

If you don't raise your voice, then your environmentalism means nothing; its mere tokenism or opportunism... We have a special responsibility to the ecosystem of this planet. In making sure that other species survive we will be ensuring the survival of our own.

Wangari Maathi, 2004 Nobel Peace Prize Winner

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### Environmental Science

- "Field of knowledge that studies of how humans and other species interact with one another and with the nonliving environment."

- <http://www.physicalgeography.net/physgeoglos/e.html>

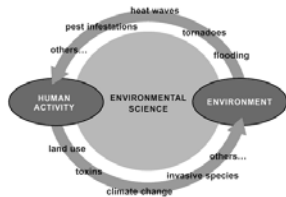


Fig. 1. The role of science in understanding and influencing human-environment interactions.

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### Environment

- The abiotic (inorganic) and biotic (organic) factors that influence the life of an organism



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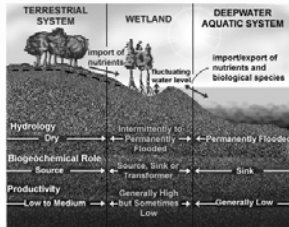
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## Ecosystem

- Ecosystem: the environment, its organisms, and interaction between them
  - Can be any size, any location, natural or man-made



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## Ethics

- **Anthropocentric:** human-centered view, denies non-humans have rights
- **Biocentric:** certain living things have rights
- **Ecocentric:** holistic viewpoint; all things are important

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## Defining people

- Environmentalist
  - From Wikipedia: broadly supports the goals of the environmental movement
- Environmental steward
  - From EPA: strive to sustain natural resources and our environment for future generations.
- Environmental activist
  - Actively seek, through campaigning, protesting, or other types of promotion, to protect earth
- Environmental manager
  - One definition: responsible for overseeing the environmental performance of private, public and voluntary sector organizations.

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## Environmental issue

- What is an issue:
  - A problem or concern that could adversely affect the environment
  - Problem may or may affect humans



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## Environmental Issues

- Atmospheric issues: drought, ozone depletion
- Water Pollution: "Dead zone", contamination, RX in water, arsenic
- Erosion: land, soil, and coastlines
- Waste disposal and management
- Land use and degradation: desertification
- Agricultural production: soil erosion, alternate demands on food (ethanol)

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## Sustainability

- The measured use of resources so that they are available (not depleted) and useable (not polluted) for future generations
- Concerned with land, water, air, and other natural resources
- The work "sustainable" is a very popular word
  - Not regulated

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## Environmental impact

- Human's impact on environment can cause problems in the system
- Ecological footprint:
  - “a measure of how consumption may affect the environment by taking account of food and fiber production, energy use, and human use of land for living space and other purposes.” (NASA)
  - Footprint is different depending on the nation

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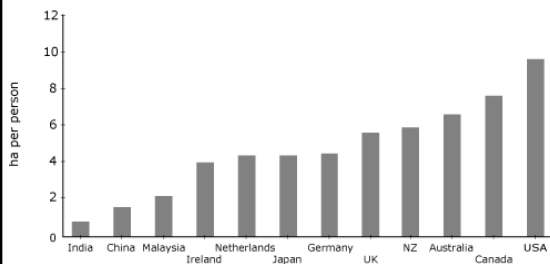
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## Ecological footprint by nation



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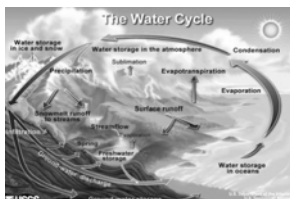
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## Systems theory

- System: a collection of interacting and interrelated parts
- When one part change, the other parts react and change
- Every system has function and structure



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## Equilibrium

- Equilibrium – the average state of the system
- Steady state equilibrium
- Dynamic equilibrium
- Stable equilibrium
- Unstable equilibrium

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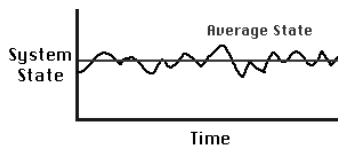
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## Steady state equilibrium

- An average condition of a system where the **trajectory** remains unchanged in time.



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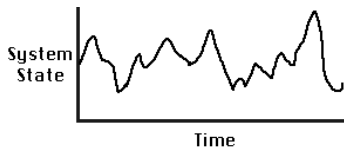
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## Dynamic equilibrium

- When there are unrepeated average states through time.



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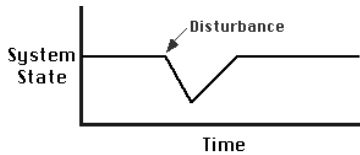
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## Stable equilibrium

- The system displays tendencies to return to the same equilibrium after a **disturbance**.



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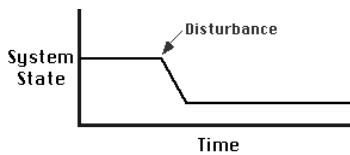
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## Unstable equilibrium

- The system returns to a new equilibrium after a disturbance.



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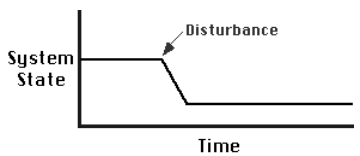
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## Feedbacks

- Negative-feedback: the state of the system does not change.
- Positive-feedback: the state of the system changes.



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