EE475 Natural Resource Economics

Relationship between economics, economy, and natural resources

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Outline

- Development of Natural Resource Economics
  - Natural Resource (Land) Economics
  - Environmental Economics
  - Ecological Economics
- Various Perspective on Human-Environment Relationship
  - Environment as an asset
  - Social-Ecological System
  - Anthropocene and Planetary Boundaries
  - Sustainability Perspective

Questions

- What is Economics?
- What are the Factors of Production in Economics? Which factor are related to Natural Resources?
- What is 'Scarcity'? How does economics help solving this problem?
- Is it necessary that usage of natural resources today would lead to scarcity in the future?

Development of Natural Resource Economics

1700s – 1800s

- Main debate in economics: "Wealth of Nation"
- Two major schools of thought linked to Natural Resources
  - "French Physiocrats" :
  - Agriculture and quality of land are the foundation of economic growth.

Quesnay

Development of Natural Resource Economics

1700s – 1800s

- "Mercantilism"
  - Accumulation of valuable mineral such as gold and silver is very important for economic growth.
  - Exploration and colonization other continents.

Quesnay

Development of Natural Resource Economics

Late 1800s to 1900s

- Main debate in economics related to natural resource shifted to "Limit to Growth"
- Two possible explanations in relations to natural resources
  - Diminishing Marginal Productivity of Land suitable for agriculture
  - The need to engage in more marginal mining operation

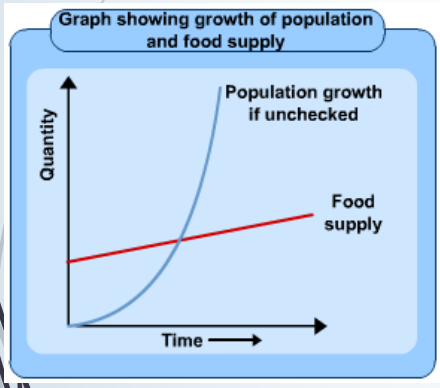
Development of Natural Resource Economics

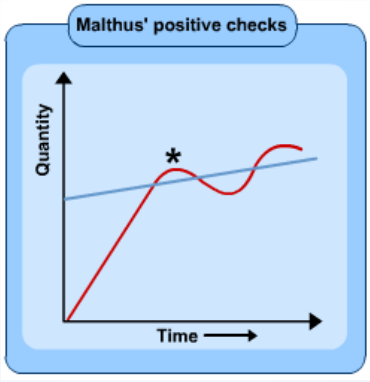
Late 1800s to 1900s

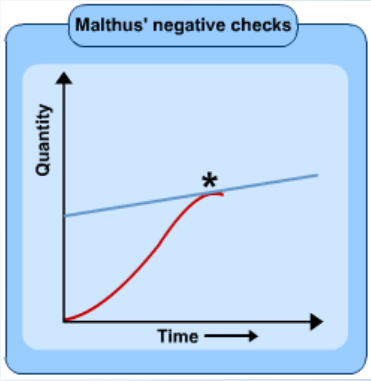
- Thomas R. Malthus
- An Essay on Principle of Population (1798)
- Population growth rate is Geometric progression whereas growth rate of food is Arithmetic progression.
- Eventually, the population growth rate will exceed the food growth rate. This will lead to a catastrophic result.

Thomas R. Malthus(1766-1834)

Development of Natural Resource Economics



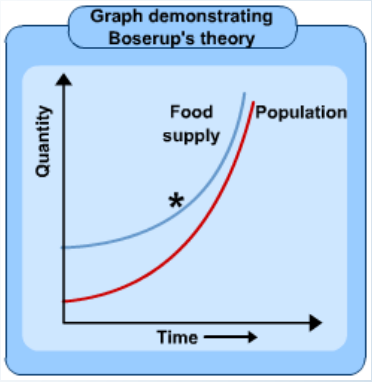




Development of Natural Resource Economics

Late 1800s to 1900s

- On the other side of the debate, David Ricardo (1817) and Engel (1844), as well as scholars in 1900s such as Boserup argue **development in science and technology** will solve the problem of scarcity.



Development of Natural Resource Economics

- What is your opinion on the Malthusian theory and the debate?

Development of Natural Resource Economics

Late 1800s to 1900s

- Direction of the field's development was heading towards **more detailed analysis of the economic exploitation of natural resources**.
- Recognition of roles of man-made physical capital and human capital in production of these primary products.

Development of Natural Resource Economics

Late 1800s to 1900s

- **Environmental economics emerged** in early 1900s due to negative externalities caused by the primary industry such as mining, commercial fisheries.
- **Pigou** (1932) applied microeconomics in the analysis of the externalities and showed that the externalities intensify scarcity problem and reduce economic welfare.

Arthur C. Pigou
1877-1959

Development of Natural Resource Economics

Late 1800s to 1900s

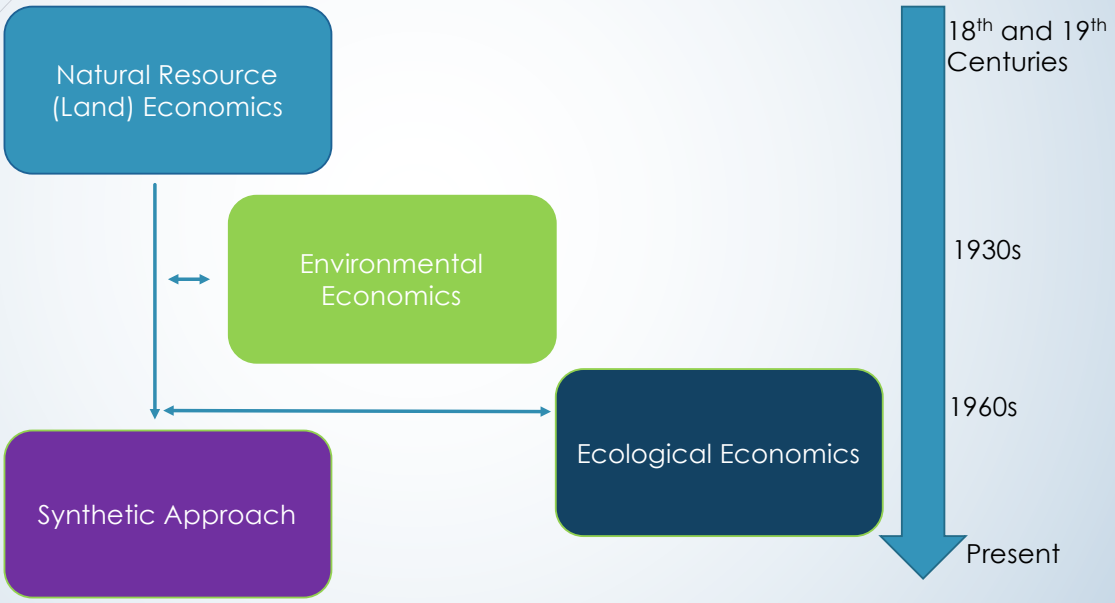
- **Ecological economics emerged in 1960s**.
  - Emphasizing eclectic and holistic analysis approach, and interdependence of natural and social system, in which economic activities are embedded.
  - Limit to growth is natural resource depletion and pollution in necessary resources.

Development of Natural Resource Economics

Late 1900s to early 2000s

- **Synthesis between the fields:** natural resource economics, environmental economics, and ecological economics
- A Shift of economists' interest from material values to **non-material values** provided new techniques for environmental and natural resources resource.

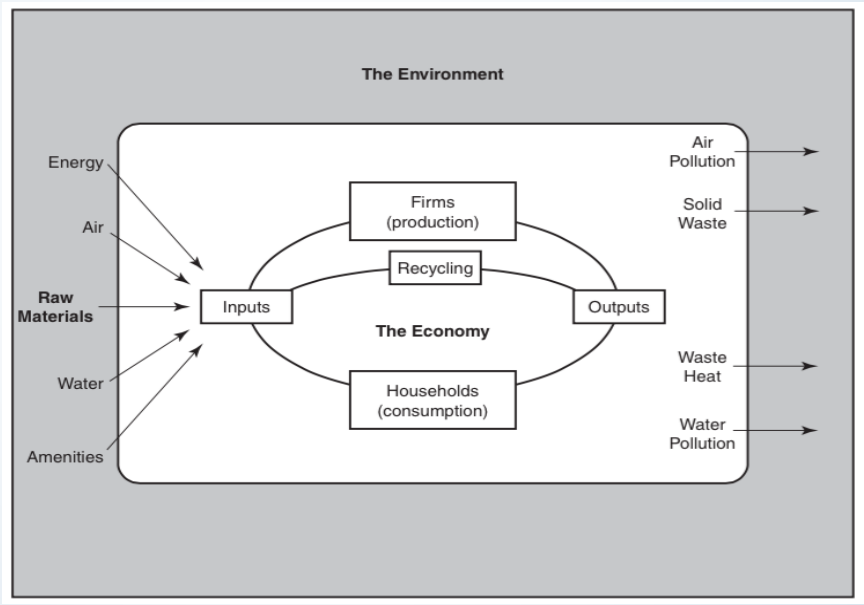
Development of Natural Resource Economics



Human-Environment Relationship

- Environment as an asset
- Social-Ecological System
- Anthropocene and Planetary Boundaries
- Sustainability perspective

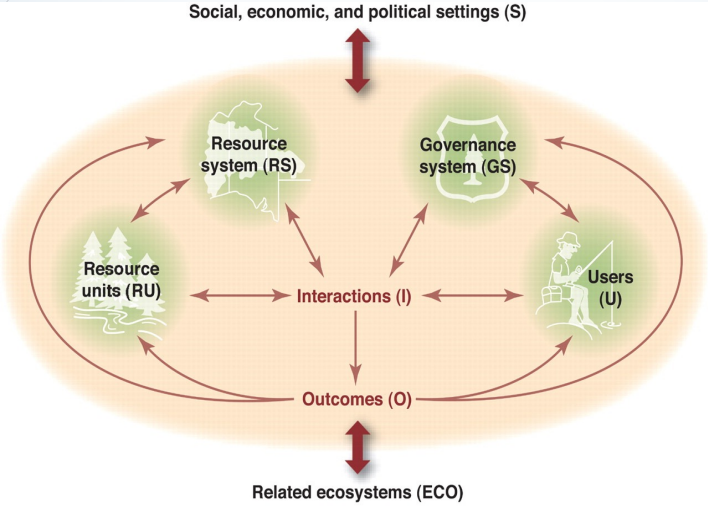
Environment as an Asset



Social Ecological System

- A recent framework developed for studying environment and natural resource issues, especially, sustainability and resilience.
- Core concept:
  - Social system is not only a sub-system in ecological system.
  - Social and ecological systems are closely linked. Changes in one system will affect the other. Feedback mechanism among factors within those systems and between the two systems increases degree of complexity.

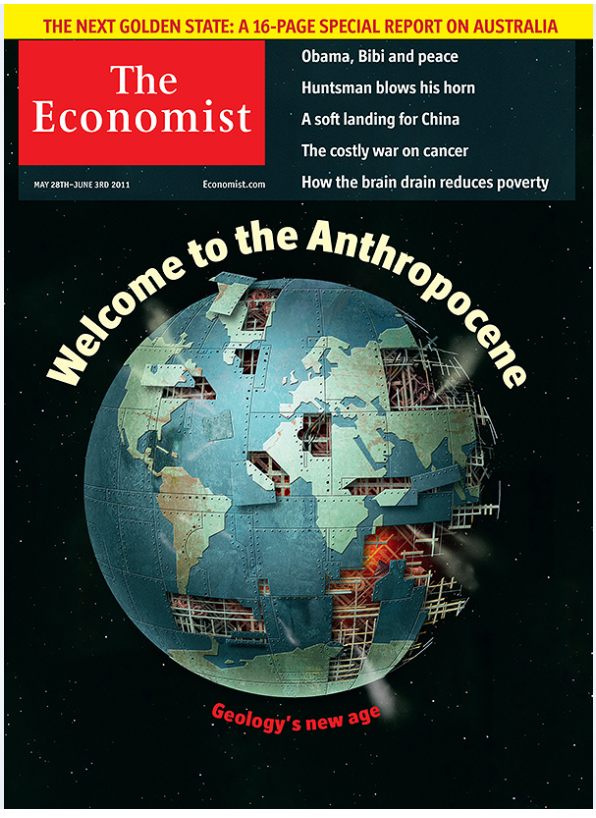
Social Ecological System



Example:

SES Framework

Proposed by Elinor Ostrom in *Science*, 2009



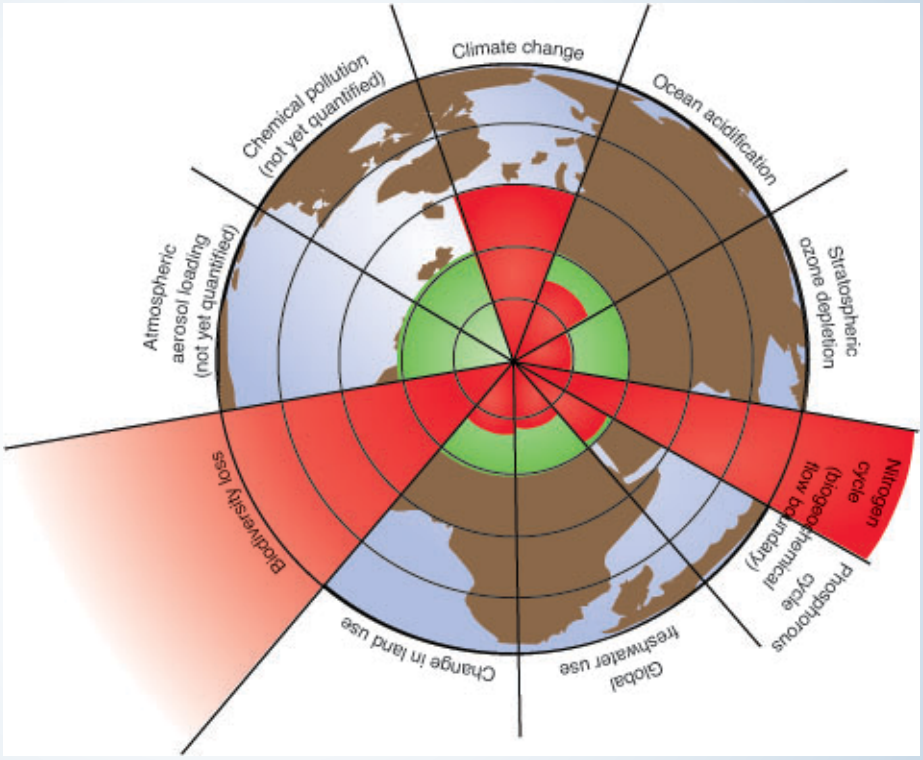
Anthropocene

- An geological period when changes of global natural system are caused significantly by human actions.
- Paul Crutzen, a Nobel Laureate in Chemistry, coined the term in 2002. It was used informally by geologists and environmentalist.
- Jan Zalasiewicz et al. (2008) investigated the claim by measuring geological factors used for determining geological period and found evidences that support the existence of Anthropocene.

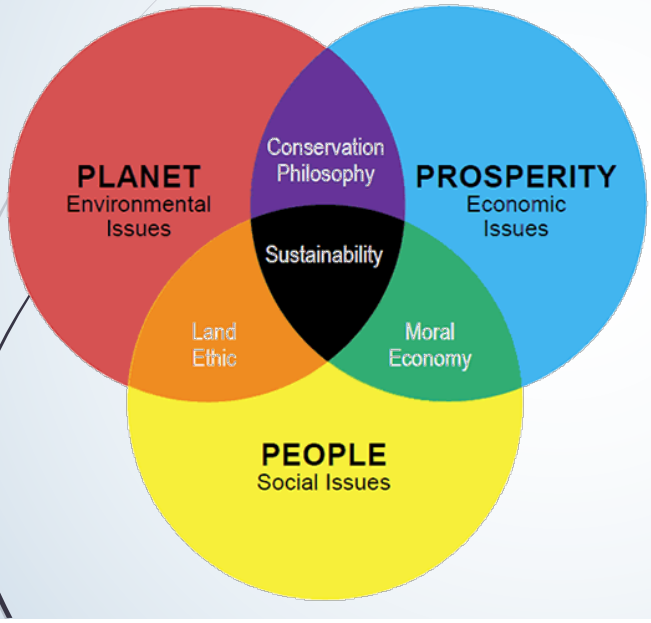
Anthropocene

- The study found that the Anthropocene has started since the industrial revolution in the late 18th century, and accelerated in 1950s with globalization.
- Factors that indicate Anthropocene are the followings: changes to physical sedimentation; carbon cycle perturbation and increase in temperature; Biotic change; Ocean changes
- Welcome to Anthropocene: https://www.youtube.com/watch?v=fvgG-pxlobk

Planetary Boundaries



Sustainability



Sustainable Development

"sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

SDGs: Planet

Issues in SDG6

- Access to clean drinking water
- Sanitation and Hygiene
- Reducing water pollution
- Increase water-use efficiency
- Integrated Water Resource Management
- Protect Water-related water system
- Expanding international cooperation
- Strengthening participation of local community

SDGs: Planet

Issues in SDG12

- Sustainable and efficient use of of natural resource
- Food waste
- Environmentally sound management of chemicals and all wastes
- Reduce waste generation
- Sustainability Report
- Sustainable public procurement
- Availability of relevant information and raise awareness

SDGs: Planet

Issues in SDG13

- Strengthening resilience and adaptive capacity to climate change
- Integration of climate change policies
- Raising awareness on the Climate Change problems, mitigation and adaptation

SDGs: Planet

Issues in SDG14

- Reduce Marine Pollution
- Manage and protect marine ecosystem
- Minimize impact of ocean acidification
- Regulate overfishing
- Conserve 10% of coastal and marine areas
- Prohibit subsidies of overfishing activities
- Increase knowledge and technology for marine resource management
- Access to market and resource of artisanal fisheries

SDGs: Planet

Issues in SDG15

- Conservation and sustainable use of terrestrial and inland freshwater ecosystems
- Sustainable management of all types of forests
- Combat desertification
- Conservation of mountain ecosystem and its diversity
- Loss of natural habitat and biodiversity
- Utilization of genetic resources
- End poaching and trafficking of protected species
- Invasive species
- Integration of ecosystem and biodiversity value into local and national planning