SOCIAL STUDIES: Gather & Analyze Primary/Secondary Sources, Evaluate Maps and Globes, Landforms and Bodies of Water, Explain Changes in Regions, Population Issues, Cause and Effect / READING: Words in Context, Research Aids, Accessing Information, Summarize, Listening Skills, Prereading Strategies

Where Has All the Farmland Gone?

Exploring Agricultural Land Use

Background

Since the beginning of agriculture, humans have been altering the landscape to secure food, create settlements, and pursue commerce and industry. Croplands, pastures, urban and suburban areas, industrial zones, and the area taken up by roads, reservoirs, and other major infrastructure all represent conversion of natural ecosystems. These transformations of the landscape are the defining mark of humans on Earth's ecosystems, yielding most of the food, energy, water, and wealth we enjoy.

Historically, expansion of agriculture into forests, grasslands, and wetlands has been the greatest source of ecosystem conversion. Within the last century, however, expansion of urban areas with their associated housing, roads, power grids, and other infrastructure, has also become a potent source of land transformation.

In some developed nations, including the United States, agricultural lands themselves are being converted to urban and industrial uses. Rapid expansion of urbanization has resulted in significant losses of agricultural lands. Cultivable land per capita in China has declined approximately 20 percent since 1978, mostly due to rural industrialization and small-town growth. In the US, total cropland area reached a 57-year low in 2002.

Urban and built-up areas now occupy more than 471 million hectares worldwide—about 4 percent of land area. Almost half the world's population—some 3 billion people—live in cities. Urban populations increase by another 160,000 people daily, adding pressure to expand urban boundaries into agricultural areas.

Suburban sprawl magnifies the effect of urban population growth, particularly in North America and Europe. In the United States, the percentage of people living in urban areas increased from 65 percent of the nation's population in 1950 to 77 percent in 2000. The area covered by cities quadrupled in size during roughly the same period.

Urban migration in developing countries takes place on

P.A.S.S.

GRADE 6
Social Studies—1.1,2,3
Reading—1.1a; 3.1b; 5.1ab
Writing—2.7
Oral Language—1.2

GRADE 7
Social Studies—1.1,3; 2.3; 4.5; 5.2; 6.1
Reading—1.1; 3.1a; 5.1ab
Writing—2.8
Oral Language—1.2

GRADE 8
Social Studies—1.1,2
Reading—1.1; 3.1a; 5.1a
Writing—2.8
Oral Language—1.2

such a scale that we now have a new category of cities—megacities—with populations over 10 million. By 2015 there will be 23 megacities, including Beijing, China; Cairo, Egypt; Mumbia, India; Lagos, Nigeria; Mexico City, Mexico; and Sao Paulo, Brazil. In 12 years, nearly three out every four city dwellers will live in a megacity.

Background Sources: Mock, Gregory, "Domesticating the World, Conversion of Natural Ecosystems," World Resources 2000-2001; "Major Uses of Land in the United States, 2002," Economic Research Service, US Department of Agriculture; "Farmland Protection Issues," American Farmland Trust, http://www.farmland.org

Activities

1. Read and discuss the background information and vocabulary.
   —Students locate megacities listed in the background on a world map.
2. Hand out copies of "Some Facts About Agricultural Land Use," included with this lesson, or use an overhead projector.
   —Read the statements aloud, or provide time for students to read independently.
   —Lead a discussion about the loss of agricultural land worldwide and in the US. Ask: "Why does it matter that we are losing agricultural land?
3. Hand out copies of "What Would You Do?" provided with this lesson.
   —Divide students into groups of four or five.
   —Students will discuss the situations and answer the questions in groups.
   —Discuss the situations as a class.
   —Each student will select one of the issues and write a paper defending his/her position.
4. Hand out the "Land Use and Ecosystems in Select Countries" chart along with the worksheet. Note: The percentages on the chart may differ some from those in background information due to differences in methodologies for gathering statistics.
   —Students will answer the questions on the worksheet.
   —Students will match the countries to regions, based on the land use statistics provided.
5. Lead a discussion about the chart.
   —What numbers are surprising?
   —What correlations can students find between the percentage of cropland areas compared with percentages of other ecosystems.
6. Students will locate the countries listed on a world map.

Resources Needed

overhead projector or smart board

computer and/or library access

world map

7. Review "How Reliable Are Your Sources?" included with this lesson. Each student will select one of the countries listed and research online, in an encylopedia or in the library to find additional information about land use in that country. Students will answer some of the following questions:
   —What are the major agricultural products?
   —Are the major agricultural products animal or plant-based?
   —How much of the food supply is imported from other countries?
   —How much is exported?
   —What are the major cities, and how large are they?
   —What is the rate of population growth?

Extra Reading

Bramwell, Martyn, *Food Watch: Protecting Our Planet*, DK Children, 2001.

Desonie, Dana, *Geosphere: The Land and Its Uses* (Our Fragile Planet), Chelsea House, 2008.

DK Children's World Atlas, DK, 2003.

Miller, Debra, *Urban Sprawl* (Current Controversies), Greenhaven, 2008.

Gifford, Clive, *The Kingfisher Geography Encyclopedia*, Kingisher, 2003.

National Geographic Student Atlas of the World, National Geographic, 2002.

Vocabulary

big box store—a large chain store having a boxlike structure

commerce—the exchange or buying and selling of commodities on a large scale involving transportation from place to place

cropland/natural vegetation mosaic—areas where cropland and natural vegetation are mixed together

cultivable—capable of being used for the raising of crops

degradation—the state of passing from a higher grade to a lower

ecosystem—a system made up of an ecological community of living things interacting with their environment especially under natural conditions

erosion—the state of being worn away by the action of water, wind, or glacial ice

grassland—an ecological community in which the characteristic plants are grasses

hectare—a unit of area, equal to 10,000 square metres, commonly used for measuring land area; 1 hectare = 2.4710439 U.S. survey acres

infrastructure—the system of public works of a country, state, or region

megacity—a city with populations over 10 million

salinization—containing a large proportion of salt.

soil compaction—the condition of soil when its particles are pressed very tightly together

sprawl—the spreading of urban developments (as houses and shopping centers) on undeveloped or agricultural land near a city

suburban—the residential area on the outskirts of a city or large town

temperate—having a moderate climate which especially lacks extremes in temperature

tropical—of, relating to, occurring in, or suitable for use in the tropics

urban—of, relating to, characteristic of, or constituting a city

wetlands—land or areas (as marshes or swamps) that are covered often intermittently with shallow water or have soil saturated with moisture

Some Facts About Agriculture and Land Use

1. The world's population is growing by about 1.6 percent per year, and some experts believe it will double by the end of the 21st century. To feed the growing population, farmers will need more land for growing crops or much higher yields on current land.

2. About 85 percent of agricultural land contains areas judged to have been degraded by erosion, salinization, compaction, and other factors, Soil degradation has already reduced global agricultural productivity by 13 percent in the last 50 years,

3. Urban and built-up areas now occupy more than 471 million hectares worldwide—about 4 percent of land area. Almost half the world's population—some 3 billion people—live in cities. Urban populations increase by another 160,000 people daily, adding pressure to expand urban boundaries into agricultural areas.

4. Farm and ranch land is desirable for building because it tends to be flat, well drained and affordable.

5. The food and farming system in the US is important to the balance of trade and the employment of nearly 23 million people.

6. Far more farmland is being converted than is necessary to provide homes for a growing population. Urban areas in the US have increased at twice the rate of population growth since 1945. **Over the past 20 years, the average acreage per person for new housing almost doubled.**

7. Three times the current population of the world could fit in the state of Oklahoma. The State of Oklahoma has an area of 69,903 square miles. One square mile will accommodate 278,784 people if each person is allowed 100 square feet. At that rate the state of Oklahoma could accomodate a 19.49 billion people—almost three times the Earth's current population of 6.4 billion.

8. Farm and ranch lands provide food and cover for wildlife, help control flooding, protect wetlands and watersheds, and maintain air quality. They can absorb and filter wastewater and provide groundwater recharge.

9. Total cropland area in the US reached a new 57-year low in 2002. **Every minute of every day, we lose two acres of agricultural land to development.**

10. Cultivable land per capita in China has declined approximately 20 percent since 1978, mostly due to rural industrialization and small-town growth.

11. **Global consumption of livestock products has more than doubled in the past 30 years.** Demand for livestock products in developing countries grew three times faster than in industrialized countries. Because many developing countries lack modern transportation infrastructure for shipping food (particularly meat, which must be kept refrigerated), most of the expanded production of livestock and feed grains to feed their populations will have to be close to home.

Oklahoma Ag in the Classroom is a program of the Oklahoma Cooperative Extension Service, the Oklahoma Department of Agriculture, Food and Forestry and the Oklahoma State Department of Education.

Name _____

What Would You Do?

1. Your family is moving to a new town. You have two choices. The first is a house in town that is near shopping, work and schools. You will have to share a room with your sibling. The other is to buy a lot on the outskirts of town and build a new home on land surrounded by wheat fields. You will have your own room. What is your vote?
   Discuss the impact of each option on you personally.
   Discuss the impact of each option on agriculture, the environment and the local economy.

2. You are a rancher in Brazil. The demand for beef in your country is growing more every year. The population of the nearby city is growing as well. A developer has made a very generous offer to buy your ranch so he can build apartments to meet the demand for housing. You can take the money and buy land in the rainforest and continue your cattle operation there. What do you do?
   Discuss the impact of your choice on you personally.
   Discuss the impact of your choice on agriculture, the environment and the local economy.

3. You own a pineapple plantation in a beautiful area in Costa Rica that is becoming a popular area for tourism. You have many employees. A wealthy developer wants to buy your land and build a resort. Several of the other plantation owners have already moved their operations to Thailand. What do you do?
   Discuss the impact of your choice on you personally.
   Discuss the impact of your choice on agriculture, the environment and the local economy.

4. A big box store wants to build on land at the edge of town that is surrounded by farms. A citizens' group has petitioned to bring the required zoning change up for a vote of the people in the county. Most of the businesses in your town depend on the farming economy. The traffic from the new store could disrupt the surrounding farming operations. How will you vote?
   Discuss the impact of your choice on you personally.
   Discuss the impact of your choice on agriculture, the environment and the local economy.

5. Your favorite tennis shoes are made in Mexico by a company you find out has bought up large amounts of farm land to build its factories, displacing many small farmers from the land. You could buy a different brand, but they aren't as cool, and they cost more. What do you do?
   Discuss the impact of your choice on you personally.
   Discuss the impact of your choice on agriculture, the environment and the local economy.

6. Your family has moved into a new housing development in an area that is surrounded by farms. Dust from the farm causes your asthma to flare up, and sometimes the noise from the farm machinery wakes you up when you want to sleep late on weekends. A group from your housing development is gathering signatures for a petition to put restrictions on the farming operation. Do you think your parents should sign it?
   Discuss the impact of your choice on you personally.
   Discuss the impact of your choice on agriculture, the environment and the local economy.

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Land Use and Ecosystem Areas in Select Countries

Country	Total land area (hectares)	forests %	shrublands, savanna, grasslands %	cropland and crop/natural vegetation mosaic %	urban and built-up areas %	sparse or barren vegetation; snow and ice %	wetlands and water bodies %
Ecuador	28,356	33	36	24	.1	5	2
Afghanistan	65,209	0	73	11	.1	15	0
Australia	774,122	4	88	6	.1	0	1
China	959,696	11	43	29	.1	15	1
Ethiopia	110,430	5	72	16	0	7	1
France	55,150	17	3	79	.6	0	1
India	328,759	8	18	68	.2	4	1
Argentina	278,040	3	58	32	.1	6	1
Brazil	854,740	48	25	25	.1	0	2
Czech Rep	7,886	22	0	76	1	0	0
Egypt	100,145	0	1	3	0	95	1
Greece	13,196	15	18	61	.2	0	5
Thailand	51,312	31	9	59	.2	0	2
Iran	163,319	1	49	9	.1	40	1
Ireland	7.028	1	0	91	.4	0	7
Israel	2,106	1	33	36	2.1	26	3
Bermuda	5	0	28	0	0	0	72
Japan	37,780	57	17	20	1.3	0	5
Kenya	58,037	5	67	20	0	6	2
Mexico	195,820	29	53	17	.1	1	1
Nigeria	92,377	2	74	19	.1	1	3
Cuba	11,086	23	24	44	.4	0	9
Somalia	63,766	0	88	2	0	10	0
Canada	997,061	38	25	7	0	21	10
Fiji	1,827	0	0	0	0	0	100
Turkey	77,482	10	33	55	.1	0	2
Belize	2,296	60	6	29	0	0	5
United States	936,352	27	40	25	.8	3	3
World	13,328,979	24	37	20	.2	16	3

Source: World Resources Institute. 2007. EarthTrends: Environmental Information. Available at http://earthtrends.wri.org. Washington DC: World Resources Institute.

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Land Use Around the World

Use the "Land Use and Ecosystem Areas in Select Countries" chart to answer these questions:

1. Of the countries listed, which country has the largest total land area?

2. Which has the least total land area?

3. Name the countries with over 50 percent of land in cropland and crop/natural vegetation mosaic.

4. Name the countries with less than 25 percent in cropland and crop/natural vegetation mosaic.

5. Name the country with the largest percentage of land in urban and built up areas?

6. Name the countries with 0 percent land in cropland and crop/natural vegetation mosaic.

7. Name the countries with over 50 percent wetlands and water bodies.

8. Name the countries with over 50 percent sparse or barren vegetation; snow and ice.

Place countries from the previous page in the correct region below. Locate each country on a world map.

Sub-Saharan Africa	Midle East and Northern Africa	Europe	Central America & Caribbean	South America	Asia	Oceania	North America

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Land Use Around the World (answers)

Use the "Land Use and Ecosystem Areas in Select Countries" chart to answer these questions:

1. Of the countries listed, which country has the largest total land area? **China**

2. Which has the least total land area? **Bermuda**

3. Name the countries with over 50 percent of land in cropland and crop/natural vegetation mosaic.
   France, India, Czech Republic, Ireland, Turkey

4. Name the countries with less than 25 percent in cropland and crop/natural vegetation mosaic.
   Ecuador, Afghanistan, Australia, Ethiopia, Argentina, Egypt, Iran, Japan, Kenya, Mexico, Nigeria, Somalia, Canada

5. Name the country with the largest percentage of land in urban and built up areas?
   Israel

6. Name the countries with 0 percent land in cropland and crop/natural vegetation mosaic.
   Bermuda, Fiji

7. Name the countries with over 50 percent wetlands and water bodies.
   Bermuda, Fiji

8. Name the countries with over 50 percent sparse or barren vegetation; snow and ice.
   Egypt

Sub-Saharan Africa	Mid East and N Africa	Europe	Central America & Caribbean	South America	Asia	Oceania	N America
Ethiopia	Afghanistan	France	Mexico	Ecuador	China	Australia	US
Kenya	Egypt	Czech Republic	Cuba	Argentina	India	Fiji	Canada
Nigeria	Israel	Greece	Belize	Brazil	Japan		Bermuda
Somalia	Turkey	Ireland			Thailand		

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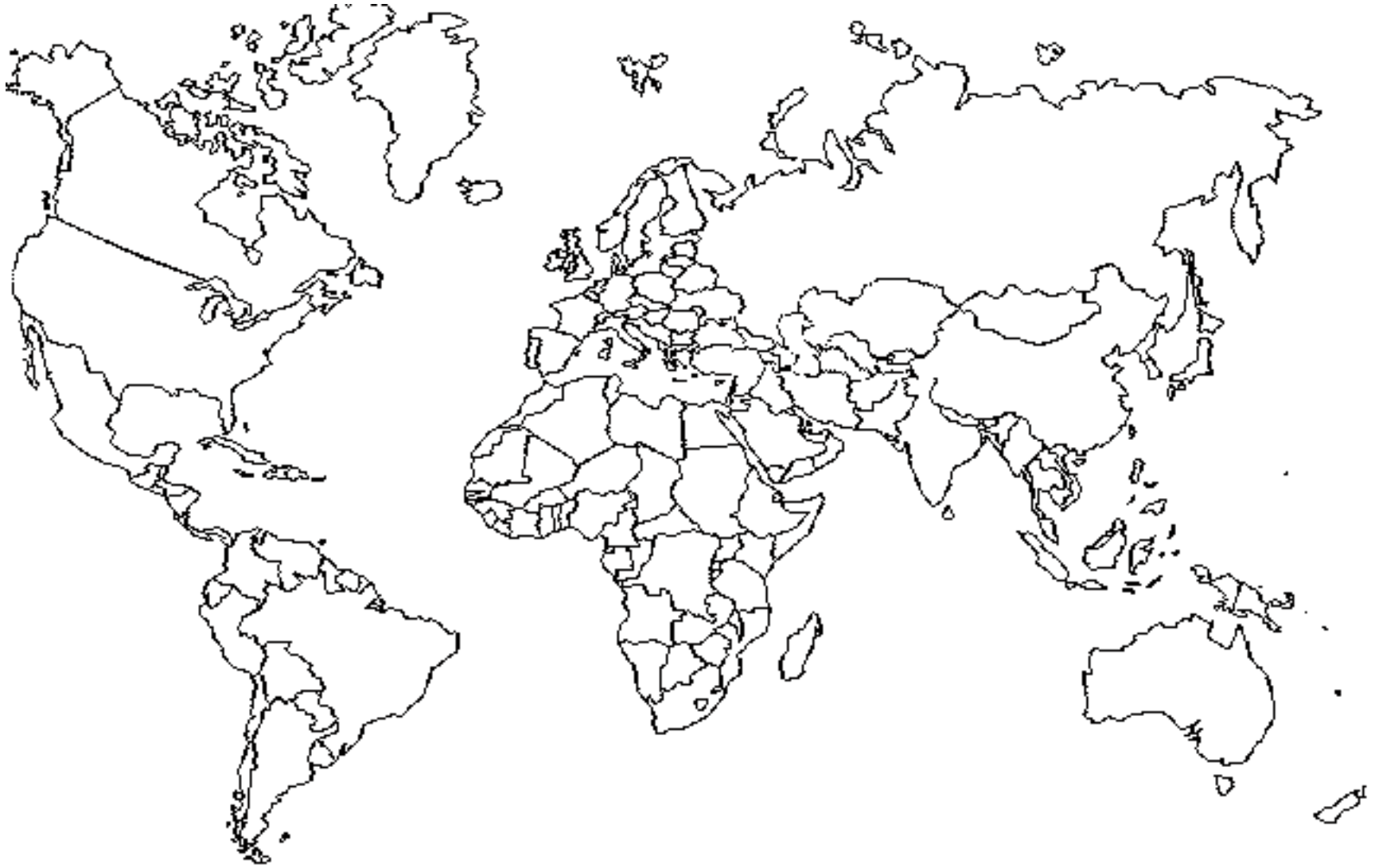
World Map



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How Reliable Are Your Sources?

When conducting research, make sure you use reliable information from legitimate sources. Reliable information is well-researched from sources that are well-respected and as objective, or neutral, as possible. The best way to find legitimate sources is to go to the library and use scholarly journals, reference books and other well-researched sources.

Another place to find information is the Internet. Conducting research on the Internet is convenient, but it can also be tricky. There are many thousands of Web pages that have little actual content and are mainly links to other pages, which may be links to other pages, and so on. Anyone can post anything to the Internet. To make sure you have found a reliable source of information, ask yourself these questions:

1. Who is responsible for the Web site? Is the Web page associated with a reliable organization, such as a university or a government agency? What interest does the organization responsible have in the information presented. For example, will the organization profit from the information presented?

2. Who wrote the information? If the author is not listed or has no credentials, it may not be a credible source. Pay attention to the author's credentials or experience. Is the source really an authority on this particular matter or someone with an impressive title that has no connection to the subject matter?

3. When was the information written? Is it current? Is it still relevant?

4. Are there other sources that agree with statements made on the site, or do other sources contradict this source? In that case you may need to search further. It's always a good idea to gather more than one source.

5. Are any sources cited? If the author does not document anything, then the information may simply be someone's opinion. If statistics used come from a survey, how was the data gathered? Who conducted the survey or poll? Was the sample representative of the population? How many were surveyed? What percent of the population?

When choosing between the library and the Internet keep in mind that up to 90 percent of the contents of college library collections are not on the Internet. Because of copyright laws it is too expensive to put all scholarly work on the Internet. This means that the most comprehensive source of information is still the library.

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How Reliable Are Your Sources?

Website name	What organization is responsible for the site?	When was it written?	Who is the writer?	What are the sources cited?	How did you find the site?	Legitimate site or questionable?

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