Human-Environmental Interactions ENV1600-001

Class 14: Thurs, Oct 24, 2019

With special guest, Dr. Jonathon Luedee

1

Today's topics

Water resources: The state of Lake Winnipeg

2

Learning objectives

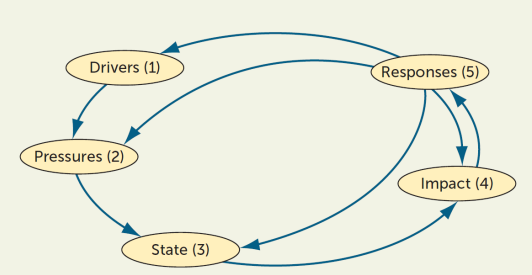
- After this part of the class you should be able to:

1. Describe the state of Lake Winnipeg, referring to drivers, pressures, state changes, impacts and responses

3

Recall the DPSIR framework

- Helps analyze causal connections among factors of environmental change



- Here is a recap with climate change examples

4

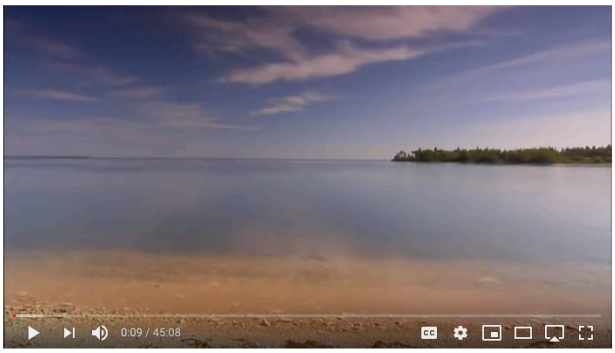
1. Drivers: Underlying social, demographic, and economic forces causing environmental change
   - Climate change ex: economic growth, increased consumption of fossil fuels
2. Pressures on the environment resulting from the drivers
   - Climate change ex: air pollution from production and combustion of fossil fuels
3. State changes: Physical, biological and chemical changes in the state of a particular environment
   - Climate change ex: increased atmospheric CO_2 levels and global temperatures

5

4. Social-ecological impacts arising from state changes
   - Climate change ex: northern range shifts in pest species, more severe hurricanes
5. Responses: Policy, management, scientific and other responses to the foregoing problems
   - Climate change ex: carbon tax to reduce fossil fuel consumption, laws restricting coastal development

6

The Nature of Things - Save My Lake

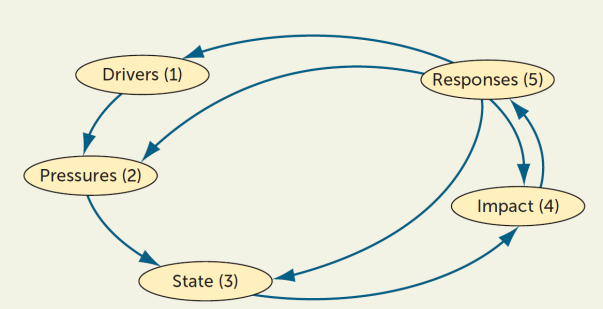


https://www.youtube.com/watch?v=-eaUihTvwyI

7

DPSIR appraisal

- Based on the video let's do a rapid DPSIR appraisal of the state of Lake Winnipeg



8

Drivers: Underlying social, demographic, and economic forces causing environmental change

- Population growth on the prairies
- Climate change
- Modernization/ intensification of agriculture
- Demand for hydro electricity
- Growth in hydro electricity sales
- Urbanization/ suburbanization

9

Pressures on the environment resulting from the drivers

- Jenpeg dam on the Nelson River; stabilized lake levels
- Draining of potholes, marshes and other wetlands
- More frequent large floods
- Increased annual spring runoff
- Increased application and runoff of fertilizers
- Growing numbers of hogs and other livestock

10

State changes: Physical, biological and chemical changes in the state of a particular environment

- Increased nutrient and contaminant concentrations
- More frequent and bigger algal blooms
- Increased algal toxins
- Growing numbers of aerobic bacteria
- Lower O_2 in bottom waters
- More big fish

11

Social-ecological impacts arising from state indicators

- Increased fish catches (initially)
- Potential reduced catches
- Potential health impacts of algal toxins on humans and domesticated animals
- Reduced property values
- Reduced enjoyment from aesthetics, leisure and adventure
- Reduced tourism activities

12

Responses: management and scientific responses to these problems

- New agricultural practices, e.g., direct injection of manure
- More fluctuation in lake levels (and learn from the results)
- Other research, e.g., extent of hypoxic zones, influx of contaminants, levels of contaminants and algal toxins
- Reclaim and create wetlands, e.g., micro marshes, to increase take up of nutrients
- Encourage cattail growth and harvesting to sequester and remove P