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Sustainability as a knowledge Domain

1. **PROFILES of STATES**

2. **CLIMATE CHANGE**

3. **SUSTAINABILITY SCIENCE**
   - Characteristics
   - Knowledge System

4. **GLOBAL SYSTEM FOR SUSTAINABLE DEVELOPMENT**

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Definition of State Profiles

Group VI:	*Technology*	>	Population	>	Resources
Group V:	*Technology*	>	Resources	>	Population
Group IV:	Resources	>	*Technology*	>	Population
Group III:	Population	>	*Technology*	>	Resources
Group II:	Population	>	Resource	>	*Technology*
Group I:	Resources	>	Population	>	*Technology*

*****See Choucri and North (1993) for the original specification; this slide is an update to reflect the salience of technology. See Wickboldt and Choucri (2006) for extension of the logic to differentiate empirically among countries within each of the profile group.

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Distribution of States in Profile Groups - 2008

Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Algeria	Albania	Bangladesh	Argentina	Bahamas, The	Andorra
Angola	Armenia	Costa Rica	Australia	Faeroe Islands	Antigua and Barbuda
Belize	Azerbaijan	Dominica	Canada	Finland	Aruba
Bhutan	Belarus	Dominican Republi	Chile	Norway	Austria
Bolivia	Benin	El Salvador	Equatorial Guinea	Palau	Bahrain
Botswana	Bosnia and Herzegov	Grenada	Estonia	Sweden	Barbados
Brazil	Bulgaria	Jamaica	Greenland	United States	Belgium
Cameroon	Burkina Faso	Lebanon	Iceland		Bermuda
Central African Repu	Burundi	Lithuania	Latvia		Brunei Darussalam
Chad	Cambodia	Malaysia	Libya		Channel Islands
Colombia	Cape Verde	Maldives	New Caledonia		Croatia
Congo, Dem. Rep.	China	Marshall Islands	New Zealand		Cyprus
Congo, Rep.	Comoros	Mauritius	Oman		Czech Republic
Djibouti	Cote d'Ivoire	Micronesia, Fed. St	Saudi Arabia		Denmark
Ecuador	Egypt, Arab Rep.	Philippines	Uruguay		France
Eritrea	Ethiopia	Sri Lanka			French Polynesia
Fiji	Gambia, The	St. Lucia			Germany
Gabon	Georgia	St. Vincent and the			Greece
Guinea	Ghana	Thailand			Hong Kong SAR, China
Guyana	Guatemala	Turkey			Hungary
Iran, Islamic Rep.	Guinea-Bissau	West Bank and Gaz			Ireland
Kazakhstan	Haiti				Isle of Man
Kyrgyz Republic	Honduras				Israel
Lao PDR	India				Italy
Liberia	Indonesia				Japan
Madagascar	Iraq				Korea, Rep.
R>P>T	**P>R>T**	**P>T>R**	**R>T>P**	**T>R>P**	**T>P>R**

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Distribution of States in Profile Groups - 2008

Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Mali	Jordan				Kuwait
Mauritania	Kenya				Liechtenstein
Mongolia	Kiribati				Luxembourg
Montenegro	Lesotho				Macao SAR, China
Mozambique	Macedonia, FYR				Malta
Namibia	Malawi				Mexico
Nicaragua	Moldova				Netherlands
Niger	Morocco				Poland
Panama	Nepal				Portugal
Papua New Guinea	Nigeria				Puerto Rico
Paraguay	Pakistan				Qatar
Peru	Romania				San Marino
Russian Federation	Rwanda				Seychelles
Solomon Islands	Samoa				Singapore
South Africa	Senegal				Slovak Republic
Sudan	Serbia				Slovenia
Suriname	Sierra Leone				Spain
Tajikistan	Swaziland				St. Kitts and Nevis
Tanzania	Syrian Arab Republic				Switzerland
Turkmenistan	Timor-Leste				Trinidad and Tobago
Vanuatu	Togo				United Arab Emirates
Venezuela, RB	Tonga				United Kingdom
Yemen, Rep.	Tunisia				
Zambia	Uganda				
Zimbabwe	Ukraine				
	Uzbekistan				
	Vietnam				

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Comments on the TAINTER argument:

Why Investments in complexity yield a declining marginal return

- Increasing size of the bureaucracies
- Increasing specialization of bureaucracies
- Cumulative nature of organizational solutions
- Increasing taxation
- Increasing costs of legitimizing activities
- Increasing costs of internal control and external defense

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Climate Change – Potential Effects examples

- Differential impacts within & across countries
  - **more burdens on the poor everywhere**
  - **more social cleavages**

- Erosion of governance & institutions
  - **Loss of law and order**
  - **Growth of individual 'self-help' actions**

Climate Change Index (CCI) for 189 countries

- The 10 countries of highest overall risk account for 2% of GHG Emission

  Djibouti, Egypt, Pakistan, Cuba, Iraq, Morocco, Dominica, Antigua and Barbuda, Mozambique and Somalia.

- Of the 31 countries with extreme risk, only 3 are industrial

  Netherlands, Canada & USA

The index consists of 3 equal components; (i) Coastal exposure; (ii) inland exposure (iii) Health exposure. Socio economic or other - impacts not covered/. Source: Mapplecroft Maps

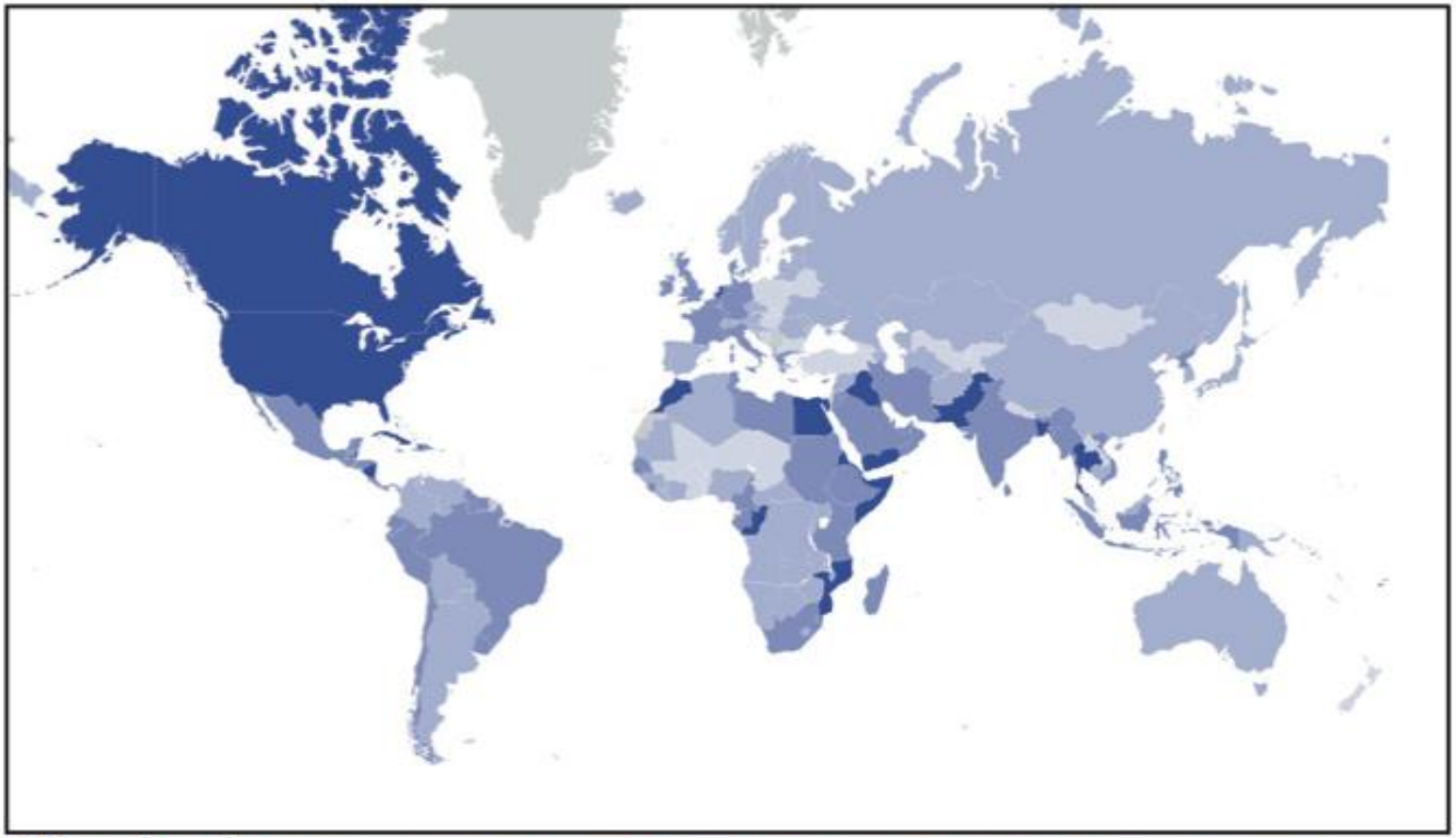
Climate Change Index

The index consists of 3 equal components;

(i) Coastal exposure;
(ii) Inland exposure
(iii) Health exposure.

Socio-economic or other impacts not covered.

Distribution of CCI Impacts



Climate change - levels of exposure to the impacts of climate change.
Darker shades represent higher levels of exposure.

Some Potential Dangers

Global sea levels rise as oceans warm & sea ice melts

- uninhabitable conditions

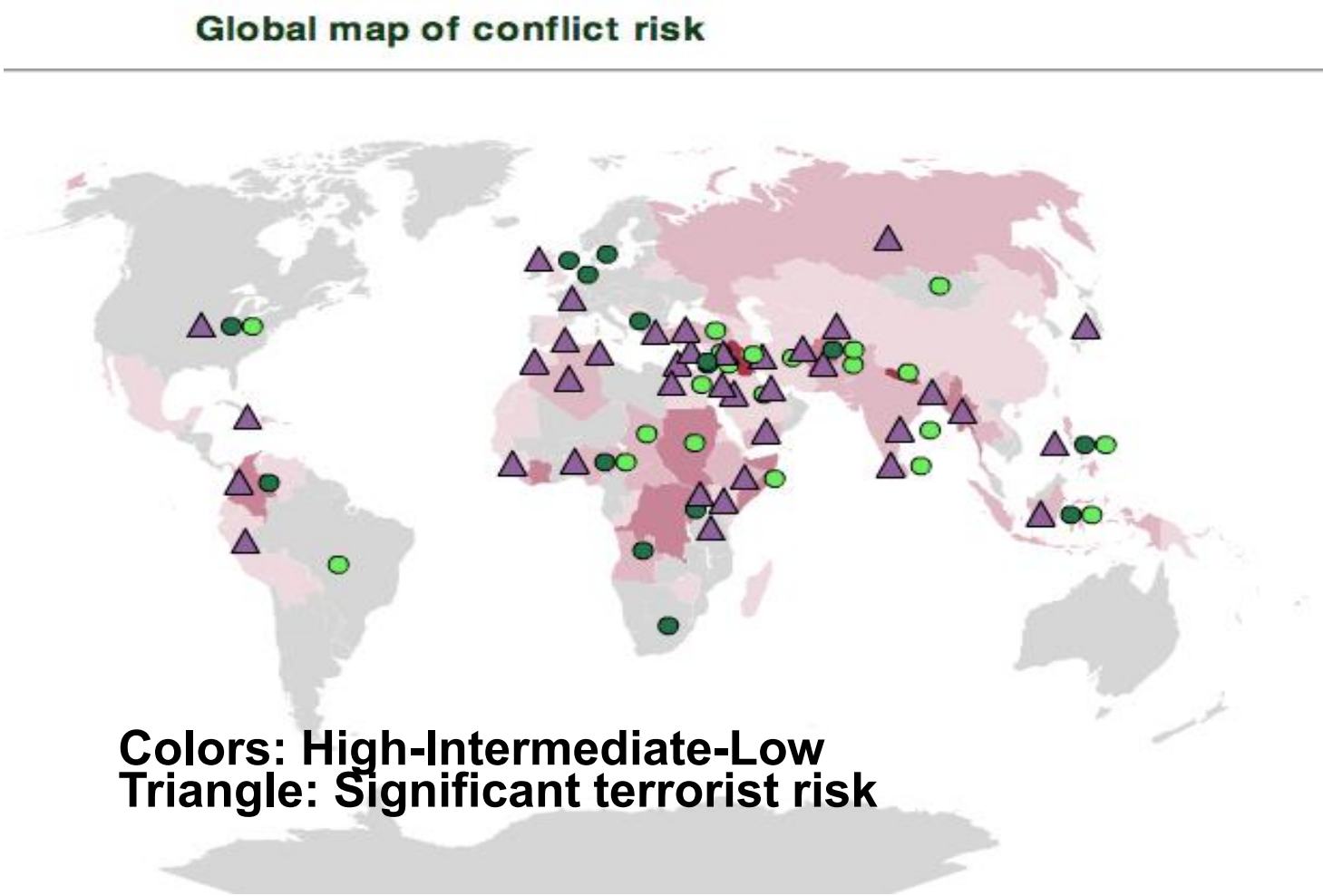
Increase in rainfall intensity will increase tropical storms

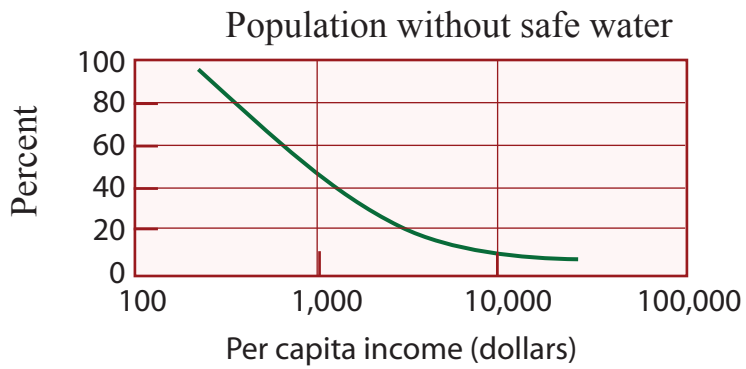
- more risk of weather-relate disasters
- Infectious disease

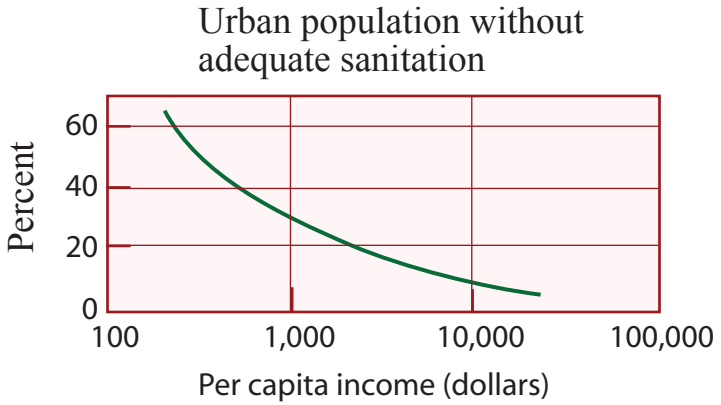
Infrastructure must adapt to these changes

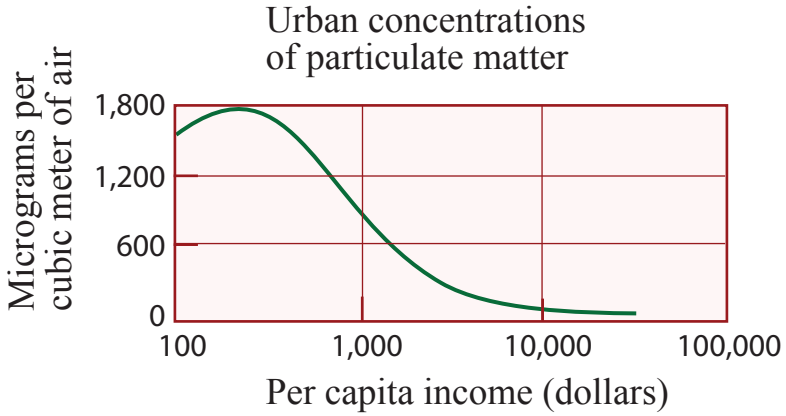
- more social & economic pressures
- more stresses on resources

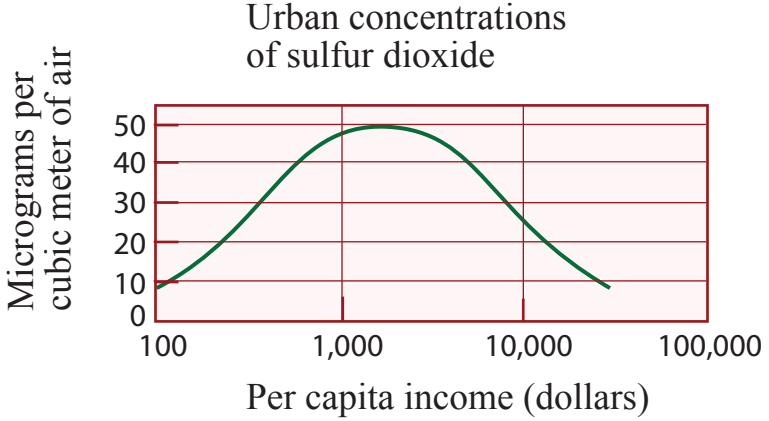
Countries at Risk of Conflict - 2005

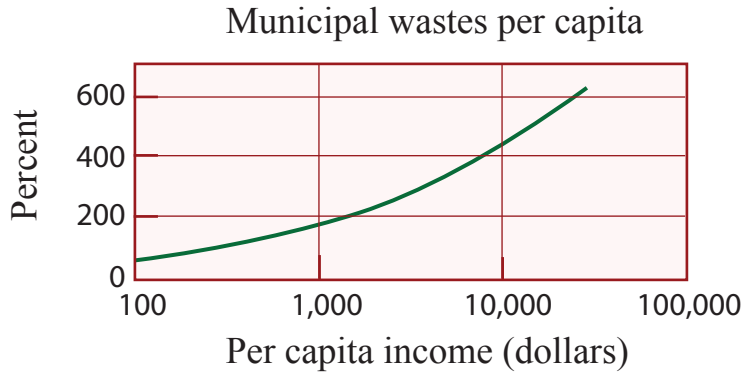












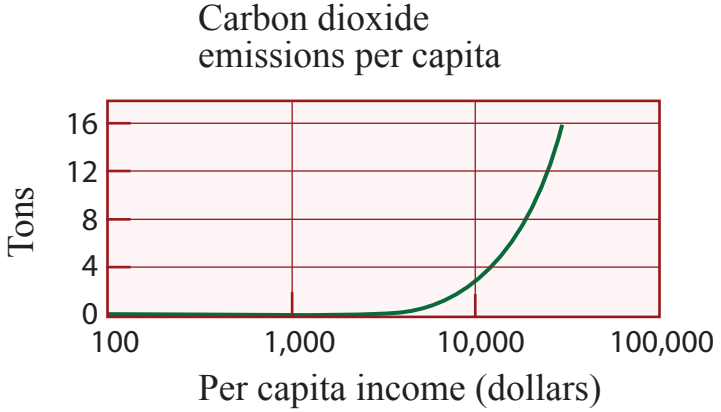


Figure by MIT OpenCourseWare.

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Sustainability Science

Advance basic understanding of the dynamics of human-environment systems in order to

- Facilitate the design, development, implementation, and assessment of policy and strategy to facilitate transitions to sustainability in localized and globalized contexts particular places and contexts;

- Enhance conenctions between (i) research and innovation (ii) relevant policy and management (iii) in national and international contexts.

Source: Based on and extended from US-NAS materials

Goals of Sustainability Science

- Knowledge structuring
- Coordination of data
- Multidisciplinary cooperation
- Contextualization – of the above
- Internationalization – of the above

Source: Based on and extended from US-NAS materials

Challenges to Sustainability Science Specifying**:

- Nature of the challenge
- System boundary
- System components
- System behavior
- Time horizon
- Normative Underpinnings National & International Linkages
- Institutional Linkages

Notes

Barriers to Knowledge on Sustainability

1. Remaining uncertainty re "sustainability"
2. Explosion of information on sustainability
3. Gaps in infrastructure conditions in the industrial and developing countries
4. Impediments to the provision of local knowledge
5. 'Knowledge-bias' from Industrial Countries' sources
6. The matter of language on the Internet

Reducing the Barriers to Knowledge for Sustainability

1 **Conceptual ambiguities** –
provide a *conceptual framework* to capture current understandings of key issues and interconnections,

2. **Explosion of information** -
develop a *knowledge provision process* that is coupled with quality controls and content consistency checks.

3. **Infrastructures differences -**
partnerships with knowledge providers in various parts of the world

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Reducing the Barriers ....continued

4. ***impediments to the provision* of local knowledge.**
   Knowledge submissions from LDC to world

5. **'*knowledge-bias' from Industrial Countries' sources***
   Cyber partnerships with institutions from developing regions

6. **Internet is *English-speaking* in** a world that is non-English speaking - develop multilingual functions to enable the provision and distribution of knowledge that does not original in English & vice versa,

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Knowledge System - Defined

An organized structure & dynamic process to

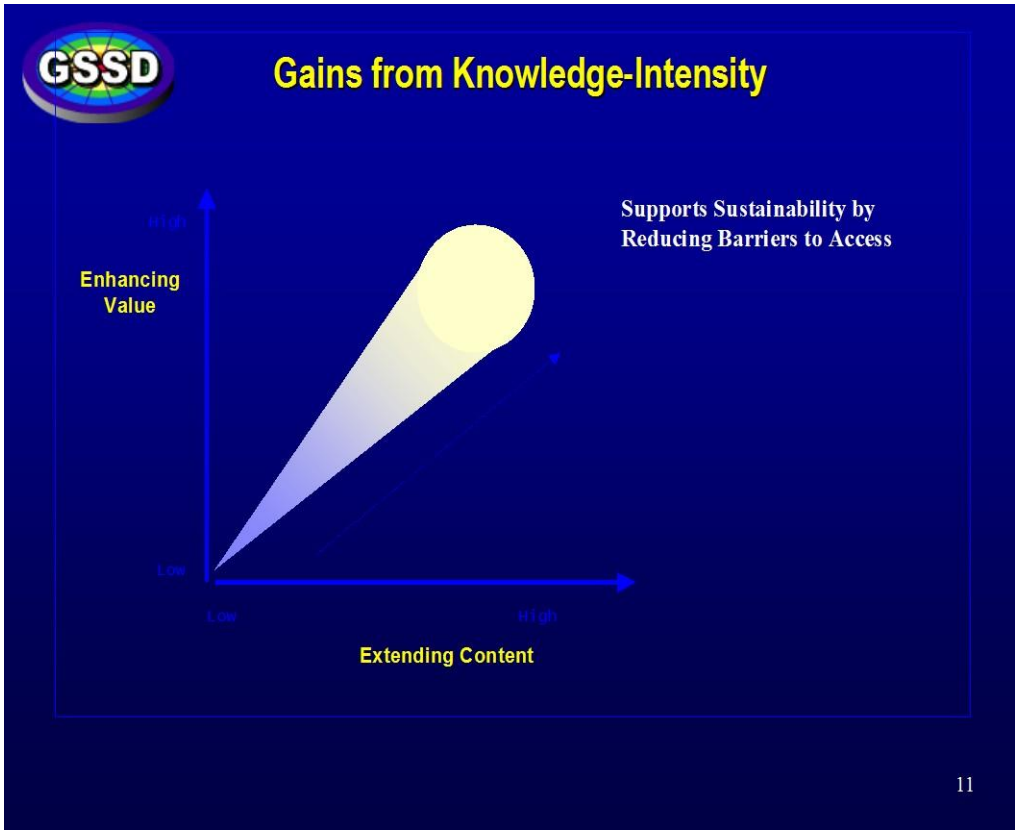
(a) generate & represent content

(b) domain specific or relevant

(c) logical connections between content of knowledge to its value (utility)

(d) enhanced by a set of iterations to enable advances

(e) subject to criteria of relevance, reliability, and quality



Giving that knowledge can no longer be viewed simply as a 'residual' – companion to the proverbial 'technology factor' in the production function – but *central to economic performance*, in some sectors it is a driving force.

Basic proposition between content and value in schematic form, (a) in the most generic terms, and (b) with reference to more specific activities that provide the 'engine' for the linkages.

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The Sustainability Knowledge Transition Path

- From ‘supply chain’ to ‘knowledge chain’
- From material production to meeting societal needs
- From isolated understanding to increased value due to knowledge deployment
- From knowledge creation to knowledge diffusion through networking practices

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Sustainability as a "Knowledge Domain"

Economic growth theory a global context frames processes of growth as seen by those on the 'top' of global social and political systems rather than by those at the 'bottom', nationally or internationally.

We focus on the knowledge base related to matters of 'sustainability' and to the economic growth model sees 'more' as a strategic imperative subject only to efficiency

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Global System for Sustainable Development

Knowledge Meta-Networking for Decision and Strategy

English | العربية | 简体中文

- What is GSSD?
- Mapping Sustainability
- GSSD Mapping Design
- Knowledge System
- Search GSSD
- Submit Site
- Research and Reports
- Contact GSSD
- Site Map

النظام العالمي للتنمية المستدامة

全球可持续发展系统

Massachusetts Institute of Technology

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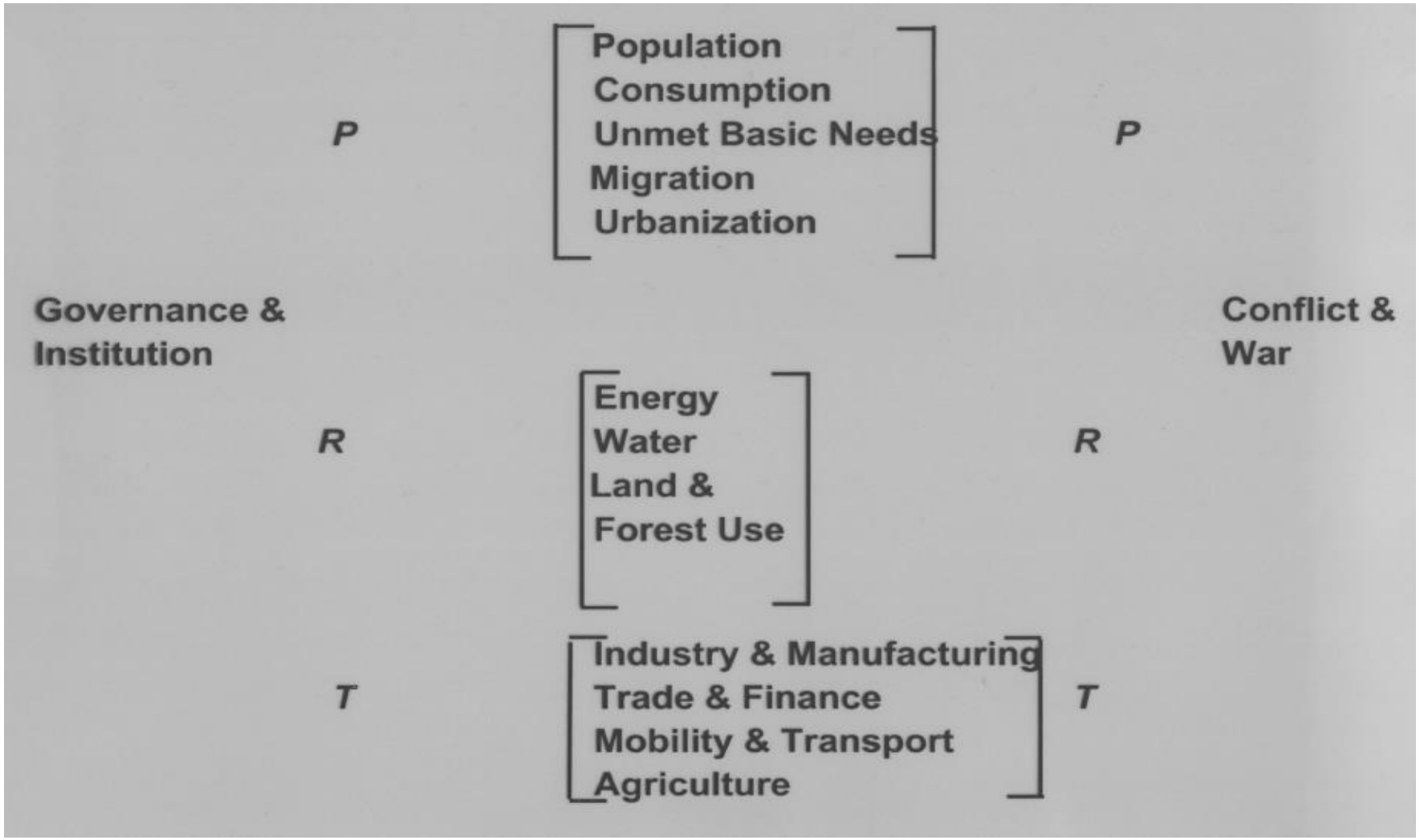
http://gssd.mit.edu/

What is GSSD?

- Global Knowledge e-Network of e-Networks
- Structured Knowledge about Sustainability
- System for Multilingual e-Networking
- Decentralized Knowledge Provision

Knowledge Representation Sustainable Development



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Alternatives to Collapse –

Proposed to the Class (NC).

- Knowledge as problem solving
- Knowledge as problem creation
- Anticipatory tools and behaviors
- Technological investments
- Increased efficiency
- Can we recognize too high marginal costs?

What can we do to move toward sustainability

- Extend time horizons
- Expand valuation framework
- Invest in dematerialization
- Focus on equity
- Institute policy & performance feedback
- Formulate reactive & adaptive mechanisms
- Develop relevant analytical tools

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ONCE MORE:

Select Requisites for Sustainable Development

DE-MASSIFICATION
DE-SPACIALIZATION
DE-CENTRLIZATION
DIS-AGGREGATION
DE-NATIONALIZATION
DIS-INTERMEDIATION

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17.181 / 17.182 Sustainability: Political Economy, Science, and Policy
Fall 2016