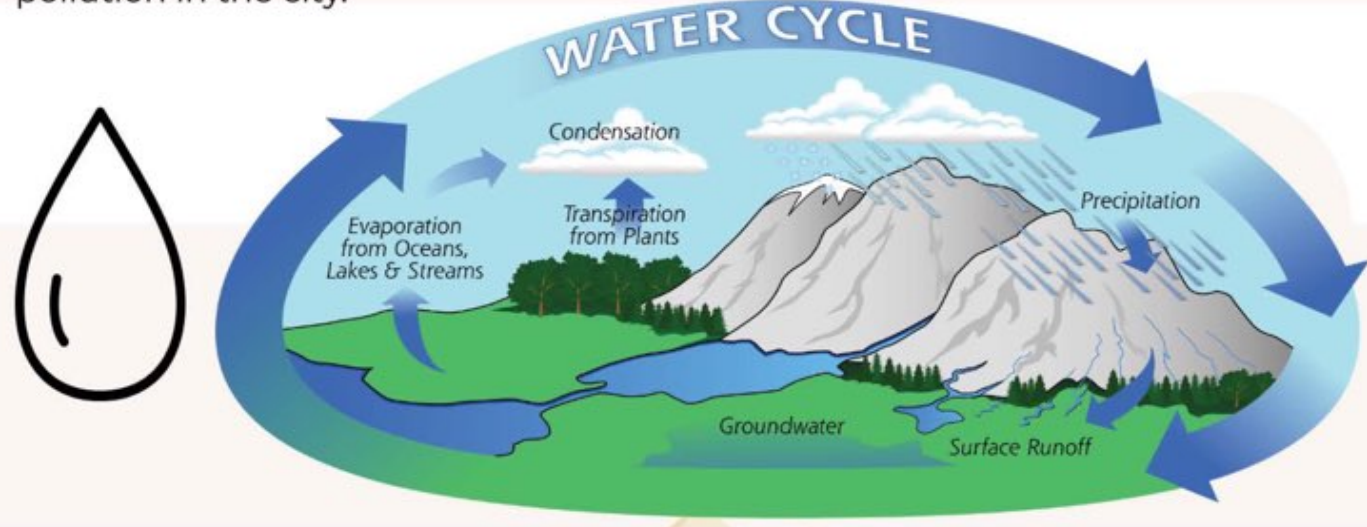
The Background:

When undisturbed by humans an ecosystem functions correctly and is healthy. There is no pollution, no animals dying and organisms are connected and working together with their environment. Two factors in an ecosystem are Abiotic, which are non-living things and biotic which are living things. Plants make food and oxygen. Animals give carbon dioxide. Bacteria break things down to minerals to help things grow. The types of organisms in an ecosystem that are connected and work together are producers, consumers and decomposers. The ecosystem needs organisms to work together to be healthy and work.



The Problem:

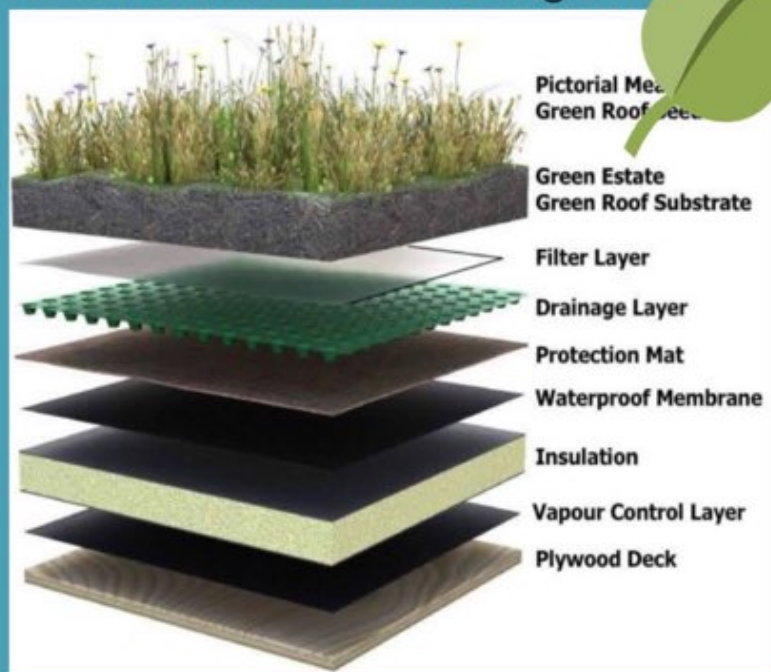
Increase in human population impacts the water cycle. When it rains in urban areas there is runoff. Runoff has bacteria, pollution, and fertilizer that can be harmful to the water cycle in the areas that are impervious like the city of Boston. A researcher named Kleindall stated that, "When we clear lands, remove and pave roads we increase the amount of silt accumulating in our waterways." This means that organisms will no longer be able to grow the same. The growth in populations are adding to the problem of reducing urban runoff and pollution in the city.



85%
of Boston is Impervious

The Solution:

One way we can help reduce human population growth is to have greenroofs on buildings in Boston. A green roof is a special type of garden that is built into the roof of a building. This will help reduce the water runoff in the city. Greenroofs stop water from running off a rooftop and causing harm to waterways and runoff in the city that has pollution in it. Greenroofs prevent rain and water from rushing off roofs.



"Greenroofs can reduce stormwater volumes by up to 85% - from Growing Up the City"

Some people use green roofs for urban gardening which is a way to grow food in cities instead of farms. -from Growing up the city.

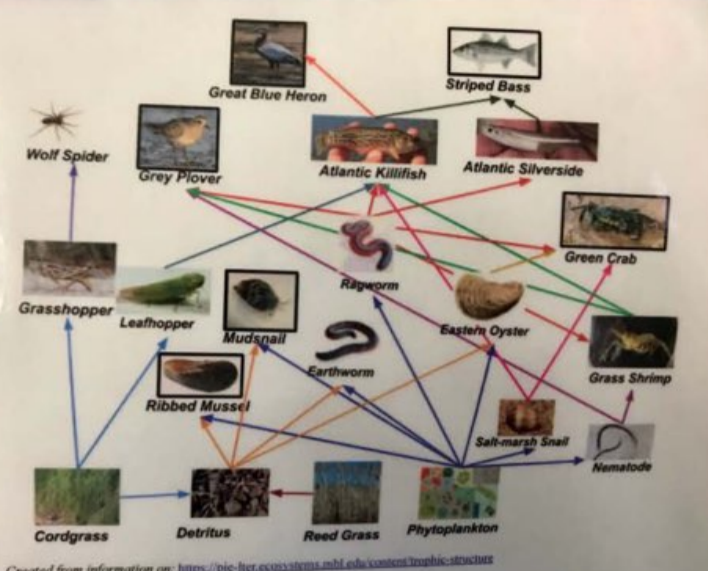


Science Infographic About Marine Ecosystem



FOOD WEBS

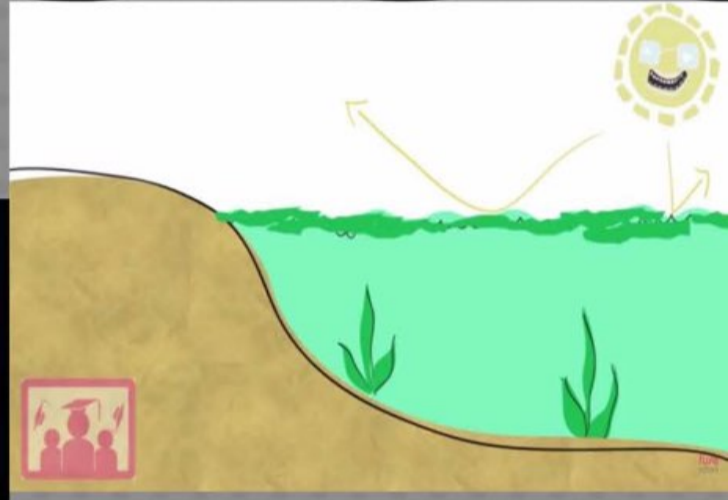
The complex network of food chains in an ecosystem, connect predator and prey, a producer is what help primary consumers live. Secondary consumers are predators to primary consumer. Example, grasshopper eats grass , a mice comes and eats that grasshopper , then maybe some sort of bird eats that grasshopper, then a lion of some sort eats that bird.



Created from information on: <https://pic-lter.ecosystems.mbl.edu/vosmer/foodweb-structure>

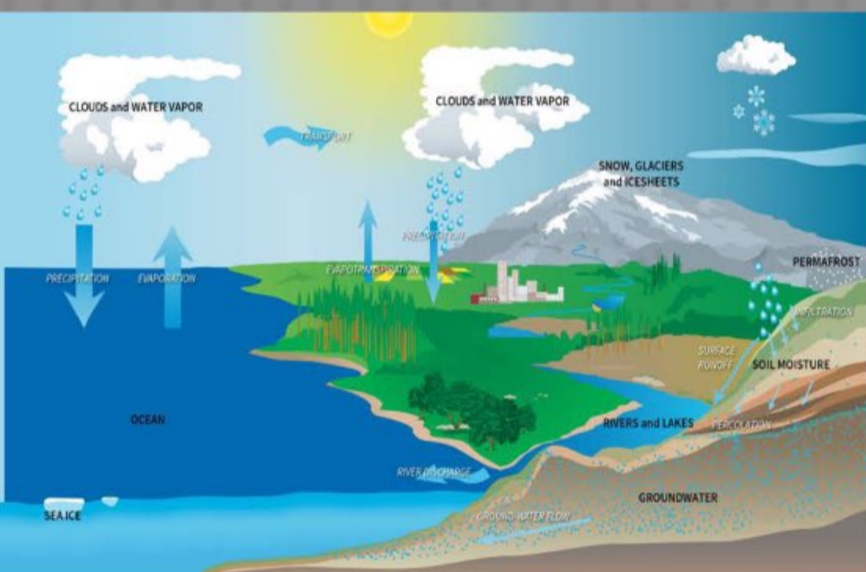
EUTROPHICATION

Eutrophication happens when It starts when fertilizer gets into the river/lakes. The nutrients are food for algae, and then the algae grows and reproduce quickly growing a thick green goo in the. Plants who need photosynthesis die, then algae will also start to die when they eat all the nutrients and run out of food. After when the plants and algae die the bacteria decomposes them and releases more nutrients in the water, then the Algal Bloom Cycle keeps going.



WATER CYLCLE

When the sun shines on the water, then that causes the water to turn into vapor. That's called evaporation. Then after they reach a cloud, the cloud gets full of rain, then once the cloud is full, it rains. That's called precipitation caused by gravity. After that when the rain falls it goes down a hill and back into the water, or when it goes down hill it soaks into dirt. That's called runoff caused by gravity, and then the cycle repeats.



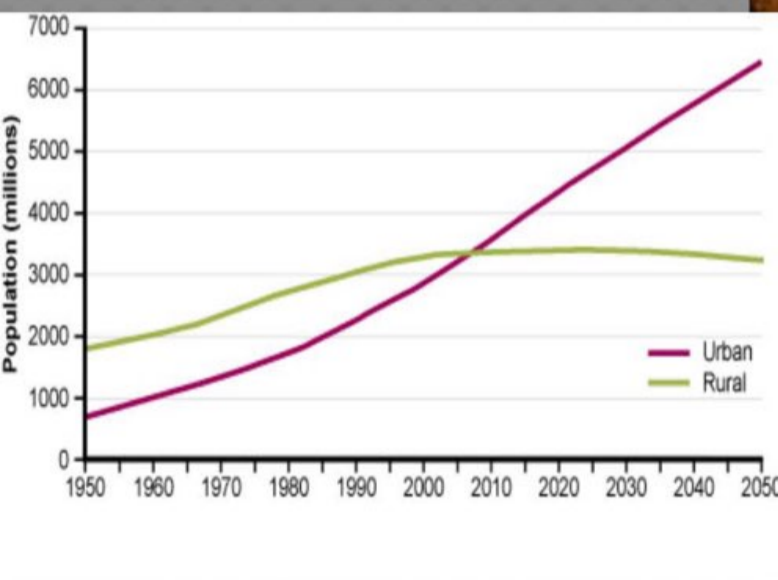
WHY PICKING UP POOP IS IMPORTANT

Picking up poop can help us drink cleaner water, animal waste is one of the smaller reasons why there is little clean water. Just like eutrophication, when the animal waste gets in the water it gets green, Feces also contain nitrates, and when that gets in water, it makes it where it is unfishable. Feces also contain nitrates, and when that gets in water the contaminants make it undrinkable. Picking up poop can really help this environment if you really do it



URBANIZATION

In the 1960s Boston once was an 800 acre peninsula, but Boston made itself bigger. In the past 70 years, rural and urban population has been going up and down. The difference between rural and urban is rural is an area that has more greenland, urbans is more of an impervious surface or the city. In the 1950s the rural population was more rural than urban, but then the rural population went down because people started building more urban cities



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Urbanization and Boston's Marine Ecosystem's



[Info]

What you need to know



What an Ecosystem is

An ecosystem is a community of organisms and their environment. Ecosystems are interconnected as in anything that happens to just one part means it affects the entire environment. An example of an ecosystem being connected is the predators largemouth bass and bluegills dying off that means the prey the minnows population starts to grow. Low amounts of Do(Dissolved oxygen) will cause bigger species of fish to die in a marine ecosystem which causes more decomposers to come and then there is less Do in the water than before.



[Problem]

What's going on

Ecosystems are constantly being ruined by runoff that collects garbage, chemicals, trash, and more these things can ruin a marine ecosystem. Things like Nitrates and Phosphorus get into the water causing eutrophication to happen. Eutrophication is the process in which Fertilizer contain Nitrates gets into water caused by runoff Nitrates cause excessive algae growth that algae blocks sunlight. That then causes plants to die attracting decomposers who use up the Do in the water causing it to become Anoxic(Without Air)

[How To Fix]

Lowering Urban Runoff

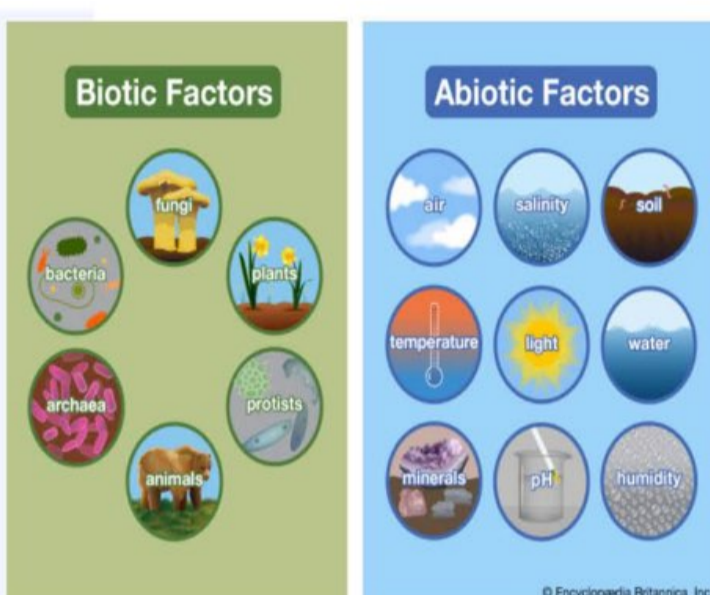
Permeable pavement is a good way of lowering urban runoff but also keeping urban aka cities around. Having permeable pavement can lower runoff up to 86% stopping the degradation of our marine ecosystems.



Heibyn's Urbanization And Building Boston

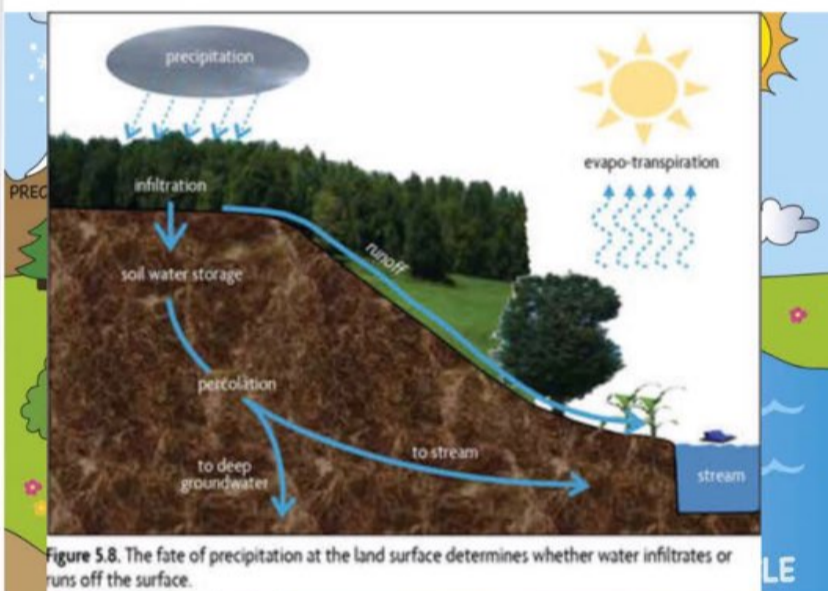
Abiotic Factors

Ecosystems are interconnected groups of animals and plants. There are three different types of living organisms. They're called producers, consumers, and decomposers. All of these types are different because producers eat meat, consumers network a food chain and decomposers finish all of their food.



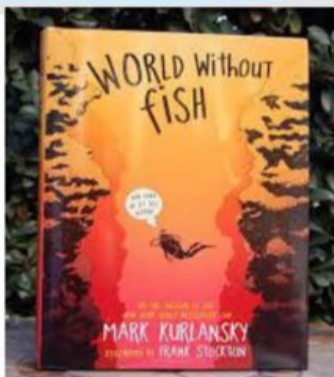
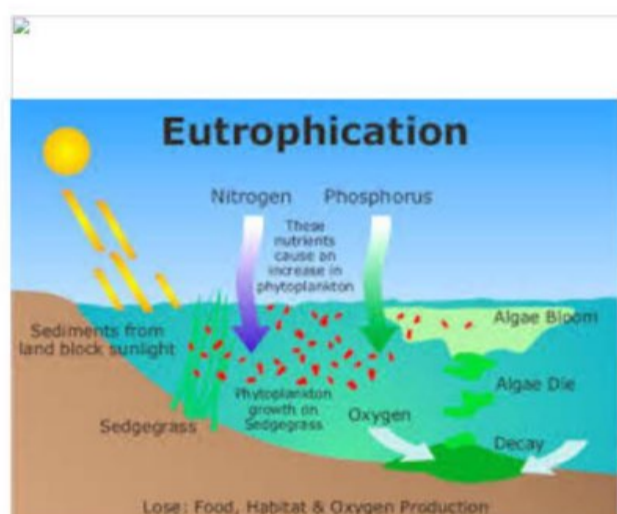
Runoff

Runoffs is when there is water out of a mountain and then the water comes down from the mountain and then it goes to the soil. Infiltration is when the water goes down into the dirt then to the soil but you might think that the soil is bad but it actually filters the water. There is more pollution in cities because that's where there are buildings. When it rains in the city the rain doesn't infiltrate because it's not a natural area. It's a whole bunch of buildings and barely any plants. The rain turns to puddles and runoff happens and it goes into the sewer. It takes plastic and bad stuff to the ocean.



Eutrophication

Eutrophication is in a river or lake because of how many nutrients are in the lake and then there are nitrates and phosphates that are washed into the river or lake. After that, algae comes and then the water in the river or lake will turn green.



"it is not likely that human beings could catch and destroy all sea life even if they tried to- and of course we are trying not to. nevertheless, considering overfishing, pollution and global warming the entire system of ocean life could completely unravel"

Solution: Rain Garden

In the rain garden the most useful and fascinating part about rain gardens is what puts dips in the ground. When runoff hits the rain garden then all the water from the rain garden are is going to the dirt were the rain garden is this is good for the ecosystems because the dirt captures the the water.



Remember to give credit to your resources — insert links to the original articles. Take this example:

www.piktochart.com/blog

permeable pavement



permeable pavement was underrated process that seemed like it wasn't effective enough, but actually helps a lot to prevent runoff.

1 Background

Run-off

Runoff is how water hits an impervious surface and travels to a body of water. After precipitation, the water that hit the impervious surface, will start to travel, picking up more nutrients and pollutants, then travels into bodies of water, which is bad for the ecosystem. But if the water hits a pervious surface, that will allow water to infiltrate the ground which will be healthy for the ecosystem.

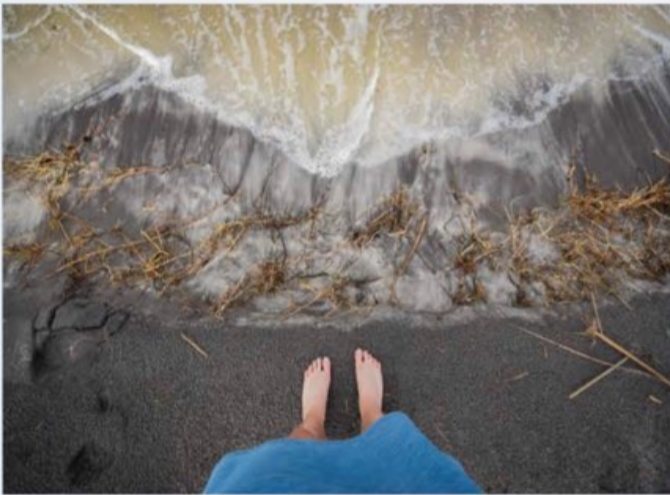


Eutrophication

Nutrients are great for humans, but not so great for the marine ecosystem. Too much nutrients will cause eutrophication where the water makes an algae bloom, which has repercussions for cutting off sunlight. But eventually **all** organisms in the water will die to where its just water.

2 The problem

There's a lot of pollutants in the water, which is making the bodies of water worse over times. run-off pick up silt, as in dirt, sediments, etc. which makes bodies of water dirty and not so healthy looking. this happens after precipitation hits impervious surfaces.



3 Solution



stops 85% of run-off

Ever walked out on a rainy day a saw water flowing down the street? Permeable pavement stops that. Which means less pollutants going into the water and more infiltration to be done. This is important because it will prevent a lot of marine's pollution, having a better biological integrity, which will turn into a better healthy environment for the marine ecosystem.



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 PIKTOCHART

Urbanization and Boston's Marine Eco system

Eco System

01

Eco-System



There is a lot of competitiveness in our ecosystem which makes have a bad ecosystem because our animals are dying. And if the animals are dying that means we can't have a good planet to live on and it's an opportunity to grow, learn and discover more about the amazing planet we live on. An ecosystem is a biological community of interacting organisms and their physical

Ecosystem 2

02

Eco-System



Are ecosystem is harmed byl because of the chemicals and fertilizer in the water. And the way the people get the fertilizer and chemicals in the water is by Lawn and garden chemicals, such as fertilizers enter the groundwater in two ways. ... The water in streams replenishes groundwater, so the chemicals are absorbed into the groundwater as well. The second method of contamination is through leaching, which is the downward movement of a substance through the soil.

▶▶ Your Key Metric: e.g. website traffic per channel.

Eco System 3

03

Eco System



In order to have a good ecosystem people need to stop putting fertilizer and bad chemicals in the water. And the fertilizer is bad for the ecosystem because Nutrients from fertilizer are harmful to aquatic ecosystems because they cause algae and other plant life to grow rapidly

▶▶ Your Key Metric: e.g. number of free trials.

Urbanization

04

Urbanization



In the urbanization packet it says Urbanization poses a major threat to marine ecosystems. And When we clear our lands and remove the wheat lands and paved roads the increase of runoff. And this is happening because urbanization helps make more cities. According to the graph I see that the urban population was going up and the rural population is going down.

▶▶ Your Key Metric: e.g. revenue.

Eco system

05

Eco system



In order to keep our fish population up people should stop throwing there plastic in the water were the fish stay because that's how the fish die in the first place which is plastic.

▶▶ Your Key Metric: e.g. lifetime revenue.

Scoop the Poop

06

Scoop the Poop



Scoop the poop is important because if we don't clean it, people can get a serious illness in there body and a disease that causes bacteria and virus. When the shortage stops it causes long-term health problems. And nutrients and pathogens that enter water which can cause a big growth of algae and that the water starts to turn green and then the fish die.

▶▶ Your Key Metric: e.g. new revenue.

SOURCE

Remember to give credit to your resources — insert links to the original articles.

Take this example:

www.piktochart.com/blog



Ecosystem's

Problem

What is pollution ?

Pollution is when the water gets too many particles, trash, etc in the water. If this happens it's only a matter of time that all living things factor's die. This is the worst thing that could happen to any ecosystem because it makes unlivable for humans and animals. Pollution may also start because of a runoff.



Healthy ecosystem

This is when an ecosystem is healthy that everything is going well. Example when the foodweb is the same what I mean is when one part of the foodweb dies out. Another example is when there are no invasive species. An invasive species is when another animals who goes to a habitat and disrupts everything for the animals or plants in the habitat. If you are planting a garden or pick out fruit, vegetables, it won't look rotten or will be edible.



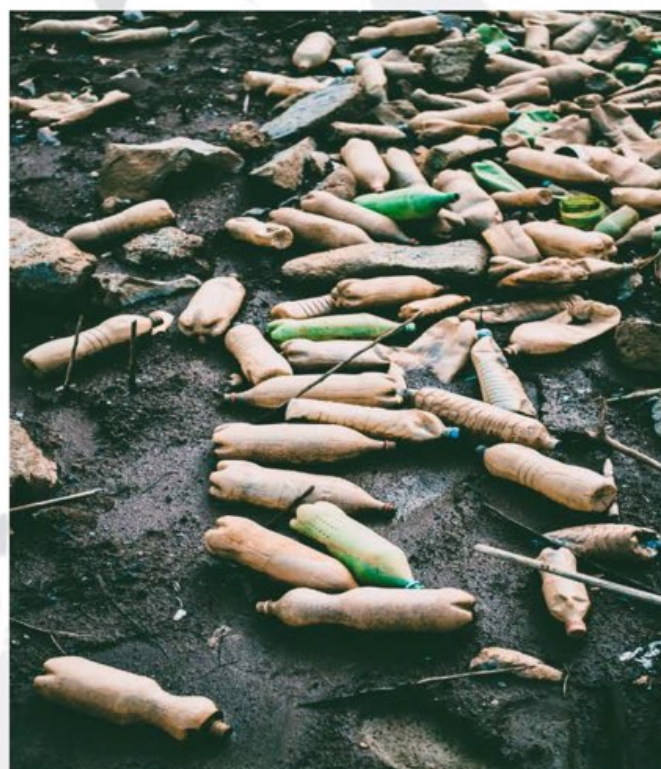
• SCOOP THE POOP

IF WE DON'T PICK UP AFTER OUR PETS AND WE JUST LET THEM POOP WHEREVER THEY WANT. IT COULD GET CAUGHT IN A RUNOFF AND GO TO ANY WATER SOURCE IT CAN BE FATAL TO ANYTHING OR ANYONE WHO DRINKS IT. IF IT REACHES TO A BODY OF WATER IT MAY CAUSE ALGAE TO GROW RAPIDLY AND MAKE THE WATER ALL GREEN AND DISGUSTING. IT CAN ALSO MESS UP YOUR PLANS IF YOU GO FISHING.



Impervious Areas

Impervious areas can be very bad to the marine ecosystem because if there is a lot of impervious areas it makes the water dirty. And the soil dirty, so if both things are dirty it's like a runoff but with no water going to the drain to a water source. And Boston has grown a lot more impervious areas since the 1990's. Where a scientist named William Kleindl tried to measure how many impervious areas in Washington.



RUNOFF

Runoff is when it rains and anything that gets caught like bacteria, oil spills, etc. That goes down the drain or an open water source. It can be bad most of the time because it can bring down all the things I said earlier. Like metals that if they touch water it can let off all that factory dust and it can really do bad for the water and the things that drink it.



Algae is something that give plants and animals food and oxygen. But it needs a cycle called photosynthesis where the sun hits the plants and it feeds the animals in the marine ecosystem. But if there is too much algae it blocks the sunlight for plants and animals breath.

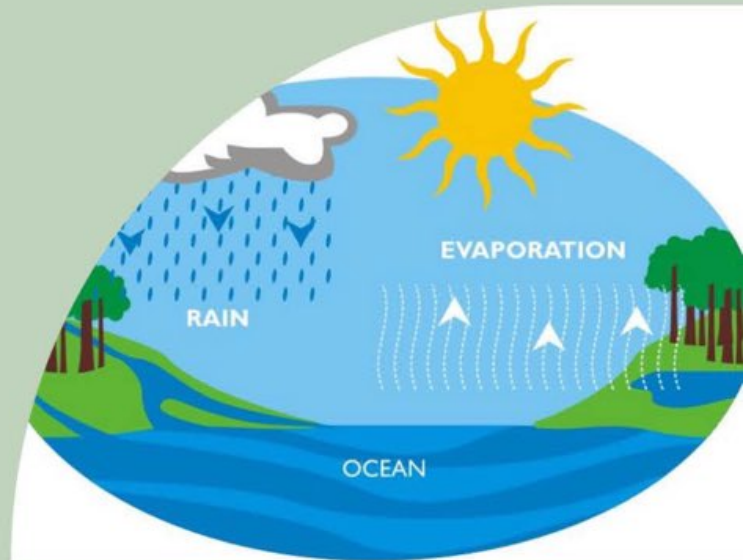


solution water palution

1 The Background:

Ecosystem are interconnected. Disruptions can cause many changes to the ecosystem. These disruptions can cause death of animals and plants. The cause of these disruptions are when rain runoff can not get into the ground due to impervious ground.

Abiotic factor is a factor a factor that is alive for an example an animal, plants, humans, Bacteria. The effect that they do to an ecosystem is work with Abiotic factors and for an ecosystem to survive and flourish. If one Biotic factor is removed or changed it can affect the whole ecosystem



2 The Problem:

Impervious surfaces are mainly artificial structures such as pavements roads, sidewalks as well as industrial areas and all of which use considerable paved areas that are covered by materials like concrete. Soils compacted by urban development are also highly impervious this is bad because the water that go in the ground for filtering so it can help the plants grow cant get in tha is bad for the ecosystem.

3 The Solution:

permeable pavement is the best choice for the solution for equadick paulton it is the cheapest way and the most apsilot way to fix the problem because it lies the water flow thru and it purify it and lets it flow thru so it can get to the trees



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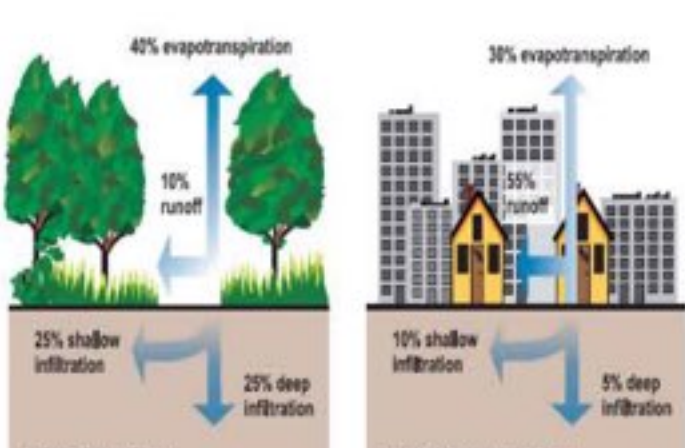
Infiltration

Early in a storm, water usually enters soil as it is literally sucked into the dry ground. Water can be absorbed by the soil and may stay in the soil for a long time until it gradually gets evaporated. If land is covered by impermeable surfaces, such as pavement, infiltration cannot occur as the water cannot infiltrate through an impermeable surface. This relationship also leads to increased runoff. Areas that are impermeable often have storm drains which drain directly into bodies of water, which means no infiltration occurs.



Figure 5.8. The fate of precipitation at the land surface determines whether water infiltrates or runs off the surface.

Impervious



Impervious surfaces prevent water and rainfall from absorbing into the ground naturally. Instead, the water runs off the impervious surface, picking up many types of pollution in the process, and then flows into a storm drain or a nearby body of water. Water that is unable to infiltrate into the ground will flow over parking lots, roads, rooftops, driveways, sidewalks, and streets into the local drainage and cause polluted water. If we didn't have impervious surfaces then it will provide more habitat, wildlife, and more green space. The loss of water resources results in water shortage and decreases surface water quality, which doesn't only affect people's health but also our ecosystem.

Runoff

01

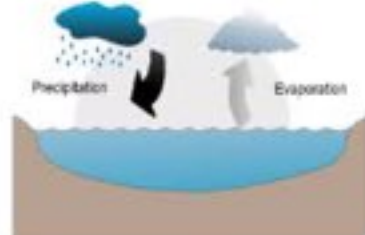
Runoff happens when a large amount of rain falls over a short period because the soil cannot absorb the rainfall water. Runoff mostly depends on climate, sources, and surfaces of urban areas.

02

It also includes precipitation that turns into evaporation and enters the surface to become groundwater. Urban runoff contains waste from both humans and animals which results pathogens like noroviruses and adenoviruses.

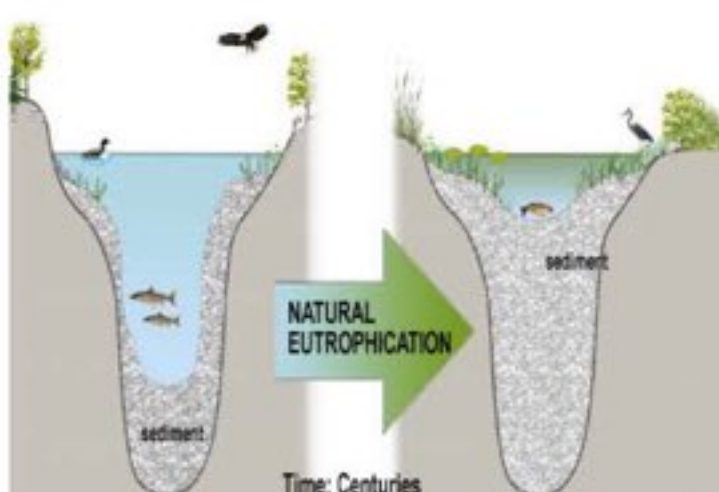
03

If either of those enter the bodies of water it may cause virus, disease, unswimmable water, etc. Stormwater management that is livable is becoming increasingly necessary for areas that are urbanizing.



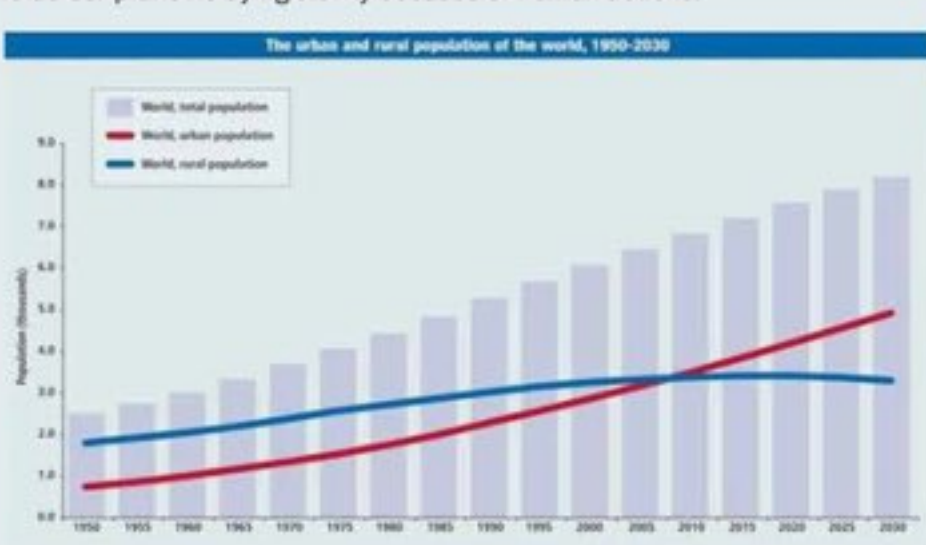
Eutrophication

A lot of algae in the water can lead to algal bloom and cause dead zones, which leads to fish decrease. This is called eutrophication, eutrophication is when too much nutrients causes an algal bloom. When too much nutrients enters the water it can also cause low oxygen waters. Algae eats nutrient which causes it to reproduce easily and when it reproduces easily then the water would be covered in algae than bacteria would start to eat up the oxygen. Most reasons why fish tend to die and reduce fish habitats off is by the discharge of nitrate or phosphate containing detergents, fertilizers, or sewage into an aquatic system. Algal blooms can cause for no food in the water because plants use energy from the sun to turn water and carbon dioxide into food. So if the sun can't get through it could cause fish to die because sunlight won't pass through water and give off oxygen.



Degradation

The human population has grown by a lot and more of our land is becoming urban and less of our land is green. We use our natural resources too much and by the time 2030 hits we won't have a lot of water or forest left. Our reefs, forests, ocean, we have to help them because if not then it's our fault for not helping for not owning up to what we do our planet is dying slowly because of human actions.



Water Cycle

The water cycle is when water gets warmed by the sun and changes from a liquid water to water vapor gas, this is called evaporation. As that happens water vapor turns into a liquid and this is called condensation. When condensation happens precipitation also happens and that's when any form of water falls from the sky to the surface as precipitation. The water falling on land collects in rivers, lakes, and soil. Most of the water flows back into the oceans. When it flows back into the ocean that's called runoff, when runoff happens in the city it collects all different dirty things and chemicals.

Ecosystems and what they do

Ecosystems are a complex system on the life of different organisms. There are three different roles in this system. Producers, Consumers, and Decomposers. The Producers make/create food from the sun while Consumers consumes the food from the Producers. When the Consumers die the Decomposers for example Bacteria or mushrooms break down dead matter and puts it in the soil for the plants to grow in then the cycle starts again. These organisms help with the ecosystem so it's able to survive.

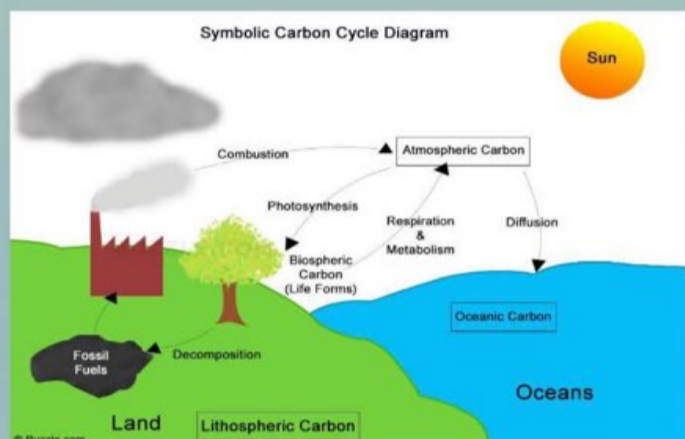
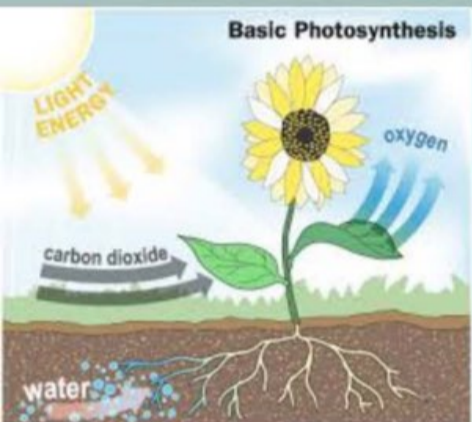


“The key to success for all life on earth is Biodiversity, the presence of a wide variety of species.” - Page 3 W.W.F

“A fish with several fins is more evolved than a fish with one long fin.” - Page 3 W.W.F

Different cycles in the Ecosystem

There are different types of cycles in the ecosystem like the ones I'm going to mention. In an ecosystem there are two important cycles that is needed which are Photosynthesis and Respiration. Photosynthesis is how plants make Oxygen from Carbon Dioxide and water droplets. Respiration is the opposite so instead of making Oxygen it separates the atoms and elements that create it which are Carbon Dioxide and Water droplets letting it back out into the Ecosystem. The only difference is that Respiration only happens it the night and Photosynthesis happens in the day.



The harm that causes the problems in the ecosystem

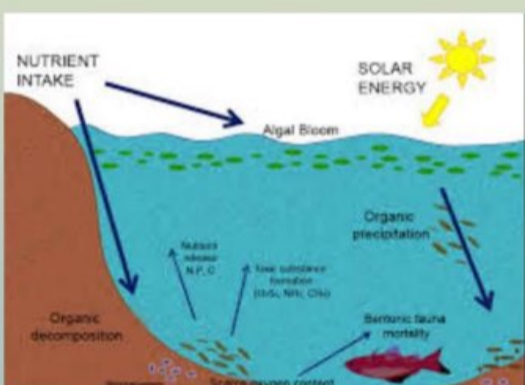
In the Ecosystem there are different disruptions in it. If the Biodiversity is low then that means the quality is low and unhealthy. Biodiversity is depending on how many living organisms are living in the ecosystem. If pollution from an impervious area enters the water in marine life then the fish and organisms will suffer with survival.



“When the destruction of fish was moderate, the impact was moderate, and the small adjustments made by nature usually were not even noticed.” - Page 23 W.W.F

What is the Eutrophication system?

The Eutrophication system is when nitrates and phosphates enter the ecosystems water and Nitrates added to water creates algae. When the algae grows it stops photosynthesis from happening for any plants that need sunlight. When the plant die off Bacteria enters and decomposes the dead plants along with consuming the Dissolved Oxygen making the water Anoxic. If the water is anoxic then anything that isn't bacteria will die.



“They also understood that taking too many small, young fish would destroy the population.” - Page 24 W.W.F

How to stop it from happening

There are multiple ways on how to stop pollution from happening. One way is to clean the streets of any trash with gloves on. Another is the 4th Intervention Permeable Pavement which helps with the city's infiltration system.

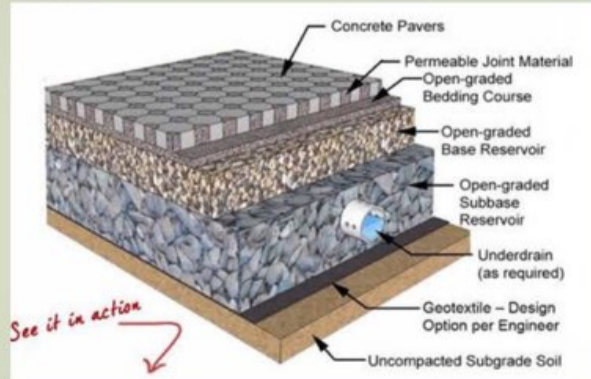
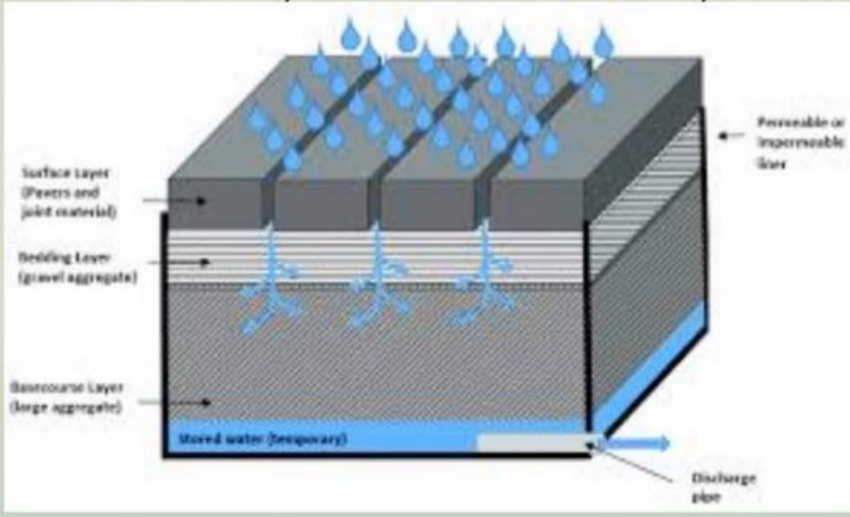
“The total population of plankton and krill is already the largest mass of protein in the world today.” - Page 11 W.W.F



“Overpopulated large numbers of plankton would die, leaving poisonous areas the sizes of small islands where they are rotting.” - Page 11 W.W.F

What are the 5 interventions?

The five Interventions are different methods in order to help the ecosystem. For example the fourth intervention: Permeable Pavement. It's known as gravel and cement glued together. It doesn't have sand and fine particulate in the mix so when it rains the water can go through into the soil underneath. Why this intervention helps the ecosystem and biodiversity is because when it rains it helps the water to sink through the cement and enters soil underneath for the infiltration percentage to raise since the average infiltration percentage is 15% in the city of boston or in any Urban place.



GREEN ROOF

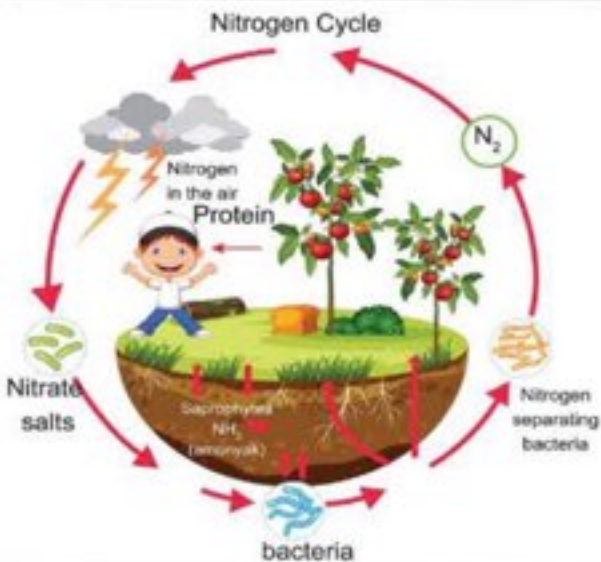
Green roofs are a mini garden on a roof. Also Green roofs helps or "reduce storm water volumes by up to 85%." It's good because not a lot of chemicals go into the water.

Also it helps clean the water by infiltration because soil cleans dirty water. Also it help runoff by not getting chemicals into water.

If you don't have green roofs more water will get more polluted.

Impervious land

Impervious land is a land that water can't travel through. Impervious land are driveways, sidewalks. Impervious land is always increases by urbanization and green roofs can save and also make more people.



Nitrogen cycle

Nitrogen cycle is a process of a recycle that takes nitrogen from living things and nonliving things from the atmosphere to earth. Nitrogen falls from the atmosphere to earth by precipitation which is rain and snow. Then they get into the soil and goes into the nodules in the ground because we humans can't breath nitrogen. Nitrogen cycle is important because it gives nitrates to animals and plants to grow. Nitrates are nitrogen but bacteria changes it into Nitrates and that is called nitrification.

3 Water cycle

First water evaporates when the sun shines on the water. Then evaporation goes to the clouds and does condensation is when evaporating water goes to the clouds and turn the vapor in a solid. Then when the clouds get heavy it starts to rain it rain because all of the vapor turns into water and when the clouds can't hold no more it rains. Then precipitation, and some of the runoff goes underground which is called infiltration.



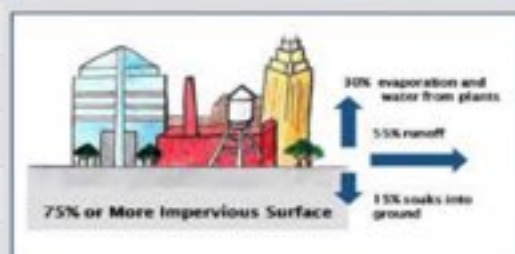
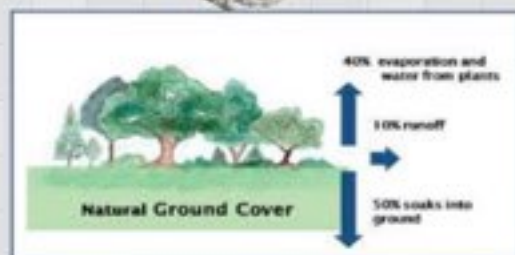
4 Air Pollution

Air pollution is bad because dust, chemical, and car emissions. Also air pollution and global warming makes the ice melt. Also air pollution melts the ice in Antarctica. When the ice melt animals that live in Antarctica will died.

5 Pollution

In the world, pollution is the main cause of waste in the marine ecosystem. One of the main causes is runoff, runoff catches chemicals and waste and puts it into the marine ecosystem.

The only reason that runoff catches chemicals and waste is that impervious land. Runoff catches chemicals by cement, driveways, roads etc. Also urbanization mean a when a grown of a population. impacts pollution by impervious land, sewage. Previous land is when water can go through like dirt or grass etc. But when water goes on top of previous land it doesn't catches chemicals when on impervious land.



The Biological Integrity of the Boston Area

How healthy is Boston?

Background

Biological Integrity

Biological integrity is how healthy an ecosystem is. One of the most common ways that people measure the Biological Integrity is but look at the water quality. Water plays a big role in this because if the water is bad then it is most likely because of something that happened on the land. For example if there is low dissolved oxygen it is most likely because the bacteria grew because the Algae died and in coving the sun.



Impervious Covers

Since 1630 Boston has gone from 800 acres of land to 5,000 acres of land. That is approximately 3,7000 foot ball fields. An Impervious surface is a surface where water cannot get through. 83% of Boston is covered by impervious areas. This is very bad for our Environment.



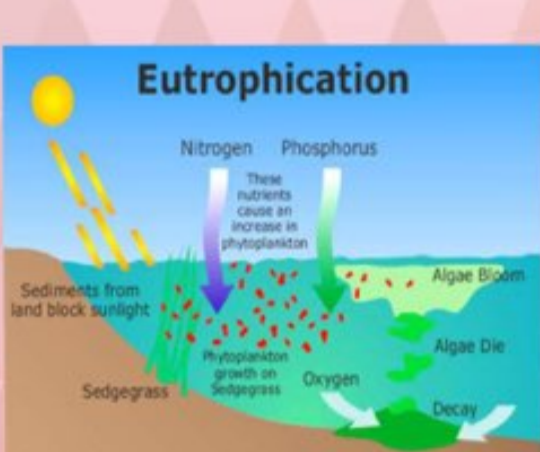
The chart above is showing the percentage of the Pervious and Impervious areas of Boston

Degradation

Degradation is when things are getting worst. Boston has been Degrating since 1630. People are trying to make more land. For example Back Bay. It is built on wooden pipes that go all the way into the sand on the bottom of Boston's blue clay. Because of this they destroyed lots of reefs and many animals and living organisms were forced to leave the habitat and inhabit someplace else. And on top of that all of the runoff has been causing Eutrophication.

Quote from "World Without Fish" pg. 120

"Over the Past century, Tremendous quantites of petrolem have spilled into the Oceans."



Eutrophication

Eutrophication is what happens to the water when it has too much nitrogen. When there is too much nitrogen (it comes from the runoff) then the algae start to grow and cover the surface of the water. This causes the plates in the water to get no sunlight so they don't grow. When the plants die all the decomposers decompose them. Then the decomposers have a rapid amount of growth in their population. Then that's when the bacteria breath in all of dissolved oxygen. Because there is not a lot of Dissolved oxygen to begin with then they use it all up and there is no oxygen in the water so everything dies. Anoxic water that's what you call it. Water with no oxygen.

Runoff



This is a picture of real Etrrophication happening in the real world.

Runoffs are caused by too many impervious surfaces. A runoff is when the water slides down to the ocean on the roads. This is very bad for the water. This is the very thing that cause Eutrophication. Runoff causes eutrophication because when the water is sliding down the roads picks up a bunch of pollutants and nitrogen and brings it to the water. And as I explained before the too much nitrogen can be very harmful to the marine ecosystem.



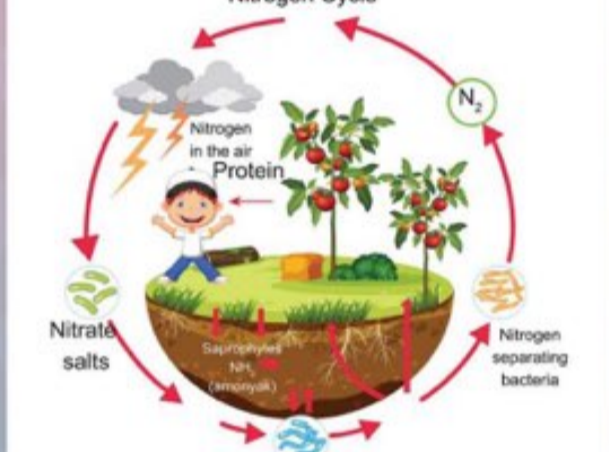
The problem

Nitrogen Cycle

The nitrogen cycle is the cycle in which nitrogen cycles through the atmosphere. The cycle is...

- Nitrogen Gas
- Ammonia
- Nitrate
- Nitrates
- Plant Protein
- Animal Protein

Decomposers turn the nitrogen in dead plants and animals back into Nirtrogen Gas.



Hopfully now you have a better understanding of what Nitrogen it and how it helps the ecosystem. But as you already know it can also hurt the ecosystem.

Ubanization

Over the past 70 years, the world population has grown from just over 2 billion to over 7 billion people. At the same time, the world's population has become more urban and less rural. This means that there are many more people living in cities, and far fewer people living in less developed areas.

As the world's urban population grows, there is more and more development, creating a greater amount of impervious land surface. This impervious cover impacts the environment

A Quote for How Boston Made Itself Bigger

"In the 1830s, railroad lines were built through Backbay, reducing circulation and hampering the already underwheming tidal power that could never keep more then a few mills running."

The Solution

Infiltration

Infiltration is how much water soaks into the ground. When water soaks into the ground it gets filtered by the dirt. The dirt take out all of the pollutants and extra stuff the water get when it comes down on the roads. This water is called ground water. Now when the groundwater it done being filtered when it goes into the oceans it is clean and healthy for the environment. The problem is that water cannot go through impervious surfaces so there is not as much clean water going into the marine ecosystem. Lucky some people are trying to fix this by making different alternatives for cement. It is called Permeable Pavement. It is hard like cement but it looks like it is not and it looks like it is not a solid but it is very solid. It is gravel stuck together with cement. It has tiny holes that water can get through. This way people can have their roads and the marine ecosystems are not hurt.

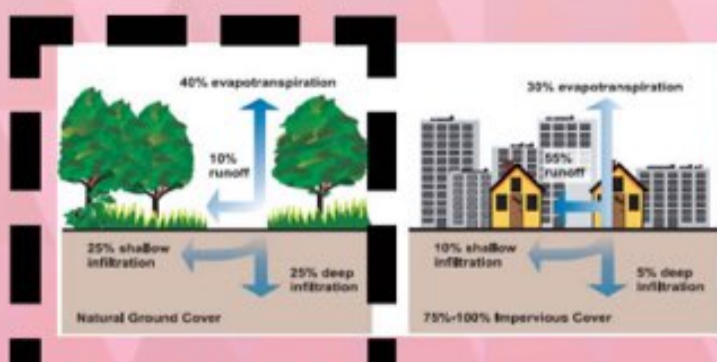
Pervious

This is not a problem for the areas that are previous (like dirt). Because once the water goes through the dirt filters it taking out all of the pollutants it may have and it let the water go. Unfortunately there are not as many pervious surface then there are impervious surfaces. But there are a lot of ways some humans are trying to fix that.



This is a picture of the layers of the permeable pavment

The one that the arrow is pointing to is the pervious area



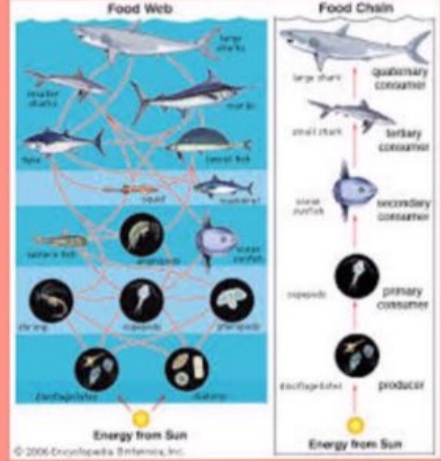
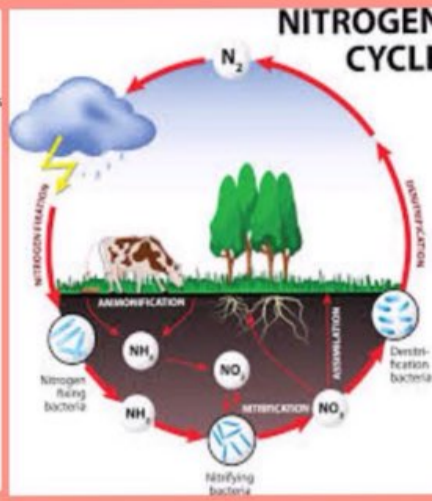
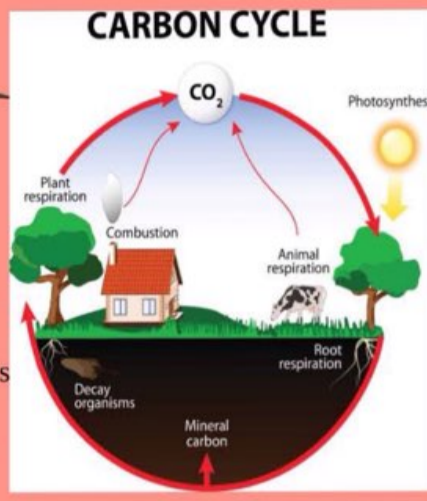
Urbanization destroying our Marine Ecosystems?

It may not seem such a big deal, but when you look deeper, urbanization makes a big impact on the marine ecosystems. I'll show you why.

1 Marine Ecosystems

The Marine Ecosystem has different relationships between two or more organisms. This includes Competitive: a relationship between two organisms of which they compete for food, Predatory: a relationship of which and organisms preys on the other, Parasitic: a relationship in which an organism lives off harming another and Mutually beneficial: a relationship in which an organism lives off another without harming the other. The types of organisms in the marine ecosystems are producers, consumers and decomposers.

There is a process called photosynthesis that producers use to produce their food. There is also Respiration that organisms do when they breathe in and out. Plants in the Marine ecosystem use photosynthesis. Photosynthesis can help other organisms in the ecosystem because it helps plants produce food for other organisms. This runs in the Carbon cycle.



2 The Problem

Water Cycle

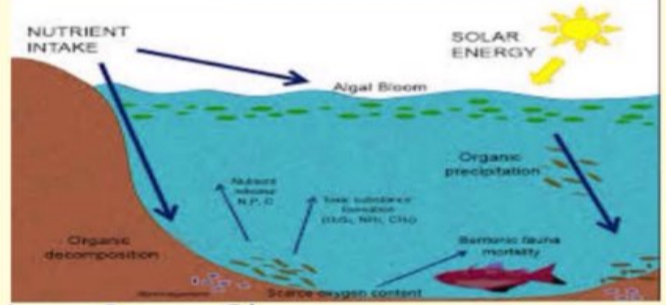
The water cycle starts when the water evaporates into the sky creating water vapor. Water vapor creates clouds in the air, and when it gets cold the vapor turns into water which is condensation, which is precipitation. Precipitation includes rain, snow, sleet and hail. When the form of precipitation hits the ground it can either sink into the dirt, or it can form runoff. The difference between the two is when the water sinks in the ground it filters it which is a good thing, but runoff is dirty and when it gets into the form of water (oceans, lakes, rivers) and makes the water dirty.

Urbanization

Urbanization is a huge problem today. The world's population mostly lives in urban areas and not rural. Urban areas have a lot of impervious cover. On the other hand, rural areas have pervious cover. Impervious is when water can't pass through the ground, previous is when water can pass through the ground.

Eutrophication

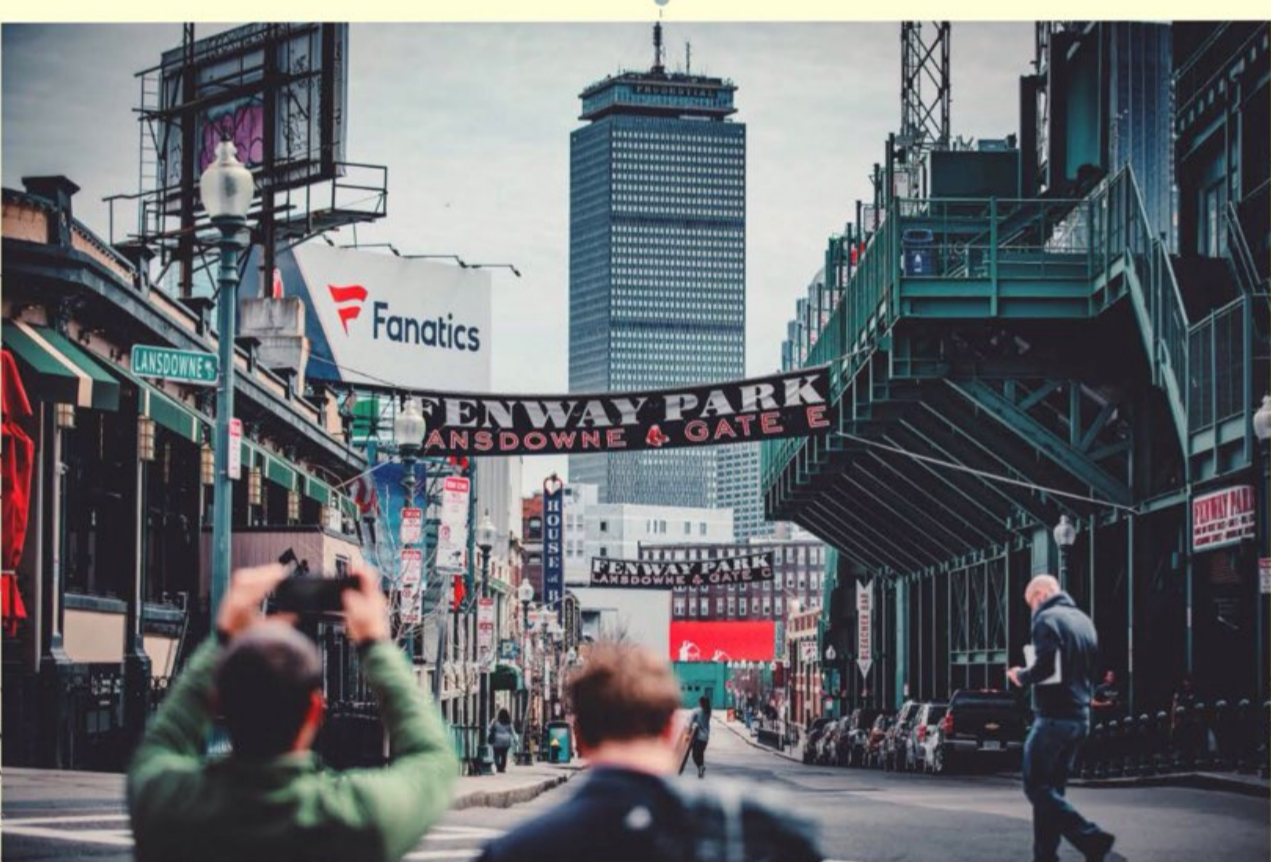
This is a process of which the water gets to much nutrients. It is a problem because this can cause algae to grow and cover the water surface. It could lead to plants under water not being able to photosynthesize. Which could lead to the bacteria population growing and taking in all the dissolved oxygen. It can lead to an increase of bacteria because the dying plants start breaking down which attracts and makes more bacteria. Which could lead to other organisms dying from suffocation. It is common when fertilizer is exposed to the water because fertilizer contains nitrates and phosphates which is a nutrient that helps plants grow.



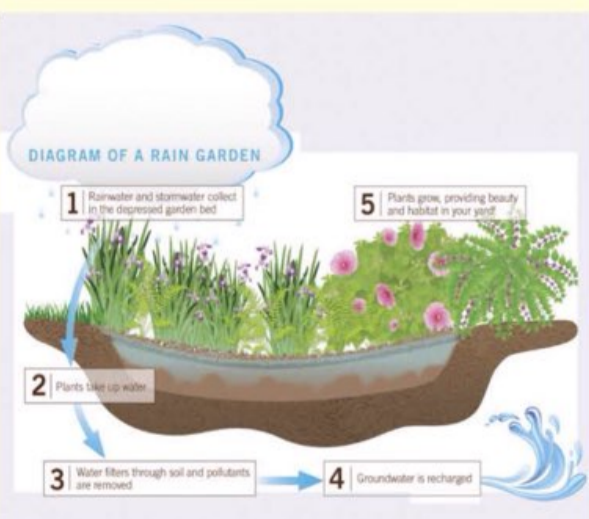
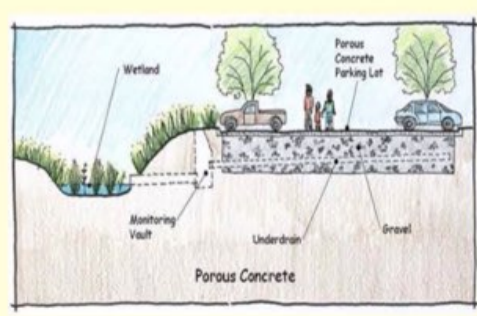
Kleindl's Impervious Cover Chart



TH



This is a problem because roofs with them. They prevent runoff from happening. It's only your people prevent contamination when it rains. They pollute the water. runoff. It can make a big impact because the water won't be dirty, if the water is dirty then the plants can't photosynthesize. And also, don't feed the ducks! This is an activity that a lot of children love to do when they see ducks. But it can affect the ecosystem. Feeding birds bread can affect their natural diet, meaning they don't get the right amounts of nutrients they need.



Whats More Helpful

The most helpful in my opinion is probably Rain Gardens. Rain Gardens take up 90% of nutrients from runoff. Meaning it can help when water gets into lakes, rivers or oceans because less nutrients will affect the water.



Assignment 6:

"A low biological integrity score indicates that the environment is struggling to support life the way a natural habitat could."

The word "Urban" means a city that has a large population with very little amount of space, and somehow there is sometimes a Marine Ecosystem in the city. And those I call an impervious area, where water cannot pass through now that's a major problem for our marine friends. Urbanization is awfully bad for our sea animals because, Urbanization is a process for when they enlarge the city even more, And for them to do that process they will have to remove the wetlands. And the results will end up with us having runoff, the more cities we build it will create more runoff. If the city has a river full of animals but yet water can't get through how will they live? How will the fish be able to survive so maybe some of us can eat them?

Urbanization

World Without Fish:

"There are areas of the sea called dead zones, Where large amounts of phytoplankton die from pollution and, as they rot, they use all the oxygen in the water."



Pollution is a serious situation that is causing animals serious habitats situation. Pollution is a dirty and contaminated concern that has a harmful effect. An example of pollution is Toxic Waste is most likely to harm you in all the possible ways, if you breathe it in, swallow it, etc. In a video called "Drops Life" it was explaining on how when the rain water drops down and flows down to the sewer, and normally when the sewers are dirty and contaminated, the water normally turns into pollution as well and be contaminated along with the sewers.

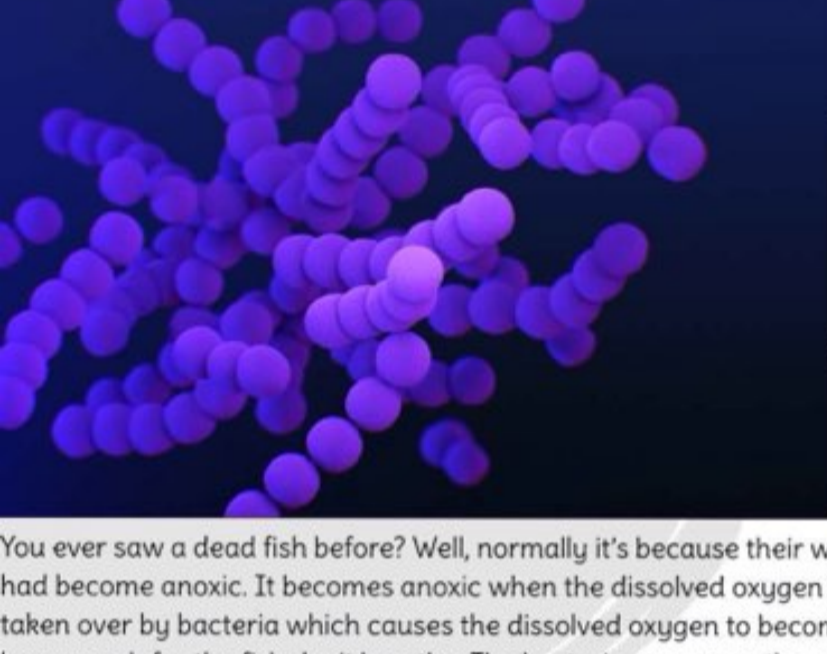
Pollution

Rural is the opposite of Urban, it is a environment that has a whole lot of green and spaces for animals.



A Rural is an area, far from the city, not many people live there, and a Rural is a previous area, a previous area is where water can pass through and where the animals are more able to pass through with their normal habitat and that will give the fish more purpose in life. And since not much many people lives there it's more opportunities for the fish to not be cooked.

Rural



Bacteria

Bacteria is threat to the ecosystem because of the weird affect it have on the fishes, it can destroy any living thing with sniffing, touching, and so on.

You ever saw a dead fish before? Well, normally it's because their water had become anoxic. It becomes anoxic when the dissolved oxygen is taken over by bacteria which causes the dissolved oxygen to become low enough for the fish don't breathe. The bacteria consumes the oxygen and if they take up too much oxygen, the water will most likely become anoxic. It matters that the water does not end up anoxic because that's when the water have this weird green color on it and would stop the fish from breathing in the oxygen that they need to breathe.

Assignment 2: Nutrient Cycling

"Organisms are dependent on each other within a ecosystem."



A community of organisms interacting with their environment is called an Ecosystem. 2 factors are Abiotic and Biotic, Abiotic is non-living thing, Biotic are the complete opposite and is living organisms. There are 3 important roles in the Ecosystem and they are, Producers, Consumers, and Decomposers. Producers are important to the Ecosystem because it makes oxygen and makes food for animals like bees and such. Consumers are also important because, we as human beings are consumers and we give out carbon dioxide. Decomposers are to me the most important because it breaks down organisms such as bacteria and make minerals to help affair grow.

Roles in a Ecosystem

World Without Fish:

"The survival of this planet, will depend on how well these changes are handled."

In our Marine Ecosystem we have quite a bit of a food web, on a food web there are 2 important roles, as again we have Consumers, Producers, And Decomposers. But in our Marine Ecosystem our producers are Phytoplankton, witch are tiny, little algae. One of our Consumers in our Marine Ecosystem are Great Blue Heron, Striped Bass, and a Leafhopper. Now the Decomposers in our Marine Ecosystem are bacteria, but when the dead waste from grasses or plants become decomposed the results will leave us with Detritus. But what's different is that they all are interconnected and affect each other.

Marine Ecosystem



Eutrophication is not a bad thing but isn't a good thing in the ecosystem. It often comes to the cycle when there is to much nutrients added.

Eutrophication

Eutrophication is a scientific term that is bad concern when the nitrogen is too much it causes Eutrophication. Eutrophication starts off with fertilizer that is filler with nitrates and phosphates that can lead to Increased Nutrient Concentration. That will lead algae to bloom meanwhile it will cut off sunlight for other sea plants and it feed bacteria to enter the ecosystem. And when the bacteria enters the water it will use up all the oxygen in the water then it will cause the water to become Anoxic. And when the water becomes Anoxic it will cause all the living things in the water to die.

Scoop the poop is a common threat to our environment because of the polluted ingredients, and the sight of it isn't really pleasant.



Have you ever walk in the park and saw dog paste? Have you ever wondered what a democracy! Well it is very much a threat to the environment, the waste that comes out the dog have very too much polluted ingredients, nutrients and pathology. Now, the pathology is very much a big threat to the ecosystem, it causes and effect disease to the ecosystem. It's also a big threat because it has to much nutrients and once it has too much of it, it creates Eutrophication.

Scoop the Poop

powered by



1 Water Cycle

Water cycles from the sky to the ground and of the ground to the sky. First water goes through evaporation is when water warms up to the point that it becomes vapor. Which rises to the sky because the higher it goes the colder it gets. So when the vapor cools it turns into a water droplet this process is called condensation. After two much water goes into a cloud the cloud needs to release it on the earth. In four different ways called (rain, snow, sleet, and hail). But when people started throwing trash in the streets. When it rained and passed through the waterways and picks up trash and takes it to the ocean

2 Eutrophication

Eutrophication is caused when people throw fertilizer or sometimes when people put fertilizer in the grass and then when it rains it falls into the lake or nearby water way. and because Protein in the fertilizer Is too much algae consuming which causes the algae population to increase. since he lives in the top of the water it covers all the sunlight from touching the bottom of the lake. so then the plants at the bottom die and then bacteria consume it increase and then they take up all the oxygen. so then fish die because of the deal level changing some fish can't resist it others cannot people who live in the country that caused this.

3 Permeable Pavement

Permeable pavement is a special kind of concrete it instead of it having bad chemicals. It has natural things if it rains or water flows over it. The water passes through it and reaches the soil under the concrete. Other concretes can do that why they made waterways. The problem is that when it's going through it the waterways it collects trash and oil in the streets. Dumps it in the ocean which harms the marie live. But I know that your thinking that if this is so much better than normal concrete then why don't people use it. But the rising why no one has tried it out because people thought tha t it wouldn't hold to normal heavy weight of traffic.

4 Symbiosis & Ecosystems & food webs

Symbiosis Is when two or more animals have a relationship I'm going to talk to you about two and there's more there all very different but i'm not going to tell you the rest. The first one is parasitic it's when one animal benefits from the other animal which is the parasite while the other animal is being harmed which is the host. The other kind of symbiosis is mutualism. it's when animals are getting something back and then of them are harmed people change this system because if we take out one animal species from this relationship the other animal species will die. Some people kill snakes because they say there's no use for them and they're terrible creatures. but if they weren't snakes around the most population would go up and most people will be surrounded by mice. And a lot of people don't just killing snakes they kill a lot more animals which can cause way more different environment. for a lot of animals some could die others could be harmed and some can't thrive so much that their population can go out of control.

5 Carbon Cycle

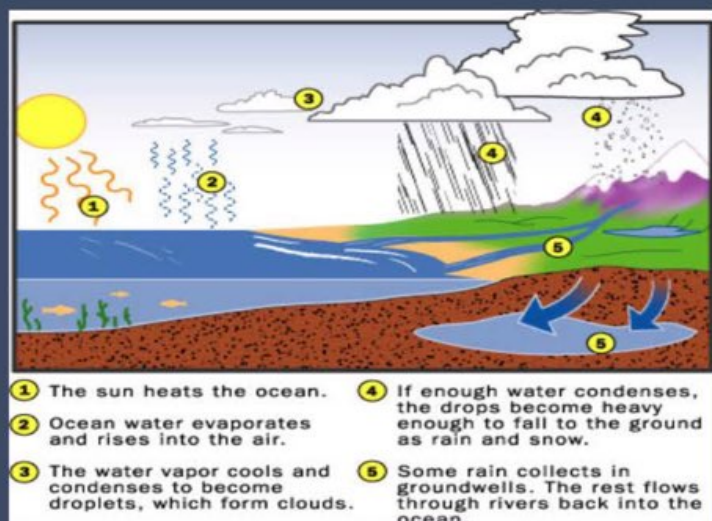
The carbon. cycle is important not just for animals and plants but is also important for us animals plants and us are all made of carbon so we should know. how important it is the curbing goes through a long process and also a complicated one people don't know it but if we use too much cars or if we keep burning. oil where chemically causing climate change we burn carbon is carbon is oil if we were starting to use. more bikes walking or do more things. that make us work and have energy we would actually be saving the planet earth.

6 Nitrogen Cycle

The Nitrogen cycle first when the nitrogen when the nitrogen goes in the soil Bacteria turn it into Ammonia after different bacteria turn the ammonia into. nitrates then different bacteria turn into nitrate this whole process is called nature of Acacian when people make sidewalks or push the soil away .or kill plants the bacteria that lives in the soil cannot turn the nitrogen into nitrates nitrates are important because plants use it protein without the bacteria and when we move that bacteria from its original place Bad things can happen.

Oyster Reefs Help Marine Ecology

1. Background: The Rain Cycle and Marine Ecology



This Picture Is About The Rain Cycle and how it works. You can see the rain drops falling from the sky and landing in a river. From there the water now turns into water vapor and goes back up to sky then turns into water again. Then it comes right back down. Impervious surfaces such as cement in cities impact the water cycle because...if the water goes on cement it will just slide off or fall into the creases.

The Ocean has been around over 1 Billion years and still hasn't been searched 100%. But life in the ocean still matters like plants in the city and urban. Life in the ocean has to be taken care off so if you think about throwing pollution in the ocean think twice.

2. The Problem: Urban Runoff



When it rains in urban areas, water slides down the side of a house or building. The water creates runoff in the street and that water picks up pollution. The types of pollution the runoff picks up is oil, animal waste, and fertilizer. This impacts the ecosystem because the biological integrity degrades leaving the ecosystem unhealthy to support life.

The Solution: Rebuilding Oyster Reefs



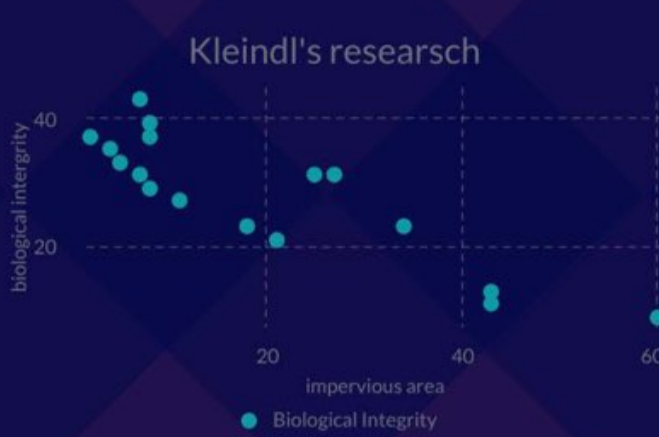
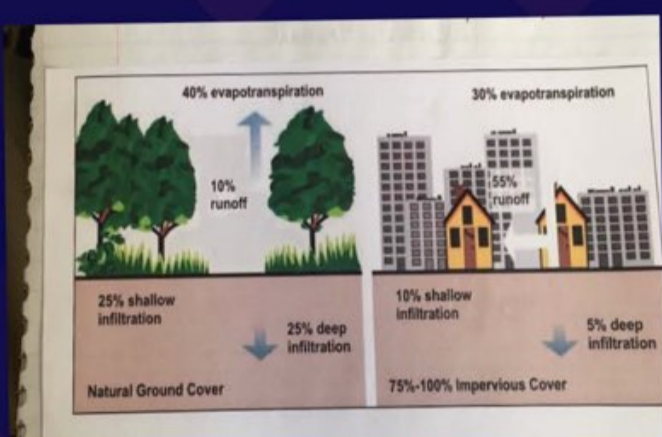
One solution to help reduce urban runoff and marine pollution in Boston would be to rebuild Boston's oyster reefs. This will help because oyster filter nitrogen from water. Nitrogen pollution is a huge problem. In the article, Rebuilding Oyster Reefs, it states that " 1300 acres of oyster roof could equal a state of the art water treatment plant at far less cost." This is important because it can support restored oyster reefs cleaning marine ecology.

URBANIZATION AND RUNOFF IN BOSTON

By: Daniel

runoff

Over time Urbanization (cities) has grown and over that time there has been more impervious (Road sidewalks, etc) areas made. When there is more impervious there is less dirt to clean the water and the biological integrity (The ability to support life) goes down because the water gets dirty or has a lot of nutrients, trash and more it gets bad for the environment. Impervious areas can get fertilizers in them and when water takes the fertilizer away then algae population can grow because algae grows when there is too much nutrients in the water making the water anoxic (water that has no dissolved oxygen) because no sunlight can pass. This affects the water cycle in multiple ways. This is why we need to be careful of what we make or what we put in our plants.



The problem

The problem is that we make items that help us but don't help the ecosystem. One thing that helps us is roads we use in our daily life but what some people don't know is that roads are not helping the ecosystem because they create runoff (water that does not get cleaned before it gets back in the water) and that can make water dirty. Another problem is the fertilizer. When we use fertilizer it can get in the water and it can create algae and too much algae can make the water anoxic because plants can't make their food so bacteria uses too much dissolved oxygen. Throwing trash on the floor can also make fish die and if it kills a lot of it will be a lot we will lose a food source.



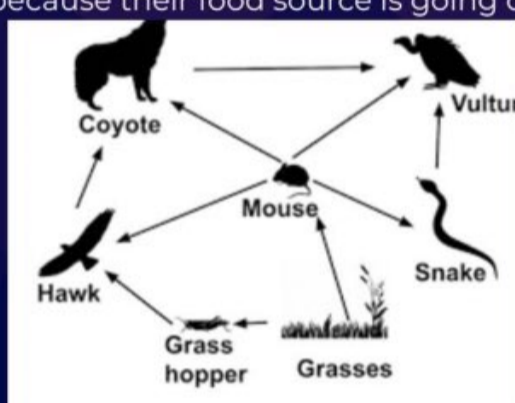
The solution

Every problem needs a solution. One solution is to add more green roofs, green roofs clean rain water and there will be more clean water than dirty. What you can do is you can scoop the poop on the floor, poop is fertilizer and if there is too much that can be a problem to animals and ecosystem. What we can do as a community is make rain gardens, this will clean the water and look good. These are some helpful solutions.



Ecosystem

In an ecosystem there is a food web. All of the animals in the food web are connected even if it does not have a relationship. If one change would happen everything gets affected because some animals need that animal to be alive so other animals can support life. If it all collapses that can be a problem, an example is fish. If fish were all gone bears will lose one of their food sources then other food sources will go down because bears will be eating that food more than it might affect other animals that eat it because their food source is going down quicker.



Tech

Green roofs are one example of tech that can help the ecosystem. Green roofs can clean water and make the water roof last longer. This will help the ecosystem because the water gets cleaned before it hits the ground, there will be less runoff and the water will get cleaner. This is why green roofs can help.



Marine ecosystems

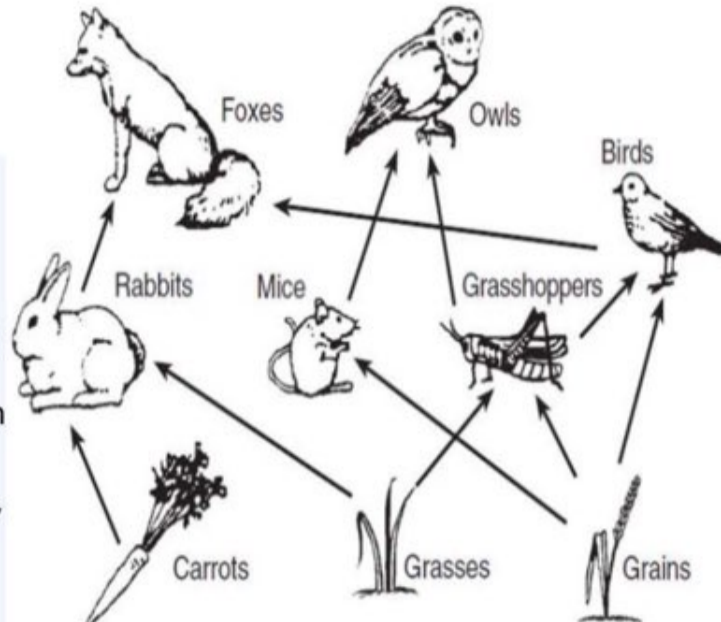
Marine ecosystems play a big role in life. There are many different relationships. One relationship is Atlantic killifish and great blue heron. Great blue herons live on land and Atlantic killifish live in a marine ecosystem. They have a predatory relationship. Marine ecosystems are important because if we did not have them, they would be all bad and disgusting, also the biological integrity will go down in the marine ecosystem. This would affect land because animals that eat marine life will die and food webs will collapse.

K'Von's Science Infographic

Connections in Ecosystems

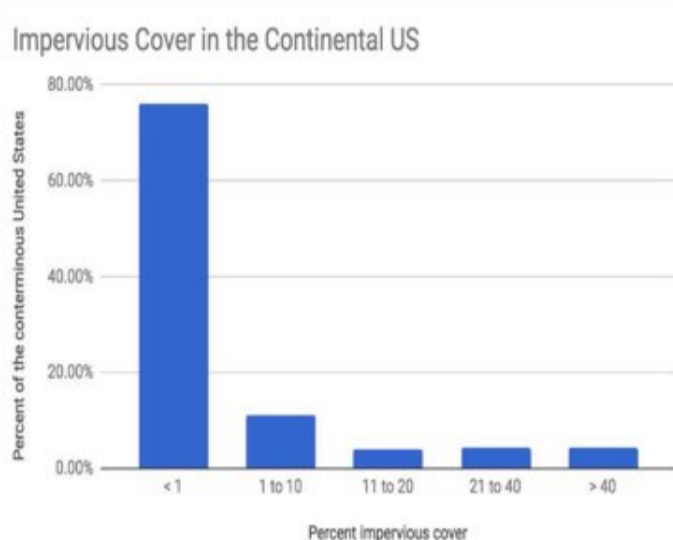
If a Heron, a Largemouth Bass and a Minnow was on a food web. It would show that the Heron eat the Largemouth Bass and the Largemouth Bass eat Minnows. And since this is true when the Heron eat the Largemouth Bass the Minnow population would show up on a graph about the population of minnows. Herons, Largemouth bass and Minnows are consumers. Herons prey on Largemouth Bass and Largemouth Bass prey on Minnows.

Ex:



The Problem

This image shows how many impervious areas there were in Boston in the 1630's and Now. The reason why I have shown this image is because this image also shows how many buildings we have built over the ocean. These impervious areas stop infiltration. Infiltration is when rain soaks into the soil and gives the plants nutrients but since there are so many impervious areas, such as concrete, plastics, asphalt and much more rain can't do infiltration. Infiltration is good for the environment. The reason why infiltration is good for the environment is because when it rains the rain soaks into the soil and it goes to the roots of plants and gives the plants nutrients to it can grow. Also the construction from all of these buildings and stuff can fall into the marine ecosystem and make the water contaminated. This shows how population growth can affect the marine ecosystem.



The Solution

PICK UP YOUR DOG WASTE! The reason why you should pick up your dog waste is because people can get diseases from dog poop such as salmonella, E. Coli, Campylobacter. These diseases can cause diarrhea, fever and abdominal cramps within eight to 72 hours. Another reason you should pick up poop is because it is not good for the environment. The reason why I think it is not good for the environment is because dog poop does not decompose and it adds harmful bacteria to the environment and nutrients to local waters. The reasons why nutrients from dog poop are bad for local waters is because when dog poop decompose or rots it takes up oxygen the algae will grow but only for a short time before the algae dies then the algae will turn into dead matter and bacteria eats dead matter and when eating dead matter it takes up oxygen inside the water then when it takes up oxygen there will be no more for the fish, then all the fish will die.



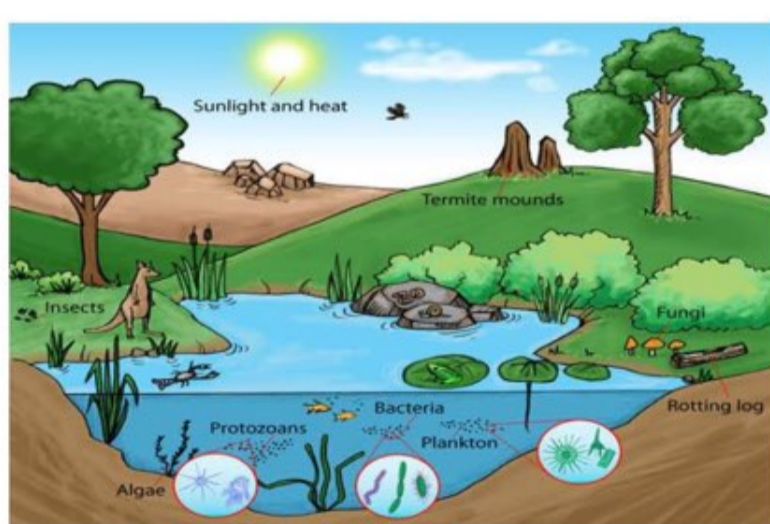
The Water Cycle is Important

The reason why the water cycle is important is because it "ensures the availability of water for all organisms and regulates weather patterns on Earth." Also if water didn't recycle itself we would run out of clean water and water is essential to life because animals and humans can't survive without water. Another reason why the water cycle is important is because since it ensures the life of all organisms that means if organisms didn't have the water cycle the organisms would've died and the predators and prey that depend on those organisms would die too.



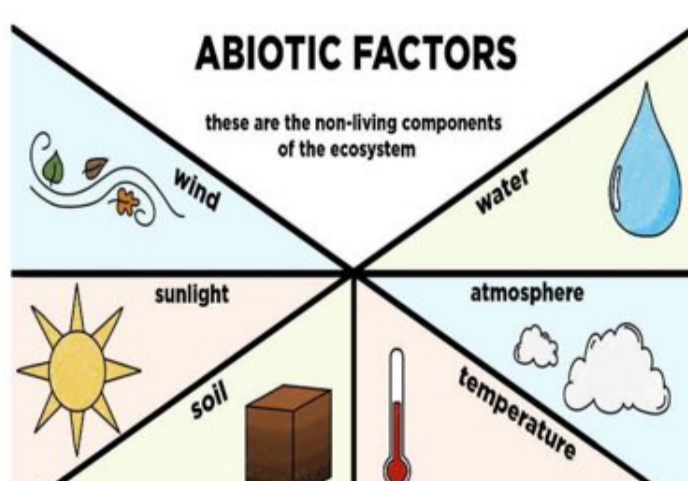
Ecosystems Are Important

The reason why ecosystems are important for the environment is because ecosystems purify the water. Ecosystems such as wetlands purify water. The reason why this is important is because if ecosystems don't clean the water that means the water can get polluted and animals and humans can possibly die from drinking the water.



Abiotic Factors

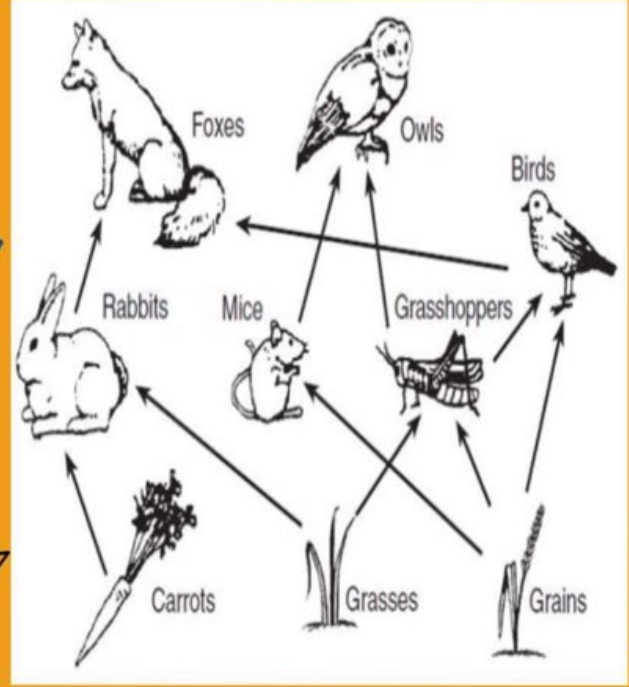
Abiotic factors are "Non-living chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems." Examples of Abiotic factors are water, sunlight, rain and oxygen. Abiotic factors affect living organisms because since water is an Abiotic factor that means its non-living and animals and humans need water. So without water humans will die, and that is how Abiotic factors affect living organisms.



“ MOST STORIES ABOUT THE DESTRUCTION OF THE PLANET INVOLVE A VILLAN WHITH A EVEL PLOT. BUT THIS IS THE STORY OF HOW THE EARTH COULD BE DESTROYED BY WELL MEANIG PEOPLE WHO FAIL TO SOLVE A PROMBLE SIMPLY BECAUSE THIER CALCULATIONS ARE WRONG. ”

1. The Background: Ecosystems

ECOSYSTEMS ARE INTERCONNECTED AND WORK TOGETHER TO CREATE A HEALTHY ENVIRONMENT ORGANISMS AND THE NUTRIENT CYCLE WORK TOGETHER. IN THE FOOD WEB FOR ECOSYSTEM TO STAY HEALTHY THERE ARE PRODUCER MAKE FOOD AND OXYGEN CONSUMER GIVE OFF CARBON DIOXIDE COMPARE BREAKDOWN THING TOMINERAILS TO HELP THINGS GROW



2. The Problem:

87%
pul
are opened on mobile devices.

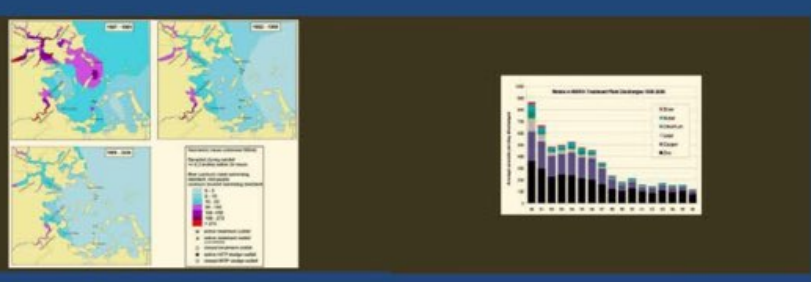
INCREASE IN HUMAN POPULATION THAT LEADS TO URBANIZATION CAN CISNUPT THE ECOSYSTEM BY AFFECTING THE WATER CYCLE. ALSO ORGANISMS IN THE FOOD WEB. IN THE WATER CYCLE WHEN IT RAINS RAIN RUNOFF HAPPENS FROM GRAVITY. RAIN INFILTRATES THE GROUND AND TRAVEL TO THE OCEAN OR LAKES. THEN EVAPORATION INTO THE AIR FROM THE SUN'S ENERGY ORGANSIM. THE ECOSYSTEM BREATHING THE AIR. PERVIOUS SURFACE RUNOFF 55%AND THERE ONLY 35% EVAPORATION. URBANIZATION DECREASES BIOLOGICAL INTEGRITY OF AN ECOSYSTEM

Water Cycle



3. The Solution: Permeable Pavement

HUMAN TECHNOLOGY CAN HELP REDUCE THE IMPACT THAT HUMAN POPULATION GROWTH IS HAVING ON THE ENVIRONMENT. ONE INTERVENTION IS INSTALLING PERMEABLE PAVEMENT IN OUR CITIES. PERMEABLE PAVEMENT IS DIFFERENT FROM REGULAR PAYMENT BECAUSE WATER RUNOFF GOES THROUGH THE CRACKS. IMPERVIOUS PAVEMENT THE RUNOFF GOES INTO OUR WATERWAYS AND COLLECT POLLUTION WITH IT. GEOFFREY SCOTT, A RESEARCHER FOUND THAT "ANYTIME WE GET ABOUT 10 PERCENT IMPERVIOUS COVER IN A WATERSHED, YOU BEGIN TO SEE ALTERATIONS IN WATER QUALITY. ANYTIME OVER 30 PERCENT, YOU BEGIN TO SEE LOSS OF ECOSYSTEM SERVICES." THIS LEADS CONTAMINATION OUR FOOD WEB.



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Urbanization In Boston

MADE BY JOE C.

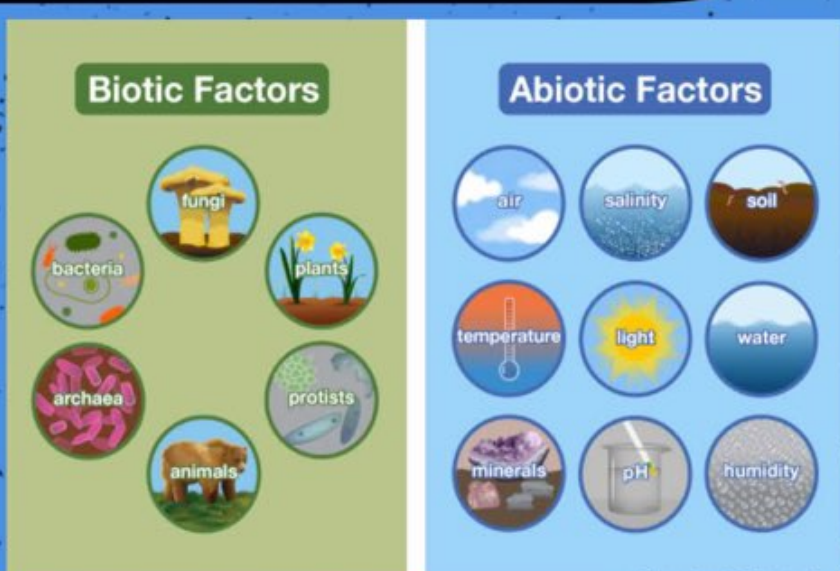
Biotic Factors

A Biotic factor is a factor that is alive for an example an animal, plants, humans, Bacteria. The effect that they do to an ecosystem is work with Abiotic factors and for an ecosystem to survive and flourish. If one Biotic factor is removed or changed it can affect the whole ecosystem



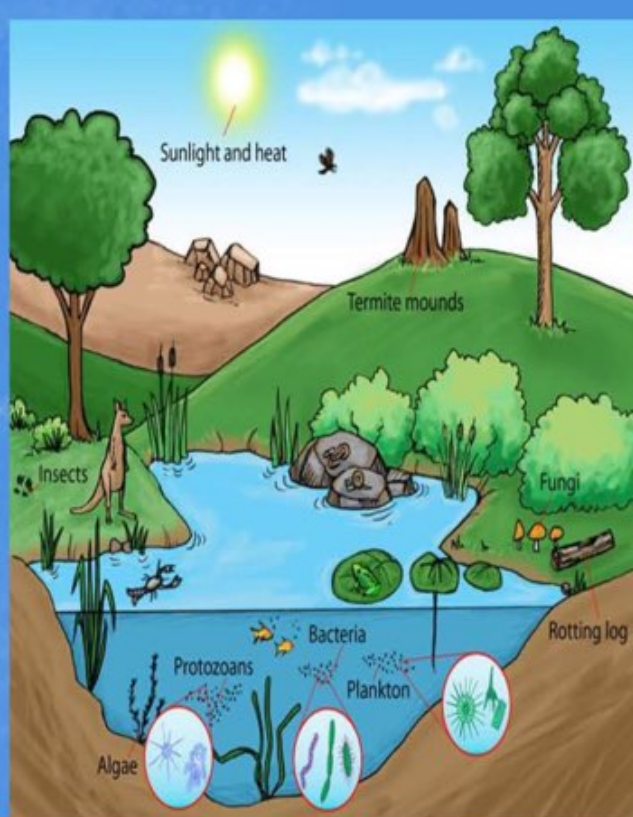
Abiotic Factors

An Abiotic Factor is a factor that's not alive non-living for example water, soil, oxygen, temperature. The effect that they do to an ecosystem is they work with the Biotic factors for an ecosystem to survive and flourish. If one Abiotic factor is removed or changed it can affect the whole ecosystem.



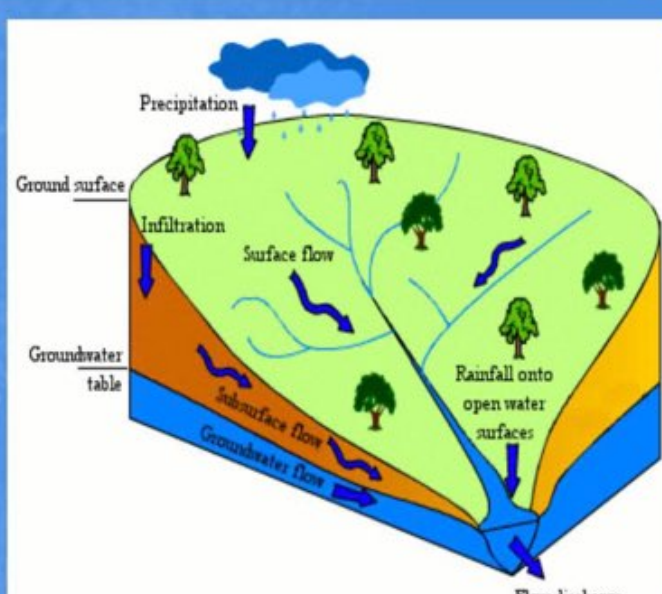
Ecosystems

An ecosystem is a community of animals and plants working together with their environment. An ecosystem contains a big variety of organisms such as producers, scavengers, parasites, consumers, predators, carnivores, omnivores, herbivores and decomposers. Producers make their own food using the sun. In almost all cases, these organisms consist of plants and other unicellular organisms.

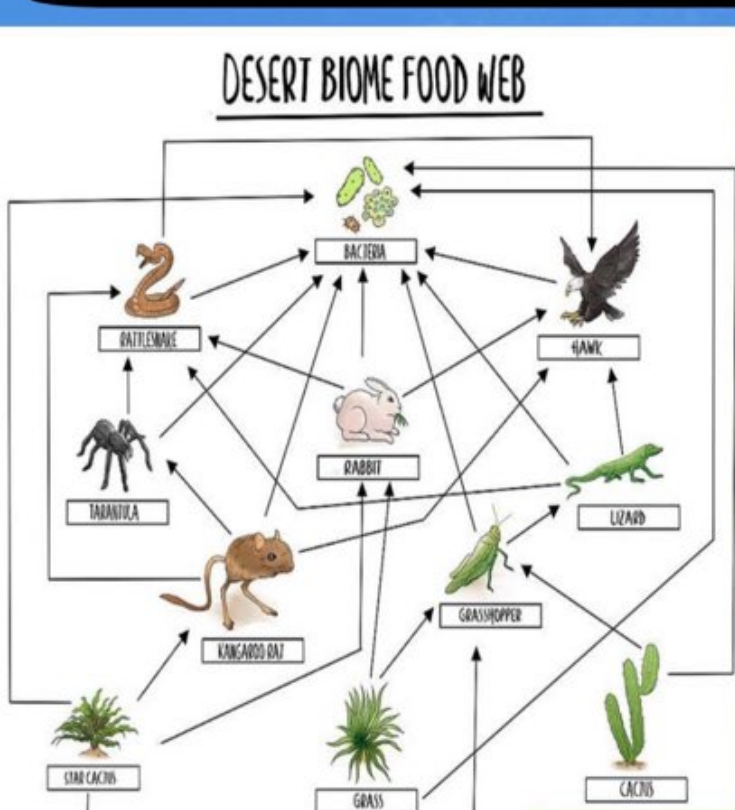


Infiltration

Infiltration is the method when water that reached down from the clouds, and absorbs within the soil or any other previous land and gets cleaned. This is good because humans can grow more plants in more places and the soil and water get cleaned at the same time. If the water can't soak into a pervious surface that would be Impervious. It will flow down and pick up anything that it's in its way such as trash, dirt and more until it comes by some were previous or a drain that will travel to the ocean.



Food web



A food web is a tangled network of food chains within an ecosystem. It's like a web that reveals how the food chain within an ecosystem is all connected. It's similar to a food chain but larger and more complex, rather of one producer which is an organism that produces food, one herbivore, and one carnivore like on a food chain, a food web links up various traits together showing the entire ecosystem of decomposers, producer herbivore, carnivore, plus omnivorous

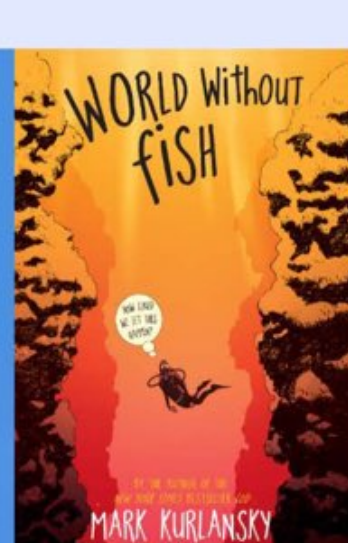
One Of The Solutions

Animal waste can affect a body of water in many ways but one way animals can cause problems is putting nutrients and pathogens in the water which can cause the water to be unswimmable unboatable, the water can be very unhealthy. Yes some animal waste can be good as fertilizer but the problem with that is too much of it. When you have too



"In The Oceans Of The World We Are Killing The Species We Most Appreciate, Being Mammals, We Tend To Do a **Better Job** Of Protecting Fellow Mammals Than Protecting Fish."

- Mark Kurlansky, World Without Fish, Pg.146-147



You can help stop this happen to our planet

pervious

Pervious spaces actually helps the ecosystem. Pervious is when places where there are no buildings, roads, sidewalks, and people. For example they're was and extra land added to Boston and it had lots of grass and trees that is pervious. instead of polluting the water. The water goes in the dirt which cleans the water and leads it to the sea or ocean.



impervios

Impervious areas can pollute the water. And in Boston, they're a lot of impervious areas. And we need more land to keep previous. Impervious means places or areas that are closed up and have no places that have dirt or soil and just building and roads. The reason why we have more impervious is because people keep moving into Boston, and in more people come to Boston they're are going to be more buildings are going to be built.



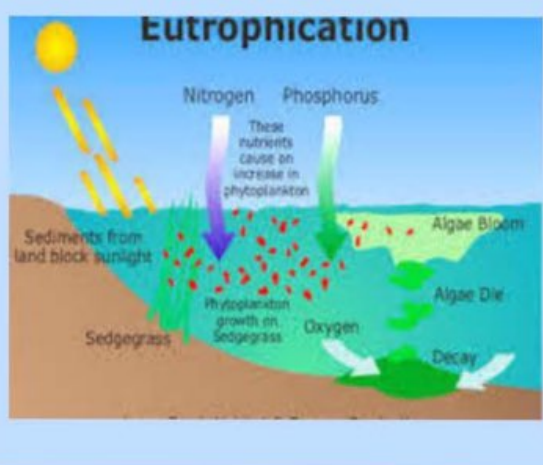
RUNOFFS

RUNOFFS CAN POLLUTE THE WATER WHICH AFFECTS THE ECOSYSTEM. AND HAVING THE ECOSYSTEM POLLUTED CAN HURT THE EARTH. IF WE GET LESS IMPERVIOUS AND MORE PREVIOUS SPACES, THAT CAN DECREASE THE RUN OFF POPULATION. A RUN OFF IS WHEN WATER DOESN'T GO INTO ANYTHING AND JUST SITS THERE AND GETS POLLUTED WITH GERMS AND BACTERIA AND GOES INTO A SEWER AND GETS DIRTY WITH ALL KINDS OF GERMS AND GETS POLLUTED AND RESTARTS THE CYCLE WITH POLLUTED WATER.



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01

Eutrophication/Nitrification

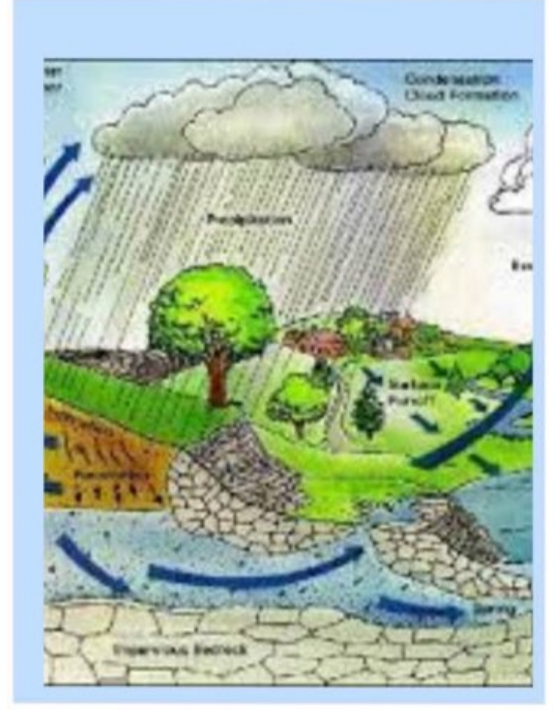
Eutrophication is when nitrates, and phosphates combine into water (rivers) and algae lose population. Meaning it can grow into plants.

Nitrification we should be careful when also having fertilizer, because when having too much it can harm the soil. Nitrification is also important to the nitrogen cycle because of the soil.

02

Infiltration

Infiltration is mostly described when water passes through the ground pervious surface (A surface that can pass through). (mud, wood, soil) (Impervious surface) A surface that water cannot pass through (plastic, metal, cement) It's harmful to the environment because as the water passes through, when the right way is the water running off and that can affect how watery the soil can get.



03

photosynthesis

Photosynthesis can be used as, Plants use their energy from the sun to turn water and carbon dioxide into food. It's important to study because it's a part of an ecosystem and it's what it does is it helps green plants make or process their food and without that are plants wouldn't be helping in an ecosystem as much as they do now and the number one is to get energy. It's also important because as photosynthesis gives energy it passes on to plants to Oxygen gas.

" This process is which sustains plant life on earth, is called photosynthesis".

04

Water cycle

The path water takes from the earth to the cloud and back again. When the precipitation falls from the sky it fills the lakes and rivers etc.. Runs down the mountain and soaks into the soil and then we drink it. (animals & plants) A lot of water can disappear into thin air through evaporation, when water gets warm from the sun, it changes from a liquid into an invisible gas called water vapor.



05

The carbon cycle/Nitrogen cycle

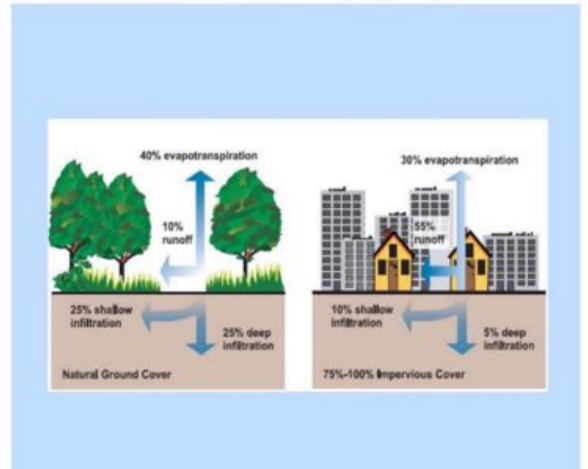
Carbon cycle is when the process continuously recycling carbon from living to nonliving things between earth and atmosphere.

Nitrogen cycle: Is when the element nitrogen moves back and forth because living things live animals and nonliving between earth. Carbon moves through the ecosystem by because since it releases energy for plants (food) organisms break that down carbon.

06

permeable pavement

Permeable pavement is when it rains the water drains right through it and into the soil. Permeable concrete is made in a similar way to traditional concrete (gravel, glued together with cement) Rain that falls has to go somewhere, and so cities have to elaborate and expensive underground pipe systems to capture and move stormwater.



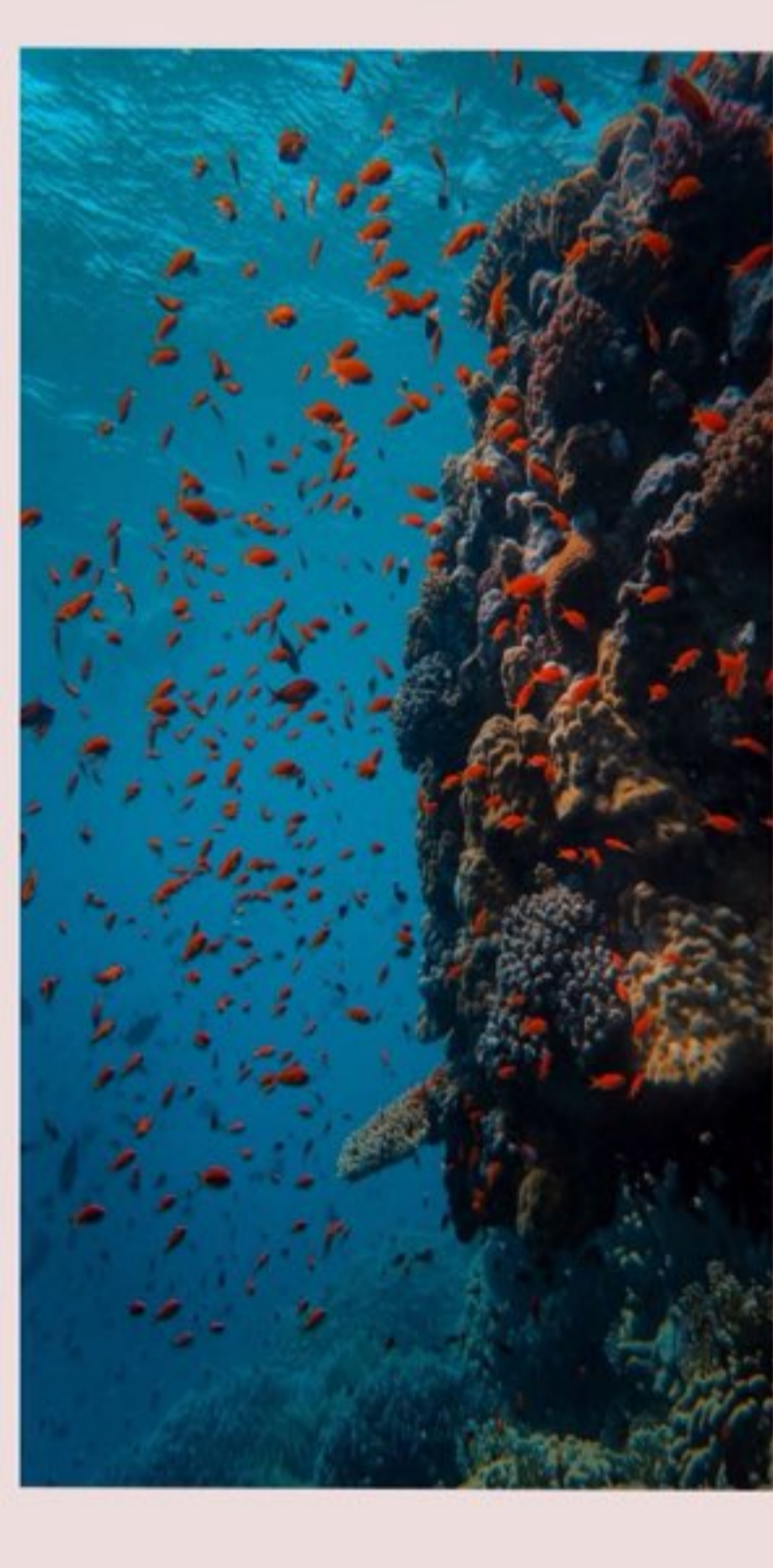
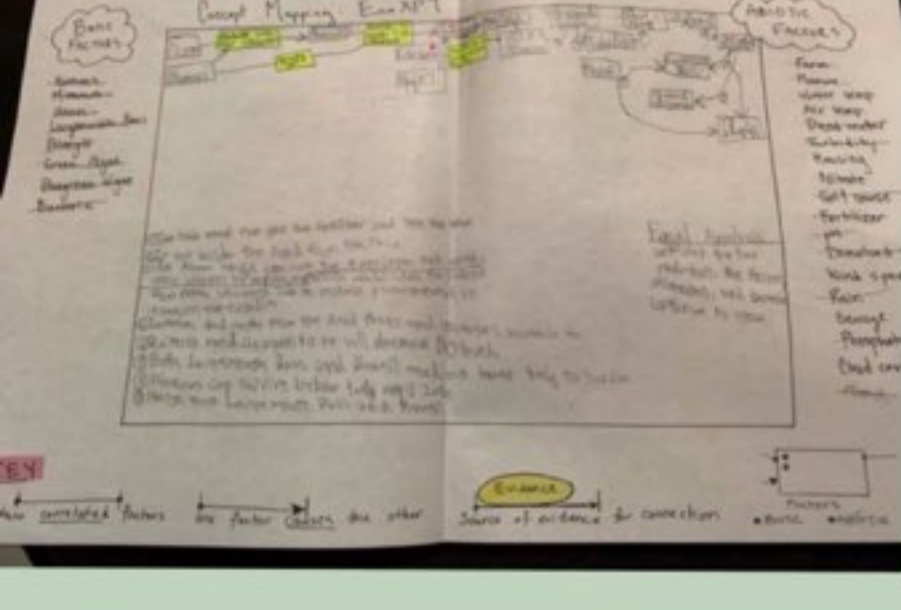
Ecosystems

Over our generations, ecosystem become more complex, and more fragile. Ecosystems now consist in types of roles to keep it healthy, active, and supportive. These roles are producers, predators, and decomposers; producers are plants that provide all organisms (including us) food and oxygen to survive, predators are the organisms that eat the food and breathe the oxygen we humans and animals eat, and decomposers are bacteria and other insectoids, etc, who decompose the waste we animals and humans provide after eating the food producers give us to survive. Though not only do we need the three roles of an ecosystem such as what I explained is environmental ecosystem, we also need marine ecosystems to survive as well.



Marine Ecosystem

Our marine ecosystems are crucially important to our world and to ecosystems too. Such as our EcoXPT concept maps that we study, how one mistake in the marine ecosystem caused the the only predators to die in a matter of minutes except for the prey (a predators food). Not only is this crucial to our world, so is the marine ecosystems way of cycling water.



Not only is this crucial to our world, so is the marine ecosystems way of cycling water. It all starts from a body of water, like a lake or the ocean, the sun's ray of light causes the water to evaporate and turn to steam. This process is called evaporation, once the steam goes up to the sky, it cools off due to the temperature in the sky is lower, then the steam turns into gas bubbles, which are water droplets. Then they are filled inside a cloud, this process is called condensation, when the cloud is filled up, it will rain, this is also called precipitation, while precipitating, water would start to form streams from slopes. This process is called runoff, but some water however, are sunk in the soil and gather pollutants that are hiding under the ground, and then repeats its process from evaporating while carrying the pollutants with it, this process is called infiltration. Although, today infiltration doesn't function as much as it's supposed to be, and if this would continue, we may be endangered for all life on earth.

1 Urbanization

Urbanization is the growth population in urban cities, such as Boston. Like Boston, our growth populations continually increased since the 1950s to 2020s, from 2 billion to 7 billion in world population. While we grow we develop, and while we develop, we cover more spaces, and while we cover more spaces, we are affect our marine ecosystems. By that, the main reason is our impervious surfaces, an impervious surface is a surface that water cannot pass through, such as our paved roads and grass that cannot perform infiltration. As for that, the amount of waste that would be thrown out into the streets, roofs, and parking lots, along with the chemicals that we would leave our cars, abandoned mines, and factories, would all be carried from the runoff water into storm drains which would lead to the ocean where our fish could be affected by our mess. Substances could include oil, waste metal, acids, toxic metals, chlorine, E.coli, human waste, and fertilizer. At least half of these substances are called biological contamination and chemical contamination. This was all caused just for our growth in our population.



2 Eutrophication

With these pollutants spreading off in to our ocean, it will cause serious harm to fishes in our marine ecosystem, but what's worst of all is the Eutrophication cycle. Eutrophication is cycle that in the end creates the water to become a dead zone, or anoxic as its pronounced. The cycle begins as nutrients being carried by the runoff water and entering bodies of water, carrying phosphates and nitrates, then the algae would begin to grow more and more due to the excessive nutrients, until it's thick enough to block out sunlight from plants who need the sunlight to do photosynthesis and produce air. While the plants die off one by one, bacteria would come to decompose the dead matter from it, but when more die, so will the bacteria. Sadly, like all of us, bacteria would need oxygen to breathe, so while they take up all the oxygen left, it will lower Dissolved Oxygen levels too, causing everything nonbacterial to die in a matter of minutes. If this continues, we may not have anymore fish for us at all.



1 type of species die every 10 million years



3 Habitat Loss

Not only would our water supply and local waters would be on the line, so will our biodiversity in animals due to our population growth. Tons of habitats are lost from our population growth, since we need to put housing and farmlands for our survival in life, though while not worrying about the other animals in the area that had claimed that spot first. In addition, this is causing an undergoing event known as the die-off, a mass extinction that happened with the dinosaurs and other species 65 million years ago. Back then, about three-quarters of the earth's species suddenly went extinct, now today scientist estimated that the same portion is caused by human actions, as us. Species are now dying off at an alarming rate, from 1,000 to 10,000 times faster than normal, all for our destructions in their habitats that rely on it to survive, as well as the ecosystem within it too, this matter would have to be stopped, or else more animals would die, thankfully there is a solution to this problem.

The solution

Green roofs

Green roofs is like any ordinary roof but in the form of a garden instead. With this, we'll be able to repair the amount of damage we caused over the animals habitat, plus, this would improve our water sources from getting contaminated from unwanted substances. The way it works is simple, once it rains on top of the roof, the plants on the roof would capture the water and keep it from sliding off the roof and onto the ground where it would carry the pollutants by runoff. Once the water is inside the plants, the plants would soak up the water and release it as clean, fresh air, almost like the evaporation process, though, some of the water is kept in a drain and exceded out of the drain and into the ground instead, all of this would reduce the stormwater volume by 85%. Although, as any ordinary garden, you have to take care of it well and out of harm's way, and you'll need the right plants to handle a job like, like a cactus, cactuses leave extra water for themselves in case of drought and other emergencies, so you won't have to worry about them if you were to panic.

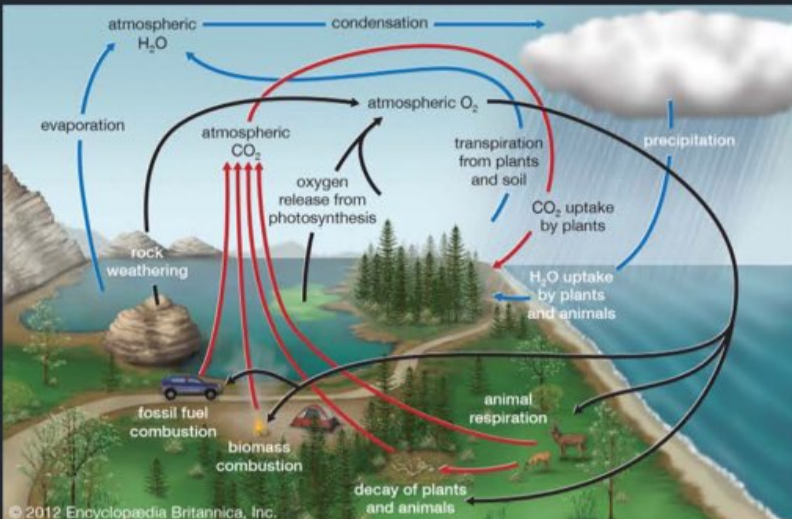


Habitat recovery

Using the Green roof solution would also recover the ecosystems for the habitat losses from our population growth. Just like any ordinary ecosystem would be, it would have it's three main roles, producers, predators, and decomposers, and with all these requirements you've made yourself a nice little garden. These Green roofs would be able to benefit people, plants and insects that also help the ecosystem with it too, such as bees, butterflies, etc. They are also none as hot spots for organisms to rest on or take a break from any troubles. Even used as a relaxing, quiet place from any troubles, or as a place to test science experiments, or you could even make it as a farm to grow food for yourself and whoever, and this is how using the Green roof solution, can benefit all marine ecosystems on earth, including environmental ecosystems.



Urbanization



Ecosystems

All Ecosystems in this world are interconnected so if one gets messed up that could affect the other. So, it is like a bad kid getting slapped and snitching on his brother who snitched on him and it spreads. If they have more siblings or tell on people the know.

DID YOU KNOW that there are more cities than Suburbs so that would mean there is more cities than Ecosystems in a more greener area.



Nutrient cycling and Eutrophication

- Oxygen is very beneficial for ecosystems without it ecosystems would not survive. Oxygen Enters an ecosystem by plants during photosynthesis which they use sunlight and CO₂ to make oxygen.
- DID YOU KNOW Plants can do photosynthesis underwater. Also, another fact is that when water loses its oxygen it is Anoxic.
- So If du du goes into water it gets absorbed by algae and the algae grows until it is nice and thick.
- When that thick algae it the top of the surface of the water stays there it blocks out sunlight from reaching the plants below it in the water causing them to die. All these dead plants in the water attract bacteria which gobble it up, but when they do that, lots of oxygen in the water gets used up, then the water loses all of its oxygen making it Anoxic. When the water is Anoxic it kills any organism such that is not bacteria. Overtime algae can restore the oxygen using photosynthesis.

Infiltration (water cycle too)

- When it rains water gets filtered from the toxins that were in it when it evaporated, by pervious land but, impervious land doesn't. So all the toxins pervious land filtered from the water goes into it so this why your parents tell you to not eat dirt
- Pervious land is land that filters water like grass, sand, dirt, silt, gravel, clay and mud so, technically land that is not really solid but solid, like it is able to be walked on.
- Impervious land does not filter water like roads, streets, concrete, sidewalks, pavement, turf, marble, sod, and big rocks.
- SAD THING DID YOU KNOW that most of that unfiltered water is entering ecosystems because there are so many roads and cities with impervious land. So u know what that means.

Smart solutions from scientists to the problems



United states is 76% impervious

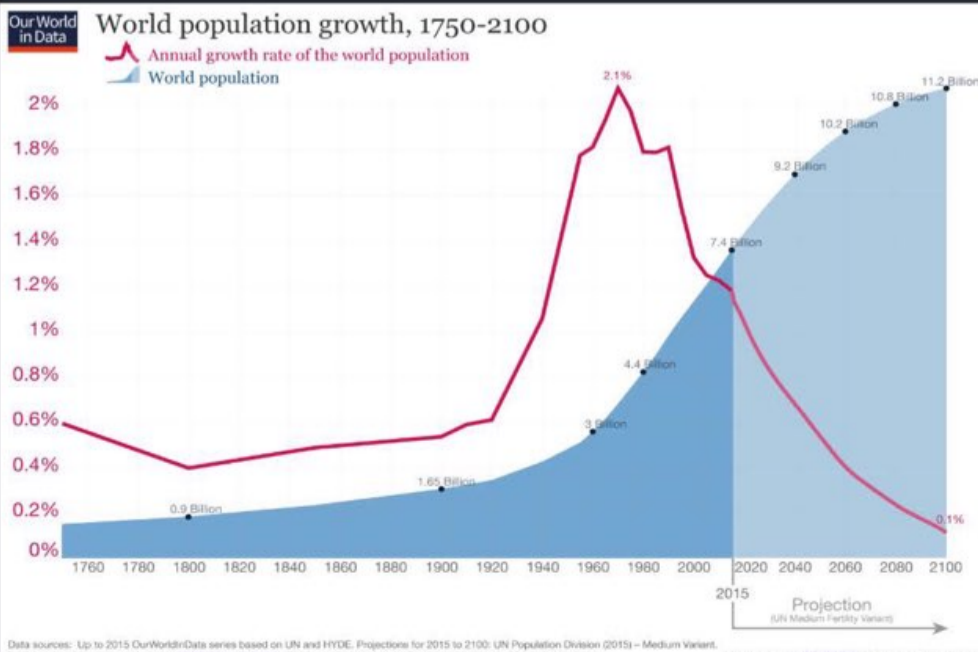
Problems can always be solved

Permeable Pavements

- Some Governments are to stubborn to even think about applying it to their roads. Even though, It is hard there are mini gaps in it that let water be filtered through dirt in it which is beneficial for ecosystems and better for a green planet. They can support weight like regular ground but, Government officials still think they are bad when they don't have proof for a reason to not use it.
- FUN FACT DID U KNOW that Canada uses permeable pavement because it is cheaper and lasts forever AND filters water for ecosystems.

Green roofs

- Green roofs are gardens on roofs of houses that filter water making it ok for an ecosystem, If the house is near an ecosystem or near it.
- They not only help the ecosystem but they also benefit the person living in the house with the green roof. It helps cool down the house in the summer and lets it have fresh air.
- But, the thing is green roofs have to be constantly tended and it would cost some.



Global Population Is increasing every year by a billion

And impervious cities are being build along with it

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