Anthropogenic Biomes: A High School Biology Unit Plan

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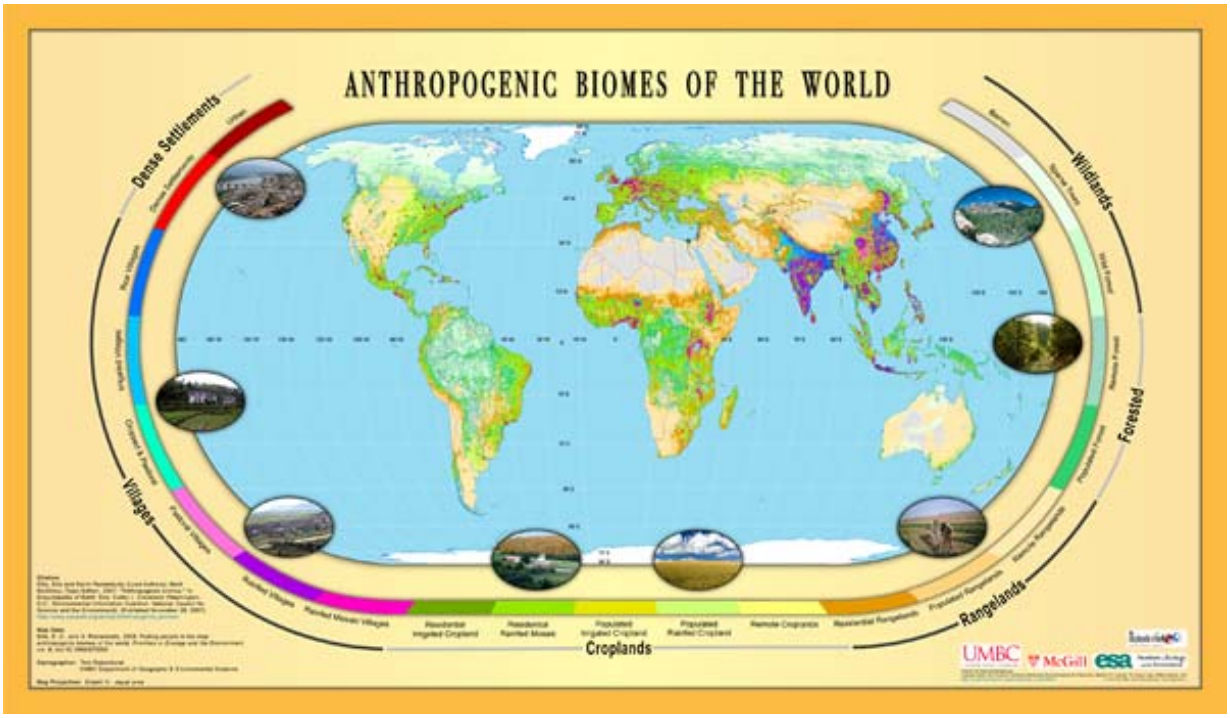


Image from: http://ecotope.org/projects/anthromes/

Purpose:

- To introduce biology students to a new way to look at the biomes of the earth by studying land areas of the biosphere which include human use. The unit introduces and incorporates anthropogenic biomes into the ecology unit.

Context:

- Instructional unit for a high school biology class with students in grades 9-12.

Unit Plan:

- Integrates an ecology unit study of biomes which is based on climate and vegetation (the traditional view): tropical rain forest, tropical dry forest, tropical savannah, temperate grassland, temperate forest, temperate woodland and shrubland, desert, Northwestern coniferous forest, boreal forest (tiaga), and tundra
- Introduces students to these 'human included' environmental systems called anthropogenic biomes which have human interactions incorporated into the environmental system – the Anthropogenic Biomes: urban areas, villages and dense settlements which vary between crops and ranges, croplands which vary between rainfed and irrigated areas, rangelands and forested lands which vary between populated and remote.
- Introduces students to organisms which live within and have adjusted to environmental systems which humans are using
- Is planned for five 55 minute lessons, a study day and a presentation day.

Summary of the Unit Plan

Students will demonstrate their understanding of each anthropogenic biome by:

- analyzing the biotic and abiotic factors which determine the survival and growth of various organisms found within each biome
- analyzing the relationships between the different organisms and human activity
- explaining ecological succession and comparing the stages to land areas within a biome

- Day 1: The introduction to the unit will encompass a brief review of the traditional biomes. Students will then be introduced to the anthropogenic biomes. These biomes include: Forested Biome, Rangeland Biome, Cropland Biome, Villages Biome and Urban Biome.
- Days 2: Students will study the natural history traits of the organisms within the Forested Biome.
- Day 3: Students will study the organisms within the Croplands Biome. They will then analyze the adaptations and the interactions of the organism (predator/prey, competition, emigration, niches, habitats, symbiosis, mutualism and parasitism).
- Day 4: Lab - Students investigate varying soils and moisture conditions on worms and seed samples.
- Day 5: Students will define the concept of ecological succession and explore interactions of the mouse and ant populations within the Village Biome.
- Day 6 and 7: At the conclusion of the unit the students will demonstrate their knowledge by applying what they have learned in a small group project.

This unit introduces the anthropogenic biomes to students through the website “Anthropogenic Biomes” by Erle C. Ellis and Navin Ramankutty at http://ecotope.org/projects/anthromes. The unit plan incorporates a high school text and the accompanying compact disc from Biology by Miller & Levine (Prentice Hall 2008). The accompanying disc provides an interactive power point and questions which follows the textbook. Chapter 4 from the text is integrated with the introduction of the anthropogenic biomes. The lessons from of the unit plan covers the concepts and vocabulary from Chapter 4 – Ecosystems and Communities. Other websites for students’ use approved by the Howard County Department of Education are also utilized as well as related articles and chapters from books listed in the bibliography. Various resources integrate the concept of anthropogenic biomes within the guidelines of the approved science curriculum required by the Maryland State Goals and Objectives.

Lesson Plan Day 1

Description: This lesson reviews biomes and introduces the new concept of anthropogenic biomes. Activities are included which reinforce vocabulary which students should have some prior knowledge of and introduces new vocabulary. After they have an understanding of the abiotic and biotic factors in a biome, they have the opportunity to apply their knowledge by completing a group brief essay.

Goal:
The student will demonstrate the ability to distinguish the anthropogenic biomes from the traditional biomes and to analyze the relationship among organisms to the abiotic factors and biotic factors related to them.

Objectives:
Students will:

1) define traditional biomes (cold and tropical forests, deserts, grasslands, savanna, taiga, tropical rainforest, and tundra)
2) describe the Anthropogenic Biomes (dense settlements, villages, croplands, rangelands and forested areas)
3) compare/contrast traditional biomes with the anthropogenic biomes.
4) define abiotic and biotic factors which determine the survival and growth of an organism and the productivity of the ecosystem in which the organism lives

Vocabulary:

abiotic	dense settlements	mosaic
anthropogenic	villages	wildlands
anthromes	croplands	
biome	rangelands	
biotic	forested	

Materials Needed:

1. Computer and LCD projector
2. Power Point Disc - Prentice Hall Disc #1
3. Anthropogenic Biomes Website
4. Worksheets 1.1, 1.2
5. *Biology* (Prentice Hall, 2008) Student and Teacher Text

Prior Knowledge:
Students have already learned about the levels of organization which ecologists study Chapter 3. Students should have pre-read Chapter 4.3 Biomes (pages 98-105), and have an understanding of the following vocabulary:

Canopy, understory, deciduous, coniferous, humus, tiaga, permafrost

Drill/Warm Up:
Students start a KWL (**worksheet 1.1**)

Students will review Chapter 4.3 Biomes (pages 98-105) and read Chapter 4.2 (page 90) Biotic and Abiotic Factors

Information Delivery/Guided Practice:

Introduction:

- students view Power point Prentice Hall, Presentation Express 4.3 Biomes (relevant terms, review of biomes)
- conduct a clicker question and answer period to determine prior knowledge of traditional biomes. Review any terms which are still unfamiliar to students, provide examples
- handout Worksheet 1.2, students will complete Part 1

Part 1:

- View Encyclopedia Earth – Terrestrial Biomes http://www.eoearth.org/article/Biome.
- View Discovery News Videos, Earth: Human Influence on Ecology Mapped http://news.discovery.com/videos/earth-human-influence-on-ecology-mapped.html.
- View Encyclopedia Earth - Anthropogenic Biomes – Education and Research power point from http://www.eoearth.org/article/Anthropogenic_biomes. slides 8-20
- List each biome on the board; have students describe animals/plants which would be found in each biome

Part 2:

- students view Power point Prentice Hall Presentation Express 4.2 What shapes an Ecosystem, slides 1-10 (Abiotic/Biotic Factors)
- students define the abiotic and biotic factors which affect these organisms, write on board

Discussion:

- How have organisms adapted to the Anthropogenic Biome?
- Do the organisms which live within the traditional biome exist in the Anthropogenic Biome? Do they exist in more than one? Why or why not?
- Do these systems promote diversity and richness to these biomes? How?
- Describe the richness that has been added to the anthropogenic biomes.
- Have we introduced species that don't belong to these areas?
- Describe how some are invasive but many have enriched the system.

Independent Practice/Assessment:

Students work in groups of three, and complete the following:

- Complete Worksheet 1.2 part II
- Evaluate and list how the traditional biomes differ from the anthropogenic biomes.
- Describe an organism within an Anthropogenic Biome that was not originally from the area. Has it been a benefit, a nuisance, or neither – explain.

Closure: Students share with the class.

Lesson Plan Day 2

Description: This lesson introduces the Forested Biome. Students will build on their prior knowledge of Ecology (Chapter 3) by applying vocabulary to the Forested Biome. Various activities help students to organize key factors when evaluating an organism within this biome.

Goal:
The student will demonstrate the ability to analyze the relationships among organisms and between organisms and abiotic factors within the Forested Biome

Objectives:
Students will:

- organize organisms in the forested biome (producer, consumer, etc.)
- define a niche and describe the conditions which cause organisms to form a niche
- define the natural history of an organism–description of traits and population characteristics of single species (herbivore, carnivore)
- research the natural history of the deer.
- have an understanding of specific traits of the organism:
    - preferred habitat (different at different life stages or seasons?)
    - preferred food(s)
    - age at sexual maturation
    - mating season

Vocabulary:

Habitat
Niche

Materials Needed:

1. Computer and LCD projector
2. Power Point Disc - Prentice Hall Disc #1
3. Anthropogenic Biomes Website
4. Worksheets 2.1 (Crossword Puzzle) and 2.2 (Wolves)
5. *Biology* (Prentice Hall, 2008) Student and Teacher Text

Prior Knowledge:
Students have already learned about the levels of organization which ecologists study and the natural history of an organism from Chapter 3. Students should have an understanding of the following vocabulary:

Producer, consumer, decomposer, autotroph, heterotroph, herbivore, carnivore, detrivore, omnivore, photosynthesis

Drill/Warm Up:

- Students read pages 91-92 in textbook (Niche)
- Students complete Worksheet 2.1 Crossword Puzzle

Information Delivery/Guided Practice:

Introduction:

Discussion (Review Niche)

- How would you describe a niche?
- What factors may cause organisms to form niches?
- How is a habitat different from a niche? (ex: Warbler family feeds at different parts of the spruce tree however have the same habitat)
- How can niches of the Warbler family be affected in an anthropogenic biome? (ex: land use changes; new subdivision of homes takes all trees down versus builds among the trees)

Part 1:

- view Anthropogenic Biomes – Forested Biome http://ecotope.org/anthromes/v1/guide/forested/default.aspx.
- review of abiotic factors (temperature, precipitation, wind, nutrients in biome) and biotic factors (ecological community) within this biome

Ask:

- What abiotic and biotic factors do deer require?
- Describe deer habitat.
- What do deer need to survive?
- List events in deer natural history
    - preferred food(s)
    - preferred habitat (different at different life stages or seasons?)
    - age at sexual maturation
    - mating season
- How do deer and humans cohabitate in the forested biome? (deer for hunting: man and prey, deer forage in scrub, in gardens, etc.)
- Have deer developed a niche within the forested biome?
- Can you describe where deer have developed a niche?

Part 2:

- Students read page 128 of text about wolves.

– Enter the wolf, brief history of the wolf and where they are found

Closure/Assessment:

Quick Jot – Name one organism within the forested biome.

Is it a consumer/producer, herbivore/carnivore?

Describe the abiotic factors that this organism prefers.

Describe organism's positive/negative interactions with humans.

Independent Practice:

Homework Student research: Wolves

Hand out to Students Homework Worksheet 2.2 Wolves

Lesson Plan Day 3

Description: This lesson introduces the (optional: rangelands and) croplands biome and focuses on the interactions of the organisms within their community and with other organisms. The Anthropogenic Biomes web information continues by introducing the students to the croplands biome. There are two parts to this lesson including a lab on day 2. Discussion provides students with examples of predator/prey and competition. Students will use a website which provides visual examples of land use described within these biomes. Students will explore a worm, different soil types and germinated rice and rye plants in a terrarium activity to predict and to analyze the interactions observed within this habitat.

Goal:
The student will demonstrate the ability to analyze the community interactions among and between organisms and between humans within the croplands biome.

Objectives:
Students will:

- analyze the organisms' adaptations from forested biome to a habitable area within the cropland biomes
- analyze the different factors which define the croplands biome
- describe the Community interactions of the organism (Competition, predation, symbiosis…) with another organism (plant and animal) and with humans

Vocabulary:

Competition
Predation
Parasitism
Symbiosis
Mutualism
Commensalism
Parasitism

Materials Needed:

1. Computer and LCD projector to show Power Point
2. Power Point Disc - Prentice Hall Disc #1and
3. Anthropogenic Biomes Website
4. Worksheet #3
5. "Cornworm" story from Gilbert Waldbauer's *Insights from Insects: What Bad Bugs Can Teach Us*
6. Textbook, Prentice Hall Biology
7. Lab book, Prentice Hall Biology

Drill/Warm Up:
Question on board: What types of plants grow in the forested biome? What types of indigenous (native) plants would you find growing within the croplands biome? Name a

type of crop. Can you think of an organism that can be found living in one of these areas or in both? Describe it.

Information Delivery/Guided Practice:

Part 1

"Wolf" Homework review

Place students' answers in categories on the board: Abiotic (vegetation, temperature) & Biotic (predation vulnerability, parasite/disease susceptibility) Factors, Habitat, Natural history, interactions with deer, interactions with humans, other

Part 2

A) Students read pages 92-93 in textbook (Community Interactions)

B) Students View Power Point PH 4.2 – Slides 12 – 29 (Community Interactions)

Discussion:

How might these species interact?

- Competition: Mice and rats - Two organisms require the same resource. May be interspecific or intraspecific (define)

What kinds of resources might these organisms compete for?

- Predator/Prey: Corn snake / Field Mouse - Trophic levels, transitions between them.
- Commensalism: Orchids / Trees - One organism benefits and the other is unaffected.
- Parasitism: Ticks / Humans - One organism benefits at the expense of another organism, short of predation.
- Mutualism: Both organisms benefit from the relationship

C) Assessment Handout Worksheet 3.1 – Students complete first section

D) (Optional) View Anthropogenic Biomes – Rangelands http://ecotope.org/anthromes/v1/guide/rangelands/default.aspx.

Discussion:

Describe the different types of rangelands.

What factor predominately divides this biome?

E) View Anthropogenic Biomes – Croplands http://ecotope.org/anthromes/v1/guide/croplands/default.aspx. Interactive Google Earth which shows examples of today's croplands –

Students Complete Worksheet

Discussion:

- How are the biomes within the Croplands biome described?
- How have these biomes transitioned from the grassland biome?
- Describe the landscape.
- Highlight pertinent facts about corn: Science Explorer: From Bacteria to Plants, (Prentice Hall 2002) pages 174 – 180.
- Which factor was present within this biome that was not in the forested biome? What was missing?
- What benefits do the croplands (and rangelands) biomes provide to humans? To other organisms?

- Would you find the deer and wolf in these biomes? Why or why not?
- What is their behavior and interactions with other organisms in this biome? Why?
- How would you describe the organisms which live in the croplands biomes?
- How would you describe human interactions with organisms in this biome?
- Describe a community of (organisms) within (rangelands and) croplands
- (What organism lives on the rangelands? Is it there naturally?)
- What types of organism would you find living in croplands?

Independent Practice / Assessment:

Students complete 3.1

Closure:

Review:

- highlights from the story about the "Cornworms" from Gilbert Waldbauer's *Insights from Insects: What Bad Bugs Can Teach Us*.

Students

- define the community interactions in relation to the cornworm
- describe the adaptions that the cornworm has made
- list the positive/negative effects that the cornworm has to the ecosystem (including to humans)

Homework:

Students complete 3.2

Lesson Plan Day 4 - Lab

Description: (See Lesson Plan Day 3)

Goal:
The student will demonstrate the ability to investigate how changes in environmental conditions and human activity will affect the earthworm and plant samples

Objectives:
Students will:

- Analyze the two types of organisms (plants, worms) in different soil type, in the presence of acid, with disturbance, and with varying amounts of moisture

Materials Needed:
Case Study to demonstrate the abiotic/biotic factors/environmental/human interactions and conditions

- Terrariums – set up two weeks prior – two terrariums
  1) different soils and rice and rye seeds and
  2) different soils and earth worms.
  (http://docs.google.com/viewer?a=v&q=cache:YLJgWOFbAzcJ:www.calrecycle.ca.gov/Education/Curriculum/worms/98Activities.pdf).

Drill/Warm Up:
Warm up – Review of the natural history and physiology of the earthworm

Information Delivery/Guided Practice:
Terrarium experiment and observations – students will observe and analyze the growth of the rye and rice and the behavior of the earthworms as described in the lab booklet

Independent Practice/Assessment:
Students complete Worksheet 4.1

Closure:
Discuss:

- Which soil did the earthworm prefer?
- Which soil did the crops prefer?
- What happened when Acid was introduced to both environments?
- Why do we need the earthworm?
- Did moisture make a difference? If so, how?
- How would plowing a field affect the earthworm?
- What are farmers doing today to work with the habitat?
- In what areas of the world do these seeds grow?
- Are these grains used to sustain the local population or the global population?
- Would you consider the croplands or rangeland biomes as efficient land use? Why or why not?

Homework: Students

- Read Textbook Chapter 28-3 “Ants”
- Find a community of ants and describe what you see
- List the benefits ants contribute to the environment
- Describe any damage that they may do to your environment
- Describe what we use to control their interactions with our environment.
- You are taking a walk in a park and come across and an ant hill. Describe your thoughts towards this ant population. (at least one paragraph)

Resources:

An Ant Colony by Fischer-Nagel, Heiderose, and Andreas Fischer-Nagel

Lesson Plan Day 5

Description:

This lesson develops a basic understanding of how environments go through different stages of ecological succession. The ant and mouse will be examined within the Village Biome. The unit is concluded with a final activity. This activity incorporates the vocabulary learned into the anthropogenic biomes by having the students create either a poster project or small report. The students will have an opportunity to explore an animal of their choice and research their animal and the community interactions.

Goal:

The student will demonstrate the ability to analyze the interrelationships and interdependencies of the ant and mouse populations within the Villages biome.

Objectives:

Students will

- explain how an ecosystem goes through various stages of stability after a catastrophic disaster: (□Primary succession, □Secondary succession)
- analyze the villages biome and compare the land areas to succession
- analyze the interactions of the mice and ant populations with humans and within the villages biome

Vocabulary:

Resource	Competitive exclusion principle
Ecological succession	Primary succession
Secondary succession	Pioneer species

Materials Needed:

1 Computer and LCD projector to show Power Point
2 Power Point Disc - Prentice Hall Disc #1
3 Anthropogenic Biomes Website
4 Project Worksheet 5.1
5 Textbook, Prentice Hall Biology

Drill/Warm Up:

Question to students, write answers on the board

1. Describe where you live. Are there a lot of homes, stores and concrete? What type of vegetation can be found?
2. If you travel ½ hour away from your home, what does the landscape look like? Describe the neighborhood, the spacing between the homes, and the vegetation.

Information Delivery/Guided Practice:

Part I

View Power Point Prentice Hall Presentation Express 4.2 – Slides 30 – 35 (competitive exclusion principle, ecological succession)

Students to complete clicker questions at the end of the slides

Question –

- If a section of cropland were to be destroyed by fire, describe the stages of ecological succession

Part II

View Anthropogenic Biomes – Villages
http://ecotope.org/anthromes/v1/guide/villages/default.aspx.

Discuss:

- The differences between the various villages. Would we find deer, wolves, mice and ants within these settings? Why or why not?
- Describe the varying stages that can be seen.
- How is land transformed / utilized?
- Is land abandoned in the Villages Biome?
- Describe the vacant land.
- Compare the vacant land to the cultured land
- Why is there vacant land?
- Does this vacant land provide a service? To what / whom?
- What other types of organisms would you find in the vacant land?

Review article: "The Ecology of Small Mammals in Urban Habitats: Populations in a Patchy Environment."

- What benefit do mice, shrews, and voles provide to the anthromes? To the villages biome?
- Describe how the competitive exclusion principle is exercised within this biome
- Describe how these animals have interacted with humans. Are some of these animals dependant on humans?
- How are these lands dissected?

- Within the villages biome, vacant land is seen throughout. Describe the stages of ecological succession which an abandoned farm would follow.

Review article: " The last mile: How to sustain long-distance migration in mammals."

- Do you think that the vacant lands could be patterned within the villages and even the croplands and rangelands biomes to create connections for organisms to travel safely?

View: Rattlesnakes

http://news.discovery.com/animals/rattlesnakes-road-genetic-diversity.html

- What effect do roads have on organisms?
- Do you think that these vacant lands may be utilized by organisms as a pathway to and from other habitats?
- How often do you see dead animals on the sides of the roads?
- How do these animals cross the roads?
- Can you think of a worthy plan to help organisms travel across roads?

View: Land bridges:
http://thenewipo.com/category/habitat/
http://www.patagonia.com/web/us/patagonia.go?slc=en_US&sct=US&assetid=27902

Independent Practice/Assessment:

Review:

- Science Explorer. Animals (Prentice Hall 2002) pages 62 – 67 "Insects".
- Students share their short paragraph from the previous night's homework in groups of four.
- Students evaluate the pros and cons of ants within this biome and describe the 'ultimate' balance for humans and ants in an Extended Short Answer

Closure:

- Students share and paraphrase ESA
- Introduce unit assessment (worksheet 5.1)

Unit Assessment:

- Unit project, Worksheet 5.1 – Student Project
- Go over explanations, expectations and rubric

Day 6 – Day in Library / Day 7 – Presentations

(Worksheet 1.1)

Name_____

KWL

1. **Describe what you know about each of the following words or phrases**
2. **Describe what you would like to learn**
3. **When the lesson is done, describe what you have learned.**

Word or Phrase	What you know	What you want to know	What you have learned
Biomes			
Anthropogenic Biomes			
Abiotic factors			
Biotic factors			
Niches			

(Worksheet 1.2) **Name**_____

We will discuss the following traditional biomes.
As we discuss these biomes, fill in the categories below:

	Abiotic Factors	Predominant Plants	Predominant Animals	Geographic Distribution
Tropical Rain Forest				
Deciduous Forest				
Tropical Savanna				
Desert				
Temperate Grassland				

We will discuss the following Anthropogenic Biomes.

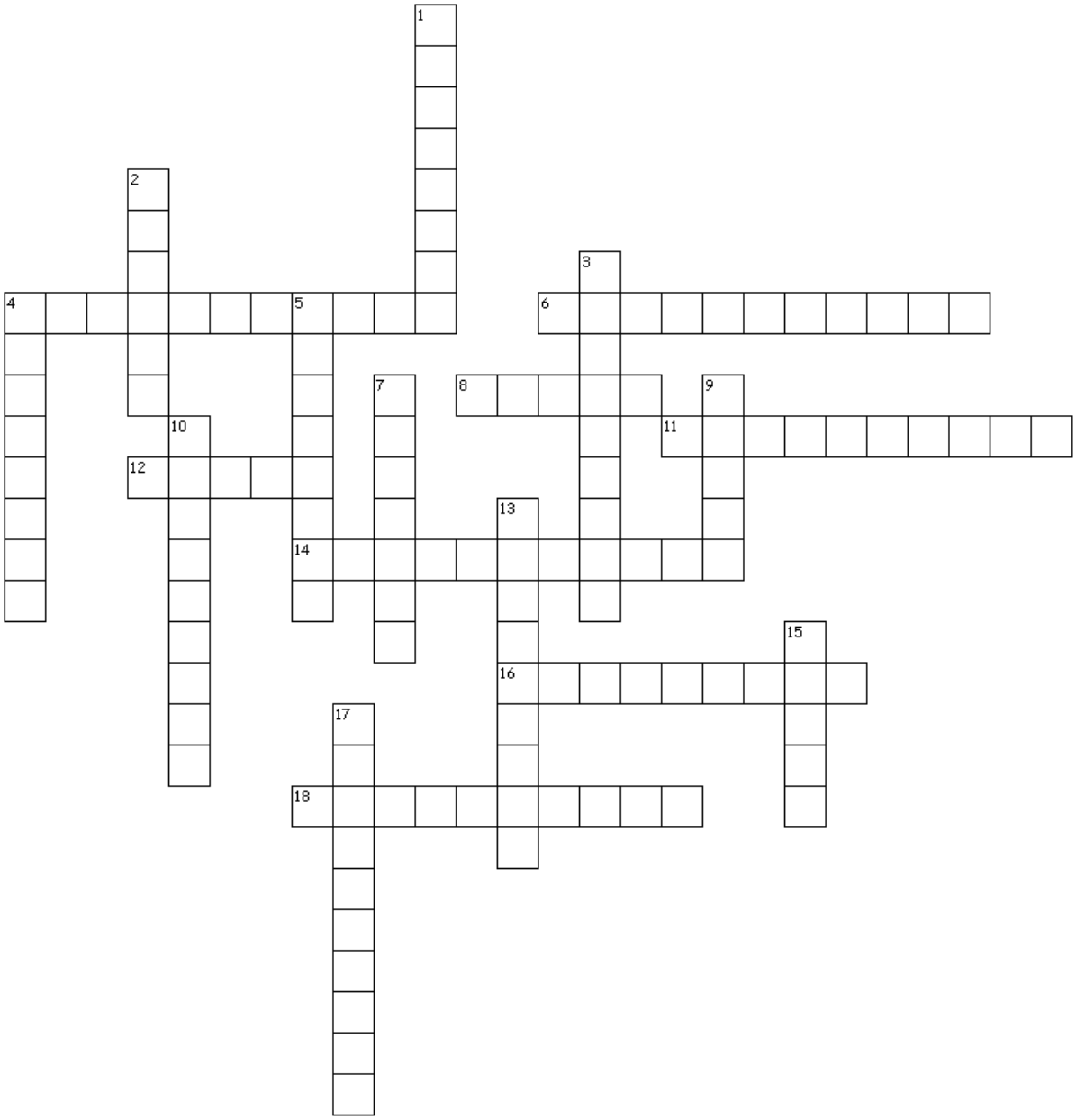
As we discuss the Anthropogenic Biomes, fill in the categories below:

	Abioitic Factors	Predominant Plants	Predominant Animals	Geographic Distribution
Urban				
Villages				
Rangelands				
Croplands				
Forested				

Name_____

Crossword Puzzle Page 1
Worksheet 2.1

Anthropogenic Biomes



Across
4. Another term for anthropogenic biomes
6. Activity between humans and organisms
8. Organism which has found an area that no others share has developed this
11. Collection of interbreeding organisms of a particular species
12. Cities
14. Villages are found here
16. Physical and biological components of an environment
18. Human factors on land use have created anthropogenic biomes

Down
1. Mixture of crops within settlements
2. The landscape from above would be described as this
3. Anthropogenic biomes divides 21 classes within 6 large groups
4. Natural environments where an organisms live
5. Single or multi-celled living system
7. Temperature and climate
9. A human feature found within all anthromes
10. Describes the majority of land use which are cultivated and include 1/4 global tree cover
13. Roads through forested biomes cause this feature
15. The population at the sprawling edges of a city
17. Where you would raise livestock

http://puzzlemaker.discoveryeducation.com/CrissCrossSetupForm.asp

Key

Across

4. Another term for anthropogenic biomes – humanbiomes
6. Activity between humans and organisms - interaction
8. Organism which has found an area that no others share has developed this - niche
11. Collection of interbreeding organisms of a particular species - population
12. Cities - urban
14. Villages are also described as this - settlements
16. Physical and biological components of an environment - ecosystem
18. Human factors or _____ on land use have created anthropogenic biomes - influences

Down

1. Mixture of crops within settlements - villages
2. The landscape from above would be described as this - mosaic
3. Anthropogenic biomes divides 21 classes within 6 large groups - anthromes
4. Natural environments where an organisms live - habitats
5. Single or multi-celled living system - organism
7. Temperature and climate are what type of factors - abiotic
9. A human feature found within all anthromes - roads
10. Describes the majority of land use which are cultivated and include 1/4 global tree cover - croplands
13. Roads through forested biomes or connecting farms cause this feature - segmented
15. The population at the sprawling edges of a city - dense
17. Where you would raise livestock – rangelands

http://puzzlemaker.discoveryeducation.com/CrissCrossSetupForm.asp

Name_____

Homework (Worksheet 2.2)
Wolf
Extended Response (Essay)

Research the natural history and physiological features of wolves
You may use the approved online resources. The books listed below may also be used.

Your Paragraph should address the following points:
Describe habitat, abiotic and biotic factors needed for survival
List wolf natural history
Does their habitat include humans?
How do wolves cohabitate with both man and deer, or do they?

Approved books:

Dudley, Karen. *Wolves*. Austin, Tex.: Raintree Steck-Vaughn, 1997. Print.

Lawrence, R. D. *Wolves*. San Francisco: Sierra Club, 1990. Print.

Patent, Dorothy Hinshaw., and William Mun?oz. *Gray Wolf, Red Wolf*. New York, N.Y.: Clarion, 1990. Print.

Name_____
(Worksheet 3.1)

List the other five community interactions and provide an example in each category:

Animal +	Plant	Animal	Human
Competition			

Describe below the differences between the various croplands:

Croplands	Irrigated	Rainfed
Residential		
Populated		
Remote		

On the back of this page, describe briefly how humans have transformed grasslands:

(Worksheet 3.2) **Name**_____

Find a word from this unit that matches the following letters and write a brief description of it in the space on the graph. Provide page number

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P	Q	R	S	T
U	V	W	X or Y	Y or Z

Name_____

(Worksheet 4.1)

	Worm	Rice	Rye
Sandy soil			
Potting soil			
Damp environment			
Dry environment			
Solution with diluted HCL			
Disturbance: - Sound - Vibration - Movement			

Conclusions: _____

_____

_____

Name_____

(Worksheet 5.1)

Project – Written or Oral Report, Poster, Brochure, News Article, or Website

Directions: Find an organism of your choice and have it approved by your teacher
Decide on a form for your project:

- brochure
- poster
- report
- newspaper article
- website

Research your organism
Within your choice of project, address the following questions/topics for your organism:

1) Define the abiotic and biotic factors which determine the survival and growth of the organism and the productivity of the ecosystem in which the organism lives

2) Explain the natural history of the organism

3) Describe the anthropogenic biome your organism lives in. What does the vegetation look like? Name some of the other organisms that live within this anthrome.

4) Does the organism exist in more than one anthrome? Which ones?

5) Identify the geographic locations that the organism and the anthromes(s) can be found in.

6) Was the organism original to its environment or has it been introduced?

7) List the organism's adaptations to its anthropogenic biome

8) Describe the organism's habitat and define if it has a niche. Explain how its niche is different from its habitat

9) Describe the community interaction of the organism

10) Describe the organism and its interaction with humans. Do humans consider it a benefit or a nuisance, neither or both? Why? Does the organism rely on humans?

11) If the ecosystem in which the organism lives in were to be destroyed would the organism return? Describe the ecological succession that would occur over time.

Matrixes for Content

Content		Performance					
Obj #	Content	Remember	Understand	Apply	Analyze	Evaluate	Create
1.	Traditional Biomes	X					
2.	Anthropogenic Biomes		X				
3.	Vocabulary to Anthro-Biome			X			
4.	Organisms within each Anthro-Biome				X		
5.	Interaction of animal and its environment					X	
6.	Project with choice of organism included in an anthropogenic biome						X

Rationale:

I chose this unit to establish a deep understanding within students that the world today includes the interaction of all species, including humans. Humans have been part of earth's systems biomes. It is true that forests are defined as a traditional biome; however human influences are developed throughout this biome (Ellis and Ramankutty, 2008). For example, humans have divided many forests with roads and have areas of habitation or commercial use found intermittently within. The forest biome is in reality forested areas which include human influences. The grass lands across many different continents have been transformed into crop producing systems. Land areas near cities globally are made of villages interwoven with buffer areas (Ellis and Ramankutty, 2008). These human factors should be taken into consideration when studying an organism which lives within any ecosystem which shares similar climate around our planet. This unit is intended for students to understand that ecosystems of today should include not just climate and vegetation when studying organisms. Through this unit students will understand the importance of the human factor which is part of most of the planet's land systems. The students will be introduced to the five anthropogenic biomes and explore three of the biomes – the forested, the croplands and the villages biomes. Ecological concepts are included for students to analyze the environment wholly. The adaptations and interactions of five organisms will provide students with examples of living organisms within each of these systems. By the conclusion of this unit, students will analyze how factors, both ecological and human, determine how an organism exists within its anthropogenic biome. The view of our planet is that we need to become more connected to our world and become better caretakers of our planet (P.M. Vitousek, et al. 1997). The insight that students will gain from this unit is that our living world is interconnected and we, as caretakers of our planet, should learn to manage our environment in a sustainable manner so that all organisms may coexist (Ellis and Ramankutty, 2008).

Photograph from: http://ecotope.org/anthromes/v1/guide/villages/

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