

Ethics in Engineering and Research

Lecture #12 Environmental Ethics (Part 1)

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• Environmental Issues

- Increase levels of greenhouse gases
- Global Warming, Sea level rise
- Pollution
- Extinction of species
- Destruction of ecosystems
- Depletion of natural resources
- Waste
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- Ecological awareness as a part to engineer's responsibility

Engineering , Ecology and Economics

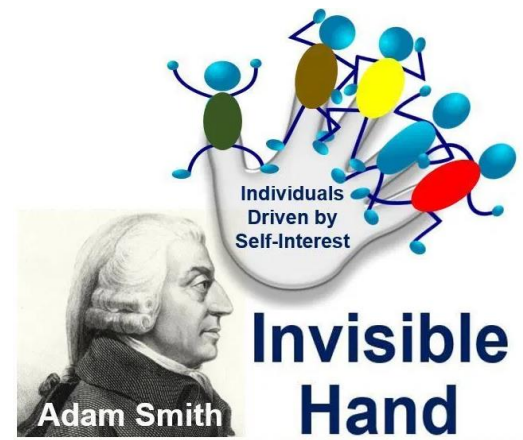
- If your technology messes up the environment, it can affect the health and safety of many humans!
- Environmental ethics = (1) the study of moral issues concerning the environment and (2) moral perspectives on those issues
- Two powerful metaphors have dominated thinking about the environment:
 - the invisible hand
 - the tragedy of the commons
- Both metaphors highlight unintentional impacts of the marketplace on the environment
- But one is optimistic and the other is cautionary

The Invisible Hand

- The “invisible hand”: Adam Smith, 1776, “*The Wealth of Nations*”
- Businesspersons think of only their self-interest
- “It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest”
- Yet although “he intends only his own gain”, he is “led by an invisible hand to promote an end which has no part of his intention”
- By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it

- Professionals and many businesspersons do profess to “trade for the public good”, claiming a commitment to hold paramount the safety, health, and welfare of the public
- Predominantly motivated by self-interest, they also have genuine moral concern for others
- Companies benefit society in many ways through self-interest:
 - Create companies that produce goods and services for consumers
 - Competition drives quality improvements and cost reductions
 - New jobs for employees and suppliers
 - Wealth supports consumerism, taxes, and philanthropy

- Invisible hand metaphor does not adequately take into account damage to the environment
 - ❑ Pollution
 - ❑ Destruction of natural habitats
 - ❑ Depletion/damage of shared resources
- Self-interest of companies cannot be relied on to protect the environment



Tragedy of the Commons

- Aristotle observed we tend to be thoughtless about things we do not own individually and which seem to be in unlimited supply
- W.F. Lloyd and G. Hardin: **Tragedy of the commons**: e.g., cattle in the common pasture of a village were more stunted than those kept on private land. Common fields were more worn than private land.

The Tragedy of the Commons



Use of the commons is below the carrying capacity of the land. All users benefit.



If one or more users increase the use of the commons beyond its carrying capacity, the commons becomes degraded. The cost of the degradation is incurred by all users.



Unless environmental costs are accounted for and addressed in land use practices, eventually the land will be unable to support the activity.

- Individual farmers are motivated by self-interest to enlarge their common-pasture herd by one or two cows, given that each does negligible damage.
- Yet, when all the farmers behave that way, the result is the tragedy of overgrazing that harms everyone
- The same kind of competitive, unmalicious, but unthinking exploitation arises with all natural resources held in common
 - Air, land, forest
 - Lakes, oceans, endangered species
 - Entire biosphere



- Today, a wide consensus that we need concerted responses to ecological concerns that combine economic realism with ecological awareness
- Engineers play a key role in that consensus
 - ❑ Develop technical details on environmental impact, encourage corporations to be concerned about the environment
 - ❑ Help set policy, help follow laws
 - ❑ Help make it economically feasible

Engineers: Sustainable Development

- Historically, engineers were not as responsible concerning the environment as they should have been. They simply reflected attitudes predominant in society.
- Individual engineers differ considerably in their views, including their broader holistic views about the environment (e.g., politics affect)
- All engineers should reflect seriously on environmental values and how they can best integrate them into understanding and solving problems

Codes of Ethics and “Sustainable Development”

- ASCE, 1997:
 - Engineers shall hold paramount the safety, health, and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties.
 - Also have requirement to notify “proper authorities” when the principles of sustainable development are violated by employers, clients and other firms

IEEE Code of Ethics

- 1. To accept responsibility in making engineering decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment
 - Weak!
 - No hold “paramount”
 - No integration of the concept of sustainable development

What is “Sustainable Development”?

- United Nations World Commission on Environment and Development, *Our Common Future*, 1987:
 - Sustainable development = development that meets the needs of the present without compromising the ability of future generations to meet their own needs



Other views on sustainability

- But should “needs” be the central focus of sustainability”?
- [Solow](#) defines “sustainability as the requirement that the next generation must be left with whatever it takes to achieve a standard of living at least as good as our own and to look after their next generation similarly.”
- [Amartya Sen](#) (in “The Idea of Justice”) says we need to sustain, and when possible expand, freedoms (including the freedoms to meet our needs and to live our life according to certain standards) and capabilities, and what humans value and have reason to think are important, without compromising these for future generations.



- ASCE:
 - Sustainable development is a process of change in which the direction of investment, the orientation of technology, the allocation of resources and the development and functioning of institutions [is directed] to meet present needs and aspirations without endangering the capacity of natural systems to absorb the effects of human activities, and without compromising the ability of future generations to meet their own needs and aspirations.



Corporations: Environmental Leadership

- In present climate, it is good business for a corporation to be perceived by the public as environmentally responsible
- **Example:** Compaq Computer Corp. (now merged with Hewlett-Packard), Life-cycle strategy, “**Design for Environment**”
 - Efficient use of resources
 - Energy-efficient products
 - Easy disassembly for recycling
 - Waste minimization

- Other Examples

- Usage of Biodegradable Materials in products
- Reduce-Reuse-Recycle campaign
- Earth Day Celebration
- No plastic bag in supermarket or reuse



Government: Technology Assessment

- Government laws and regulations are the lightning rod in environmental controversies.
- Need laws to protect degradation of the commons
- But how much law, and what sort, and to what ends, are matters of continual disagreement

- Incentive policy and tax rebate for renewable energy installation, electric vehicle, etc.
- Carbon credit
- Paris Agreement (limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C)
- Kyoto agreement (signed by 150 governments in 1997, to reduce carbon emissions to 5.2 percent below 1990 levels by 2012)
- And others