

MIT OpenCourseWare
<http://ocw.mit.edu>

17.181 / 17.182 Sustainable Development: Theory and Policy
Spring 2009

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.

New Thinking & Knowledge Economy

17.181-17.182

Week 4 Outline

I. BACKGROUND TO REVIEW

Decolonization

Phases of Theory and Policy

Challenges to Sustainability

II. REVIEW – KEY ISSUES & READINGS

III. KNOWLEDGE ECONOMY

IV. THEORY OF LATERAL PRESSURE

State Profiles - Types

Sustainability of State Profile Types

1. BACKGROUND

TRAIL and ERROR

SHIFTS in FOCUS

CONVERGING on SUSTAINABILITY

Review Week 1

- Variety of Definitions

- Core Definition

- Readings

concepts

positions

Issues

What is Sustainability?

- **The ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. [Bruntland, 1987]**
- **Preservation of productive capacity for the foreseeable future. [Solow, 1992]**
- **Biophysical sustainability means maintaining or improving the integrity of the life support system of earth. [Fuwa, 1995]**
- **A dynamic harmony between the equitable availability of energy-intensive goods and services to all people and the preservation of the earth for future generations [Tester, et al. 2005]**

Are There Limits to Growth?

- **Malthus – 1798 – Population grows exponentially; food production grows linearly. Population growth ceases when incremental person doesn't have resources to survive**
- **Hardin – 1968 – Tragedy of the Commons**
- **Ehrlich – 1968 – Overpopulation is the problem, depleting soils and disrupting natural life support ecosystems**
- **Forrester – 1972 – Limits to Growth – potential for disaster within 100 years**
- **Meadows – 1992 – Beyond the Limits – overshoot but human ingenuity could prevent collapse**
- **Cohen – 1995 – How many people can Earth support? (maybe a trillion, more likely around 16 billion)**

What are the major material concerns?

- **Global Energy consumption is growing because:**
 - **Population is growing**
 - **Energy use per capita is growing – especially in developing countries**
- **Major fossil energy sources have problems**
 - **Security of supply/price stability (esp. petroleum)**
 - **Depletion concerns**
 - **Climate impacts**
- **Energy access is unequally distributed**
- **Global economy is dependent on present levels of fossil energy prices & availability – change will slow economic growth**

What are the major material concerns?

- **Global Energy consumption is growing because:**
 - **Population is growing**
 - **Energy use per capita is growing – especially in developing countries**
- **Major fossil energy sources have problems**
 - **Security of supply/price stability (esp. petroleum)**
 - **Depletion concerns**
 - **Climate impacts**
- **Energy access is unequally distributed**
- **Global economy is dependent on present levels of fossil energy prices & availability – change will slow economic growth**

The Core – High Level Definition

We define sustainable development as:

- The *process of meeting* the needs of current and future *generations*
- Without undermining
- The *resilience* of the life-supporting properties of nature and the *integrity* (or cohesion) of social systems”.

What are the properties of this definition?

Relationship between Institutional quality and national income

Image removed due to copyright restrictions.

Global Freshwater Withdrawal

Image removed due to copyright restrictions.

To see a similar graph go to the [GRID-Arendal Website](#)

Review Week 2

Evolving Conceptions – causes and consequences

Themes that Explain Collapse

According to Tainter

Each of the items below are listed as separate causal factors in his book (p. 43). As such we cannot see any theory dynamic logic. But if we begin to group the items, and imply some logic, a form of 'theory' emerges*.

(1) *Resource Constraints*

- Depletion
- New resource Base
- Economic Factors

(2) *Social costs*

- Class conflict, elite mismanagement
- Social dysfunction

(3) *Persistent Pressures*

- Catastrophe
- Insufficient responses

(4) *Beliefs & Chance?*

- Mystical Factors
- Chance and events

(5) *External Threats*

- Other complex systems
- Intruders

* Numbered items represent the grouping of Tainter's 11 items, p. 43).

Intragenerational Principles

- **Reduce gross inequities between the poorest and wealthiest both nationally and globally**
 - **Meet the basic needs of the poorest with food, shelter, health care, clean water, access to electricity, education, opportunity for work, etc.**
 - **Avoid exploitation of poorer country/region resources and labor to create even greater wealth for the richest**
- **Provide ways to protect the common good (social, environmental, economic) locally and globally through national and international governance/cooperation**
 - **Preserve natural ecosystems against unconstrained development**
 - **Avoid interference with natural balances in the atmosphere, the oceans, and the arctic regions**
 - **Maintain stable institutions that protect human rights, adjudicate conflicts, and allow responsible trade and market economy activities**

Intergenerational Principles

- **Trustee: Every generation has an obligation to protect interests of future generations**
- **Chain of obligation: Primary obligation is to provide for the needs of the living and succeeding generations. Near term concrete hazards have priority over long term hypothetical hazards**
- **Precautionary Principle: Do not pursue actions that pose a realistic threat of irreversible harm or catastrophic consequences unless there is some compelling or countervailing need to benefit either current or future generations**

Dynamic Complexity Arises because systems are

- Constantly changing**
- Tightly coupled**
- Governed by feedback**
- Nonlinear**
- History-dependent**
- Self-organizing**
- Adaptive**
- Characterized by trade-offs**
- Counterintuitive**
- Policy resistant**

Source: J. Sterman, "System Dynamics, ESD Symposium, 2002.

Review Week 3

The equation – several times

Issue of Scale

Issue of Linkages and Supply Chain

Annual Global Carbon Emissions from Fossil Fuels and Land-Use Change Graph

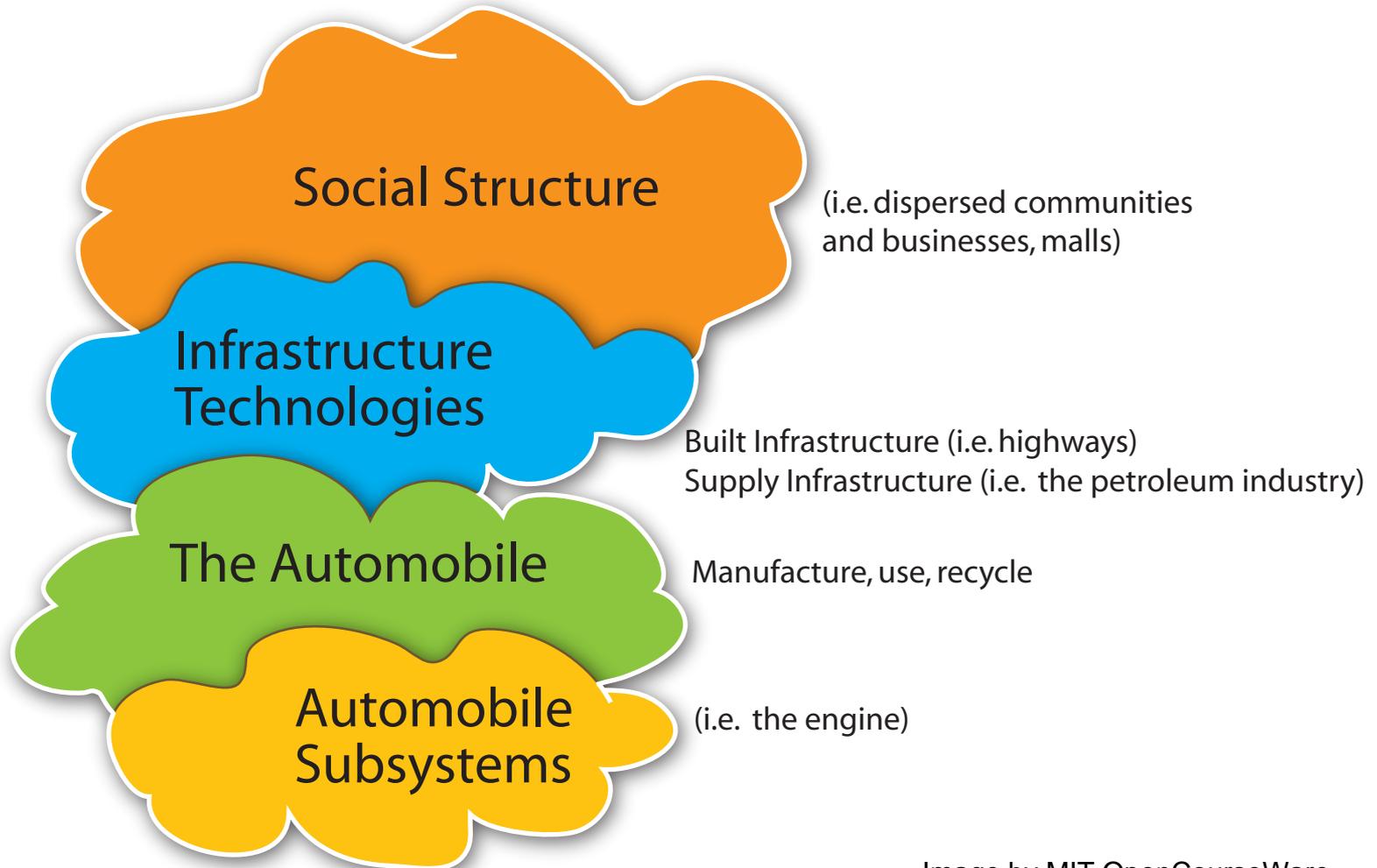
Image removed due to copyright restrictions. Please visit the [Pew Center on Global Climate Change](#) to see a similar graph.

Image removed due to copyright restrictions.

Income and Happiness in the US Graph

Image removed due to copyright restriction. Please go to the [Students Against Climate Change website](#) to see a similar graph.

The automotive technology system as seen through the lens of an industrial ecology view.



World Primary Energy, GDP, and Population Trends Graph

Image removed due to copyright restrictions.

World Primary Energy Consumption

Image removed due to copyright restrictions.

Institutional Capacities

Institutional Capacity (IC) consists of a set of capabilities involving:

Finance (FC)	Taxation and other forms of public levy
Distribution (DC)	Systems of revenue-expense balances
Regulation (RC)	Exercise of “law and order”
Response (RC)	Accountability in governance
Symbolism (SC)	Identity formation and maintenance

Figure by MIT OpenCourseWare.

Adapted from Chourcri, Nazli. “The Politics of Sustainability.” In *Sustainability and the Social Sciences: A Cross-Disciplinary Approach to Integrating Environmental Considerations into Theoretical Reorientation*. Edited by Egon Becker and Thomas Jahn. London, UK: Zed Books, 1999, pp. 153.

New Thinking on Sustainability

Elements	Question
Key Dimensions	What is it that must become sustainable?
Core Processes	How is it that sustainability might proceed?
Behavior Principle	Which norms (computational and conceptual) could facilitate transitions towards sustainability?
Performance Goals	What would be the alternative, generic, society-wide outcomes desired?
Implementation conditions	Which conditions facilitate implementation of sustainability strategies?
Decisions and policy choices	What are the decisions that must be addressed?

Figure by MIT OpenCourseWare.

Adapted from Chourcri, Nazli. "The Politics of Sustainability." In *Sustainability and the Social Sciences: A Cross-Disciplinary Approach to Integrating Environmental Considerations into Theoretical Reorientation*. Edited by Egon Becker and Thomas Jahn. London, UK: Zed Books, 1999, pp. 147.

Week 4

Knowledge Economy

The Theory of Lateral Pressure

Summary in Required reading
Choucri & North, 1993.