

DO WE NEED A WINDFARM?



CLASS



1 HOUR

KEY CONCEPTS:

Decision making, following instructions, independent learning, role play

COLORADO ACADEMIC STANDARDS:

- *Reading, Writing and Communication 1.1:* A clear communication plan is necessary to effectively deliver and receive information.
- *Reading, Writing and Communication 4.1:* Comprehending new information for research is a process undertaken with discipline both alone and within groups.
- *Reading, Writing and Communication 4.2:* Identifying implications, ideas and concepts enriches reasoning skills.
- *Social Studies 4.1:* Analyze and debate multiple perspectives of an issue.

LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Any

GOAL:

In this activity, students will gain a deeper understanding of the relationship between the human communities and wildlife habitats.

LEARNING OBJECTIVES:

- Students will role play various community groups.
- Students will analyze the pros and cons of a proposed wind farm on the community and local wildlife.
- Students will present their group decisions to the local City Council.

COMMON CORE:

- *Writing Standards #1:* Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- *Writing Standards #2:* Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- *Writing Standards #4:* Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- *Writing Standards #5:* With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing).
- *Speaking and Listening Standards #1:* Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
- *Speaking and Listening Standards #3:* Identify the reasons and evidence a speaker provides to support particular points.
- *Speaking and Listening Standards #4:* Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
- *Speaking and Listening Standards #6:* Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.
- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #2:* Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

- Placards for citizen's groups, attached
- Information cards for each citizen's group, attached
- Board to write on

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LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Any

BACKGROUND INFORMATION:

We have already looked at habitat in the 2nd grade lesson where “habitat” was defined and the basic attributes of a habitat described. This activity will broaden the understanding of habitat, examining the impacts of human actions on several habitats and the wildlife that are a part of them.

To review, habitat is a physical environment offering an animal food, water, shelter and space. This habitat is by no means a closed system. There are numerous forces constantly affecting the health of the plants making up the habitat, how animals interact inside and outside the system and how quickly changes occur in the habitat. Succession (the changing of habitats over time from one dominant habitat into another) is a normal and very important part of the natural world. Nature “promotes” succession through what we sometimes consider catastrophes; prolonged drought, massive storms, beetle kills, etc. Most scientists consider the change in habitats resulting in these events Mother Nature’s way of cleansing or renewing.

What about when we humans step in and modify habitats? Our cities are modifications of habitat, as are vast plowed fields and interstate highways, just to name a few. Are these simply new habitats where animals learn to adapt to new situations, or are they sterile remnants of the habitats they have replaced? This is a debate that will continue in the scientific field and communities.

What is critical in any of the future development we as humans do is that we look at all aspects of our effects on the environment when we make decisions. How will this new road/housing development/clear cut/etc. affect the plants, which keep our water clean and prevent flooding, which feed many types of wildlife, which impact so many other little details of a habitat? The small details do really count.

For this activity we are proposing a new wind farm be built in the community the students live in. The two chosen sites are at the field trip site and the elementary school. The students will play the roles of several citizens’ groups in the valley taking a stance for or against the wind farm, or wanting to push it to one of the specific sites. They will write, and present, their proposals to the City Council.

ACTIVITY:

1. Introduce the students to the concept of role-playing. Outline the following situation they will be role playing: 5 citizen’s groups are to petition the City Council as to whether a large wind farm should be allowed in the valley, and where it should be located. Be sure the students understand the concept of a wild farm.
2. Separate the class into 5 groups. Be sure the students understand the concept of a wind farm.”
3. The naturalist will read out the proposal. The groups will have 10-15 minutes to discuss amongst their group the options. During this time they will write a decision according to their citizen group’s directives. These papers will be collected after the activity so make sure the students add their names to the paper, write legibly, and formulate complete thoughts. Encourage the students



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LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Any

ACTIVITY: (CONT.)

to use the directives on their citizen's group card, and put aside their own values and beliefs. They will represent this group. Their personal opinions are not a part of this decision. Do a brief example for the students such as: I represent the mountain biking community in the valley. Our opinion is that the wind farm should be allowed because it is a valuable alternative energy source, etc...

4. Write on the board the following items they could include in their written decision: wildlife health, habitat health, human safety, economics and long-term effects. An easy way to begin the process is to write each of the above items down as a heading on a piece of paper with "pro" and "con" in two columns just below them. It helps to do a sample up on the board so they can see how this is done. Remind them that even if they do not believe personally in the group they are representing, they must put themselves in their shoes and do their best to come to the best decision they can for that group. They will need to justify their decisions.
5. The naturalist (and teacher if he or she would like to) will act as the City Council and hear the presentations from each citizen's group. The presentations should be brief (no more than 5 minutes), and should cover the points made on the board. If there is time remaining after all the presentations, open up the floor for comments. Remind the students to stay in their citizen's group role even during the discussion.
6. The City Council should decide that they need more information to make a decision. They will ask a group of scientists to visit both sites and collect data on the local wildlife to help in this decision.
7. Wrap up the lesson by inviting the students to the field site to look at the site for a future wind farm. They will be comparing the field site with a site around their school. Keep the papers they wrote their comments on for the future activities.

MAPPING THE WIND FARM AT OUR FIELD SITE



FIELD



1 1/2 HOUR

KEY CONCEPTS:

Compare/contrast, observations, data collecting, map reading

COLORADO ACADEMIC STANDARDS:

- *Geography 1.1:* Use several types of geographic tools to answer questions about the geography of Colorado.
- *Reading, Writing and Communication 4.2:* Identifying implications, concepts and ideas enriches reasoning skills.

LOCATION:

Field site

SUGGESTED TIME OF YEAR:

Any

GOAL:

Students look at the habitats in the field site, use data they collect on the diversity of wildlife at that site, and discuss how a wind farm might change the areas of diversity and make an impact on wildlife.

LEARNING OBJECTIVES:

- Students will interpret local topographical maps.
- Students will compare older and recent topographical maps of the field site.
- Students will examine animal habitat at the field site and observe signs of animals.
- Students will discuss how a wind farm at that site may impact wildlife.

COMMON CORE:

- *Speaking and Listening Standards #1:* Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
- *Speaking and Listening Standards #3:* Identify the reasons and evidence a speaker provides to support particular points.
- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

- Aerial map of the field site large enough to hang on easel and all students can see
- Topographical map of the area, as close to present-time as possible
- Historical topographical map of the area
- Plastic overlay sheets to fit over the map of the area to be covered in the survey
- Xeroxed sheets for each group of topo map; detailed section of the field site
- Clipboards with pencils attached for each group
- Pen for each participant
- Snowshoes for each participant (if appropriate)

Parent volunteers are recommended for the field session.

BACKGROUND INFORMATION:

Review the background information from the first classroom lesson on habitat. Succession is a “sequence of changes in plant species on a newly exposed site (i.e., where a glacier or perennial snowfield has melted) or an area that has undergone some sort of site-altering disturbance due to natural events (i.e., flood or fire) or human activities (i.e., logging)... Change essentially brings all the species – briefly – to the same starting line. Succession tends to work in one direction.” (The Naturalist’s Guide to the Southern Rocky Mountains, by Audrey Delella Benedict,

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LOCATION:

Field site

SUGGESTED TIME OF YEAR:

Any

c. 2008). Plants that are good colonizers take over an area rapidly, eventually being replaced by more stable species with competitive adaptations that benefit them over the long haul. There is still debate even today as to whether there are true “climax communities”, a community of specific plant populations that remain stable over time (at least for centuries). Many ecologists believe that our natural world is in constant flux and there are no climax communities, just communities that evolve much more slowly over time. Human induced succession from agricultural lands, mining, logging, development, etc. has been shown to lead to loss of diversity from the original habitat. Unless the land use reverts back to a natural form, the loss of diversity continues. We have an opportunity today to develop alternative energies such as wind and solar. They offer many benefits compare to the non-renewable resources that are so readily used and available today. Yet even these renewable resources have drawbacks and should be evaluated thoroughly for each site so their impacts on the natural system will be minimized.



This activity asks the students to look at habitats from the field site, use data they collect on the diversity of wildlife at that site, and discuss how a wind farm might change the area’s diversity and, possibly, impact the wildlife. They will compare a map from several years ago to a more recent map, analyzing the growth of human habitat. After learning how to read topographical maps, they will walk/snowshoe through the field site area and document wildlife sightings and/or evidence. This data will be compared to data they obtain from their school site on the next day.

ACTIVITY:

1. Welcome to the field site! Orientation to the site for the students, then right into the activity.
2. The activity will begin inside. Review with the students the cards they produced in the classroom session for their citizen’s group proposal to the City Council regarding the wind farm. Discuss the concerns from the different groups.
3. Review habitats with the students. Ask them what all living organisms in a habitat need to survive (food, shelter, water and space).
4. Ask the students if they think a habitat can change. Discuss succession, making sure to introduce the concept of human-induced “successions” such as agricultural fields, forested areas, urban areas, etc. Ask if they think we will find more or less diversity in areas such as these compared to a more “natural” habitat such as a wetland, forest, etc.
5. To gather more information about the viability of a wind farm the students will gather data from 2 sites: the field site and the area around their school. This session will be looking at the field site as the proposed wind farm site.
6. Several of the citizen’s groups brought up their concerns regarding impacts on wildlife and the environment. This session’s studies will focus on those two concerns. The students will use maps of the area to highlight different habitats. Then they will go out into the field to look for signs of wildlife in the different habitats.
7. Bring out the aerial map and explain the use of aerial maps (vegetation and

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LOCATION:

Field site

SUGGESTED TIME OF YEAR:

Any

ACTIVITY: (CONT.)

- hard surfaces). Have them locate the river, roads, buildings, then describe what type of vegetation (or lack of vegetation) they find.
8. Show the students the topographical map and have a short review of the meaning of “topography” and a “topographical” map. Have them point out steep vs. flat areas using the contour lines.
 9. Bring out a map from 10 years ago. Hang this up next to the more modern map and ask the students if they notice any large changes from the two maps. Discuss if the number of structures changed, the amount of open space, anything else they might note.
 10. Each student receives a Xeroxed topo map of the area immediately around the buildings (where they will be examining) on a clipboard and a pencil. Discuss with the students the importance of good observation skills; walk slowly, look up and down, look in the shrubs and trees (not just at them), look on the barbed wire fences (lots of hair there), tracks in the snow, etc. They will be carefully following their maps as they note any habitat and animal signs on their maps. Perhaps ask the students to contribute to a list of animal signs – nests, scat, tracks, nibbled branches, etc. to remind them of what to look for.
 11. The best method is to stay together as a group so everyone can see the findings and confirm them.
 12. Gather them together in the building. Starting with the beginning of your trail have the students state what they recorded along the trail. Record each group’s findings on an overlay on the main topo map.
 13. After all the groups have presented their findings, have them study the topo map with the overlay of all their information and discuss the habitats and wildlife signs they found. Discuss if the wildlife signs are clustered in any one area. Discuss if there are certain habitats that show more signs of wildlife than others.
 14. From this discussion ask them if they have any input on the proposed wind farm. Discuss if their observations changed their initial opinion of the wind farm. Ask if they feel like they have enough information to be able to make a decision on whether this is a good site for the wind farm. Ask what else the students could do to become more informed.
 15. Wrap up by discussing the need to collect data from their school so that the two areas can be compared for the City Council.

MAPPING THE WIND FARM AT YOUR SCHOOL



SERVICE-LEARNING 1 HOUR

KEY CONCEPTS:

Compare/contrast, observations, data collecting, map reading

COLORADO ACADEMIC STANDARDS:

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LOCATION:

Outdoors and indoors at school area

SUGGESTED TIME OF YEAR:

Any

GOAL:

In this session, students explore how the habitats surrounding their school have changed through the years and how this may influence their decision on building a wind farm in the area.

LEARNING OBJECTIVES:

- Students will examine the habitat surrounding their school site for animal signs.
- Students will revise the original proposal for City Council.
- Students will present their final decisions to City Council.
- Students will debate the final decision.

COMMON CORE:

- *Writing Standards #1:* Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- *Writing Standards #4:* Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- *Writing Standards #5:* With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.
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- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

- Aerial map of school grounds, large enough to hang on easel
- Topographical map of the area, as close to present-time as possible
- Historical topographical map of area
- Plastic overlay sheets

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LOCATION:

Outdoors and indoors at school area

SUGGESTED TIME OF YEAR:

Any

MATERIALS NEEDED: (CONT.)

- Xeroxed sheets for each group of topo map; detailed section of their school
- Clipboards with pencils attached for each group

ACTIVITY:

1. Review briefly with the students the lessons up to this point; the decisions made during the City Council role play, the results from mapping at the field site. Discuss if they think that mapping their school grounds will change their opinions of where, or if, the wind farm will be placed.
2. Several of the citizen's groups brought up their concerns regarding impacts on wildlife and the environment. This session's study will focus on those two concerns. The students will use maps of the area to highlight different habitats. Then they will go out into the field to look for sign of wildlife in the different habitats.
3. Have the students look at the aerial map and topographical map of their school grounds (this is easiest if they are hanging on a wall or easel). See if they can find noticeable landmarks such as roads, streams, buildings, etc. Discuss the different habitats found there (meadow, riparian, urban). Try to compare the aerial view with the topo map so they see the topo lines and images.
4. Bring out a map from 10 years ago. Hang this up next to the more modern map and ask the students if they notice any large changes from the two maps. Note if the number of structures has changed, the amount of open space, any other noticeable changes.
5. Each student will receive a Xeroxed topo map of the area immediately around the buildings (where they will be examining) on a clipboard and pencils. Discuss with the students the importance of good observation skills; walk slowly, look up and down, look in the shrubs and trees (not just at them) etc. They will be carefully following their maps as they note any habitat and animal signs on their maps. Again, review what signs they might see in the field.
6. The best way is to stay together as a group so everyone can see the findings and confirm them.
7. Gather them together in their classroom. Starting with the beginning of your trail, have the students state what they recorded along the trail. Record the student's findings on an overlay on the main topo map.
8. Have the students study the topo map with the overlay of all their information and discuss the habitats and wildlife signs they found. Discuss if the wildlife signs are clustered in any one area. Discuss if there are certain habitats that show more signs of wildlife than others.
9. From this discussion, ask them if they have any input on the proposed wind farm. Ask if their observations have changed their initial opinion of the wind farm. Discuss if they think they have enough information to be able to make a decision on whether this is a good site for the wind farm. Ask them what else could be done to become more informed.
10. Have the students gather into their previous citizen's groups and hand out their proposals written from an earlier lesson. The students should discuss whether



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LOCATION:

Outdoors and indoors at school area

SUGGESTED TIME OF YEAR:

Any

ACTIVITY: (CONT.)

their initial decision has changed according to the data they have collected from the two sites. They should rewrite their proposal to include the data in their new proposal, even if their viewpoint has not changed.

11. Give each citizen's group time to present their new proposals to the City Council. Allow time for questions and discussion from the audience.
12. Wrap up by asking the students if they changed their own personal point of view because of the presentations and discussions from each representative group.



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