Biome Builder

A game by Elizabeth Anne Viau

In this game students begin with a Bingo-like game board. They fill the squares that match the numbers that the leader obtains by throwing dice. The first player to complete two rows calls our "Got it!" or raises his/her hand.

The students add up the total number of points covered by markers on their game cards. They find others who are working with the same biome and form groups of four. They combine all their points.

Small group discussion: Now the fun begins! Multiply the total number of points by the primary productivity of the biome to see how many kilocalories the plants produce each day. Now allocate those kilocalories to determine the sizes and numbers of plant eaters that live in your biome. Once you have your plant eaters, divide the number of kilocalories availavble to the animals by 10 and see what kinds of predators you can have. If you have a very productive biome, you might even be able to have a second layer of predators (divide the number of kilocalories availavble to the animals by 10 again).

Now pick a biome on earth and see if you can find appropriate animals to fill in your biome. The students can draw pictures of their biological community or create a diorama or a food pyramid.

An interesting follow-up activity would be a discussion to compare the primary productivity of a biome with the complexity of ecological communities and food webs. Why are there more species in the rain forests than in the arctic? It becomes easier to understand this now.

Once students have played with this game, they will be better able to design animals and plants for the biomes on their own planets if they are building worlds.

This packet contains a work sheet with instructions for playing the game.and thirty six different game cards, six for each biome. Of course, the game cards can be used to determine points and then all the students could use those points to study the same biome as well. Print out the game cards on paper or poster board. There are two cards per page.

Game is available from the World Builders Web Site at http://curriculum.calstatela.edu/courses/builders/

(CD-ROM of site is available for $5 (includes shipping)
E. Viau, CSULA, 5151 State University Drive, Los Angeles, CA 90032

If you use this game I would love to hear how it works for you! My email is: eviau@earthlink.net

Biome Builder

Reporting Your Biome Builder Game Results

Get your game card and some markers to put on the numbers. Cover the numbers as they are called out. Raise your hand or call, "Got it!" when you have two rows filled. Winner gets 500 bonus points.

Add up all the numbers in the ovals of the spaces that you covered on your own card. Write your total here: _____ . Join a group of 2-4 people in the same biome list your totals here: then add the totals up to get a grand total for your group.

Players	Player 1	Player 2	Player 3	Player 4	Total
Total for Cards					

Your grand total gives you the number of square meters in your biome. Your biome produces the number of KiloCalories per square meter listed in the chart below. This is the Primary Productivity of your biome.

Biome	Desert	Tundra	Grassland	Conifer Forest	Deciduous Forest	Tropical Rain Forest
KiloCalories per Square Meter	1	2	7	10	16	25

Now multiply to figure out how many calories you have for your animals to eat:

(Total Number of Points) * (Primary Productivity of biome) = KiloCalories for Your Animals to eat.

Now pick out your herbivores! You need groups of each kind so each kind can reproduce. Keep track of the Kilocalories! Your total for all of the herbivores must not be more than your Total Number of Points.

	Tiny Herbivores *under 5 pounds*	Small Herbivores *Rabbit 15 pounds*	Medium Herbivores *Sheep 150 pounds*	Large Herbivores *Cow 1000 pounds*	Small Carnivores *Fox 10 pounds*	Medium Carnivores *Wolf 200 pounds*	Large Carnivores *Lion 400 pounds*
KiloCalories per day	150	550	2000	15,000	600	3000	6000
How many animals?							
Total Calories							

Tiny Herbivores Small Herbivores Medium Herbivores Large Herbivores Small Carnivores Medium Carnivores Large Carnivores

Carnivores eat herbivores, but don't get all their KiloCalories. Carnivores get

Total Number of (KiloCalories for Your Animals to eat)
divided by 10.

(For example, if your grand total =24,000, your carnivores will get a total of only 2,400 calories. You will only be able to have small carnivores.) Choose the numbers and sizes of your carnivores. Calculate the KiloCalories that they will need. Now go to the biomes on earth and figure out which animals could be in your biome! Draw a picture of your ecosystem or make a food pyramid or diorama.

From the World Builders Web Site at http://curriculum.calstatela.edu/courses/builders/

Desert Biome

KCalories produced per square meter per day = **1**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
4 300	2 700	5 600	6 200	1 100
2 100	5 400	1 500	1 300	5 600
1 700	3 200	4 800	5 900	2 400
3 400	6 800	3 300	2 100	6 500
5 600	1 900	6 500	3 700	3 200

Desert Biome

KCalories produced per square meter per day = **1**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
3 800	6 100	4 300	5 400	2 800
1 300	4 100	3 700	2 900	3 100
4 600	1 600	5 200	1 500	4 400
5 400	2 200	1 500	3 700	6 600
2 300	5 200	6 900	4 700	1 500

Desert Biome

KCalories produced per square meter per day = **1**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
5 300	3 700	6 600	1 200	4 100
3 100	6 400	2 500	5 300	6 600
4 700	2 200	5 800	3 900	5 400
6 400	4 800	4 300	2 100	1 500
2 600	5 900	1 500	4 700	2 200

Desert Biome

KCalories produced per square meter per day = **1**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 800	5 100	3 300	4 400	1 800
6 300	3 100	2 700	1 900	2 100
3 600	6 600	4 200	6 500	3 400
4 400	1 200	6 500	2 700	5 600
1 300	4 200	5 900	3 700	6 500

Desert Biome

KCalories produced per square meter per day = 1

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 500	5 400	6 800	3 200	1 700
6 900	2 100	5 50	4 900	6 400
5 300	1 600	4 200	6 500	3 900
1 50	3 200	3 700	2 100	4 800
3 400	4 600	1 800	5 300	2 600

Desert Biome

KCalories produced per square meter per day = 1

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
4 400	1 600	4 300	3 500	6 200
5 700	2 900	3 100	4 800	5 600
1 900	5 100	2 800	1 400	3 50
3 600	6 600	5 400	6 800	4 200
6 200	4 50	1 500	2 700	2 300

Tundra Biome

KCalories produced per square meter per day = **2**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6 800	1 100	2 700	3 800	4 200
1 50	5 300	1 900	2 500	3 400
3 500	4 100	6 200	1 700	2 100
5 700	2 900	5 800	6 300	1 400
2 900	3 100	4 200	5 500	6 300

Tundra Biome

KCalories produced per square meter per day = **2**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
1 700	2 300	3 500	4 900	5 400
2 500	3 200	4 800	5 100	6 300
3 50	4 700	5 200	6 900	1 400
5 800	5 900	6 50	1 100	2 200
4 400	6 100	1 300	2 500	3 700

Tundra Biome

KCalories produced per square meter per day = **2**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
4 300	6 800	5 200	1 700	3 900
6 700	1 100	1 1000	3 400	6 900
1 600	5 800	3 300	5 100	2 500
3 900	4 500	6 50	2 600	5 1000
2 400	2 50	4 700	6 200	4 300

Tundra Biome

KCalories produced per square meter per day = **2**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
5 400	3 800	2 100	6 50	6 600
6 1000	5 700	4 200	2 300	4 300
4 50	6 100	6 800	3 600	1 200
2 300	2 200	1 900	5 500	3 700
3 900	1 500	3 1000	4 1000	5 400

Tundra Biome

KCalories produced per square meter per day = **2**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
5 50	6 800	2 200	1 900	3 600
6 500	2 100	5 1000	3 300	1 700
3 200	4 700	1 600	6 400	5 900
2 900	1 300	4 800	5 100	6 400
4 200	5 400	3 50	4 1000	2 500

Tundra Biome

KCalories produced per square meter per day = **2**

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
3 500	6 100	5 300	4 700	1 200
2 600	3 1000	1 400	5 800	3 1000
6 700	2 900	4 200	1 50	2 600
4 100	5 900	6 500	3 300	5 900
5 800	1 400	2 500	6 600	4 300

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Grassland Biome

KCalories produced per square meter per day = 7

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
4 500	3 700	5 400	6 500	1 100
3 800	1 100	6 700	4 900	5 900
2 200	4 700	2 300	1 50	3 900
6 600	5 300	3 800	2 200	4 800
5 400	6 800	1 500	5 100	2 600

Grassland Biome

KCalories produced per square meter per day = 7

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 200	1 700	4 500	3 100	4 900
3 400	4 100	3 800	5 300	2 600
6 600	5 300	1 900	4 800	5 400
5 500	2 700	6 200	1 50	3 600
1 300	6 600	2 900	6 400	6 200

Grassland Biome

KCalories produced per square meter per day = 7

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 800	1 100	2 700	6 800	3 200
1 50	6 300	4 900	4 500	2 400
4 500	5 100	1 200	3 700	1 100
6 700	2 900	5 800	5 300	5 400
3 900	4 100	3 200	2 500	6 300

Grassland Biome

KCalories produced per square meter per day = 7

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6 700	2 300	4 500	1 900	3 400
2 500	4 200	6 800	2 100	4 300
5 50	1 700	2 200	3 900	5 400
1 800	6 900	3 50	5 100	2 200
4 400	3 100	5 300	6 500	1 700

Coniferous Forest Biome

KCalories produced per square meter per day = 10

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
3 50	2 800	4 200	4 900	3 600
2 500	3 100	1 1000	5 300	2 700
6 200	1 700	6 600	3 400	4 900
1 900	4 300	2 800	2 100	5 400
5 200	6 400	5 50	1 1000	6 500

Coniferous Forest Biome

KCalories produced per square meter per day = 10

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6 500	4 100	2 300	2 700	4 200
1 600	5 1000	6 400	5 800	3 1000
4 700	6 900	3 200	1 50	5 600
5 100	1 900	4 500	6 300	2 900
2 800	3 400	1 500	3 600	6 300

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Coniferous Forest Biome

KCalories produced per square meter per day = 10

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
1 300	3 800	6 200	5 700	1 900
5 700	5 100	1 1000	6 400	5 900
3 600	2 800	2 300	4 100	6 500
6 900	1 500	4 50	3 600	3 1000
4 400	4 50	3 700	2 200	2 300

Coniferous Forest Biome

KCalories produced per square meter per day = 10

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6 400	3 800	1 100	4 50	2 600
4 1000	1 700	4 200	3 300	6 300
5 50	2 100	6 800	1 600	4 200
3 300	6 200	2 900	5 500	1 700
2 900	5 500	3 1000	2 1000	5 400

Coniferous Forest Biome

KCalories produced per square meter per day = 10

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
5	6	5	5	4
500	400	800	200	700
3	2	6	4	1
900	100	50	900	400
4	5	1	3	2
300	600	200	500	900
1	3	2	6	3
50	200	700	100	800
2	4	3	1	6
400	600	800	300	600

Coniferous Forest Biome

KCalories produced per square meter per day = 10

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6	5	2	4	1
400	600	300	500	200
2	1	5	5	2
700	900	100	800	600
4	6	4	3	4
900	100	800	400	50
5	3	6	1	5
600	600	400	800	200
3	4	3	2	6
200	50	500	700	300

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Deciduous Forest Biome

KCalories produced per square meter per day = 16

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 300	4 800	2 200	5 700	5 900
4 700	1 100	4 1000	6 400	2 900
1 600	6 800	3 300	2 100	4 500
5 900	2 500	6 50	1 600	3 1000
3 400	5 50	1 700	3 200	6 300

Deciduous Forest Biome

KCalories produced per square meter per day = 16

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 400	4 800	6 100	5 50	3 600
6 1000	2 700	4 200	1 300	5 300
4 50	1 100	2 800	3 600	6 200
1 300	5 200	5 900	2 500	2 700
3 900	6 500	3 1000	4 1000	1 400

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Deciduous Forest Biome

KCalories produced per square meter per day = 16

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6 50	3 800	2 200	4 900	1 600
2 500	6 100	3 000	5 300	4 700
1 200	4 700	5 600	6 400	3 900
4 900	1 300	6 800	3 104	2 400
3 200	2 400	1 50	4 000	5 500

Deciduous Forest Biome

KCalories produced per square meter per day = 16

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
2 500	1 100	6 300	3 700	5 200
6 600	2 000	3 400	4 800	1 000
4 700	6 900	1 200	6 50	4 600
3 100	4 900	2 500	1 300	3 900
5 800	5 400	4 500	2 600	6 300

Deciduous Forest Biome

KCalories produced per square meter per day = 16

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
3 500	5 700	4 400	1 500	6 100
2 800	3 100	5 700	6 900	4 900
5 200	1 700	6 300	2 50	3 900
4 600	6 300	1 800	4 200	5 800
6 400	2 800	2 500	3 100	1 600

Deciduous Forest Biome

KCalories produced per square meter per day = 16

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
5 200	4 700	6 500	2 100	1 900
4 400	5 100	2 800	6 300	2 600
3 600	6 300	3 900	1 800	3 400
6 500	1 700	5 200	3 50	4 600
1 300	2 600	4 900	5 400	6 200

Grassland Biome

KCalories produced per square meter per day = 7

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
4 500	2 700	5 400	1 500	3 100
3 800	1 100	3 700	5 900	1 900
1 200	5 700	6 300	4 50	2 900
6 600	4 300	1 800	2 200	4 800
5 400	3 800	2 500	6 100	6 600

Grassland Biome

KCalories produced per square meter per day = 7

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
1 200	5 700	1 500	2 100	6 900
5 400	2 100	6 800	4 300	3 600
6 600	3 300	4 900	3 800	2 400
4 500	6 700	5 200	1 50	4 600
3 300	1 600	2 900	6 400	5 200

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Tropical Rain Forest Biome

KCalories produced per square meter per day = 25

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
1 500	5 400	4 800	6 200	2 700
5 900	1 100	5 50	1 900	4 400
4 300	3 600	1 200	2 500	3 900
6 50	2 200	3 700	4 100	6 800
3 400	4 600	2 800	5 300	1 600

Tropical Rain Forest Biome

KCalories produced per square meter per day = 25

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
3 400	2 600	4 300	1 500	4 200
2 700	4 900	6 100	4 800	5 600
6 900	1 100	5 800	2 400	3 50
4 600	5 600	1 400	3 800	2 200
5 200	3 50	2 500	6 700	1 300

Tropical Rain Forest Biome

KCalories produced per square meter per day = 25

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
1 300	2 700	4 600	3 200	2 100
2 100	5 400	2 500	4 300	3 600
3 700	6 200	5 800	2 900	4 400
4 400	1 800	6 300	5 100	6 500
6 600	3 900	1 500	1 700	5 200

Tropical Rain Forest Biome

KCalories produced per square meter per day = 25

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
4 800	1 100	6 300	2 400	3 800
6 300	4 100	1 700	3 900	6 100
3 600	5 600	2 200	1 500	5 400
5 400	2 200	5 500	6 700	1 600
2 300	3 200	4 900	5 700	4 500

Tropical Rain Forest Biome

KCalories produced per square meter per day = 25

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
3 800	5 100	6 700	4 800	1 200
1 50	6 300	4 900	3 500	2 400
5 500	3 100	5 200	1 700	5 100
6 700	1 900	2 800	6 300	4 400
4 900	2 100	1 200	5 500	3 300

Tropical Rain Forest Biome

KCalories produced per square meter per day = 25

KCalories Needed by Animals Per Day

Tiny Herbivore	150	Small Carnivore	600
Small Herbivore	550	Medium Carnivore	3000
Medium Herbivore	2000	Large Carnivore	6000
Large Herbivore	15000		

B	I	O	M	E
6 700	3 300	4 500	1 900	5 400
5 500	1 200	3 800	4 100	6 300
1 50	4 700	2 200	5 900	1 400
2 800	6 900	5 50	3 100	2 200
3 400	5 100	6 300	2 500	4 700