

Environmental Science

Welcome to SVN 3E!



What is Environmental Science?

The study of how humans interact with their environment

Our environment is everything that surrounds us, both natural and man-made.



- ▣ Ilmu lingkungan (*environmental science*) berasal dari dua kata yaitu ilmu (*science*) dan lingkungan (*environment*).
- ▣ Ilmu: suatu upaya penggalan pengetahuan tentang bagaimana bumi ini bekerja.
- ▣ Ilmu lingkungan: ilmu interdisipliner yang memanfaatkan konsep dan informasi dari ilmu alam (ekologi, biologi, kimia, geologi) dan ilmu sosial (ekonomi, politik, dan hukum) untuk memahami dan mempelajari bagaimana bumi bekerja, bagaimana manusia memengaruhi lingkungan (*life-support system*) dan untuk menyelesaikan masalah lingkungan yang sedang dihadapi manusia.
- ▣ Tujuan mempelajari ilmu lingkungan: mencapai masyarakat yang berkelanjutan (*sustainable society*).

Definisi Lingkungan Hidup

a> Prof Emil Salim :

“ Sebagai suatu benda, kondisi, keadaan & pengaruh yang terdapat dalam ruangan yang kita tempati & mempengaruhi hal-hal yang hidup termasuk kehidupan manusia “

b> Prof Munadjat Danusaputro, SH :

“ Segala benda & daya serta kondisi, termasuk di dalamnya manusia & tingkah perbuatannya, yang terdapat dalam ruang dimana manusia berada & mempengaruhi kelangsungan hidup serta kesejahteraan manusia dan jasad jasad hidup lainnya “

c> Prof Otto Soemarwoto :

“ Jumlah semua benda , kondisi yang ada dalam ruang yang kita tempati yang mempengaruhi kehidupan kita “

Kesimpulan Definisi Lingkungan Hidup

"Kesatuan ruang dengan semua benda, daya keadaan & Mahluk Hidup termasuk di dalamnya manusia dan perilakunya yang mempengaruhi kelangsungan peri kehidupan & kesejahteraan manusia serta Mahluk hidup lainnya"

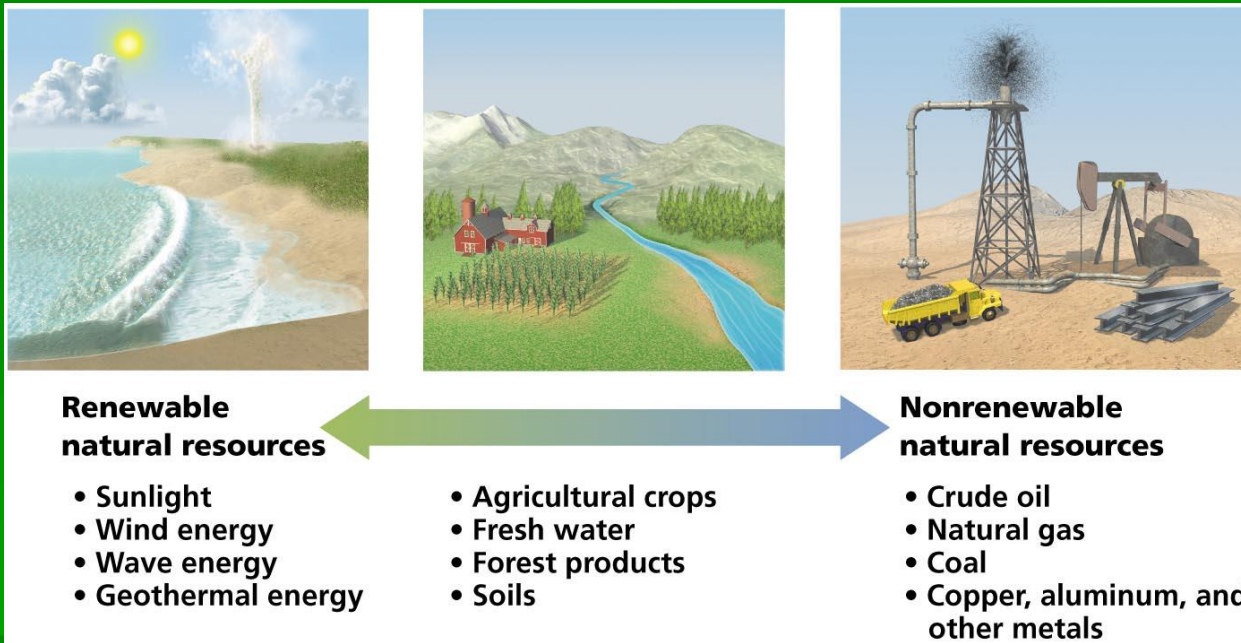
Environment: the total of our surroundings

- All the things around us with which we interact:
 - Living things
 - Animals, plants, forests, fungi, etc.
 - Nonliving things
 - Continents, oceans, clouds, soil, rocks
 - Our built environment
 - Buildings, human-created living centers
 - Social relationships and institutions



Natural resources: vital to human survival

Natural resources = substances and energy sources needed for survival



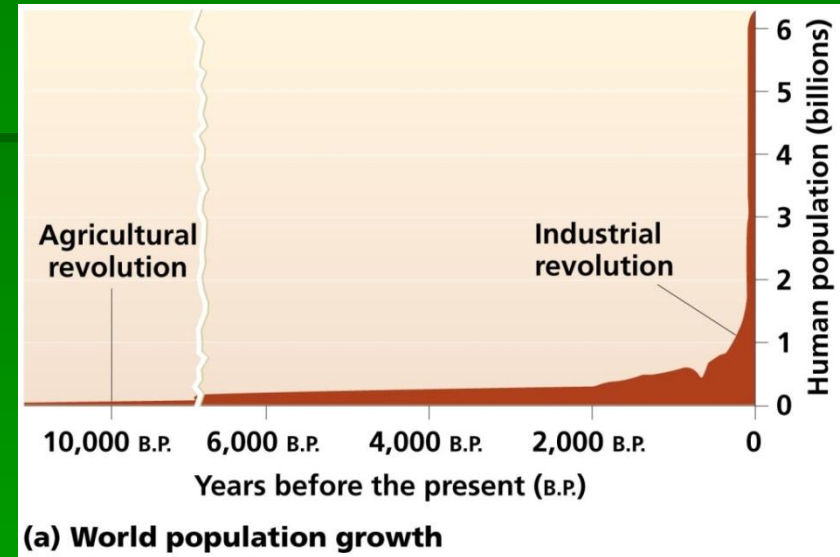
- **Renewable resources:**
 - Perpetually available: sunlight, wind, wave energy
 - Renew themselves over short periods: timber, water, soil
 - These can be destroyed
- **Nonrenewable resources:** can be depleted
 - Oil, coal, minerals



- “...the earth enables our people to survive, the environment must be respected and maintained. As long as the earth remains healthy, the people remain healthy.” (*Long and Fox, 1996*)

Global human population growth

- More than 6.7 billion humans
- Why so many humans?
 - Agricultural revolution
 - Stable food supplies
 - Industrial revolution
 - Urbanized society powered by fossil fuels
 - Sanitation and medicines
 - More food



(b) Urban society

- **Human population growth exacerbates all environmental problems**

- *The growth rate has slowed...but we still add more than 200,000 people to the planet each day We depend completely on the environment for survival*

- Life has become more pleasant for us so far (Increased wealth, health, mobility, leisure time)

- But...natural systems have been degraded and environmental changes threaten long-term health and survival



Brainstorm

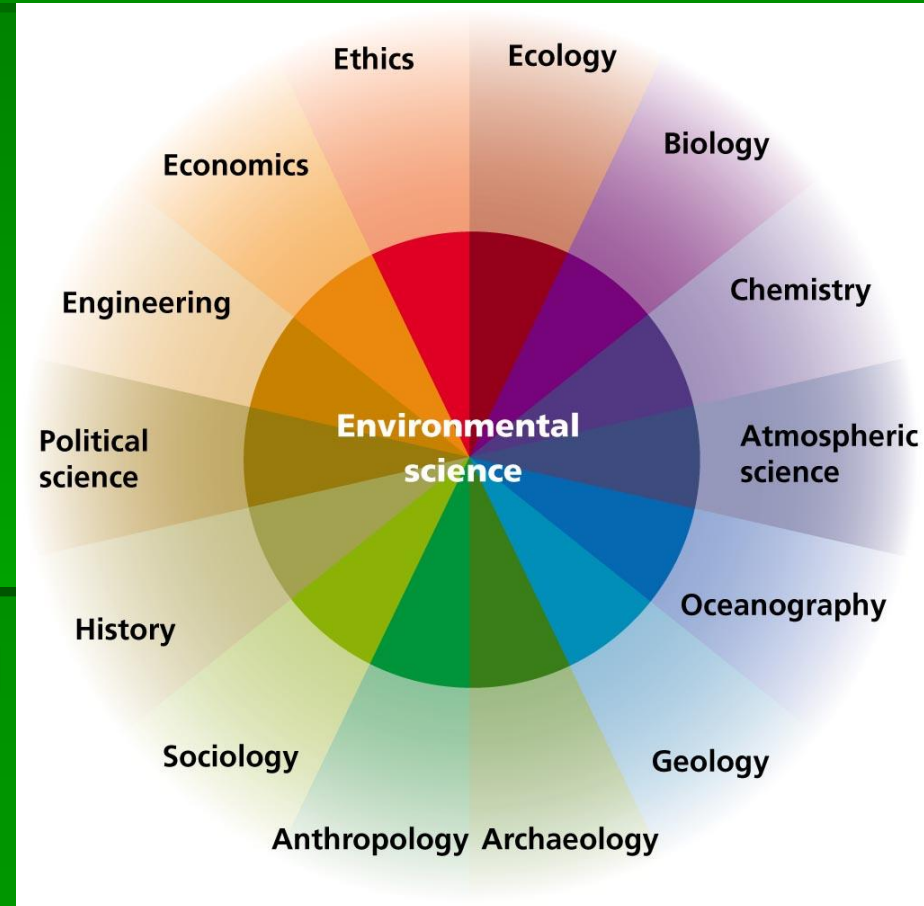
- With your partner/group, brainstorm at least 10 ways in which destruction to the environment and depletion of resources can affect our overall well being as a population



Environmental science: how does the natural world work?

Environment ← impacts →
Humans

- It has an applied goal: developing solutions to environmental problems
- An interdisciplinary field
 - Natural sciences: information about the world
 - Social sciences: values and human behavior, politics, economy, etc.



What is an “environmental problem”?

- The perception of what constitutes a problem varies between individuals and societies
- Ex.: DDT, a pesticide
 - In developing countries: welcome because it kills malaria-carrying mosquitoes
 - In developed countries: not welcome, due to health risks



Environmental science is not environmentalism

- **Environmental science**

- The pursuit of knowledge about the natural world
- Scientists try to remain objective

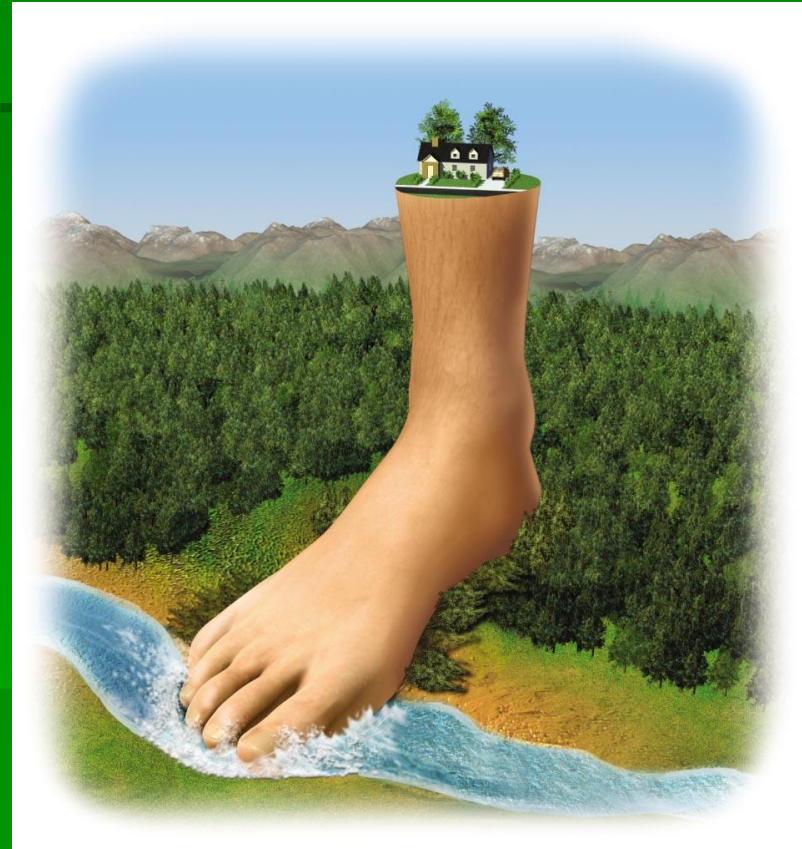
- **Environmentalism**

- A social movement dedicated to protecting the natural world



The “ecological footprint”

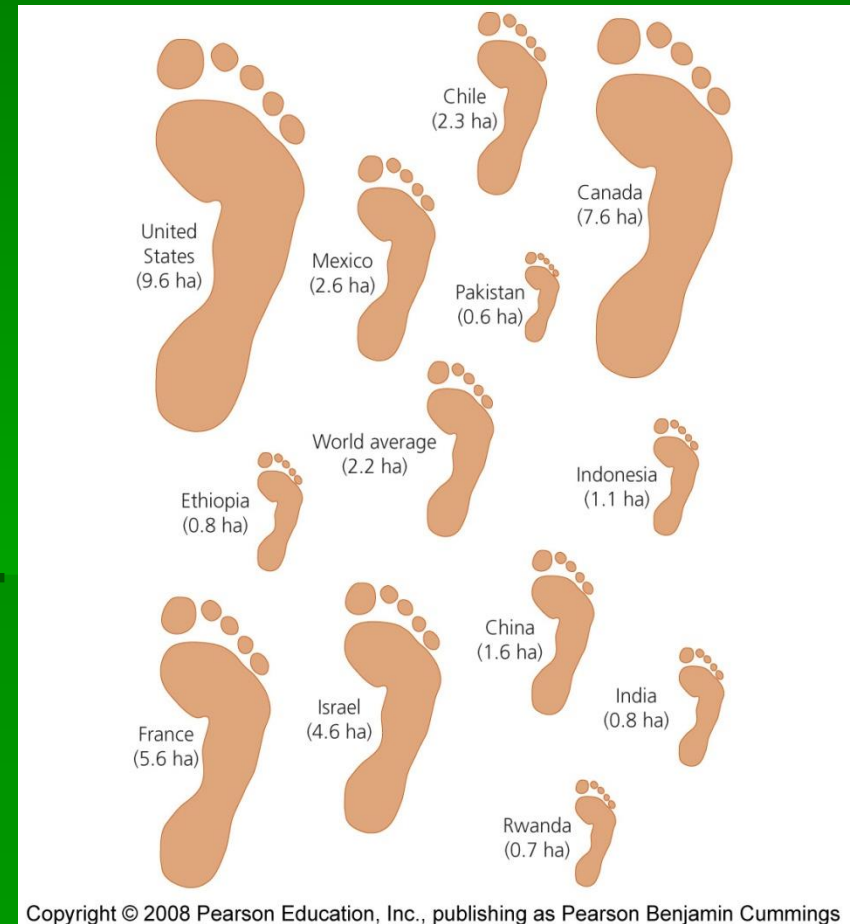
- The environmental impact of a person or population
 - Amount of biologically productive land + water for raw materials and to dispose/recycle waste
- **Overshoot:** humans have surpassed the Earth’s capacity



We are using 30% more of the planet’s resources than are available on a sustainable basis!

Ecological footprints are not all equal

- The ecological footprints of countries vary greatly
 - The U.S. footprint is almost 5 times greater than the world's average
 - Developing countries have much smaller footprints than developed countries



What are the challenges we face?

- What are the environmental issues we are facing today?
- Come up with at least 10!



We face challenges in agriculture

- Expanded food production led to increased population and consumption



It's one of humanity's greatest achievements, but at an enormous environmental cost

- Nearly half of the planet's land surface is used for agriculture
 - Chemical fertilizers
 - Pesticides
 - Erosion
 - Changed natural systems



We face challenges in pollution

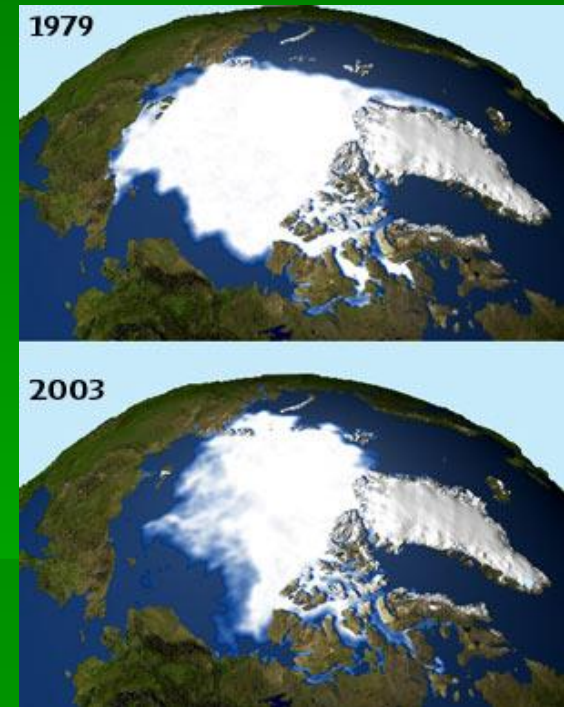
- Waste products and artificial chemicals used in farms, industries, and households



Each year, millions of people die from pollution

We face challenges in climate

- Scientists have firmly concluded that humans are changing the composition of the atmosphere
- The Earth's surface is warming
 - Melting glaciers
 - Rising sea levels
 - Impacted wildlife and crops
 - Increasingly destructive weather



Since the Industrial Revolution, atmospheric carbon dioxide concentrations have risen by 37%, to the highest level in 650,000 years

We face challenges in biodiversity

- Human actions have driven many species extinct, and biodiversity is declining dramatically



Biodiversity loss may be our biggest environmental problem; once a species is extinct, it is gone forever

Our energy choices will affect our future

- The lives we live today are due to fossil fuels
 - Machines
 - Chemicals
 - Transportation
 - Products
- Fossil fuels are a one-time bonanza; supplies will certainly decline

We have used up ½ of the world's oil supplies; how will we handle this imminent fossil fuel shortage?



Sustainable solutions exist

- We must develop solutions that protect both our quality of life and the environment
- Organic agriculture
- Technology
 - Reduces pollution
- Biodiversity
 - Protect species
- Waste disposal
 - Recycling
- Alternative fuels



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Are things getting better or worse?



- Many people think environmental conditions are better (Human ingenuity will solve any problem)
- Some think things are much worse in the world (predict doom and disaster)
- How can you decide who is correct?
 - Are the impacts limited to humans, or are other organisms or systems involved?
 - Are the proponents thinking in the long or short term?
 - Are they considering all costs and benefits?

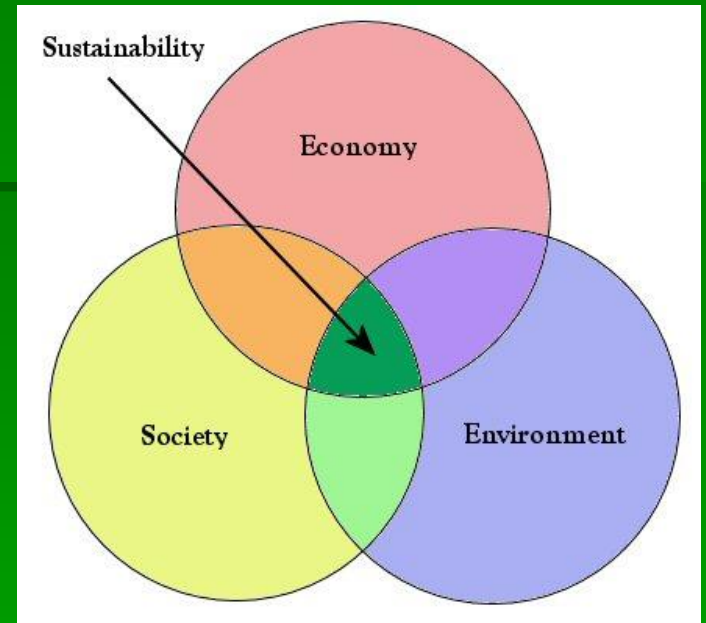
Sustainability: a goal for the future

- How can humans live within the planet's means?
- **Sustainability**
 - Leaves future generations with a rich and full Earth
 - Conserves the Earth's natural resources
 - Maintains fully functioning ecological systems
- **Sustainable development:** the use of resources to satisfy current needs without compromising future availability of resources



Will we develop in a sustainable way?

- **The triple bottom line:** sustainable solutions that meet
 - Environmental goals
 - Economic goals
 - Social goals
- Requires that humans apply knowledge from the sciences to
 - Limit environmental impacts
 - Maintain functioning ecological systems



Conclusion

- Environmental science helps us understand our relationship with the environment and informs our attempts to solve and prevent problems.
- Solving environmental problems can move us towards health, longevity, peace and prosperity
- Environmental science can help us find balanced solutions to environmental problems

