



Answers

Sc and SS Middle Elementary

Do we Do That?

To investigate our relationship with our environment.

PART 1 What is land-use?

- 2) Watch “Introduction” under the “*Tutorials. How to.*” in the video tab or view the video at <https://www.youtube.com/watch?v=g4VfAc16l9w&t=3s>
- a. Give examples of human land-use and explain, in general, their impacts on the land and ecosystems
i.e. Forestry, human settlement, agriculture, mining, transportation, ...
General impacts – change ecosystems, habitats, natural landscapes, how water moves
 - b. Based on the video examples, list four human land use activities found in your communities.
Answers will vary depending on region. Examples - roads, malls, housing developments, hotels, farming (agriculture), powerlines (energy), mines, tourism/ recreational uses – skiing, hiking/biking, golf courses, ..
 - c. What could the land look like in the future?
 - i. What has happened to BC’s population in the last 100 years?
179 000 in 1901; population has increased 26X now over 4.6 million
 - ii. When population rises, what happens to natural resource extraction and the landscapes?
The rate of extraction of natural resources goes up and there is an increase in the rate of disturbance to ecosystems, habitats, water movement and natural landscapes
 - iii. What does Sustainable development mean?
Development that helps us meet the needs of the present, without compromising the ability of future generations to meet their own needs. It’s part of BC’s motto – “Splendor without diminishment”
 - iv. What does the narrator mean when she says land-use produces positive and negative effects?
Positive effect: natural resource production
Negative effects: disturbing wildlife habitat, negatively impacting water in watersheds.
 - v. How does the narrator suggest we can we achieve sustainable development in BC?
Carefully plan land use to find the best balance of positive and negative effects including the cumulative effects of all the other land uses (not just a single land use in isolation) including those from the past AND mother nature.
 - vi. Do modelling tools like BC Tomorrow **actually** predict the future?
No, models do not actually predict the future. Instead, they allow us to run a range of scenarios and explore different land use options and the potential future impacts on ecosystems, economies and societies.
- 3) What are watersheds? Watch the “Watersheds” video under the “*Understanding the landscape*” in the video tab
- a) How does water move in a watershed?
Water either flows on top of the land or seeps into the ground and flows downhill. On its journey, water might be stored in lakes or remain in underground aquifers. Ultimately all water drains down through watersheds into the ocean. They can be small like streams or large like entire basins!



b) Why are watersheds important?

Watersheds are important because they supply us with drinking water, water for agriculture and manufacturing, offer recreational opportunities, and provide habitat and ecosystems for all the plants and animals that live in the watersheds

c) What are some of the services performed by healthy functioning, intact watersheds?

They provide food and fiber for animals (including humans), create diverse landscapes and habitats and sediment is moved and sorted, cycle nutrients (such as nitrogen, phosphorous, calcium, ...), and clean, purify and store water – helping to reduce flood damage, and help to clean the air and store greenhouse gases.

d) How do human land use activities impact the movement of water in local watersheds?

Human activity disrupts waters natural cycles of distributing nutrients and creating habitats. Human land-use activities speed up the movement of water through watersheds – roads and/or ditches collect and concentrate water increasing the flow rate which alters the flood risk or the movement of nutrients. Impermeable surfaces like roads, parking lots or human developments (roofs on buildings) prevent water from seeping into the ground. Dams or reservoirs alter the flow of water through a watershed.

PART 2 – How has my Watershed changed?

Becoming an advocate for something means becoming an expert. The BC Tomorrow simulator will help you learn more about your watershed.

1) Go to the dashboard area on the left and choose “Scenarios.”

- Click “*Create a new Scenario*.” Choose the **Historic Scenario**.
- **Find your watershed.** You can click all the way down to your sub watershed. In more remote areas larger watersheds often show more change.
- Provide a title, click “**Run Scenario**”
 - **Definition:** 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.
 - Smaller Watersheds drain into larger watersheds; ultimately all water drains into the ocean. In BC, most watersheds drain to the Pacific Ocean. In the north, watersheds may drain to the Bering Sea via the Yukon River, or the Arctic Ocean, via Great Slave Lake and the Mackenzie River.

a) What watershed do you live within? I live within:

- the Pacific drainage basin,
- the Thompson watershed and,
- the Shuswap sub watershed (s)

b) List some of the dominant distinguishing feature in your watershed (natural and human) are. For example: Parks, Towns, Mountains, Rivers, deltas, cities, desert, grasslands, plateaus

Monashee provincial park, Lakes – Mabel and Sugar, SilverStar ski resort, Enderby, Armstrong (parts of).

c) Has my watershed always looked like it does today?



The colors on the map represent landscape/land use as follows:

Landscape Type/ Land use	Color
Agriculture	Orange/Red
Natural Grassland	Yellow
Water	Blue
Wetland	Light Green
Forest	Dark Green
Human Settlement	Purple
Energy	Grey
Alpine and Exposed	White

- i. Press the **PLAY** button. Watch the landscape change as the years go by. List the top 3 changes you see occurring on the map:

Answers will vary depending on location

- ii. Examine relationships while the simulator runs. Some relationships you might see:
- “As human population goes up, water quality goes down,” or
 - “As natural landscape goes down, GDP goes up.”
 - “As Timber production goes up, natural landscapes go down”

With the dials on the top right (indicators), complete the following observations: **For example:**

- when natural landscapes went down **grizzly habitat went down**
- when Timber production went up **GDP went up**
- when Agriculture went up **water quality went down**

- iii. Develop three of your own relationships you observe in the simulator:

Answers will vary depending on location

PART 3 – What could our Watershed look like when I get older?

The Business as Usual (BAU) is what the landscape **could** look like if we keep doing what we’re doing and don’t make changes.

- a. Go back to the dashboard; choose “*Create a new Scenario*”
- Choose the **Business as Usual** Scenario.
 - Again, find a (your) Watershed and click “*Run Scenario*”
 - Press **PLAY**.



b. Watch the indicators and the landscape/land use changes into the future. Complete the Chart 1
 Use the data - answers will vary depending on location

CHART 1: Landscape/Land use Area	2020 (Ha)	2050 (Ha)	Trend (increase/decrease)
Agriculture			
Grassland			
Water			
Wetlands			
Forests			
Urban Area			
Industry			
Alpine			

c. What are the trends predicted for the indicators? Complete chart 2.
 Use the data – again, answers will vary depending on location however, there are some general trends

CHART 2: Indicator Dials	2020 (%)	2050 (%)	Trend (increase/decrease)
Environmental Indicators			
Natural Landscape			Likely decrease
Grizzly Habitat			Likely decrease
Fish Habitat			Likely decrease
Water Quality			Likely decrease
Biotic Carbon Storage			Likely decrease
Greenhouse Gases			Likely increase
Socio-Economic Indicators			
Population			Likely increase
GDP			Likely increase
Energy			Likely increase
Timber Production			Likely increase
Agricultural Production			Likely increase
Water Consumption			Likely increase



- d. Do you have concerns about the land use and/or indicator trends you observe? If so, what would you like to change, so that, when you become older, things could look different?

Answers will vary depending on student values. This is a good entry place for discussion, collaboration and prioritization of trends deemed important to the whole region. It could be where students start to get exposed to trade-offs critical thinking and compromise.

PART 4 - Land Use planning. Decide how you think your watershed should look and make a plan to achieve your goals.

IT'S YOUR FUTURE. SEE WHAT YOU CAN DO!

- 1) You come up with an idea or plan (hypothesis), then you
- 2) run a test (experiment – gather data). Next you
- 3) evaluate the data (use indicators), and then
- 4) adjust your hypothesis/make changes to your plan/experiment, and finally
- 5) run more tests and repeat the process.

The more tests you run, the more confident you can feel about your hypothesis.

- Create *NEW SCENARIO*. Choose “**LAND USE**” find your watershed/study area. Describe the scenario - hit “**NEXT.**”
- Select **GOALS** - Set Environmental and Socio-Economic indicator goals. Are your goals realistic? Click “**NEXT.**”
- Come up with a plan for your area that you think will achieve your goals. Select **CHANGES**.
 - Here you “select” the land use type and place a pin in a suitable location. Place pins where you want things to change.
 - For example, if you want to change the forests, place a *forests pin* in a suitable location and use the slider to allocate the land-use for your study area.
 - Use **logic** when placing pins. For example, human settlement will not have much of an impact on the indicators if you put it in a lake or at the top of a mountain!
 - Select other land-uses; place pins in suitable areas and adjust the sliders.
- *RUN SCENARIO*. See how your ideas worked relative to your goals.
- *EDIT* your scenario. Adjust your plan and re-run your scenario. The more scenarios you run, the more confident you can feel about your hypothesis.

Conclusions:

- a. Describe your plan. What were you trying to achieve? Were you able to achieve your goals?

Answers will vary, generally however, student plans should attempt to balance liabilities and benefits – even if they advocate for a specific sector, most will realize the different parts of the system need to be maintained for the benefit of the community.

- b. Did you have to make changes to your goals or how were you able to make your plan work?

Students may have to make trade-offs (adjust their goals). Encouraging students to share their plans with others helps provide new ideas and increases awareness of the interconnectedness of the different parts of the system.

- c. For First Nations people, the concept of “Interconnectedness” is a core world view. In general, this mindset centers toward a fundamental belief that everything in the universe is connected. This all-encompassing world view embraces the idea that people are tightly connected to their communities, to their ancestors, to future generations, to the lands, and to all of the animals, plants and even inanimate objects that reside on these lands.

- For more information, please see <http://www.llss.sd73.bc.ca/clark/flyfishing/interconnectedness.pdf>



How is BC Tomorrow's simulator consistent with First Nations Interconnectedness view?

In BC Tomorrow, when one part of the system, other parts are affected – therefore they are interconnected. If we want to sustain the parts of the system (i.e. habitats, water quality, GDP, natural landscapes) for future generations, all the different human land-uses plus those that have occurred in the past need to be included in the decision making process.

d. What differences are there between your plan and the Business-as-usual scenarios? Provide examples.

Students should notice, during business-as-usual scenario, trends occurred, and their aim was to address the trends during their planning. This question should align with the chart in the BAU section

e. After using BC Tomorrow, describe three things that surprised you or made an impression that you would like to share with others.

Answers will vary.

- Typically, students are quite taken by the time machine aspect; Interconnectedness – when trying to fix one area, other parts are also impacted, how difficult it is to achieve a balance; how much a specific land use affected the indicators, ...
- tools like BC Tomorrow are helpful for planning.
- Student ideas and solutions can be presented to authorities such as municipalities, regional districts, water boards, or band councils via youth councils or student initiatives.
- **Go on a Quest!** See achievements on the main dashboard.