

FARMLAND DEVELOPMENT

Subject: Social Studies, Science

Skills: Analysis, Comparison, Description, Discussion, Graphing, Interpretation, Large Group, Mapping, Problem Solving, Reading Data

Duration: 3-5 class periods, depending on depth and discussion

Setting: Classroom

Materials:

- copy of the **Plotting Farmland Development** map for each student
- copy of the **Farmland Development** worksheet for each student
- transparency copy of **Farmland** data and graph for class display (or copy the information onto the board)
- transparency copy of **Michigan Populations** data and graph for class display (or copy the information onto the board)
- graph paper

Michigan Curriculum Framework Content Standards and Benchmarks:

- **Science LEC- III.5 e-4:** Strand III. Using Life Science Knowledge, Standard 5. Ecosystems (LEC), Benchmark e-4. Describe positive and negative effects of humans on the environment. (Key concepts: Human effects on the environment - garbage, habitat destruction, land management, renewable and non-renewable resources. Real-world contexts: Household wastes, school wastes, waste water treatment, habitat destruction due to community growth, reforestation projects, establishing parks or other green spaces, recycling.)
- **Science II.III.5.MS 6:** LEC Ecosystems, Standard III.5. Describe how materials cycle through an ecosystem. Benchmark MS 6. Describe ways in which humans alter the environment.
- **Social Studies II.2.LE 2:** Strand II. Geographic Perspective, Standard 2. Human/Environment Interaction, Benchmark LE 2. Describe the location, use, and importance of different kinds of resources and explain how they are created and the consequences of their use.
- **Social Studies V.1.LE 2:** Strand V. Inquiry, Standard 1. Information Processing, Benchmark LE 2. Organize social science information to make maps, graphs and tables.
- **Social Studies V.1.LE 3:** Strand V. Inquiry, Standard 1. Information Processing, Benchmark LE 3. Interpret social science information about local, state, and national communities from maps, graphs, and charts.
- **Social Studies VI.2.LE 1:** Strand VI. Public Discourse and Decision-Making, Standard 2. Group Discussion, Benchmark LE 1. Engage each other in conversations that attempt to clarify and resolve issues pertaining to local, state, and national policy.
- **Social Studies V.1.MS 2:** Inquiry, Standard 1. Acquire information from books, maps, newspapers, data sets and other sources. Benchmark MS 2. Use traditional and electronic means to organize social science information and to make maps, graphs, and tables.

Kent County Collaborative Core Curriculum (KC²):

- **Science:** 3:5
5:1, 5:4
- **Social Studies:** 4:4, 4:6, 4:7, 4:8, 4:9
5:4, 5:5, 5:9
6:1, 6:4, 6:5, 6:6, 6:10
7:1, 7:3, 7:4, 7:5, 7:8, 7:9
8:1, 8:2, 8:3, 8:9

OVERVIEW

Students graph and interpret trends in farmland and population data. They also plot land use scenarios and evaluate the pros and cons of developing farmland.

OBJECTIVES

After participating in this activity, students will be able to:

- Make line graphs to demonstrate trends in farmland acreage and population growth in Michigan.
- Interpret line graphs to compare trends in land use to population growth.
- Plot land use scenarios and evaluate the pros and cons of developing farmland.
- List some reasons for the loss of farmland in Michigan.

BACKGROUND

In 1920, Michigan had 19 million acres of farmland. From 1954 to 1974, Michigan farmland decreased by 5.6 million acres — an average of 280,000 acres per year. Michigan's loss of farmland has been greater and more rapid than any other state in the Great Lakes Region. From 1982 to 1992, Michigan lost the amount of farmland acreage equivalent to the area of Rhode Island (600,000 acres) or about 10 acres lost per hour, each hour for the entire decade (Agricultural Trends, MSPO). This is the equivalent of losing an average sized farm (215 acres) almost every day. (Note: some of the lost farmland went to state owned land or fallow ground that may or may not be developed.)

The 1997 U.S. Census of Agriculture, administered by the U.S. Department of Agriculture, continues to show a decline in Michigan's agricultural land. Even though Christmas tree farms, maple syrup producers and other types of farmland were added into the "farmland" definition (a total of 170,000 acres added), Michigan still lost a total of 400,000 acres of

farmland from 1992 to 1997.

Urban areas experienced farmland loss at double the state average, representing a loss of more than 75% of Michigan's total cropland. In the five years between 1992 and 1997, Leelanau and Grand Traverse counties surrounding Traverse City lost 6% of their farmland (7,866 acres). The five county area encompassing Grand Rapids lost 38,000 acres of its farmland, or 4%. Detroit area counties lost about 4% of their farmland acreage, or 24,315 acres. The Lansing area counties also lost a significant amount of farmland.

As urban populations move into rural areas, land values increase, and farmers feel pressure to sell their land. Non-agricultural rural land uses include:

1. Home construction for the increasing number of rural households.
2. Larger suburban lot sizes and rural lot divisions greater than 10 acres.
3. Recreation and leisure facilities (especially golf courses).
4. Construction of second homes (Michigan leads the nation in second homes).
5. Services needed to support the increasing rural, non-farm populations.
6. Commercial construction in suburban areas.
7. Road construction.

Farmland lost to urban sprawl can be viewed as widespread, low-density development that consists primarily of strip commercial developments (or development that occurs in strips along roadways). Examples include malls, large office buildings, and housing subdivisions connected by new, wide roads and boulevards. Subdivisions are set apart from other development, and people are dependent on their cars to get from one place to another.

With sprawl, fewer people occupy more land, and as the people spread out, so do the buildings, roads and houses. The following designs compare a subdivision with conventional development (Diagram 1) to a subdivision designed with conservation in mind (Diagram 2). Wetlands along the water were conserved in both designs, but the conservation design example also pre-

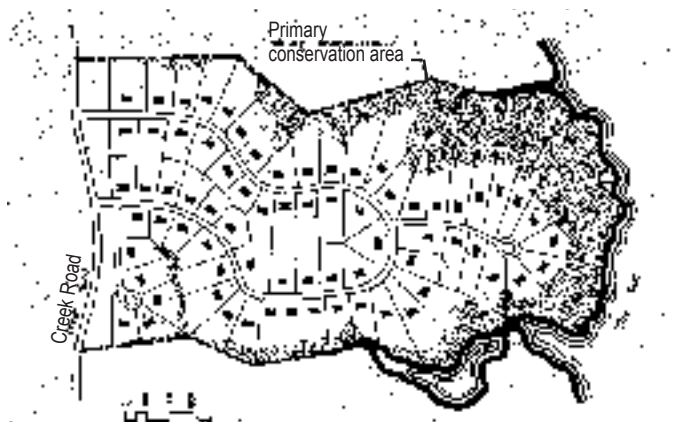


Diagram 1. Suburb with Conventional Development.

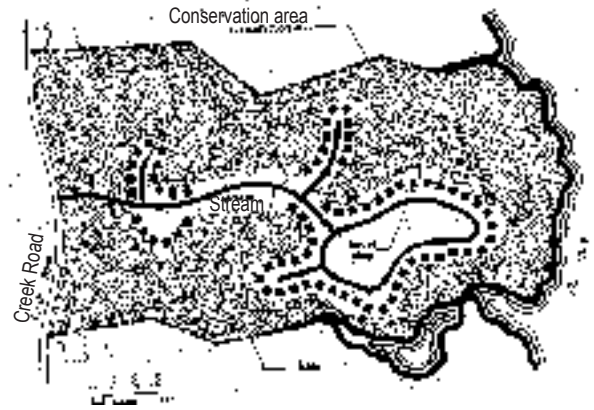


Diagram 2. Suburb with Conservation Design.

served upland woodlands, a field, and walking trails.

It is important that new communities work together to develop land use plans that work for both humans and the environment. As in the above example, compact development preserves natural habitat and farmland while maintaining broad patterns of desired density. Compact development can also lower infrastructure costs, decrease impermeable surfaces, and promote a stronger sense of neighborhood.

Appropriate community planning is essential to community growth, environmental quality, and farmland preservation.

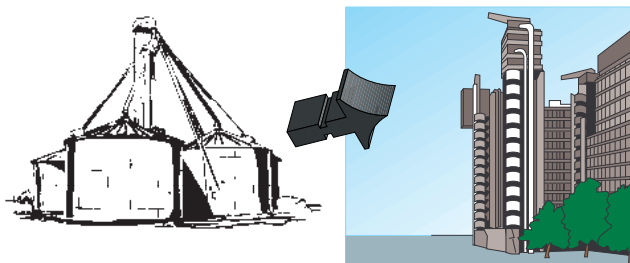
PROCEDURE

PART ONE: GRAPHING

1. Open the lesson by showing the students how much farmland has been lost. From the **Farmland** master provided, post the statistics in Table A on the board or overhead. Help the students to make line graphs like Figure 1 with the Michigan data. Point out that Michigan lost 600,000 acres of farmland from 1982 to 1992, a rate of almost 10 acres per hour for 10 years. This is the equivalent of losing an average-sized farm (215 acres) almost every day.
2. Brainstorm reasons for the loss of so much farmland. (If students suggest increased population as the major reason, give them the following statistics: Michigan's 1980 population was about 9,250,000; the 1990 population was 9,300,000. This isn't a large increase and doesn't completely account for loss of farmland.) Accept any answers that seem reasonable. (Examples from the Background information include second homes, people moving from the city to rural areas, larger plot sizes, golf courses, strip malls, new roads...)
3. Show students the **Michigan Populations** overhead and help them make a line graph of rural and urban populations from the Michigan Population data in Table B (see Figure 2).
4. Be sure that students understand that population increases in

many rural areas are caused by movement from the cities into suburbs, and not necessarily an increase in total state population (Table B). Explain that this expansion often puts pressure on farmland to be converted to homes and accompanying commercial and service needs. Examples of commercial needs are grocery stores and gas stations, and service needs are fire stations, schools, libraries, banks, and roads. This development also causes an increase in farmland value and taxes, forcing farmers to sell if farming doesn't prove to be profitable enough to cover increasing taxes.

5. Ask the students to compare graphs and make conclusions about land changes using the farmland and population data. Help them by suggesting that they lay one graph directly on top of the other. Conclusions and observations from the graphs include:
 - Farmland is decreasing
 - Rural population is increasing
 - Urban population increased until 1970, and is now decreasing (possibly moving to rural areas)
 - As the population increases in rural areas, acres of farmland decrease
 - When the urban population declines in 1970, there is a larger increase in rural population



PART TWO: PLOTTING A LAND USE SCENARIO

6. Either in class or for homework, have students complete the **Plotting Farmland Development** map and **Farmland Development** worksheets. Have students read each situation aloud or to themselves and then make changes on their map. After students have completed their worksheets, discuss the demands on farmland for housing developments, recreation, and services. Ask whether students have noticed any new construction in their own community (on farmland or even vacant lots). What is the new construction for?
7. Close the lesson with an open-ended discussion of the following questions, and help the students take notes by writing discussion ideas and answers on a chalkboard or overhead.
 - What types of development can farmland be used for?
 - What are the pros and cons of developing farmland?
 - Should anything be done to reduce the loss of farmland in Michigan? What can be done to minimize this decline?

ASSESSMENT OPTIONS

1. Evaluate the students' worksheets and line graphs for completeness and accuracy.
2. Have students list three ways farmland is lost to development and then two pros and cons for each type of development.
3. Have students make and interpret simple bar graphs using the same farmland and population data. Ask for a written explanation of their interpretation.

Adaptations/Extensions

1. Ask the class if it is possible to plan development so that the remaining farmland is less fragmented, leaving better habitat for wildlife. Attempt to plot the planned, reorganized scenarios.
2. Obtain local farmland data from the U.S. Department of Agriculture's National Agricultural Statistics Service and make graphs. Data can be obtained at <<http://www.usda.gov/nass/>>
3. Have students call some of the "Contacts" listed to find out about farmland preservation, including laws and personal involvement in preservation and planning developments.
4. Create a scenario for students to write about a personal choice. For example, "land has been in your family for generations..." etc. Ask the students what they would do with their farmland if they saw land prices rising.

Computer Extensions

1. American Farmland Trust. Homepage. 6 June 2002. <<http://www.farmland.org/>> AFT's mission is to stop the loss of productive farmland and to promote farming practices that lead to a healthy environment. Empowering communities: AFT identifies "strategic" farmland — productive farmland threatened by sprawl — through mapping and other analysis, then works with communities to plan and effect farmland conservation.
2. Natural Resources Conservation Service. Homepage. 2002. 6 June 2002. <<http://www.nrcs.usda.gov/>> Mission Statement: The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. This site contains a wealth of information on agricultural land, including graphs that show prime farmland development statistics.
3. Conscious Choice: The Journal of Ecology and Natural Living. Homepage. 2002. 6 June 2002. <<http://www.conscious-choice.com>> Type "farmland development" into the site's search engine, and several articles will be available. Also, the May 2001 issue specifically contains three farmland development articles.
4. Great Lakes Greenfields Exchange. Homepage. Feb. 2002. 6 June 2002. <<http://www.glc.org/green/>> Excellent resource for Great Lakes agricultural lands and open space information. Greenfields are generally parkland, undeveloped open space and agricultural lands, located near the outskirts of towns, cities and larger metropolitan areas.
5. Michigan Department of Agriculture. Homepage. 2002. 6 June 2002. <<http://www.michigan.gov/mda>> Mission Statement: To protect the food, agricultural, environmental, and economic interests of the people of Michigan. A "Kidz-Korner" is also available.



SOURCE

Adapted with permission from Connecting the Farm to the City, Lesson 4: "The Case of the Lost Farmland," by Michigan Geographic Alliance Teacher Consultant Marty Mater, pages 21-27. Additional background information from Great Lakes Information Network (GLIN), TEACH GL Sept. 2001. <http://www.great-lakes.net/teach/pollution/sprawl/sprawl_1.html>

ADDITIONAL RESOURCES

Contacts:

- Grand Valley Metro Council
- Land Conservancy of West Michigan
- Michigan Farm Bureau
- Michigan Farmland and Community Alliance
- Michigan Geographic Alliance
- Michigan Land Use Institute
- Natural Resources Conservation Service
- Timberland Resource Conservation and Development
- U.S. Department of Agriculture's National Agricultural Statistics Service

References and Teacher Resources:

- Ag in the Classroom. Kids, Crops, and Critters in the Classroom 4-6 grade. (Approx. 70 lessons, \$20) Contact the Illinois Farm Bureau at (309) 557-3334.
- Skjaertund, David. "1997 Census of Agriculture Highlights." Planning and Zoning News Vol.17, No.4, Feb. 1999: 5.

Additional Lessons:

- Connecting the Farm to the City (Distributed by the Michigan Geographic Alliance)
 - Lesson 1: What Makes a Good Farm? Students use maps of physical phenomena (rainfall, soil, elevation, growing season) to determine possible sites of agricultural land in Michigan.
 - Lesson 2: What Do We Grow Here? Students locate the state's counties and map statistics on the specific agricultural products grown in Michigan.
 - Lesson 3: Where Would You Build the Plant? Students decide where to locate an agribusiness using maps of specific products and defend their choice.
 - Lesson 5: Conflicts Over Country Living. Students analyze two problems related to conflict over rural land use, examine the positions of both sides in the debate, and propose possible solutions by taking a position and developing a reasoned argument.

CONCEPTUAL FRAMEWORK REFERENCE

IB3,IB4,ID1,IE1,IE2,IF1,IF3,IIB1,IID1,IID2,IIC2,IVB,IVD1,IVD2,IVF1

Answer key to "Farmland Development" worksheets:

On the **Plotting Farmland Development** map, students should have shaded in 1 box in the NW corner, 2 boxes in the NE corner, 1 box in the SW corner, and the equivalent of 7 boxes (including the 5 "forest" squares) on the SE corner.

1. How much of the 600 acres is still left undeveloped? 490 acres (18 % lost)
2. Which of the farmers sold land for the following reasons?
 - Houses needed for more families Farmer Ima Hogg
 - People want larger lots for more room Farmer B.A. Jersey
 - People want places for recreation Farmer Cornelia Stalk
 - People need services Farmer Willie Makit
3. What are some other recreational uses, besides golf, that may take the place of farming? Parks, tourist attractions, motor cross, skate park, trails, second homes, etc.
4. What are some other services that might be needed by people living around here that would take the place of farming? Shopping centers, schools, hospitals, fire stations, churches, roads, etc.
5. List 3 pros and 3 cons of developing farmland.

Pros of development:	Cons of development:
1. Increased economic value/business	1. Loss of food production
2. New jobs/employment opportunities	2. Loss of wildlife habitat
3. Fun recreational facilities	3. Loss of scenic land
4. Nice, spacious homes	4. Non-farm residents complain (farm odors)
5. Accept any reasonable answers	5. Land values/taxes go up
6. **CHALLENGE:** In this farmland example, do you think the pros outweigh the cons to development? Explain your answer. Look for position statement, reasonable argument/explanation, and concluding statement.



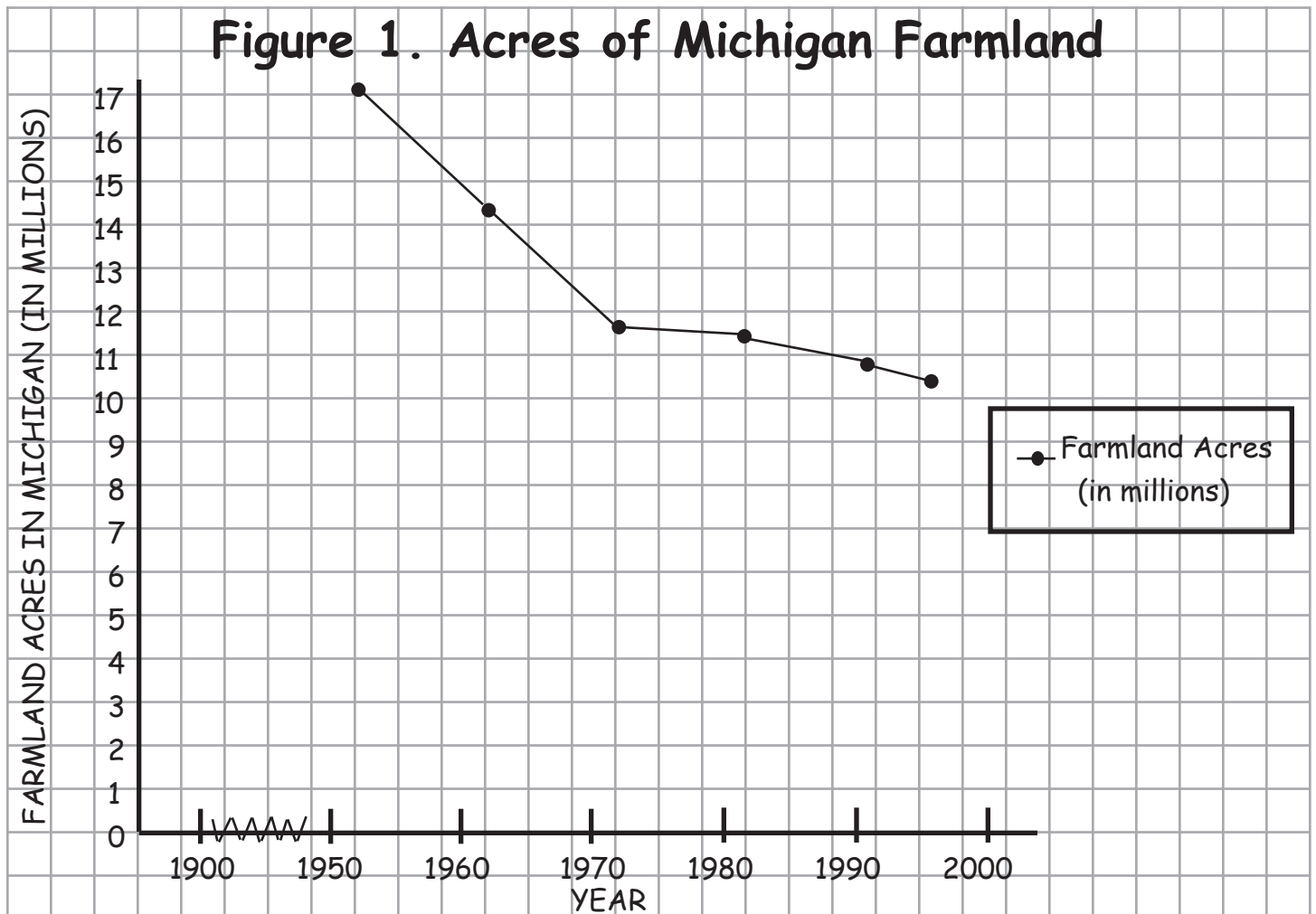
FARMLAND

Table A. Area of Farmland, 1954-1997

Year	Acres in U.S.	Acres in Michigan	Acres in Kent Co.
1954	1,206,000,000	17,100,000	364,000
1964	1,146,000,000	14,400,000	276,000
1974	1,084,000,000	11,700,000	234,000
1982	1,028,000,000	11,400,000	223,000
1992	979,000,000	10,800,000	191,000
1997	956,000,000	10,400,000	186,000

(Source: Agricultural Trends, MSP)

Figure 1. Acres of Michigan Farmland

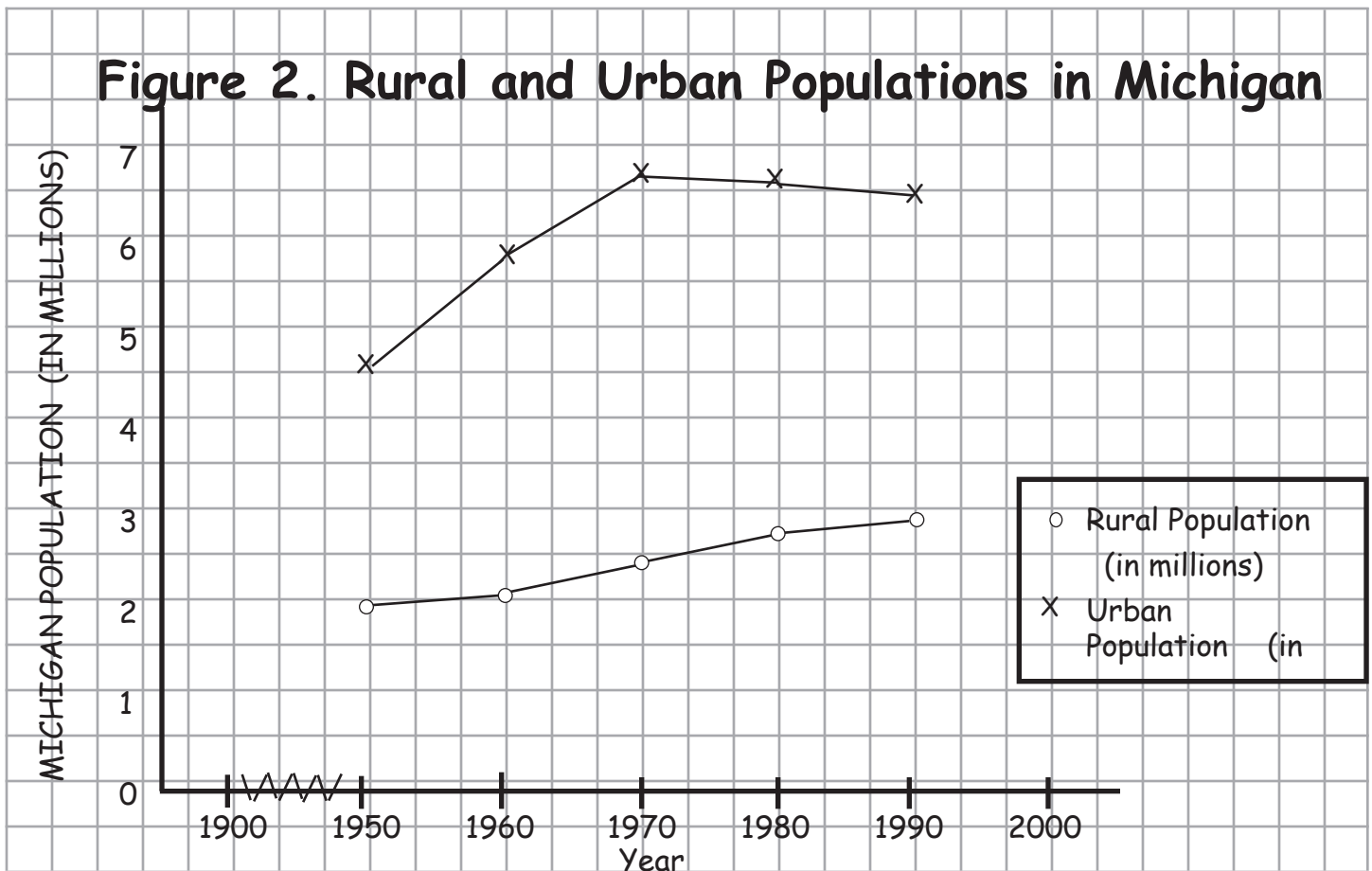


MICHIGAN POPULATIONS

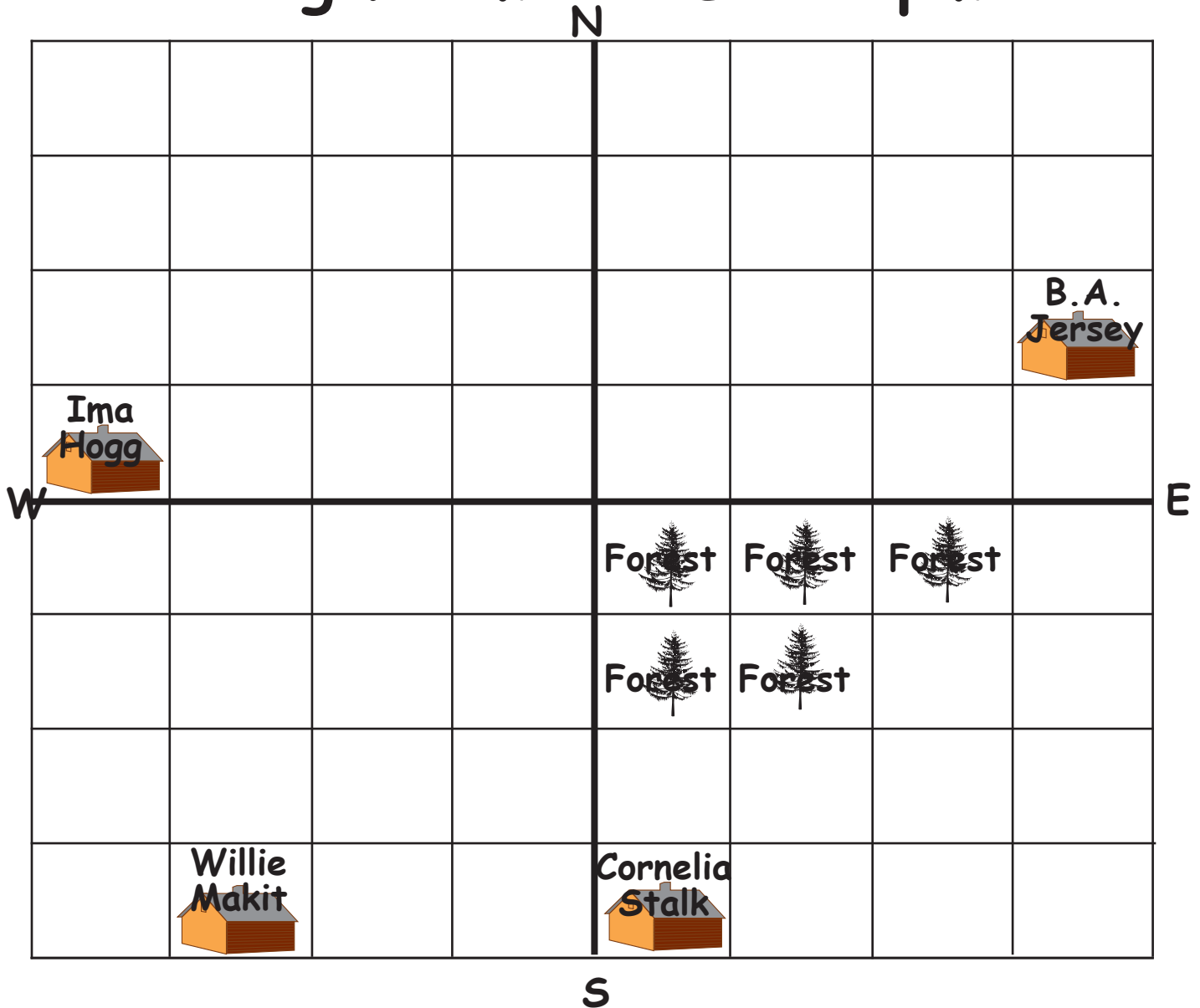
Table B. Michigan Population, 1950-1990

Year	Rural # of People	Urban # of People	Total # of People
1950	1,900,000	4,500,000	6,400,000
1960	2,050,000	5,800,000	7,850,000
1970	2,400,000	6,600,000	9,000,000
1980	2,700,000	6,550,000	9,250,000
1990	2,850,000	6,450,000	9,300,000

(Source: USDA National Ag Statistics Service)



Plotting Farmland Development



Imagine that this is a one-mile section of land in Michigan. Four farmers each own one quarter of the section (160 acres in each farm). Each box in the picture represents 10 acres. Each farm uses 10 acres for its house, barn, and garden. Farmer **Ima Hogg** (Northwest corner) raises hogs and grows corn to feed them. Farmer **B.A. Jersey** (Northeast corner) has dairy cows and grows hay and corn for silage to feed them. Farmer **Willie Makit** (Southwest corner) grows soybeans, wheat, and oats. Farmer **Cornelia Stalk** (Southeast corner) raises beef cattle and grows hay and corn for grain. She also harvests timber out of the forest. Out of this 640-acre section of land, 600 acres are used for crops and forestland. These farmers have lived here for many years, but changes are now taking place.

Farmland Development

DIRECTIONS: For each of the following four situations, shade in the land that can no longer be used for agriculture on the "Plotting Farmland Development" worksheet. Then answer the questions.

Situation 1: When Farmer Hogg's two kids got married, they wanted to live near the farm where they grew up. They each built a house along the road to the north of Mom and Dad. Each lot is about 5 acres of land.

Situation 2: The nearest town has grown to a large city, and some people who work there want to live in the country. They like the fresh air and want room for their kids to have a horse. They need 10-acre lots. Farmer Jersey sells the NE corner (10 acres) of his property, and another 10 acres to the west, right next door.

Situation 3: Traffic has increased lately as more people move to the area. The roads have been widened. A young couple realizes that a truck stop with a gas station would be a very profitable business on the SW corner of the section. They buy 10 acres from Farmer Makit.

Situation 4: Farmer Stalk has some nice rolling hills and trees near the NW corner of her property. A friend suggests that this would make a great golf course. Mrs. Stalk sells 65 acres to develop a 9-hole course and 5 more acres for a road to it, a parking lot, and buildings.

Questions:

1. How much of the 600 acres are still left undeveloped? _____
2. Which of the farmers sold land for the following reasons?

* Houses needed for more relatives _____

* People want larger lots for more room _____

* People want places for recreation _____

* People need services _____

3. What are some other recreational uses, besides golf, that may take land away from farming?

4. What are some other services that might be needed by people living around here that would take land away from farming?

5. List 3 pros and 3 cons of developing farmland.

Pros of development:

Cons of development:

1.

1.

2.

2.

3.

3.

6. CHALLENGE: In this farmland example, do you think the pros outweigh the cons to development? Explain your answer.