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# K-12 Partnership Lesson Plan

# Brook Wilke

# *Land Conservation Debate*

## Overview

In 1980, 6% of Michigan’s landscape was covered by urban areas. Experts project that by 2040, 18% of the landscape will be developed into urban areas. This comes at a huge cost to natural landscapes including the ecosystem services they provide. In this activity, students will be divided up into groups that represent different landscapes including farmland, wetlands, forests, prairies and urban areas. Students in these groups will identify reasons and share arguments for protecting natural landscapes or developing areas for urban expansion. Students are allowed to debate the topic between groups and to come up with a reasonable solution to the problem of expanding urban development. Specific examples in the local community provide grounds to really understand how this plays out in the real world.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Understand the reasons for protecting farmland, wetlands, prairies and forests from urban development
* Identify reasons for expanding urban development
* Develop an argument for an issue they are assigned to and debate with other students about why their perspective is correct

**Length of Lesson**

1 hour

**Grade Levels**

Middle and High School

**Standards covered (NGSS)**

Disciplinary Core Ideas:

*Middle School*

* **MS-LS2-4**: construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations
* **MS-LS2-5**: evaluate competing design solutions for maintaining biodiversity and ecosystem services
* **MS-ESS3-4**: construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems

*High School*

* **HS-LS2-7:** design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity

Cross Cutting Concepts:

* Systems and system models

Science and Engineering Practices

* Constructng explanations and designing solutions
* Engaging in argument from evidence
* Obtaining, evaluating, and communicating information

***Previous Michigan Standards Met:***

* **III.5.MS.6 (LEC 11)**: describe ways in which humans alter the environment
* **I.1.MS.5 (C 11)**: use sources of information to help solve problems
* **II.1.MS.1 (R 6)**: evaluate the strengths and weaknesses of claims, arguments, or data
* **II.1.MS.4 (R 9)**: describe the advantages and risks of new technologies or patterns of human activity
* **II.1MS.5 (new)**: develop an awareness of and sensitivity to the natural world.

**Materials**

* Library, Internet or other resources to research the debate positions

**Background**

### *Strategy:* *empirical or case-based storyline*: using cases to make ideas experientially real

### *Observations, patterns, and explanations*

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| --- | --- | --- |
| Observations or experiences (examples, phenomena, data) | Patterns (laws, generalizations, graphs, tables, categories) | Explanations (models, theories) |
| Groups representing the viewpoints of developers and land conservationists can debate about the relative importance of urban development and conservation. Specific examples provide a realistic basis for debate. | Urban development is expanding at the expense of farmland, wetlands, prairie and forest. Conservation biology presents multiple reasons for protecting rural areas from urban development. | The ecosystem services provided by natural landscapes are important for long term sustainability of the human population. |
| Application: Model-based Reasoning | | |
| Inquiry: Finding and Explaining Patterns in Experience | | |

### *Introduction/Anticipatory Set*

* Share the following with students, including any other information necessary to set up the ensuing debate.
* In 1980, 6% of Michigan’s land was classified as urban, but experts project that by 2040, 18% of Michigan’s land will be developed into urban areas. This increase comes at a cost of the ecosystem services provided by farmland, wetlands, prairies and forests.
* Ecosystem services are specific benefits that landscapes provide for humans, including clean water, food from farmland, medicine from plants, etc…
* Urban refers to an area that is dominated by human development and is usually called a city or town, but can refer to a housing development also.
* Pie charts (Figure 1) show how much land was in the respective categories in 1980 and the projections for 2040.

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**Figure 1:** In 1980, 6% of Michigan’s landscape was urban. However, experts project that by 2040, 18% of Michigan’s landscape will be developed into urban areas.

### Activities of the session

1. Students are divided up into 5 groups
2. Four groups are assigned to represent *Wetlands, Farmland, Forests, and Prairies*
3. One group is assigned to represent *Urban Developers*
4. In groups, students are given 20 minutes to prepare an effective argument regarding why their viewpoint is important. Land conservationists should try to identify what ecosystem services their landscape provides (e.g. Farmland provides food for humans, Wetlands provide habitat for amphibians and reptiles and clean water for humans, Forests provide animal habitat and timber for building, Prairies provide habitat for ground nesting birds and grazing animals, natural landscapes provide oxygen via plant growth, Development provides houses for the growing population and allows people to live closer to a natural landscape, which is often beneficial for emotional health).
5. After developing an argument:

* Students are given 2 minutes to share their argument in front of the class (hold questions until the end)
* After all 5 groups have presented, the teacher should prompt some interesting questions and discussion/debate between the student groups. Students can ask each other questions and argue for their point of view.

**Conclusion**

* A chart should be constructed to write down argument for each of the five student groups
* There are valid reasons to support the arguments of all five groups, but a sustainable future relies upon the protection of important natural resources. Human development is often spread wider than necessary across a landscape and there are solutions to keep development centered in specific locations
* Habitat fragmentation affects the heath of natural ecosystems by making them smaller. Many organisms need large areas of undisturbed land to survive. Therefore, even by developing small areas, wildlife habitat is indirectly affected.

**Extensions and Modifications**

* Students can get involved in local current event examples and construct logical solutions to land use arguments.
* Field trips can be taken to specific sites to see urban development and natural landscapes. This could be to a site where a current debate is taking place.
* Science projects could compare recently developed landscapes to adjacent landscapes for many different ecological factors, including plant / wildlife diversity and abundance, soil properties, water and air quality, etc…

**Post-lesson Comments and Reflection**

*12.11.06*

*For this lesson, students were allowed to gather into their own groups, but were assigned to represent a certain viewpoint dealing with the debate of land conservation. The students that were assigned to represent the developers were disappointed and could not figure out many good reasons to develop land. They ended up siding with the other groups who were trying to protect the land from development.*

*However, the students learned a tremendous amount during this lesson. Students were approaching teachers after the lesson saying, “Teacher, you have to help us preserve the wetlands!” This was very satisfying!*