Science 7: Did I do that?
The Relationship Between Humans and Their Environment

Overview

Students will view a series of short movies to acquire background information on sustainable development, land use simulators, Alberta's ecosystems and the effects of natural resource development in Alberta. Students will actively build upon this knowledge by using an interactive land use simulator to explore intended and unintended consequences of land use options. Students will apply their understanding of land use effects to build a sustainable land use strategy for Alberta. They will reflect on the intended and unintended consequences of land use, and evaluate how they can change their lifestyle to reduce the unintended consequences of land use.

Objectives

The students will:

- View short videos of the water, carbon, nitrogen and phosphorus cycle in relation to the cycling of all matter in the biosphere.
- Investigate the consequences of resource production, urbanization, and economic growth on environmental, societal and economic indicators.
- Examine the unintended negative environmental impact of as a result of resource production, urbanization and economic growth.
- Create a sustainable landuse plan for Alberta's future.
- Analyze their own lives for changes that can be made for a sustainable future.

Alberta Curriculum Links:

Alberta Tomorrow is an exciting, web-based educational resource that uses a land use simulator to instruct knowledge and STS connections (Table 1) for Grade 7 Science Unit A, Interactions and Ecosystems, and foster skill (Table 2) and attitude (Table 3) outcomes.

Knowledge and STS Outcomes *Students will*	Alberta Tomorrow Education Strategy *Students will*
1. Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions identify examples of human impacts on ecosystems, and investigate and analyze the link between these impacts and the human wants and needs that give rise to them; analyze personal and public decisions that involve consideration of environmental impacts, and identify needs for scientific knowledge that can inform those decisions;	Apply a land use simulator to identify how natural resource development affects Alberta's ecosystems. Students will reflect upon human wants and needs that give rise to natural resource development. Learn how simulation models inform land use planning. Apply a land use simulator to develop a land use strategy that balances economic development and environmental impacts.
2. Interpret the flow of energy and materials within an ecosystem	Learn how matter is recycled through the cycling of matter in the ecosystem

4. Describe the relationships among knowledge, decisions and actions in maintaining life-supporting environments	
identify intended and unintended consequences of human activities within local and global environments	Apply a land use simulator to identify the intended and unintended consequences of human activities in Alberta.
describe and interpret examples of scientific investigations that serve to inform environmental decision making	Learn how scientists build land use simulation models to inform land use planning.
illustrate, through examples, the limits of scientific and technological knowledge in making decisions about life-supporting environments	Learn that land use simulation models can not make exact predictions about the future effects of land use.
analyze a local environmental issue or problem based on evidence from a variety of sources, and identify possible actions and consequences	Use a land use simulator to develop a sustainable land use strategy that balances Alberta's needs for natural resource production and wildlife habitat.

Table 1: Knowledge and STS Outcomes taught by Alberta Tomorrow

Skill Outcomes *Students will*	Alberta Tomorrow Education Strategy *Students will*
Ask questions about the relationships between and among observable variables, and plan investigations to address those questions.	Predict the effects of land use on wildlife habitat and use a land use simulator to test the prediction.

Table 2: Skill Outcomes fostered by Alberta Tomorrow

Attitude Outcomes	Alberta Tomorrow Education Strategy
Interest in science	Interest to environmental research will be fostered by the opportunity to apply leading technology to investigate the environmental effects of land use.
Scientific Inquiry	Students will use a scientific tool (land use simulator) to answer the question: what is a sustainable land use strategy?
Stewardship	By using a land use simulator to "experience" the economic and environmental effects of land use, students will appreciate the need to balance economic and environmental values.

Table 3: Attitude Outcomes fostered by Alberta Tomorrow

ICT Curriculum Outcomes:

C.5 - Students will use technology to aid collaboration during inquiry.
Specific Outcomes
3.1access, retrieve and share information from electronic sources, such as common files
3.2use networks to brainstorm, plan and share ideas with group members

C.6 - Students will use technology to investigate and/or solve problems.
Specific Outcomes
3.4pose and test solutions to problems by using computer applications, such as computer-assisted design or simulation/modeling software

F.1 - Students will demonstrate an understanding of the nature of technology.
Specific Outcomes
3.8demonstrate an understanding that technology is a process, technique or tool used to alter human activity

Time to Complete
2-3 60-90 minute classes.

Materials
- This activity is internet based and therefore requires computers with an internet connection.
- Teachers can download the following from www.albertatomorrow.ca, in the "Dashboard" under "Teacher Resources"
    - Science 7 lesson plan and activity sheets
    - Presentation Marking Rubric

Procedure

Introduction

Alberta's landscape includes beautiful prairie, rugged mountains and forest ecosystems that provide wildlife habitat, clean water and other ecosystem services. It also provides us with great recreational opportunities. Our natural resources provide Alberta's with jobs and have resulted in a prosperous economy.

We use the land for many things and in many ways. Our activities result in intended consequences such as jobs and a healthy economy, but also unintended consequences on the environment. In Alberta, the forestry sector cut blocks and logging roads affect the ecosystem. Agriculture results in the loss of some native ecosystems and overuse of fertilizer can affect water quality. Roads, housing developments and electrical networks affect wildlife habitat. Oil and Gas Development affects the environment through the building of seismic lines, oil and gas pipelines, well sites and roads.

In Alberta, we need to strive to attain sustainable development. What does that mean? It means our actions today should not harm the health of ecosystems for future generations. How can we make decisions today to help achieve sustainable development?

Your students will use a land use simulator. Simulators help us to predict what the future affects of our activities today might be. This helps us to plan for the future.

- Go to www.albertatomorrow.ca, register as a teacher, create a class and have your students register under your teacher username name. Log in. Videos can be found on the left side of the screen.
- This activity is organized into four parts: A) viewing short background videos; B) using the land use simulator to learn about changes that have taken place in the past; C) creating a future land-use plan; and D) identifying how we can conserve natural resources in our daily lives and reduce the unintended consequences of our actions on the environment. Each part involves answering questions on the activity sheet.

Conclusion Questions:

1. List 5 unintended impacts on the environment as a result of human needs and wants.
2. Without tools like Alberta Tomorrow, would we be able to predict future environmental impacts?
3. Will the simulator always predict exactly what will happen in the future? Why or Why not?

Evaluation:
Download the marking rubric in the "Teacher Resources" in your "Dashboard".
The answer key can be used to evaluate the completed activity sheets

Extensions:

- Have mock stakeholder debate where each group represents a different stakeholder group. (Group roles can be found in the “Teacher Resources” section in the “Dashboard”)
- Design a “bio bottle” closed ecosystem. Have the students identify how the bio bottle functions like our environment.
- Have students create a poster board of their land use plan to be presented to the class.
- Brainstorm steps they can take to implement best practices and reduce their impact on the environment.
- Brainstorm steps the school can take to implement best practices and reduce the impact on the environment.
- Analyze the school’s energy consumption.
- Invite guest speakers to discuss Best Practices in industry
- Create “State-of-the-Landscape” video reports to be uploaded to www.albertatomorrow.ca
- Participate in a field trip to investigate land-uses taking place in your local area and to investigate water quality. (A field trip template can be found in the “Teacher Resources” in your “Dashboard”.

Answer Key:

What you will learn:

First you will watch videos to learn about land-use in Alberta. Next you will use a computer simulator to see past land-use changes. Finally, you will develop your own sustainable land-use plan for Alberta!

Part A – Land-use Videos

- Go to www.albertatomorrow.ca, click on "Student" and register under school and class. Please do not use your real name in your username (for privacy reasons). Record your username and password somewhere so you can reference it if you forget. Once you have created your account, log in. You will find the videos under **Videos** on the left-hand side.

1. Define Sustainable Development: This means our actions today should not harm the health of ecosystems for future generations.
2. *Watch the "Natural Landscapes" video.*
3. What region of Alberta do you live in? Answers will vary.
4. What type of land-use is present in your area? Answers will vary.
5. Why is native prairie important? 5/11 species at risk in Alberta live in native prairie.
6. *Watch the "Mammal Habitat video.*
7. How much woodland caribou habitat is left in Alberta? Half of what existed historically.
8. How does human disturbance affect caribou? Roads, pipelines, seismic lines, well sites and cutblocks increase the chances of caribou encountering humans and wolf. Caribou prefer large tracts of undisturbed older forest.
9. What are the factors that make Grizzly Bears populations so susceptible to decline? They have a low reproductive rate and don't reach breeding maturity until they are 5-7 years old. They breed only once every 3 or 4 years.
10. What can be done to help Grizzly Bear populations? Limit the possibilities of human/bear encounters by limiting development in Grizzly Bear habitat.
11. *Watch the "Fish Habitat" Video.*
12. What do fish populations need to thrive? Fish require adequate food, cover from predators, and the ability to reproduce.
13. How does human activity affect fish populations? The road network, as well as fishing pressure adversely affect fish populations.
14. *Watch the "Water Quality" Video.*
15. What is the unintended consequence of fertilizer application on lakes, rivers and ponds? Excess fertilizer runoff into lakes, rivers and ponds result in increased algae and plant growth. Once these plants die, they decompose, a process that uses up oxygen in the water. This can lead to fish kills and the gradual filling in of the water body, called eutrophication.
16. *Watch the "Water Consumption" Video.*
17. Why is water important to us? We need water to live, but our economy also relies on water.
18. *Watch the "Greenhouse Gas and Biotic Carbon Storage" Video.*
19. Describe the flow of carbon through an ecosystem. Carbon cycles between the living and non-living things in an ecosystem. Atmospheric carbon is taken in by plants in the process of photosynthesis. The animals eat the plants, and give off carbon through cellular respiration, and when they die and decompose. This carbon returns once again to the atmosphere.
20. *Watch the "GDP" and "Human Population" Videos*.
21. How does Alberta compare to the rest of Canada? Alberta has a higher GDP and population growth than any other province in Canada.
22. *Watch the following three videos: "Oil and Gas Production", "Forestry", and "Agriculture Production" Videos*
23. For each type of natural resource production describe the benefit to Albertans.
    a. oil and gas

The industry provides us with gasoline, natural gas, nylon plastic, As well, the provincial government collects royalties from companies. That collected money goes to pay for things like education and healthcare. 7/100 jobs in Alberta are related to the oil and gas industry.

b. Forestry
The forestry industry produce timber, pulp and paper. 2/100 jobs in Alberta is related to the forestry industry, and the industry provides money to the provincial government.

c. Agriculture
3/100 jobs in Alberta are related to Agriculture. Agriculture contributes to Alberta's GDP and provides you and I with food!

24. For each type of natural resource production describe the environmental liabilities.
    a. oil and gas
    Ecosystems are disturbed to locate and extract oil and gas. Roads and seismic lines fragment wildlife habitat, making it less suitable for certain species. The industry uses large amounts of water.
    b. Forestry
    Forestry reduces the area of old growth forests which are reservoirs of biotic carbon. Forestry roads further fragment wildlife habitat.
    c. Agriculture
    Agriculture uses large amounts of water. Runoff from Agricultural practices impact surface water quality. Cows release large amounts of methane gas, a greenhouse gas. Tillage of fields also adds carbon to the atmosphere.
25. *Watch the "Best Practices" video.*
26. What do best practices do?
    Best practices lower our impact on ecosystems.
27. List some of the best practices currently being used in Alberta.
    Integrated resource management reduces the number of roads needed. Low tillage farming, and careful fertilizer application reduces the amount of nutrient runoff from farmlands. Some basic best practices are driving less, using renewable energy, and conserving energy and water at work, school, and home.

Part B – Land-Use Assessment
In this step, you will use the land use simulator to see the effects multiple land-uses have had on environmental indicators in the past.

1. *Click on "Explore". Zoom in and find your school, or house. Click on the green "+ Scenario" button at the top. Click on "Create New Scenario" Create a "Historic" scenario for your watershed. Click on your desired watershed. You may look at sub-watersheds also. Once you have chosen your study area, click "Run Scenario".*

2. What watershed do you live within?

Watersheds are the sum of the streams that gather from heights of land and flow into a common water basin. Sometimes called catchment basins, watersheds are made up of many sub-basins, or tributary basins

I live within the _____ drainage basin, the _____watershed and the _____ sub watershed (s)

Where does the water in your watershed begin? Can you tell through which river the water in your watershed leaves the province?

Can you tell what ocean that water will eventually drain into?

3. How did the environmental indicators change from 1910-2020?
   a. Natural landscapes?
      ANSWERS WILL VARY DEPENDING ON THE AREA OF ALBERTA YOU ARE IN.
   b. Mammal habitat?
      _____
      _____
   c. Fish habitat?
      _____
      _____
   d. Water Quality?
      _____
      _____
   e. Biotic Carbon?
      _____
      _____
   f. Greenhouse Gas emissions?
      _____
      _____

4. How did the socio-economic indicators change from 1910-2020?
   a. Human Population?
      _____
      _____
   b. GDP?
      _____
      _____
   c. Water Consumption?
      _____
      _____
   d. Forestry?
      _____
      _____
   e. Agriculture?

_____
_____

f. Hydrocarbon production?

_____
_____

5. What happened to the area of
   a. Grasslands:_____
   b. Wetlands:_____
   c. Forest:_____
   d. Urban Development:_____
   e. Agriculture:_____
   f.
6. *Click "+scenario". This time, choose "Business as Usual"*
7. How did the environmental indicators change from 2020-2050?
   a. Natural landscapes?

      _____
      _____

   b. Mammal habitat?

      _____
      _____

   c. Fish habitat?

      _____
      _____

   d. Water Quality?

      _____
      _____

   e. Biotic Carbon?

      _____
      _____

   f. Greenhouse Gas emissions?

      _____
      _____

8. How did the socio-economic indicators change from 2020-2050?
   a. Human Population?

      _____
      _____

   b. GDP?

      _____
      _____

   c. Water Consumption?

      _____
      _____

   d. Forestry?

      _____
      _____

   e. Agriculture?

      _____
      _____

   f. Hydrocarbon production?

      _____
      _____

9. What happened to the area of
   a. Grasslands:_____
   b. Wetlands:_____
   c. Forest:_____
   d. Urban Development:_____

e. Agriculture:_____

Part C: Future Land-Use Planning

1. *Click on "Create New Scenario" Choose "Landuse"*

2. *Choose your study area, and then click "Next" (Remember, the smaller the study area the harder it is to see change.)*

3. *You are seeing the current land use.*

4. *What you see on the indicator dials are the levels as of 2020. Your first job is to set goals for 30 years from now. Move the goal slider to where you want the indicator to be in the year 2050. (if you are unsure of what the indicator is measuring, click on it and watch the video) Remember to set realistic goals.*

5. *Click "Next" You will now decide how you will reach your goals by changing the landscape.*
6. *Click on "changes"*
7. *7.Choose the landscape type or landuse you wish to add in the future and click the location where you want it to grow.*
   a. *ie, if you want to have more grassland in the future, click on the yellow grassland icon and then click on the map where you want to increase grasslands in the future.*
   b. *Remember, the simulator will only allow that change to be made if it is possible to change the current landscape type/landuse to what you want.*

8. *You may choose to adjust the level of Industrial Activity, which beneficial management practices you want to use, and which Climate Change scenario you wish to see, or save this step for later and click "Next". Click "Run Scenario" and then click "Play"*

9. *Record whether you reached your goals or not (the goal dot will be green if you reached your goal, yellow if you got close, and red if you didn't reach your goal.)*

10. *Now click on Management Practices. Watch the management practice video. You must decide on how much industrial activity you want in the study area and what management practices you wish to use from this year on.*

11. Move the Industrial Activity slider to the level you wish to see moving into the future. Record your level. _____

12. Choose which Management Practices you wish to use.

13. If you still have not reached your goals, you can go back and change your goals by clicking on individual goals, or go back and make more changes to the landscape by clicking on landscape changes.

1. Did you reach your goals? If not, why not?

_____
_____
_____

2. As a result of drawing more native grasslands or forested area, what was the effect on

   a. Biotic carbon storage?

   b. Greenhouse gas emissions?

   c. Agricultural production?

   d. Human Population Growth?

   e. *Other?*

3. *What were the unintended consequences of increasing the percentage of natural landscapes?*

_____
_____
_____

4. *Are you happy with the results? If not, you can lower your natural landscapes goal, or continue to re-draw your future map. Remember that everything is related, so changing one aspect of your plan with affect many other. It is your job to come up with a plan that achieves your goals, and is sustainable!*

Part D: Conclusion Questions:

1. An **intended consequence** of natural resource development is to produce things that we use like timber, oil and gas, and food. An **unintended consequence** of natural resource development is reduction of wildlife habitat. An intended consequence of increasing natural resource production is that more oil and gas is produced. An unintended consequence of increasing natural resource production is that there is less caribou habitat. Describe one other unintended consequence of increasing natural resource production.

The student may answer that an unintended consequence is: green house gas emissions rise, or prairie habitat decreased, etc.

2. A land use tradeoff occurs when decreasing one land use goal makes it easier to achieve another land use goal. For example, decreasing hydrocarbon production makes it easier to achieve the greenhouse gas emissions goal. Describe one other land use tradeoff that you discovered while building your sustainable land use plan.

Answer: The student should describe how decreasing one land use goal helped achieve another land use goal.

3. What were the biggest changes in land-use your local area saw over the past 125 years?

Answer: The student should describe the loss of native prairie and forested area and the increase in urban development and agriculture.

4. What was the effect on environmental and socio-economic indicators as a result of past land-use changes?

Answer: The student should describe the changes all indicators.

5. Was making a land-use plan for the future easy? What was the hardest part?

Answer: The student should describe how changing one thing affects many other and it is difficult to come up with a plan that maximizes everything you want to have, and minimizes everything you don't want.

6. Explain

a. 1 way that you can conserve the amount of wood or paper products that you use.

b. 1 way that you can conserve the amount of oil or gas that you use.

c. 1way that you can conserve the amount of water that you use.

Answer: The student should describe how they can reduce their consumption.

Alternative Teaching Strategy

Part B challenges students to apply their new understanding of land use to develop their own sustainable land use strategy. An alternative way to challenge students to apply what they have learned is through role playing. In role playing, the class is divided into groups. Each group has a particular land use goal. The goals of each group are as follows:

Forestry Company Goal: harvest as much timber as possible today and in the future

Oil and Gas Company Goal: produce as much oil and gas as possible today and in the future

Farming Association Goal: produce as much crops and livestock as possible today and in the future

Environmental Organization: maintain as much carbon storage as possible to help reduce the effects of climate change

Fishing Association: keep phosphorous runoff as low as possible to improve the quality of fisheries

Water Stewardship Group: protect watersheds from development and contamination in order to preserve water quality and ensure adequate water quantities for citizens.

Wildlife Conservation Group: minimize linear features on the landscape from forestry, hydrocarbon production, and human settlement to maximize grizzly bear and caribou populations.

Each group is tasked with using the land use simulation model to develop a land use plan that achieves their goal. Each group presents their land use plan to the class, saying why their land use plan is a good idea.

Following the presentations, you can guide the class through a discussion where the goal is to identify a land use plan that satisfies all groups. For the discussion, you can present yourself as the government, and say that your goal is to identify a land use plan that balances all of their goals. You can use the land use simulation tool during the class discussion to try solutions (land use strategies) that are suggested by students.

Role playing with Alberta Tomorrow will help students to learn that land use decisions involve tradeoffs. For example, maintaining as much carbon storage as possible reduces the amount of natural resource production that can be achieved. Role playing also mimics how land use planning occurs in real life. Different groups each have their own goals that they want met. The government's role is to identify a land use strategy that balances these goals.

Student Worksheet

What you will learn:
First you will watch videos to learn about land-use in Alberta. Next you will use a computer simulator to see past land-use changes and finally you will develop your own sustainable land-use plan for Alberta!

Part A – Land-use Videos

- Go to www.albertatomorrow.ca, click on "Student" and register under school and class. Please do not use your real name in your username (for privacy reasons). Record your username and password somewhere so you can reference it if you forget. Once you have created your account, log in. You will find the videos under **Videos** on the left-hand side.

1. Define Sustainable Development:

2. *Watch the "Natural Landscapes" video.*
3. What region of Alberta do you live in?

4. What type of land-use is present in your area?

5. Why is native prairie important?

6. *Watch the "Mammal Habitat" video.*
7. How much woodland caribou habitat is left in Alberta?

8. How does human disturbance affect caribou?

9. What are the factors that make Grizzly Bears populations so susceptible to decline?

10. What can be done to help Grizzly Bear populations?

11. *Watch the "Fish Habitat" Video.*
12. What do fish populations need to thrive?

13. How does human activity affect fish populations?

14. *Watch the "Water Quality" Video.*
15. What is the unintended consequence of fertilizer application on lakes, rivers and ponds?

16. *Watch the "Water Consumption" Video.*
17. Why is water important to us?

18. *Watch the "Greenhouse Gas and Biotic Carbon Storage" Video.*
19. Describe the flow of carbon through an ecosystem.

20. *Watch the "GDP" and "Human Population" Videos*.
21. How does Alberta compare to the rest of Canada?

22. *Watch the following three videos: "Oil and Gas Production", "Forestry", and "Agriculture Production" Videos*
23. For each type of natural resource production describe the benefit to Albertans.
    a. oil and gas

    b. Forestry

c. Agriculture

24. For each type of natural resource production describe the environmental liabilities.
    a. oil and gas

    b. Forestry

    c. Agriculture

25. Watch the "Best Practices" video.
26. What do best practices do?

27. List some of the best practices currently being used in Alberta.

Part B – Land-Use Assessment
In this step, you will use the land use simulator to see the effects multiple land-uses have had on environmental indicators in the past.

1. *Click on "Explore". Zoom in and find your school, or house. Click on the green "+ Scenario" button at the top. Click on "Create New Scenario" Create a "Historic" scenario for your watershed. Click on your desired watershed. You may look at sub-watersheds also. Once you have chosen your study area, click "Run Scenario".*

2. What watershed do you live within?

Watersheds are the sum of the streams that gather from heights of land and flow into a common water basin. Sometimes called catchment basins, watersheds are made up of many sub-basins, or tributary basins

I live within the _____ drainage basin, the _____watershed and the _____ sub watershed (s)

Where does the water in your watershed begin? Can you tell through which river the water in your watershed leaves the province?

Can you tell what ocean that water will eventually drain into?

3. How did the environmental indicators change from 1910-2020?
   a. Natural landscapes?

   b. Mammal habitat?

   c. Fish habitat?

   d. Water Quality?

e. Biotic Carbon?

f. Greenhouse Gas emissions?

4. How did the socio-economic indicators change from 1910-2020?
    a. Human Population?

    b. GDP?

    c. Water Consumption?

    d. Forestry?

    e. Agriculture?

    f. Hydrocarbon production?

5. What happened to the area of
    a. Grasslands:
    b. Wetlands:
    c. Forest:
    d. Urban Development:
    e. Agriculture:

6. *Click "+scenario". This time, choose "Business as Usual"*
7. How did the environmental indicators change from 2020-2050?
    a. Natural landscapes?

    b. Mammal habitat?

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    c. Water Consumption?

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9. What happened to the area of
    a. Grasslands:
    b. Wetlands:
    c. Forest:
    d. Urban Development:
    e. Agriculture:

Part C: Future Land-Use Planning

14. *Click on "Create New Scenario" Choose "Landuse"*

15. *Choose your study area, and then click "Next" (Remember, the smaller the study area the harder it is to see change.)*

16. *You are seeing the current land use.*

17. *What you see on the indicator dials are the levels as of 2020. Your first job is to set goals for 30 years from now. Move the goal slider to where you want the indicator to be in the year 2050. (if you are unsure of what the indicator is measuring, click on it and watch the video) Remember to set realistic goals.*

18. *Click "Next" You will now decide how you will reach your goals by changing the landscape.*
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21. *You may choose to adjust the level of Industrial Activity, which beneficial management practices you want to use, and which Climate Change scenario you wish to see, or save this step for later and click "Next". Click "Run Scenario" and then click "Play"*

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23. *Now click on Management Practices. Watch the management practice video. You must decide on how much industrial activity you want in the study area and what management practices you wish to use from this year on.*

24. Move the Industrial Activity slider to the level you wish to see moving into the future. Record your level. _____

25. Choose which Management Practices you wish to use.

26. If you still have not reached your goals, you can go back and change your goals by clicking on individual goals, or go back and make more changes to the landscape by clicking on landscape changes.

5. Did you reach your goals? If not, why not?

10. As a result of drawing more native grasslands or forested area, what was the effect on

a. Biotic carbon storage?

b. Greenhouse gas emissions?

c. Agricultural production?

d. Human Population Growth?

e. Other?

11. What were the unintended consequences of increasing the percentage of natural landscapes?

12. Are you happy with the results? If not, you can lower your natural landscapes goal, or continue to re-draw your future map. Remember that everything is related, so changing one aspect of your plan with affect many other. It is your job to come up with a plan that achieves your goals, and is sustainable!

Part D: Conclusion Questions:

1.An **intended consequence** of natural resource development is to produce things that we use like timber, oil and gas, and food. An **unintended consequence** of natural resource development is reduction of wildlife habitat. An intended consequence of increasing natural resource production is that more oil and gas is produced. An unintended consequence of increasing natural resource production is that there is less caribou habitat. Describe one other unintended consequence of increasing natural resource production.

2. A land use tradeoff occurs when decreasing one land use goal makes it easier to achieve another land use goal. For example, decreasing hydrocarbon production makes it easier to achieve the greenhouse gas emissions goal. Describe one other land use tradeoff that you discovered while building your sustainable land use plan.

3. What were the biggest changes in land-use your local area saw over the past 125 years?

4. What was the effect on environmental and socio-economic indicators as a result of past land-use changes?

5. Was making a land-use plan for the future easy? What was the hardest part?

6. Explain

a. 1 way that you can conserve the amount of wood or paper products that you use.

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