

# Environmental Paradigms

## Evaluation Context:

### A Need to Understand Environmental Paradigms

- Industrial ecology is identifying numerous options to improve environmental impact of society.
- In many cases, numerous technological options exist.
- How does one select the “best” option?
- Evaluation requires injection of values.
- Paradigms provide insight into how values vary.

## Environmental Paradigms

- M E Colby  
*Environmental Management in Development: The Evolution of Paradigms*
  - Frontier Economics
  - Externality Control
  - Resource Management
  - Eco-development (industrial ecology)
  - Deep ecology
- M Thompson  
*Understanding Environmental Values: A Cultural Theory Approach*
  - Individualism
  - Hierarchy
  - Egalitarianism
  - Fatalism

## Frontier Economics

- Earth provides limitless supply of
  - Physical resources
  - Sinks for by-products of consumption
  - Primary limitations imposed by availability of labor & capital
- Environmental problems as we know them are absent
  - *Is this a fair statement?*
- Sustainability is not a concern
- Policy strategy
  - Future is created through a price system based on free choice.
  - Free market -- Governments act only as necessary to deal with unavoidable market imperfections
  - Technological optimism -- Technology is good, progressive, and can cure any problem it creates
  - No pre-market assessments of technology - *Why?*

**Look at the data. Life expectancy across the globe has shot up**

over the course of the last two centuries. People are better fed, better clothed, and better housed today than ever before. Inflation-adjusted **prices for virtually all resources** – renewable and nonrenewable – **are going down**, which points to growing abundance, not growing scarcity. Global forests have, on balance, expanded over the past 50 years. **Air and water pollution in the most industrialized nations of the world is a mere shadow of what it was decades ago.** Even Third World countries have found that, **once per capita income reaches a certain point, economic growth coincides with a cleaner environment.** And if current trends in productivity, population growth, and consumption continue, we'll be able to return a chunk of land the size of the Amazonian Basin back to nature by 2070. **The human footprint on the environment is indeed becoming lighter and softer.**

-- Jerry Taylor, Cato Institute

## Externality Control / Environmental Protection

- Earth is an open system.
  - Waste and pollution can pose a problem
  - Waste and pollution are economic externalities.
  - Environmental problems are failures in the economic system.
- Sustainability is not a concern
  - Future can be protected by interventions in the market.
- Policy strategy
  - Technological optimism
  - Pollution reduction and control through laws and regulations.

## Resource Management

- Earth is a closed economic system.
  - Exhaustion of resources is a matter of concern
  - Mismanagement of resources is an externality to be internalized.
- Sustainability (weak) means maintaining the combined stock of human and natural capital
  - Ecology poses a necessary constraint on growth
- Policy strategy
  - Technological optimism/clean technology
  - Economize ecology
  - Correct market incentives / Get the price right..
  - Incorporate all types of capital & resources into calculations for investment planning

## Industrial Ecology / Eco-development

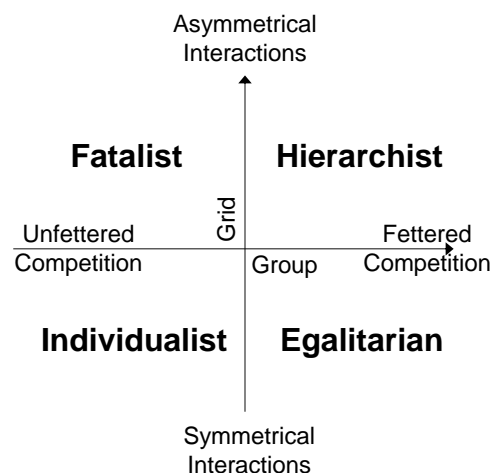
- Earth is a closed ecological system.
  - scale / type of development  $\neq$  long-term survival
- Human society and natural ecosystems have co-evolved.
  - Nature has intrinsic value, revealed through economic activity.
- Sustainability = maintain stocks of both human and natural capital
- Decoupling of biophysical from economic growth - steady flow
- Policy strategy
  - "Ecologize economy"
  - Moral/ethical transformation to instill environmental concerns.
  - Technological realism;  
precautionary principle to handle uncertainty.
  - Life cycle framework; product policy, "Pollution prevention pays"
  - Policy equity

## Deep Ecology

- Earth is a closed system.
- Human society and natural ecosystems have co-evolved.
  - Nature has value and a right to exist independent of human claims of hegemony.
  - Nature's intrinsic value is hidden by economic activity.
- Sustainability is the wrong question as it comes out of human-centeredness.
- Policy strategy
  - Human transformation of self to realize a harmony with nature.
  - Technological pessimism; the value of technological innovation must be proven.
  - Level of economic activity ultimately consistent with solar inputs.

## Another perspective on paradigms: Cultural Theory\*

- "Group" perspective, extent to which an individual is incorporated (or perceives incorporation) into bounded units
  - Greater incorporation → subordination of individual to whole
- "Grid" perspective, extent to which individual is influenced by externally imposed prescriptions
  - Greater influence → less perceived ability to negotiate individual solutions
  - Controllable / controlled



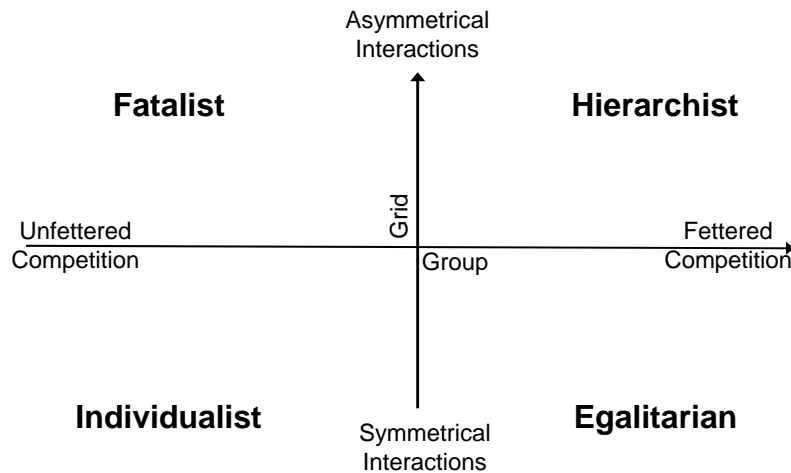
## Cultural Theory Perspectives on the Environment


- **Hierarchist**
  - Lays down the rules
  - Takes calculated / analyzed / controllable risk
- **Individualist**
  - Unconstrained innovator
  - Risks create opportunities
- **Egalitarian**
  - Disagrees with rules and exploitative attitude
  - Reject risk-taking
- **Fatalist**
  - Sees no opportunity to take action
  - See risk taking as necessary consequence of fate

## Cultural Theory Perspectives on the Environment

- **Individualist:**
  - Optimistic: Nature is benign and resilient
  - Institutions are not trusted
  - Prefers market-based trial-and-error
- **Hierarchist:**
  - Optimistic: nature is stable until pushed beyond limits, World is controllable
  - Institutions can be trusted to prevent going beyond limits
  - Analytically based regulation
- **Egalitarian:**
  - Pessimistic: Nature is fragile, intricately interconnected and ephemeral
  - Institutions are not trusted
  - Voluntary simplicity is only solution to enviro problems
- **Fatalist**
  - Pessimistic: Man and nature are fickle and unpredictable
  - No management strategy

## Locating Enviro-management Paradigms

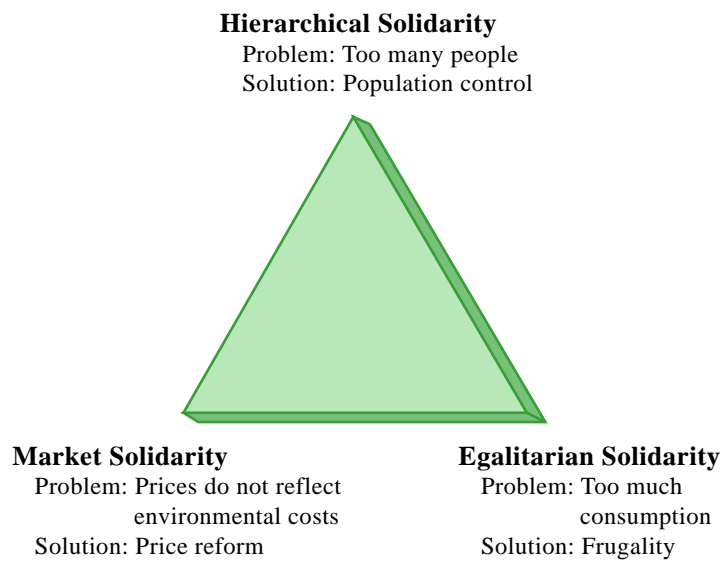




 Massachusetts Institute of Technology  
 Engineering Systems Division  
 Department of Materials Science & Engineering

ESD.123/3.560: Industrial Ecology - Systems Perspectives  
 Randolph Kirchain

Introduction: Slide 13

## Three voices of climate change debate




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Figure by MIT OCW.

Reference: Thompson, M., *Cultural Theory and integrated assessment*. *Enviro Model Assesst*, 2(3): p. 139-150, 1997.