

The Biosphere



Chapter 3







3-1 What is Ecology?

Ecology

> Biosphere

Study of interactions among organisms and between organisms and their environment

Contains combined portions of the planet in which all of life exists; including land, water, and air, or atmosphere

 8 km above Earth's surface to 11 km below the surface of the ocean



> Abiotic

living Plants, animals, bacteria, fungus, etc...

non-living Rocks, water, air, temperature, sunlight, dirt, etc..

Mork with Mother Yature Ecosystem

EEP SKIMMER

kimmer filter is the most userthe market today. This molded is buried alongside the pond edge. mp is housed inside and pulls water into an easily removed catch bag. preeze with only a periodic weekly, or bying of the bag depending on debris filter pad traps smaller debris with-ter from reaching the pump like imita-



An automatic fill valve can be added to keep your water level at a constant level so you never have to worry about filling your pond again. An overflow out the back even removes excess water during heavy rains.

PLANT POCKETS

Design plant pockets into the base of your pond and you will eliminate unsightly plant containers. Plant pockets, around 6 inches deep that are filled with soil, promote health in plant development by allowing the roots to spread through surrounding gravel, unlike containerized plants, which can quickly become root-bound.

LINER

A strong 45-mil EPDM liner is the best choice for most pond installations. Unlike concrete, it is easy and inexpensive to install and won't crack. When covered with stone, it has a 40-year life expectancy. If a leak were to occur, a simple inner-tube patch kit can make it as good as new.

UNDERLAYMENT-

A woven needle punched underlayment forms a soft padding for the liner. Unlike newspapers, it's quick to install. Unlike sand, it completely covers the vertical areas of the pond shelves. And, unlike carpet padding, it allows gases to escape out of the sides while looking more professional.

BIO

The BIOFALLS tion by becomin that, when installe design includes a mo stone placement, which the unit. A multi media filtra filter pads, bags for lava ro floating or marginal plants, filtering the water. A new ir a ribbed surface twists the back towards the pond. Th liner tape; the locking snot a leak-proof method of att BIOFALLS". Its high-densit is firm, but flexes during fr earth. It will never crack, un that can easily crack over t benefit of the BIOFALLS" i it allows you to create bear

BACTERIA

AquaClearer[™] bacteria nati and S.A.B.™ breaks down I the pond.

PLANTS

slippery rubber liner.

Marginal plants can be planted directly into the gravel. Their roots will spread throughout the gravel, cleaning the pond by using nutrients and growing vigorously.

ROCKS AND GRAVEL Adding rocks and gravel to a pond solves many traditional pond problems. Contrary to popular opinion, adding rocks

and gravel reduces pond maintenance. Gravel, unlike a smooth pond liner, provides surface area for bacteria to colonize. Fish waste and other organic mat-ter that settles to the pond bottom is broken down by

the bacteria living there. Anaerobic sludge is therefore

decreased naturally the way nature intended it to be.

mals and other sharp objects. The rocks and gravel

Additionally, covering the pond liner with gravel protects the liner from harmful UV rays and damage from ani-

also help hold down the liner during high ground water

conditions and create areas for fish to hide when pred ators come around. Finally, a stone bottom looks far

more natural and is safer to walk on than an exposed

FISH

Fish, like Koi and goldfish, can be successfully kept, and even bred in water that is only two feet deep as far north as Zone 4 (MN),

Levels of Organization

Individual
 Population









- a single organism of a species
 groups of individuals that belong to same species & live in same area
- groups of different populations living together in defined area.
- Collection of all organisms living in a particular place, with their nonliving(physical) environment
- Service of a similar dominant climate and similar dominant communities
- > all biomes combined



3–2 Energy Flow

> Autotroph (Producer)

Photoautotrophs (photosynthesis)

Chemoautotrophs (chemosynthesis) organism that can capture energy from sunlight or chemicals and use it to produce its own food from inorganic compounds

plants, protists

bacteria



Consumers

> Heterotrophs (consumers)

Types of consumers: Organisms that rely on other organisms for their energy and food supply

> Herbivores
> Carnivores
> Omnivores
> Detritivores
> Decomposers



Feeding Relationships

➢ from the sun or inorganic compounds → autotrophs (producers) → various heterotrophs (consumers)

Food Chains

Food Chain

a series of steps in which organisms transfer energy by eating and being eaten





Food Webs

Food Web

network of complex interactions formed by the feeding relationships among the various organisms in an ecosystem





Trophic Levels

step in a food chain or food web



Ecological Pyramids

Ecological Pyramid

There are 3 different kinds of pyramids: diagram showing relative amounts of energy or matter contained within each trophic level in a food chain or food web

Energy Pyramids
 Biomass Pyramids
 Pyramids of Numbers

Energy Pyramid

> Energy Pyramid:

Energy Storage/Use:

Energy Loss:Number of Levels:

shows the relative amounts of energy available at each trophic level

organisms store about 10% of this energy; 90% is used up in life processes

> much energy is lost as heat

S: > usually only 4-6 levels due to energy loss



Biomass Pyramid

> Biomass Pyramid:

Measured in:

> Represents:

shows the amount of living organic matter at each trophic level

grams of organic matter per unit area (ex: g/m²)

> amount of potential food

Pyramid of Biomass Biomass (g/m²) Trophic level Tertiary 10 consumers (herons) Secondary 100 consumers (frogs) Primary 1000 consumers (crickets)

10,000

Producers

(grass)

Pyramid of Numbers



Shows the relative number of individual organisms at each trophic level.

Water Cycle



The Carbon Cycle



The Carbon Cycle Carbon is found in several large reservoirs in the biosphere. In the atmosphere, it is found as carbon dioxide gas; in the oceans as dissolved carbon dioxide; on land in organisms, rocks, and soil; and underground as coal, petroleum, and calcium carbonate rock. Interpreting Graphics What are the main sources of carbon dioxide in the ocean?

The Nitrogen Cycle



The Nitrogen Cycle The atmosphere is the main reservoir of nitrogen in the biosphere. Nitrogen also cycles through the soil and through the tissues of living organisms. Interpreting Graphics What are the main nitrogen-containing nutrients in the biosphere?

The Phosphorus Cycle



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