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Development of Sustainability Science

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Integrated Research System for Sustainability Science (IR3S)



Sustainability is the Complex Issues



- The environment and "development" can coexist. This complex issues embraced by the new concept of "sustainability" cannot be explained by a single word "environment"
- ✓ Human stops thinking about a concept when it is *no longer new*.

We must constantly *renew* the concept of "*sustainability*", accept it in all its *complexity*, and resist simplifying its meaning.

Creating Man-Made Environment that Matches Natural Environment

Incompatible

Analytical

Science

Sustainability Science Synthesiology

ncompatible

Global Environmental Deterioration

Analytical

Science

ncompatible

Inverse Manufacturing



Research that integrates the Three Societies

Sustainability indices to connect each society



Mapping of Climate Change and SD

Problem-Solving



Key Questions for Mitigation and Adaptation



Back-Casting from Future Target World



From "Low carbon society scenarios towards 2050" project

Breakdown of Primary Energy Supply



From "Low carbon society scenarios towards 2050" project



Triple50: 50% Self-sufficiency, 50% Dependency on Fossil fuel, 50% Energy efficiency Sustainable = Emission of CO₂ within Earth ability of natural absorption (exhausted with fossil fuel 4Btoe)

Proposed by T.YUHARA

#3 Japan-China forum on environment, energy and transportation issues, Jan. 2008

A Sound Material-Cycle Society



Spheres of Sound Material Cycle



Resource Productivity in Major Countries

Resource Productivity in Major Countries(2002)



Comparison of resource productivity in major countries (2002)

For such cross-country comparison like this, which common currency used to convert the GDPs (gross domestic product) has great impact. It is pointed out that common GDP conversion in market exchange rates can give a very misleading picture of the size of a country's economy. This is particularly true for such country like China; therefore, here GDP adjusted for PPP (purchasing power parity) is used for the estimation to ensure more accurate comparison. Estimation by Yuichi Moriguchi at the National Institute for Environmental Studies of Japan based on data from Liu Bin, Xu Ming, EUROSTAT, Ministry of the Environment of Japan, International Monetary Fund and others.

Enhancing Regional Partnership in ESD

- "Decade of Education for Sustainable Development" has contributed greatly to educating people about sustainable development
- For further going, connect RCEs into networks t from regional coalitions for the "Education for SD"
- Kitakyushu City has been designated as an RCE in Japan
 - A famous model city for overcoming pollution and building a resource-circulating society
 - Training centers that support development of environmental technology in developing countries
 - Best suited for UNU on-site training centre



Crisis in Ecological System and Biodiversity



From Report of the Millennium Ecosystem Assessment: Ecosystems and Human Well-being, Biodiversity Synthesis

Land Cover Change in the Past Few Decades



From Report of the Millennium Ecosystem Assessment: Ecosystems and Human Well-being , Synthesis

National Strategy for Biological Diversity

Highlights of the New National Biodiversity Strategy of Japan

Crisis 1 :Species and habitat degradation due to excessive human activities

Crisis 2 :Degradation of *satochi-satoyama** due to insufficient level of management

Crisis 3 :Ecosystem disturbances caused by the introduced alien species and chemical contaminations



7 Priorities

- 1. Conservation of Priority Areas and Formation of "Ecological Network (s)"
- 2. Conservation and Use of Satoyama
- 3. Conservation of Wetlands
- 4. Restoration of Nature
- 5. Conservation and Management of Wildlife (Reinforcing Countermeasures against Extinction of Species and Countermeasures against Alien Species)
- 6. Development of Natural Environmental Data (Monitoring Sites 1,000)
- 7. Effective Conservation Methods and Others (Improvement of Environmental Assessments and International Cooperation) (From Ministry of Environment)

Sand-Dust Storms Become More Frequent?

- Numerical simulation by using Wind Erosion Assessment Model (WEAM; Shao 2000)
- Recent outbreaks of sand-dust storms occurred at the eastern edge of drylands in North-East Asia.



Effectiveness of Countermeasures

• The most efficient countermeasure is **prohibition of grazing in Gobi-steppe**



- It is worth spending up to around 5,000M Yuan (660M USD).
- Economic damage by yellow dust in 2000 is about 1800M USD



Knowledge Innovation for Global Sustainability



Forming International Research Networks



