

Name(s):

Period:

Date:

Food Webs, Biomass, & Energy

HASPI Medical Biology Lab 12b

Scenario

Health and Science
Pipeline Initiative

In this activity you will construct a food web consisting of organisms from the chaparral or rainforest biome. Each organism in the food web contains information about its population, biomass, and energy contribution within a specific ecosystem. The chaparral biome population data was collected from San Diego, CA. The rainforest biome population data was collected from the Peruvian Amazon basin in South America. After the food web has been built, use the provided information to calculate and create a pyramid of numbers, biomass pyramid, and energy pyramid for the ecosystem.

Materials

Biome template

Scissors

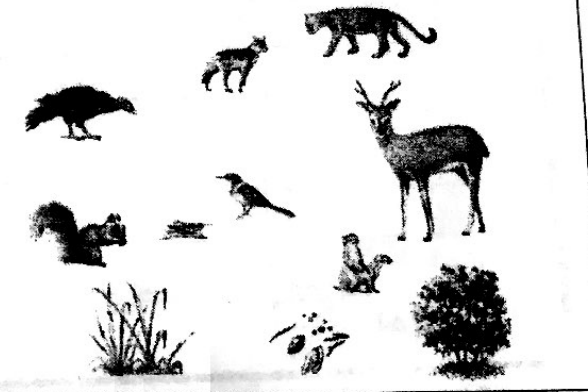

Tape

Scrap paper

Calculator

Directions

Part A. Constructing a Food Web

Task	Image
1 Obtain a biome template, scissors, tape, and 2 sheets of scrap paper. Cut out the organism cards on the organism sheet on the dotted lines.	
2 Tape the two sheets of scrap paper together, and write "Rainforest Food Web" or "Chaparral Food Web" at the top of the paper depending on which organisms you have.	
3 On the scrap paper, arrange the organism cards into a food web. Leave some space between each card. Your food web should consist of four levels. Producers should be at the bottom of the food web, followed by primary consumers, then secondary consumers, then tertiary consumers at the top of the food web.	
4 If you are uncertain about what an organism's food source may be, look on the back of the card for more information.	
5 Once you are confident in the arrangement of your food web, place a piece of tape AT THE TOP edge of the card to hold it in place. You will need to be able to flip the card over to obtain the population, biomass, and energy information on the back for Part B.	
6 Draw arrows representing the transfer of energy between organisms. The arrow should point toward the organism that will be CONSUMING it.	
7 When complete, have your instructor check your food web for accuracy. It is okay if your food web looks slightly different than other students' food webs.	

<http://ecosystems2.weebly.com/uploads/5/4/7/2/5472074/8615484.jpg?461>

Date:

Task

Response

- Table 2. Population, Biomass, and Energy

Primary Consumers

Organism

Population

Biomass

EnergyOrganism

Population

Biomass

Energy

TOTAL**TOTAL**

Secondary Consumers

Organism

Population

Biomass

Energy

Tertiary Consumers

Organism

Population

Biomass

Energy

TOTALTOTAL

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F

6

Using the population, biomass, and energy totals for each trophic level, draw a pyramid of numbers, biomass pyramid, and energy pyramid on the back of the food web.

7

Use a ruler and create a scale on the paper to make the size of each step in the pyramids proportional to one another. See the example pyramids at right and in the Background.

Example Biomass Pyramid

Trophic level

Dry mass
(g/m²)

Tertiary consumers
Secondary consumers
Primary consumers
Primary producers



1.5
11
37
809

8 For each pyramid: Title it; label each trophic level; include the totals; and use color.

9

In the pyramid of numbers, at which trophic level is most of the population located? The least population?

Answer:

10

Why do you think the population is distributed in this ecosystem in this manner?

Answer:

11

In the biomass pyramid, at which trophic level is most of the biomass located? The least biomass?

Answer:

12

Why do you think the biomass is distributed in this ecosystem in this manner?

Answer:

13

In the energy pyramid, at which trophic level is most of the energy located? The least energy?

Answer:

14

Why do you think the energy is distributed in this ecosystem in this manner?

Answer:

15

Explain how energy would flow through the food web.

Answer:

16

Explain how matter would cycle through the food web.

Answer:

17

Describe one possible food chain that can be found in your food web.

Answer:

18

Find a student with a different biome, and compare the pyramid of numbers, biomass pyramid, and energy pyramid of your biome to that of the other biome. How are they similar and how are they different?

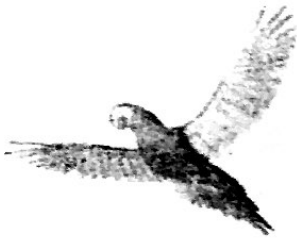
Answer:

Food Web Organisms – Rain Forest Biome

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Cut out each organism on the dotted line.

Macaw



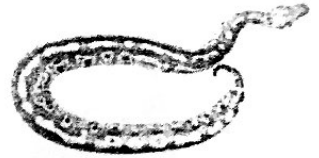
Squirrel



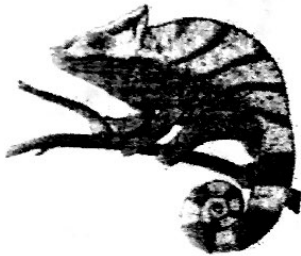
Crocodile



Python



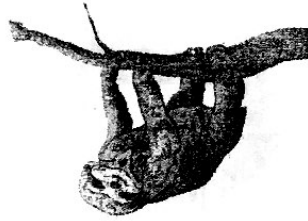
Lizard



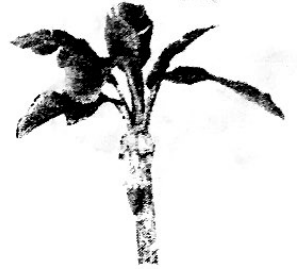
Jaguar



Sloth



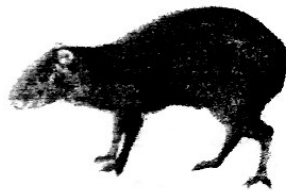
Banana Tree



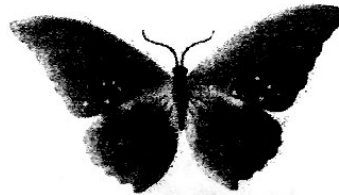
Jackfruit Tree



Agouti



Butterfly



Monkey



Toucan



Beetle



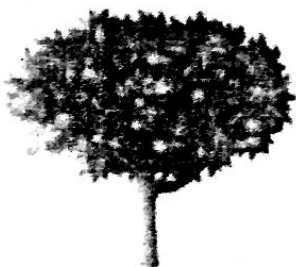
Grass



Orchids



Mango Tree



Anteater

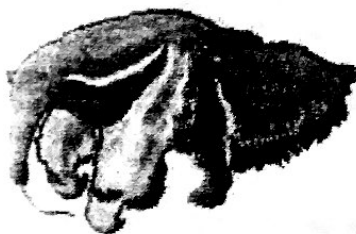


Fig Tree



Ant



Food Web Organisms – Rain Forest Biome

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Cut out each organism on the dotted line.

Python Consumes birds, reptiles, and small mammals Population: 79 Biomass: 10 g/m ² Energy: 18 kcal/m ² /year	Crocodile Consumes fish, reptiles, birds, and sometimes large mammals Population: 49 Biomass: 9 g/m ² Energy: 19 kcal/m ² /year	Squirrel Consumes insects Population: 45,124 Biomass: 60 g/m ² Energy: 124 kcal/m ² /year	Macaw Consumes seeds, fruit, and nuts Population: 11,275 Biomass: 38 g/m ² Energy: 329 kcal/m ² /year
Banana Tree Produces energy through photosynthesis Population: 428,875 Biomass: 1,116 g/m ² Energy: 10,344 kcal/m ² /year	Sloth Consumes fruit, leaves, and buds Population: 9,342 Biomass: 43 g/m ² Energy: 187 kcal/m ² /year	Jaguar Consumes large mammals, birds, reptiles, and birds Population: 27 Biomass: 6 g/m ² Energy: 8 kcal/m ² /year	Lizard Consumes insects Population: 39,744 Biomass: 54 g/m ² Energy: 211 kcal/m ² /year
Spider Monkey Consumes fruit, leaves, nuts, and seeds Population: 69,874 Biomass: 76 g/m ² Energy: 256 kcal/m ² /year	Butterfly Consumes sap and juices from flowers and leaves Population: 129,251 Biomass: 127 g/m ² Energy: 1,104 kcal/m ² /year	Agouti Consumes plants, fruits, and seeds Population: 33,865 Biomass: 53 g/m ² Energy: 696 kcal/m ² /year	Jackfruit Tree Produces energy through photosynthesis Population: 311,689 Biomass: 655 g/m ² Energy: 9,439 kcal/m ² /year
Orchid Produces energy through photosynthesis Population: 322,854 Biomass: 780 g/m ² Energy: 9,874 kcal/m ² /year	Grass Produces energy through photosynthesis Population: 1,156,890 Biomass: 1,254 g/m ² Energy: 12,231 kcal/m ² /year	Beetle Consumes nectar, pollen, and sap from fruits Population: 233,434 Biomass: 101 g/m ² Energy: 1,121 kcal/m ² /year	Toucan Consumes insects, lizards, and rodents Population: 35,432 Biomass: 39 g/m ² Energy: 184 kcal/m ² /year
Ant Consumes fruit, plants, and detritus Population: 1,322,059 Biomass: 322 g/m ² Energy: 1,287 kcal/m ² /year	Fig Tree Produces energy through photosynthesis Population: 246,789 Biomass: 876 g/m ² Energy: 8,765 kcal/m ² /year	Anteater Consumes ants and termites Population: 6,480 Biomass: 22 g/m ² Energy: 61 kcal/m ² /year	Mango Tree Produces energy through photosynthesis Population: 287,543 Biomass: 989 g/m ² Energy: 8,932 kcal/m ² /year

Food Web Organisms – Chaparral Biome

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Cut out each organism on the dotted line.

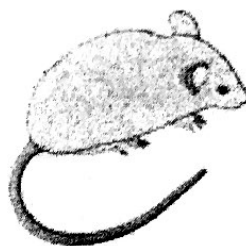
Hawk



Wild Goat



Mouse



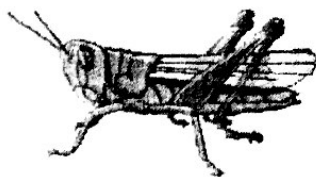
Grass



Jack Rabbit



Grasshopper



Squirrel



Lizard



Cactus Wren



Coyote



Cactus



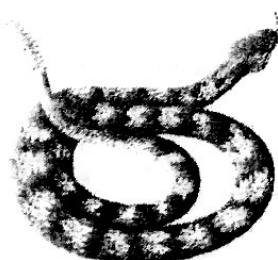
Tarantula



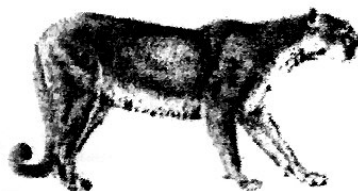
Mule Deer



Rattlesnake



Cougar



Termite



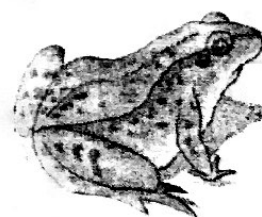
Sagebrush



Shrub



Toad



Scorpion



Food Web Organisms – Chaparral Biome

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Cut out each organism on the dotted line.

Grass

Produces energy through photosynthesis

Population: 95,510

Biomass: 212 g/m²

Energy: 10,111 kcal/m²/year

Mouse

Consumes seeds, fruit, nuts, and plants

Population: 59,788

Biomass: 31 g/m²

Energy: 298 kcal/m²/year

Wild Goat

Consumes plants

Population: 437

Biomass: 12 g/m²

Energy: 194 kcal/m²/year

Hawk

Consumes small mammals, reptiles, and birds

Population: 32

Biomass: 5 g/m²

Energy: 6 kcal/m²/year

Lizard

Consumes insects

Population: 29,654

Biomass: 12 g/m²

Energy: 51 kcal/m²/year

Squirrel

Consumes seeds, nuts, and fruits

Population: 23,674

Biomass: 29 g/m²

Energy: 197 kcal/m²/year

Grasshopper

Consumes plants

Population: 98,444

Biomass: 32 g/m²

Energy: 985 kcal/m²/year

Jack Rabbit

Consumes seeds, fruit, nuts, and plants

Population: 64,231

Biomass: 22 g/m²

Energy: 343 kcal/m²/year

Tarantula

Consumes insects

Population: 11,245

Biomass: 18 g/m²

Energy: 67 kcal/m²/year

Cactus

Produces energy through photosynthesis

Population: 67,435

Biomass: 623 g/m²

Energy: 4,256 kcal/m²/year

Coyote

Consumes small mammals, reptiles, and birds

Population: 25

Biomass: 8 g/m²

Energy: 10 kcal/m²/year

Cactus Wren

Consumes cactus fruit and insects

Population: 9,456

Biomass: 12 g/m²

Energy: 71 kcal/m²/year

Termite

Consumes wood and plant matter

Population: 175,132

Biomass: 36 g/m²

Energy: 1,764 kcal/m²/year

Cougar

Consumes large mammals and anything it can catch

Population: 8

Biomass: 2 g/m²

Energy: 4 kcal/m²/year

Rattlesnake

Consumes small mammals, reptiles, and large insects/spiders

Population: 60

Biomass: 10 g/m²

Energy: 5 kcal/m²/year

Mule Deer

Consumes plants

Population: 569

Biomass: 18 g/m²

Energy: 234 kcal/m²/year

Scorpion

Consumes insects

Population: 17,643

Biomass: 17 g/m²

Energy: 87 kcal/m²/year

Toad

Consumes insects and small rodents

Population: 4,562

Biomass: 21 g/m²

Energy: 74 kcal/m²/year

Shrub

Produces energy through photosynthesis

Population: 38,465

Biomass: 224 g/m²

Energy: 1,982 kcal/m²/year

Sagebrush

Produces energy through photosynthesis

Population: 38,440

Biomass: 156 g/m²

Energy: 2,861 kcal/m²/year