# Chapter 1: Environment, Resources, and Society

# Defining Environment and Resources

- The **environment** is the combination of the atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere in which humans, other living species, and non-animate phenomena exist
- **Resources** are more specific and are normally thought of as such things as forests, wildlife, oceans, rivers and lakes, and minerals and petroleum

# Examples of Resource Perspectives

- **Anthropocentric view** – when value is defined relative to human interests, wants, and needs
- **Ecocentric or biocentric view** – a contrasting view in which resources are seen as existing independently of human wants and needs

# Alternative Approaches to Understanding Complex Natural and Socio-economic Systems

- *Disciplinary*
  - This approach is organized around the concepts, theories, assumptions, and methods associated with an academic discipline
- *Multidisciplinary*
  - Different specialists examine an issue from their disciplinary perspectives, then provide reports, which are submitted to a person or group, who then draws upon them to synthesize the findings and insights

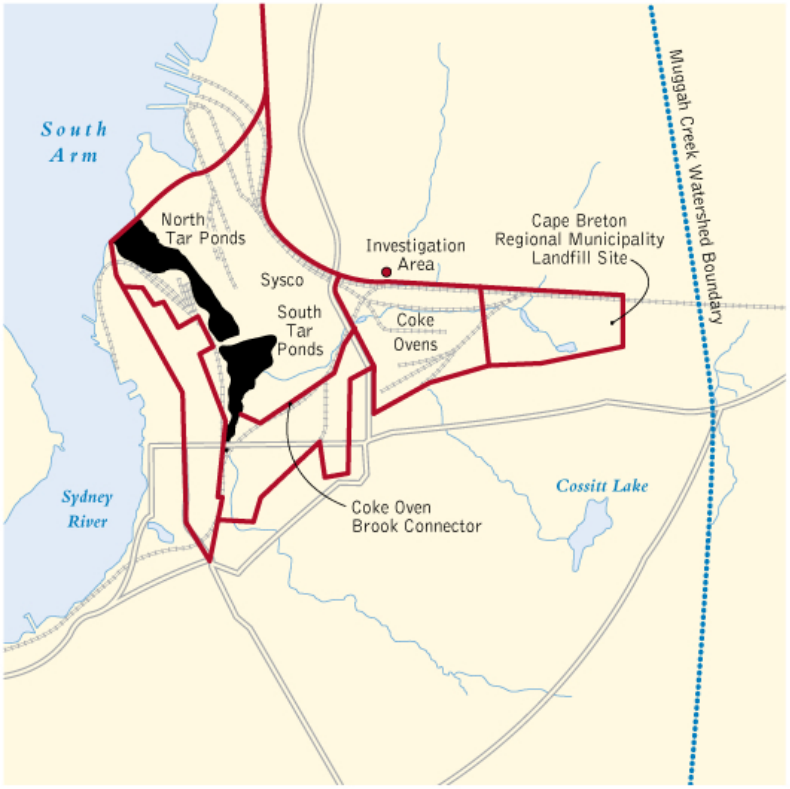
- *Cross-disciplinary*
  - A disciplinary specialist ‘crosses’ the boundaries of other disciplines and borrows concepts, theories, methods, and findings to enhance his or her disciplinary perspective
- *Interdisciplinary*
  - Involve disciplinary specialists crossing other disciplinary boundaries and interacting with other specialists from the beginning of a project

# Science-Based Management of Resources and Environment

Guidelines:

1. Focus the science on key issues, and communicate it in a policy-relevant form
2. Use scientific information to clarify issues, identify potential management options, and estimate consequences of actions
3. Clearly and simply communicate key scientific findings to all participants
4. Evaluate whether or not the final decision is consistent with scientific information
5. Avoid advocacy of any particular solution


# Case Study: The Sydney Tar Ponds

1987 – Coke ovens and quenching plant (left), coal pocket and batteries between exhaust stacks, conveyor leading to blending plant. By-products building is large brick structure (foreground)

(Photo: G. Langille)


The outcome (tar ponds) was a chemical and bacteria-laden river system, including the estuary full of contaminated sediments. Federal officials refer to this 2 km stretch as the largest chemical waste site in Canada

(left) Incinerator plant (2003)

# Critical Human Pollutants

- Polycyclic Aromatic Hydrocarbons (PAHs)
  - a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat

- Polychlorinated Biphenyl (PCBs)
  - Any of a class of highly stable organic compounds prepared by the reaction of chlorine with biphenyl, a two-ring compound. They have entered the environment through both use and disposal

# Human Health Affects

- Cancer rates far above national average and higher than in nearby Glace Bay & New and New Waterford
- Cervical cancer in women 134% higher than the provincial rate
- All cancers in men and women are higher (brain cancer, breast cancer, stomach cancer,
  lung cancer, salivary cancer
- Alzheimer's, multiple sclerosis,
  heart disease and birth defects
  all much higher


(May and Barlow, 2001)

# Problems When Science is Not Used to Inform Decisions

- Basic science was not used when arrangements were made for the raw materials for the steel mill
- This pattern continued when efforts began to address the industrial pollution in the tar ponds
- In April 1984, the consulting firm Acres International received a contract to determine the scope of the pollution and recommend options
- The government chose to remove the sludge and incinerate it, but this process was delayed by discovery of a PCB ‘hot spot’ in the south tar pond and other factors

- Lessons from the Sydney Tar Ponds:
  - When basic science is not used from the start to inform policy decisions related to environmental issues, there is a good chance that money will not be allocated to effective solutions
  - Even when science is used, understanding can be incomplete, and decisions will have to be made in the face of uncertainty
  - Local stakeholders are important – without their support, there likely will be challenges to the proposed solutions

# Sustainable Developments and Sustainable Livelihoods

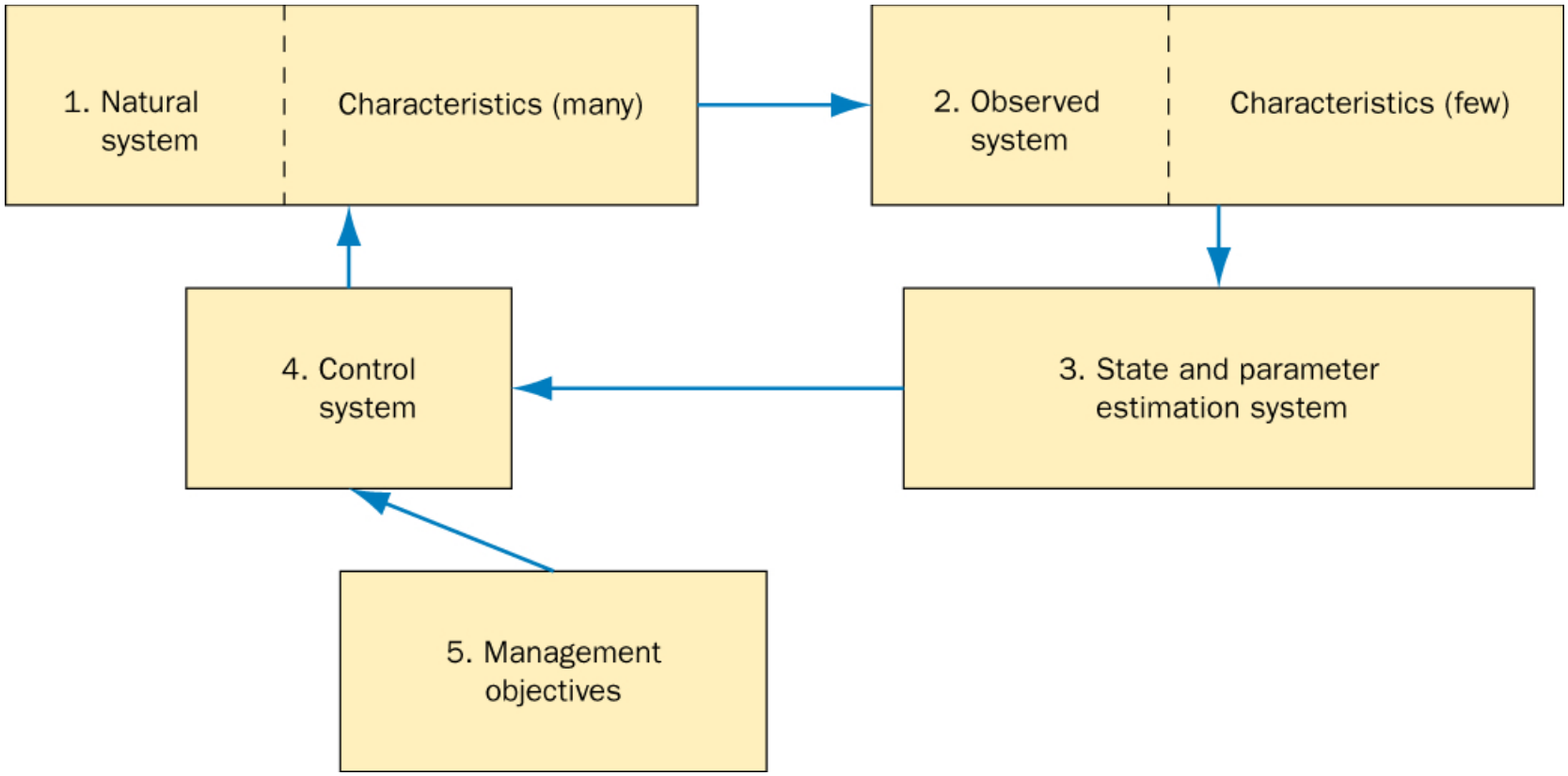
- Sustainable development involves 3 strategic aspects:
  - It represents a *philosophy* in that it presents a vision or direction regarding the nature of future societies
  - As a *process*, it emphasizes a system of governance and management characterized by openness, transparency, decentralization, and accessibility
  - As a *product* related to specific places or resource sectors, sustainable development aims to ensure that economic, environmental, and social aspects are considered together and that trade-offs are made in a way that is visible and transparent to those affected

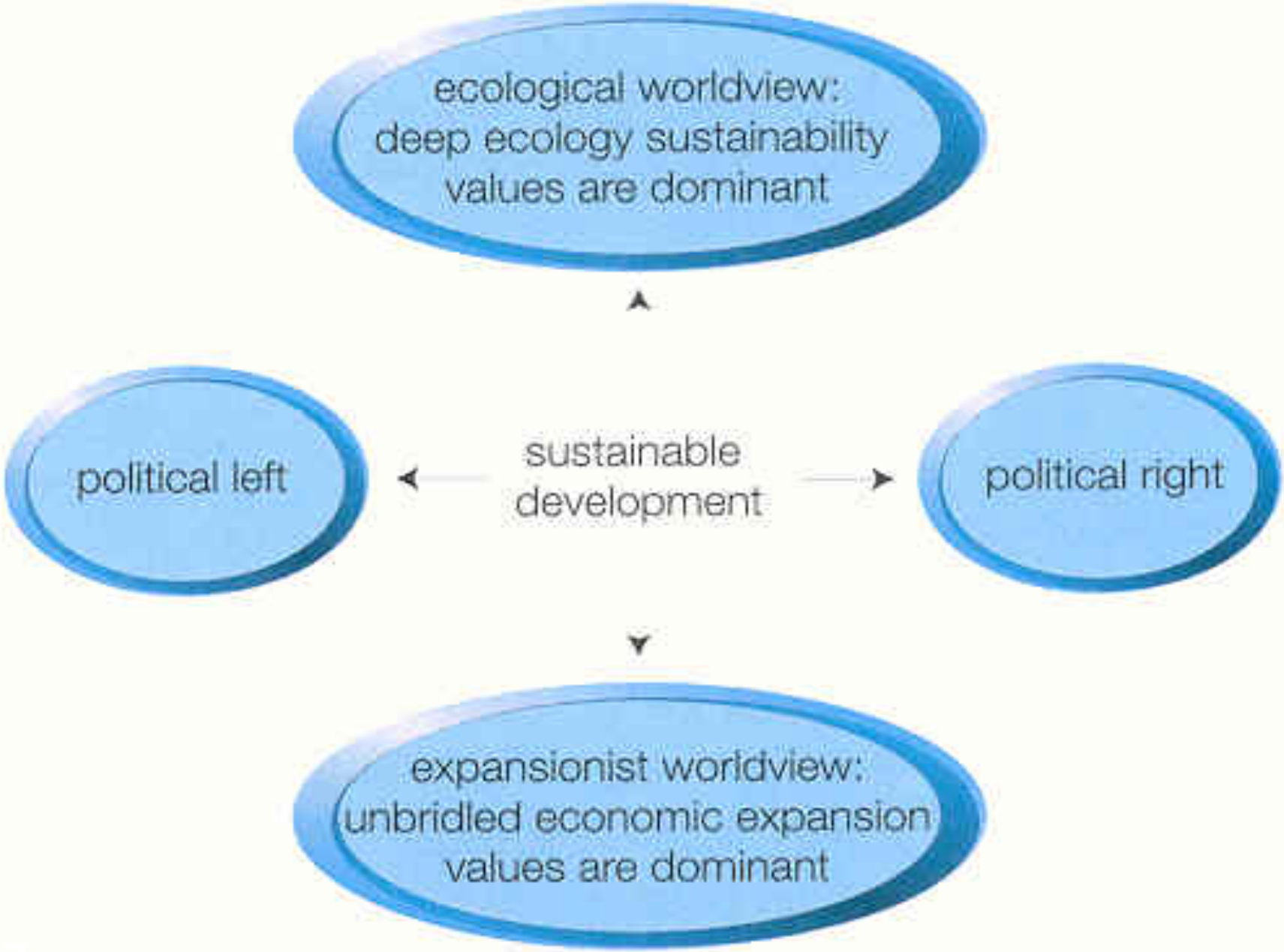
# Jurisdictional Arrangements for Environmental Management in Canada

- No one government has total authority or responsibility for natural resources in Canada
- Instead, authority is divided between the federal and provincial governments, with territorial and municipal governments increasingly having a role
- First Nations are also increasing their role, and Canada is involved in bilateral agreements with the United States

- Federal, Provincial, and Municipal Roles
  - Legislative authority is mixed between the federal and provincial governments and often becomes a significant source of conflict
  - In the 1990's, many provincial governments began to download certain responsibilities onto municipalities
  - The provinces argued that this shift was consistent with the principle of **subsidiarity**, which specifies that decisions should be taken at the level closest to where consequences are most noticeable

# Environmental Decision-Making in the 20th Century




ecological worldview:
deep ecology sustainability
values are dominant
political left
sustainable
development
political right
expansionist worldview:
unbridled economic expansion
values are dominant

- Monitoring Progress towards Sustainable Development
  - Beginning in 1997, the Office of the Auditor General began reporting on progress by 24 federal gov't departments & agencies regarding sustainable development

# James Lovelock

**GAIA Hypothesis; Gaia theory, or; Gaia principle -** a controversial ecological hypothesis or theory proposing that the biosphere and the physical components of the Earth (atmosphere, cryosphere, hydrosphere and lithosphere) are closely integrated to form a compled interacting system that maintains the climatic and biogeochemical conditions on Earth in a preferred homeorhesis

'we may have discovered a living being bigger, more ancient, and more complex than anything from our wildest dreams. That being, called Gaia, is the Earth'.

http://erg.ucd.ie/arupa/references/gaia.html

'Wicked Problems' – Ludwig, 2000

# Large-scale Assessments

- Millenium Ecosystem Goals
- The **Living Planet Index**, created by the World Wildlife Fund (WWF), is an example of a widely used index
- Canada's Index of Wellbeing
- **Biocapacity** – the amount of biologically productive area that is available to meet humanity's needs
- *Composite indices,* such as the ecological footprint, are often the most useful for decision-makers and represent the highest levels of aggregation

# Implications

- Scientific evidence supports the notion that human population and consumption are violating the global thresholds related to the carrying capacity of the life support system of Earth
- Perhaps the most important message underlying the environmental challenges we face is the need for key changes in the way we view our relationship with nature
- These changes need to take place at all levels

# Conclusions

- The human element has a dominant role in modern environmental studies
- Developed from a series of waves over the past 150-200 years
- Movement from a growing concern for nature to a broad global systems outlook (GAIA)